

Reference Guide for Prairie Gardeners

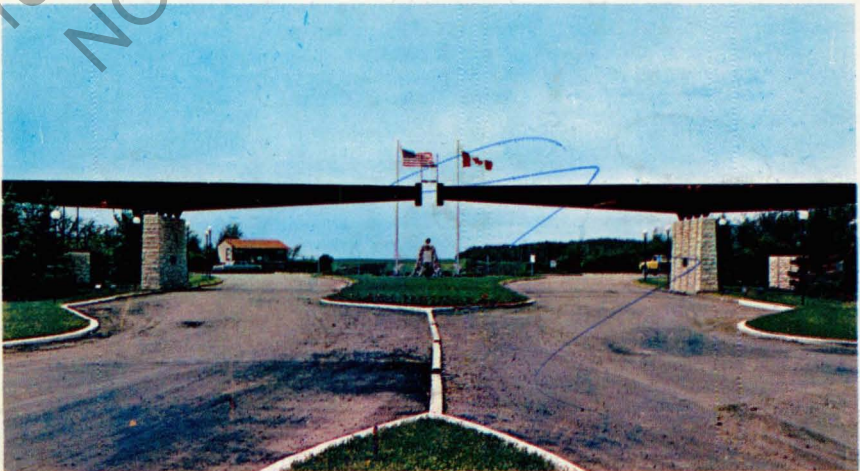
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The purpose of this advance announcement is to allow anyone interested sufficient time to build up stock of any promising seedlings, and to arrange for the growing of them in this area if they so desire. —J.R.A.

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23rd Annual Edition

Winnipeg, Manitoba

February 1966

The Prairie Garden, 1966

In presenting the 1966 issue of THE PRAIRIE GARDEN we wish, on behalf of the Winnipeg Horticultural Society directors, to pay tribute to the efforts of Mr. and Mrs. G. S. Reyecraft who have carried a heavy load of responsibility in organizing and producing the Prairie Garden publication for several years. Increased responsibilities in his business occupation compelled Mr. Reyecraft to relinquish responsibility on this committee.

No drastic change in style or content of the 1966 issue has been made, except that a majority of articles have landscaping as the unifying theme. A touch of philosophy has been introduced and we are indebted to Dr. W. T. Andrew for providing in his article, "Careers in Horticulture," a comprehensive presentation of job opportunities in the field of Horticulture.

Of course, without the co-operation of specialists in various branches of horticulture as well as in other related fields who provided the articles contained in it there would be no book. To them grateful thanks are extended by the Committee.

The support of advertisers is also gratefully acknowledged and they merit your support and patronage.

THE PRAIRIE GARDEN has been produced in the interest of gardeners in the provinces of Alberta, Saskatchewan and Manitoba and the north central United States. From the contents of the 1966 issue readers will find answers to many garden questions and specific suggestions as to what they may undertake as a truly Centennial Garden Project.

Indexes to previous issues of THE PRAIRIE GARDEN may be obtained by mailing a request to: Publication Branch, Manitoba Department of Agriculture and Conservation, 7th Floor, Norquay Building, Winnipeg 1, Manitoba.

READERS: Please note that there are limited supplies of Prairie Garden Annuals for 1964 and 1965. Copies may be obtained while the supply lasts for 75 cents per copy. For the above and additional single copies of THE PRAIRIE GARDEN 1966 for \$1.25 per copy, address your order to: Mr. W. J. Tanner, Secretary-Treasurer, Winnipeg Horticultural Society, 133 Willowdale Place, Winnipeg 16, Manitoba.

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COVER PICTURE—Memorial Cairn and Entrance Arch of The International Peace Garden situated on the international border between Manitoba and North Dakota. (For feature story turn to page 14.)

COLOR PLATES—courtesy of The International Peace Garden.

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Horticulture in Retrospect

By M. B. DAVIS, LL.D.
Carp, Ontario

Looking back over a period of 60 years brings to mind so many instances that it is impossible to encompass even a brief summary in a short space. So just let us look for a few minutes at some of the changes in Canadian horticulture in general and prairie horticulture in particular.

One of the most striking and encouraging changes has been the development of apple growing in areas considered at the beginning of this period as "well, all right but hazardous," as compared to the older, more favored areas. Today, parts of eastern Ontario and Quebec are challenging the other apple areas for first place.

Some of this development has been due to the advent of the McIntosh variety and a few other hardy and superior varieties from the plant breeders' hands. But probably more of this success can be attributed to the use of hardier rootstocks, frame-working and tree-building on hardy material, thus greatly reducing the hazards of winter injury.

Other factors, of course, were involved, such as better knowledge of plant nutrition, of pest control, and of storage and marketing, although these latter techniques were common and available to all areas, marginal and favored. I point this out because I think it offers a hope for the fulfilment of a desire to develop a more secure fruit culture for the Canadian prairies. I know that strides have been made in that direction and I am told that the Co-operative Fruit Breeding Project, promoted by the Western Canadian Society for Horticulture, already has produced some extremely promising material.

I realize that this effort to push the fruit line northward can provoke some heated debate, but just visualize how much of our favored areas is going under cement and mortar and then ponder whence will come some of the goodies they used to provide. There is no such thing as maintaining the *status quo* indefinitely; either you progress or you go behind.

Another vivid impression I have is the growth in vegetable production right in your own prairie provinces. True, as far back as I can remember, there were vegetable gardeners around your larger towns and cities. But if one had suggested the possibility of establishing processing plants the idea would have been ridiculed by the majority. You have them today, due largely to the introduction of varieties and strains more adaptable to your conditions and to the economics of the freight rate situation. But it was largely the efforts of the plant breeders that made this possible. With an increase in the use of irrigation water it is not difficult to visualize a still further rise in vegetable growing, small fruit, and even tree-fruit production for processing purposes.

Looking back, however, probably the greatest change has been in the field of Ornamental Horticulture. Sixty years ago new settlers from older lands and areas found a countryside comparatively unattractive horticulturally. Shade trees were limited, and windswept areas made the growing of many horticultural plants an extremely hazardous venture. The efforts of governments and private individuals altered this situation to a marked degree with the creation of farm shelterbelts, avenue and tree planting in cities, towns and villages. The writer can recall during his experiences town after town which have created and brought to a high degree of perfection tree



M. B. Davis Honored

M. B. Davis, former chief of the Horticulture Division, Experimental Farms Service, Canada Department of Agriculture, Ottawa, recently was made a Fellow of the American Society for Horticultural Science, the first time the Society has granted such an honor. Dr. Davis was president of the American Society for Horticultural Science in 1956-57. He is a charter and a life member of the Agricultural Institute of Canada, and was made a Fellow in 1965; and is a member also of the Canadian Society for Horticultural Science. Dr. Davis served with the Horticulture Division at the Central Experimental Farm, Ottawa, from 1914 until his retirement in 1955.—Ed.

Reprinted from the *Agricultural Institute of Canada Review*,
September-October, 1965.

planting efforts and public parks with tremendously beneficial results on the attractiveness of the countryside.

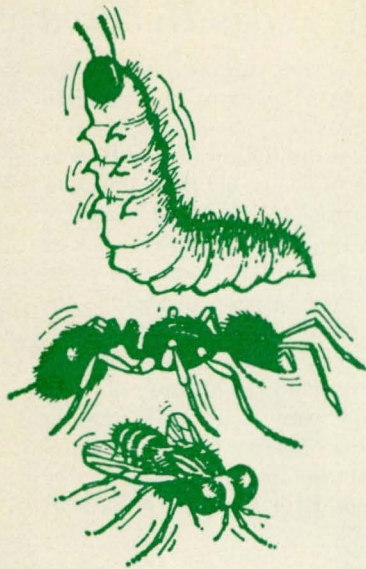
The most encouraging and amazing aspect of this change has been the wealth of material produced by private plant breeders and government institutions. I cannot prove it, but my impression is that the hobbyist and the private plant breeders actually have contributed as much or more than the government-endowed institutions, largely because of the paucity of funds made available for ornamental horticulture breeding purposes. This is understandable in a new country where dollars and cents values had to be taken into serious consideration.

The early horticultural enthusiasts had to fight a large amount of skepticism and argue for the right to create a better horticulture for the main purpose of creating living conditions conducive to attracting a permanent population. When it came to presenting an argument to those who held the money bags it was difficult indeed to make more than a minimum impression.

Even at that we were fortunate in having as the founder of the Experimental Farms System a man who was a horticulturist in his own right, Dr. William Saunders, and more fortunate still in having among the early pioneers a considerable number of enthusiasts who simply would not take the *status quo* as permanent.

A look at the available material which has been originated in your own region is most impressive: roses, lilacs, lilies, lythrum, mockoranges and better forms of caragana, elm, spruce, chrysanthemum, honeysuckle, Rosybloom crabapples. Just remember that the Centennial tree selected for universal adoption in Canada was originated right in your own backyard and named after one of your leading horticulturists, Mr. J. R. Almey. Surely there is much to provide satisfaction and encouragement for the future.

If all this could be accomplished largely by the barnyard boys, what might we expect in the future when they are being assisted by the Ivory Tower Elite.



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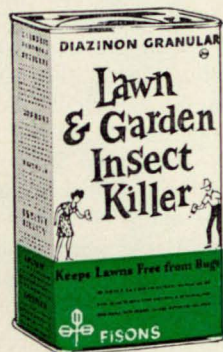
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A Means of Preserving the Sanity of Mankind

By R. J. SEIBERT

Longwood Gardens, Kennett Square, Pa., U.S.A.

Amateur horticulture is an important hobby in many parts of the world. Perhaps it figures in the everyday lives of far more individuals than most of us realize. Like all great hobbies, horticulture serves as a release from the tensions and worries of the hard, everyday job of maintaining a living standard and keeping up with the demands of the day.

This hobby has no age limits. There is no demand for social or economic status. There is no sex barrier and it is equally important to man, woman and child. So far as I know, horticulture respects, with equal enthusiasm, all races, color, creeds, languages and nationalities. It recognizes no national borders.

The people who interest themselves in gardening and horticulture are amateurs are friendly people. It is justly fitting, highly significant and most important that special tribute to amateur horticulture be paid today at this 16th International Horticultural Congress at Brussels. This, I believe, is the first time that amateur horticulture has been given special recognition at an international congress.

Since we are celebrating 100 years of recognized international horticulture by returning to the scene of the 1st International Horticultural Congress, we can assume that horticulture is here to stay. Perhaps, at long last, we recognize that all horticulture and gardening owe their continued existence to those who start in them as an amateur, for I have never known anyone who engaged in professional horticulture who was not first and always an amateur as well.

Yes, if we are to survive and if we are to get along with each other as individuals and as nations, we must find and encourage all means of enthusiastic and non-political common interest.

If this is correct, then amateur horticulture is one of the greatest human interests to be encouraged as a contributing means toward world peace and maintaining the sanities of mankind.

Reprinted by permission of the author from International Horticultural Congress, XVI, (Proc.), Brussels, 1962.



Things Flowers Are

By MRS. BLANCHE (WARRINGTON) BROWN
Dauphin, Manitoba

Flowers are things that I love and you do too, I don't doubt,

Flowers are delicate, fragile things.

Flowers are things the world cannot do without,

Flowers are wondrously courageous things.

Flowers have been picked where the ground is hard and dry,

Flowers are persistent things.

Flowers have a mystery of growing, to solve we will not try,

Flowers are almost heavenly things.

Flowers — it must be the will of God for them to grow on such hard sod.

Flowers are comforting things,

And yes, we know, deep down in a cell of our brain,

That He did make them grow, and grow without rain.

Flowers truly are wondrous things!

Careers in Horticulture

By WM. T. ANDREW, P.Ag.

Division of Horticulture, Department of Plant Science
University of Alberta, Edmonton

What is Horticulture?

To many people "horticulture" is gardening. Historically that is what the word horticulture implies, hortus, garden; colere, to cultivate. Perhaps such a concept still applies on an amateur or hobby scale, but for those considering a career in horticulture a much broader concept should apply.

As most readers of THE PRAIRIE GARDEN realize, horticulture touches the lives of everyone of us. It should not be defined narrowly as garden culture, nor as the tilling of soil and growing of plants. It is a vast array of activities evolving from the production of plants for food, comfort and beauty.

Horticulture is a business, an art, an industry, an applied science, a profession! To those considering career opportunities it offers a broad choice of interests. On the basis of crops alone one might choose to work with tree fruits, small fruits and nuts (Pomology); outdoor vegetables and greenhouse or forcing vegetables (Olericulture); outdoor annuals and perennials, greenhouse-grown pot plants and cut flowers (Floriculture); turfs; nursery crops; shrubs and trees; Landscape Architecture.

Within each of these crop groups those with advanced education and/or training have the opportunity to specialize in plant breeding, propagation, seed production, plant nutrition, irrigation, pest control (insects, diseases, weeds), mechanics, transportation, storage, packaging, processing, marketing, communications (radio, television, writing, photography). Such opportunities are directly associated with the horticulture industry. There are opportunities also in the allied fields, supplying equipment, materials and services to those working directly with horticultural crops.

What are the educational qualifications for a career in Horticulture?

Horticulture may be subdivided also on the broad bases of production, research, and teaching. As the application of scientific principles grows, the diversity of opportunities in horticulture and the number of opportunities available are increasingly correlated to the level of training earned by the prospective employee.

There are many opportunities for young people among the ranks of skilled labor today, but they go unfilled because of lack of trained personnel. This is as true in horticulture as in any other industry. A rototiller, a pickup truck and a quackgrass-infested source of top soil do not make a horticulturist. It is increasingly evident that there is a need for the skilled grower, the skilled designer, the skilled propagator; for people who know how to do the watering, spraying, pruning and grading; who can prepare proper seed beds, lay turf and plant trees.

Horticultural education and/or training in Canada are available in two major categories: vocational or technical diploma courses; and academic or degree courses.

First let us examine the careers open to those who have completed some vocational training in Horticulture. The Niagara Parks Diploma (N.P.D.) and the correspondence course in Horticulture administered by the University

of Guelph (Ontario Diploma in Horticulture), would be examples of two such vocational training courses. Graduates of these courses are employed now in such fields as Parks, Botanical Gardens, Departments of Highways, Departments of Agriculture, wholesale and retail florists, landscape contractors, nurseries, greenhouses, golf courses, grounds maintenance of commercial establishments and institutions, garden centres, consultants and salesmen. In many cases graduates have risen to positions of responsibility such as foremen, superintendents, managers. The current starting salary with three years training is something above \$4,000. Some of those who completed their course a number of years ago are now earning \$8,000 or more.

We believe that those qualifying for the Alberta Diploma in Horticulture, established at Olds in 1963, will qualify for positions similar to those held by N.P.D. and O.D.H. holders. However, we would emphasize that the Alberta Diploma in Horticulture is organized presently as a two-year course.

For those men and women who can qualify for a degree, the first step at Canadian universities usually is a Bachelor of Science degree, with a major in Horticulture. Because of the broad, basic education required of an agricultural graduate usually there is not sufficient time for those interested in horticulture to really become specialists. Sales, field men and self-employment in business or production are good possibilities for a four-year graduate. Starting salaries in the prairie region presently range from \$5,200 up.

With a Master's degree the possibilities in horticulture and the allied fields are much better. Government and commercial research organizations are interested in these men. Businesses are interested in getting them in, and up to at least the junior executive level. This has been the case in recent years with Canadian processors, greenhouses and suppliers. Frequently on a commercial basis the rise is through the technical sales representative path. The starting salary for a Master of Science in western Canadian horticulture at the present time would likely be \$5,800 and up. Generally speaking, the ceiling on the earnings of an M.Sc. graduate is considerably higher than the ceiling for an individual with a B.Sc. degree.

There was a time not too long ago when an individual with a Doctor of Philosophy degree in Horticulture was something of a rarity, a white-collar dude whose presence was frowned upon. Today many of the largest and most successful production operations in North America are directed or served by men with graduate work in Horticulture.

Those who have earned a Ph.D., contrary to popular opinion, are not limited to employment within government, university or industrial research units. Some companies have established a Doctor's degree as a requirement for technical service personnel; several fertilizer companies and irrigation companies and a greenhouse supply company are examples. Producers more and more are purchasing equipment and supplies where they can get service and advice from personnel qualified to give it.

States such as California, Michigan, Oregon, Arizona, Maryland, Ohio and Illinois now are employing Ph.D. men as Horticultural Extension specialists. There is a rising tide of opinion that our Canadian provinces should also upgrade the educational qualifications of extension personnel. Such additional education usually warrants additional recognition in a financial way. The present starting salary for a Ph.D. in Horticulture is above \$8,000 per year.

(Concluded on page 11)

Recent Plant Introductions from Abroad

By F. L. SKINNER, LL.D.
Skinner's Nursery Limited, Dropmore, Manitoba

Although I have been testing new plants for about 65 years I still find that others are becoming available now that might be suitable for our climatic conditions if given a thorough trial.

During the past few years I have been able to secure a number of new species or geographical forms and the following are promising, either from the fact that they came through the trying winter of 1964-65 without injury, or had already proved hardy in other cold climates. Of course, soil and moisture conditions have a great bearing on the hardiness of plants, and the only way one can find out if any plant will prove hardy is by testing it.

Here are a few new things that I have found promising:

Buddleia intermedia v. *insignis* (Wisteria Butterflybush). The named varieties of *Buddleia* usually listed in eastern nursery catalogues have not proved satisfactory here. Even if one per cent of plants set out came through their first winter and flowered it was unusual. Then we got *B. crispa* v. *farreri* which has lived and flowered regularly for 6 years, and in 1964 I grew some seedlings of *B. intermedia* v. *insignis* which came through the winter of 1964-65 safely and flowered. The flower spikes are longer and much deeper in color than in *B. Crispa* v. *farreri*, and if hybrids can be raised between these two varieties it might give us an entirely new race of these shrubs hardy sufficiently to flower with us without protection.

Cotoneaster obscura (Bloodberry Cotoneaster) is a new species from western China with bronzy green leaves that are more attractive than those of the Peking cotoneaster though about the same size. This came through the winter of 1964-65 uninjured. It is a slow-growing species and only about 1 foot tall now.

Cotoneaster sinkiangensis is a faster grower and is larger in both its leaves and branches than *C. obscura*. It has the same bronzy glossy leaves as *C. obscura* and being now about 2 feet tall will be above the snowline this present winter.

Hebe colensoi glauca, *Hebe decumbens* and *Hebe glaucophylla* are dwarf, slow-growing, evergreen shrubs from New Zealand related to the veronicas. In the young stage they are very similar. The leaves are smooth and about the size of thyme leaves. Although they are native of the high mountains of the south island of New Zealand they came through the winter of 1964-65 without losing a leaf and I have been able to introduce them to a number of Botanical Gardens in the United States where they were unknown until I sent specimens to these institutions.

Ilex crenata radicans (Japanese Holly) is a dwarf holly that grows on the northern Japanese island of Hokkaido all the way from the south coast to the high mountains in the centre of the island. This is a dwarf, evergreen bush growing about 12 to 18 inches tall. It came through the winter of 1960-61 at Dropmore but succumbed to the drought of 1961. I have it established now and it was going into winter in fine condition. Should our soil agree with it, it is pretty sure to be quite hardy here. A note of warning though, this holly is common in Japan and only the type from the Island of Hokkaido is likely to be hardy. The plants now growing at Dropmore were raised from seed

collected in Hokkaido by Dr. John Creech of the United States Department of Agriculture.

Lonicera microphylla is a dwarf honeysuckle with small, rather bluish leaves. It is said to be a native of central Asia and to grow about 3 feet tall. It is rather slow-growing at Dropmore but promises to be useful as a small-leaved hedging plant as it came through the winter of 1964-65 without injury.

Diascia sp. (Twinspur) from the mountains of South Africa, forms a neat mound of small leaves about 3 inches high. The pink flowers are on 6-inch spikes and it continues in bloom for a long time if the weather is not too dry. Though one would hardly expect a perennial from the high mountains of Basutoland to be hardy here this plant has proved hardy at Lautaret in the high Alps of eastern France where winter starts usually in October and lasts until well into May. This perennial has gone into the winter at Dropmore looking very well and, if it lives through the present winter, will be a welcome addition to our attractive alpine plants.

CAREERS IN HORTICULTURE

(Continued from page 9)

What additional qualifications are sought by employers?

One should enjoy working with plants. The individual who enjoys his or her work generally does a better job. A better job results usually in a higher reward. We would suggest that one should be interested in the plants themselves; but in addition a horticulturist must relate the plant to its environment, its social significance, and its economic importance. In our opinion it is these latter three items that distinguish a horticulturist from a botanist.

Because there is still some considerable vestige of 'art' within the field of horticulture, practical experience in horticultural techniques is most essential. This practical experience can be obtained before, during or after horticultural courses, but we believe that experience before or during the course work would be very much preferred to experience after the course work.

What about future career opportunities?

The fairly rapid growth in western Canada's population will lead to a greater demand for horticulturists. Rising population usually is followed by more intensified production, e.g., horticulture. A growing interest in home gardening and commercial horticulture will further improve the demand; and a third factor and very important one is bulldozer blight. This term refers to the sacrificing of horticultural land in the high-population areas of North America to subdivisions, highways and industry. This blight necessitates the shifting of production to areas where land can be adapted to horticultural production. There are thousands of acres of such land in the three prairie provinces!

We firmly believe that whether a young man or woman has a diploma or a degree, the horticulture leaders of the future, on either a practical or a theoretical level, will come from those individuals who have provided themselves with a thorough training in the fundamentals and practices of the profession.

EDITOR'S NOTE: For further information contact Dr. A. C. Ferguson, Dept. of Plant Science, Faculty of Agriculture, University of Manitoba; Dr. S. H. Nelson, Dept. of Horticulture, Faculty of Agriculture, University of Saskatchewan; and Dr. W. T. Andrew, Dept. of Plant Science, Faculty of Agriculture, University of Alberta.

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Quality as a Guide in International Peace Garden

By LEMUEL A. GARRISON

Regional Director, National Park Service, Omaha, Nebraska, U.S.A.

The very essence of National Parks is quality; and this is true of both the United States and Canada. A superb quality in the character of the natural or the historic resource at once distinguishes such places as worthy of national recognition, and establishes a guide for all planning, development and use. To do less than our own very best is to betray the worth of the place we honor. Here at the International Peace Garden astride the boundary between Manitoba and North Dakota, we see examples of the quality of thoughtful consideration and planning characteristic of the National Parks on both sides of the International boundary.

In the National Parks of the United States, we take particular pride in the quality of the park itself; only the gems of scenery or history meet the exacting standards for such designation. The twin goals of preservation and use guide all planning. Public benefits are enjoyment and inspiration. We take pride in the quality of the planning for use, and the aptness, the appropriateness of the development. We have pride in the quality of the interpretive program we then prepare to help visitors understand the particular wonder of the park.

We find in such an approach a boundless pride in our land, its resources, its past, its present and its future. This is true of any nation which thoughtfully preserves its best scenery and its best history for the inspiration of its citizens.

A Nigerian chief once said: "I see the world as belonging to all of the people. Some of them are dead, a few are living, and there are countless generations yet unborn." This charge ties us all into one pattern of man and his relationship with his world; the only world we have and share, and our obligations to all of those who live with us or will follow us. It is an overwhelming ethic of a responsibility we all bear together.

The greatest gift we can give our fellows or our children is a realistic dream of peace. Nothing is stronger in this world than an idea, and this is a happy situation in what ordinarily is a materialistic world. For an idea has no guns, no money, no stocks and bonds — yet it can have a challenge to the very spirit of man to improve his lot and to leave a better world for those generations yet unborn.

And here at the International Peace Garden we have today a part of this charge, this challenge, this dream, in a very practical and yet an idealistic way. We have built here a goal and a mission based on a dream — a desire to demonstrate to the world that peace is practical and real in the very highest sense. This Peace Garden is not a cemetery although in a way it is a memorial. But it is a memorial that is dynamic and an evolving demonstration of hope for this continuing family of man.

The association of internationally minded citizens of both nations who carry the load and direct and lead the work, who give freely of their own time and interest directed toward this high purpose, is a guide and a light and symbol of this noble crusade. All nations could profit by listening to these quotations — the first is part of an International Agreement of 1814: "There

shall be no warship on the Great Lakes between Canada and the United States and the land boundary shall have neither fortress, soldier nor guns."

The United States Congressional Act of 1932 proclaims that "This is a memorial to commemorate the long existing relationship of peace and good will between the peoples and the governments of Canada and the United States."

The Peace Garden itself bears the plaque: "To God in His Glory we two nations dedicate this garden and pledge ourselves that as long as men shall live we will not take up arms against one another." This is the charter for the International Peace Garden.



The International Peace Garden

By F. C. W. RICE

Winnipeg, Executive Director, The International Peace Garden, Inc.

One hundred and forty thousand visitors in 1965 attested to the growing interest in the one and only International Peace Garden in the world.

The Garden was conceived as a living memorial to the over 150 years of peace that have existed between the United States and Canada, and is fulfilling the vision of the founders.

The late Dr. Henry J. Moore of Islington, Ontario, presented the idea to a group of professional gardeners, the National Association of Gardeners, at a convention in Toronto in 1929. The Association liked the idea and proceeded to form an organization to promote it and to select a site. The International Peace Garden Inc. came into being and its purposes were stated in its articles of incorporation. Creation and maintenance of a garden or gardens approximately one half of each of which shall be situated in the United States of America, and the other approximate half of each of which shall be situated in the Dominion of Canada and contiguous thereto, as a memorial to the peace that has existed between the United States of America and the Dominion of Canada.

A committee of three were named to select a site and the present site was chosen after touring the international boundary from coast to coast. The Garden is nestled in the picturesque Turtle Mountains approximately midway between the Atlantic and the Pacific Oceans and only 35 miles from the geographic centre of the North American continent.

The Committee's enthusiastic approval may be summed up best in the words of Dr. Moore, who had been a member, in these words: "What a sight greeted the eyes! Those undulating hills rising out of the limitless prairie are filled with lakes and streams. On the south of the unrecognizable boundary, wheat everywhere; and on the north, the Manitoba Forest Reserve. What a place for a Garden!"

Development commenced with the erection and dedication of the Cairn on July 14, 1932. Work slowed down during the Second World War but great strides have been made toward completion of the original plans over the past 20 years. Only this past year a special committee was established to perfect a master plan for the future of the undeveloped 2,300 acres within the Garden. This committee is made up of the top planning experts of two National Park Services as well as State and Provincial Park authorities, and of course the Peace Garden Planning Committee.

Many organizations have made material contributions over the years toward existing facilities, such as picnic areas, flower borders, an arboretum in which are displayed some 100 different varieties of trees and shrubs not native to the area, playgrounds, buildings, and a fine new entrance.

With the institution of the International Music Camp in 1956, development as a youth and cultural centre has far exceeded the expectations of its founders, Mr. Merton Utgaard and Professor Marvin Fjeld. From a one-week camp in 1956 with 118 students, the program has expanded to seven one-week sessions planned for 1966 with an expected enrolment of over 2,100 students. The staff of over 100 nationally noted conductors, artist-teachers and music educators provide instruction in all phases of the comprehensive program.

The Royal Canadian Legion Sports Training Program in 3 years at the Garden has raised its enrolment of 75 boys and 75 girls for weekly camps, to 204 boys and 268 girls in 1965 with a staff of 23 coaches. Many other groups are using the facilities of the Garden for varying periods and include: North Dakota Farm Bureau, Farmers Union Youth Camp, the Church of Latter Day Saints and the International Boy Scouts.

Thus the Garden fills the need of the Great Plains area for a cultural and youth centre and ranks now with the top cultural centres of the North American Continent.

However, as the name implies, this is a Garden and the hopes and aspirations of those who conceived the idea originally always will be uppermost in our thinking in projecting our plans into the future. It will be the aim of all associated in the development to maintain the natural beauty of the terrain, complementing existing features with spot plantings of colorful material and strategically placed plantings of perennial and annual flowers.

Truly a Garden of Peace, to experience the feeling of well-being one has only to stop awhile by one of the placid lakes and see waterfowl undisturbed; or note woodland creatures wander unmolested into the open meadowland; or sit at sundown at the Lookout and drink in the beautiful sunsets over the Turtle Mountains; or see and hear at dusk the regiments of ducks and geese wheeling overhead.

This then is our Peace Garden, surely as fine an example as one could wish, showing to all the world that not only do wild creatures live here in peace, but also that the people of two great countries can and do live in harmony along the world's longest, unfortified boundary.

Much remains to be done. It is the desire of the Board of Directors that the continuing development of the Garden be shared with as many groups and individuals as care to have a part in this most unique and inspiring undertaking. You may help by becoming a member. Your group or organization may help by becoming a member or by sponsoring an approved project in the Garden. Further information will be furnished gladly upon request to the Executive Director at 185 Ash Street, Winnipeg 9, Manitoba.

To paraphrase a saying of a famous United States president, let us make this an effort of the people, for the people, by the people of our two nations.

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Highway and Roadside Plantings

By GRANT CHURCHER

Head Gardener, Legislative Building, Winnipeg, Manitoba

Great highways can form much-needed green areas across the prairie countryside and through highly urbanized, developed and industrialized areas. Responsible authorities must see that we do our very best to make these highways attractive.

The perfect highway would be constructed as 2 separate one-way lanes, each designed to fit into the terrain, and having easy curves and grades. As in the location and the construction of the routes, design for utility and economy goes hand in hand with sound landscape design in producing a complete highway that is easy to maintain. Roadsides and rights-of-way need planning and planting to protect the investment in the thoroughfares.

While the primary value of roadside planting is aesthetic, many functional benefits also are gained, such as:

1. Protection of cut-and-fill slopes against erosion.
2. Reduction of headlight glare.
3. Indicators of changes of alignment for emphasis of traffic guidance.
4. Screening the highway from nearby residences.
5. The creation of crash barriers.
6. Snow drift and wind control.
7. Moderation of monotony and driver fatigue.
8. Dust, noise and fume absorption.
9. Directional sign painting for better reading and visibility.
10. Screening unsightly areas and structures.
11. To fill slope planting to provide a visual barrier and a feeling of safety.
12. To provide shade at selected turnout areas.
13. Vegetation in place of artificial drainage structures.
14. Elimination of unnecessary mowing of areas difficult to maintain in grass.

The overall scheme must not only avoid interference with the highway function of moving large volumes of traffic, but it should add also to the efficiency of that function. The planting scheme in itself should constitute no maintenance problems but actually should reduce maintenance costs.

Streamlined grading provides flattened cut-and-fill slopes and rounded contours that are essential to mold the highway into its surroundings. This streamlined rounding of cut slopes reduces drifting of snow and facilitates machine methods of snow removal. The planning of clearing operations provides for conservation of desirable trees and other existing vegetation, the removal of unpleasant and view-obstructing growth, and the saving of topsoil where practicable.

Row planting of trees at regular intervals is out of place on rural roadsides. The aim is to preserve or recreate a natural environment on the right-of-way in harmony with the distant view. It is of great advantage to save all existing well placed and beautiful trees wherever feasible at the time roadways are being planned, and it is at this time that adjustments in slope grading are possible.

Trees are planted where necessary to supplement existing growth, to highlight the natural beauty of the view, and to screen unsightly or distracting objects or activity. Trees adapted to the environment are best suited for these purposes. In cities and the rural-urban fringe the provincial highways carry heavy traffic. Although roadside space for functional planting is limited, ade-

quately planted borders lessen the sense of crowding of buildings against the right-of-way, and insulate adjacent residential and business properties from the noise and fumes of traffic.

Trees in formal arrangement in the cityscape may be desirable when set against the straight lines of frontage roads and local streets paralleling the highway. Such planting helps to insulate bordering residential property from the restless movement of traffic on urban expressways.

The overall objective is to avoid monotony and tiresome sameness in such plantings. Visual variation is afforded between roadside cuts and fills, and between urban and rural sections of highway improvement, by providing appropriate transitions in grading and planting for erosion control and other purposes.

A mixed planting of trees and shrubs can screen roadways from freight yards, industrial sidings, or other unsightly or objectionable features.

One of the most difficult and controversial subjects in highway landscape and control is the advertising sign. Billboards are traffic hazards, and here the services of a landscape architect can also be employed.

A report by the New York State Thruway Authority indicates that advertising devices were visible to motorists on about one-eighth of the Thruways' 1,100 miles, yet almost one-third of all accidents attributed to driver-inattention occurred on this one-eighth where motorists were exposed to advertising devices. In short, there were more than 3 times as many accidents due to driver-inattention on these billboard areas of highway.

While the billboard industry is powerful and growing, much can be done to keep advertising off our highways through: (a) Legislation; (b) Public opinion, through garden clubs, good roads associations, and other organizations whereby the advertisers find that they are being identified with the act of creating a road hazard and an eyesore; (c) Tree planting to cover billboard areas.

Highways approaching urban areas are subject to extensive billboard advertising. This type of advertising is difficult to discourage but can best be controlled by the use of large shrub and tree plantings. While these plantings should not present a continuous screen of the countryside, the most likely areas can be selected and planted during the locating of the highway. The design of these beds should be irregular and should complement the view, incorporating tree groupings with good fall color such a mountainash, Amur maple, American cranberrybush and Peking cotoneaster, and trees and shrubs with showy bloom, for examples: Rosybloom crabapple, honeysuckles, lilacs, roses and spireas. Other tree groupings may include evergreens, while still others may include cottonwood or poplar to obtain height quickly.

Effective tree planting can reduce appreciably the cost of mowing inasmuch as 13 acres per mile, or approximately 45 per cent of the mowed area, can be planted to trees on four-lane sections of highway. Reading the July 1959 issue of American City, we find another benefit from the planting of trees. In this issue, Dr. C. D. Leake, Dean of Medicine, University of Illinois, says that about a dozen trees are needed to put oxygen in the air to balance the output of carbon dioxide from one automobile, 100 to balance that from one large truck.

One of the great problems confronting the creators of modern highways is that of noise abatement. Roadside plantings have proved very effective. Research has shown that by alternating rows of conifers and broadleaf trees sound waves are dispersed and absorbed. Road surfaces below the surrounding territory with planted slopes absorb sound and deflect it upward.

The above material has been taken by permission from the author's thesis Highway Landscape, Ontario Agricultural College, 1964.

The Prairie Gardener

on Sunday Mornings

The Canadian Broadcasting Corporation Sunday morning radio talks are prepared by the "Prairie Gardener," H. F. 'Bert' Harp, Ornamental Department, Experimental Farm, Canada Department of Agriculture, Morden, Manitoba. Readers will be grateful to Mr. Harp for his permission to read some of the items that brought us information during the year over the air waves.

A new race of China asters called Early Bird is available in red, white and blue and blooms a full 2 weeks ahead of the ordinary asters. The plants are somewhat spreading in habit and in bloom are mounds of flowers.

A new strain of sweet peas has dwarf, bushy plants that need no staking. The Bijous are only a foot high and bloom so profusely as almost to hide the leaves. They are recommended for window boxes as well as for beds and borders where they can be used as edging plants.

Killarney Raspberry (Morden 532) was named in 1961. It resembles Boyne in most respects with strong canes up to 5 feet tall, is fully hardy and very productive. The fruits are medium red, a bit larger than Boyne although not quite as heavy in yield. The quality is especially good as dessert and the fruit is firm, making it a market variety.

Marjorie mockorange grows to 12 feet and makes a fine informal hedge. The flowers are large, pure white and very sweetly scented. Audrey mockorange is not so tall, about 8 feet, and the blooms are creamy white, occasionally double and scented.

The Sugar Maple needs more soil moisture than it is likely to get in most parts of the prairies and it must be sheltered from drying winds.

Morden Amber chrysanthemum, a tall, amber-bronze with a long season of bloom, is one of the best. Morden Bonfire is orange-red with petals tipped with yellow. This is one of the hardiest of the new mums and certainly one of the most frost-tolerant in the bud stage. Morden Blanche blooms are white, suffused pale pink, and fully double.

Starfire tomato is a cross of Earlinorth and BB3, a Morden selection. The result of this cross was back-crossed with BB3 twice to get Starfire. The plants are dwarf with a large cluster of fruit around the main stem. The fruit is a bit smaller than that of the pollen parent BB3 but the quality is superior and the color is a bright orange-red.

Brussels Sprouts. Jade Cross is a good variety.

Damping-off. At the first sign of this disease make a mild solution of Panodrench by using a teaspoonful in a gallon of water and water the seedlings.

The reason flower buds drop off usually is mismanagement. The chief causes are sudden change in temperature; too much or too little water; insufficient light; and over-stimulation in the form of high-nitrogen fertilizer especially if applied when there is not enough daylight for the plant to make the best use of the extra nutriment.

Hardy chrysanthemums set out in the perennial border in late May or early June will get away to a good start if watered in with a solution of 10-52-17. Mix 2 tablespoons in a gallon of water and give each plant a cupful. Later on when the flower buds appear, a side dressing of 11-48-0 at

the rate of a small handful to each plant will be of special benefit but only if it is well watered in.

Snow Mold: One pound of Semesan in a pailful of sand will be sufficient to treat 3,000 square feet of lawn. It is best applied late in the fall just before snow comes.

Brown patches on the southwest side of Thujas usually are the result of sun-scald caused by a breakdown of the plant tissues due to the alternate thawing and freezing in early spring. For this reason Thujas are best planted on the east side of protection.

Evergreens, newly planted, will benefit from frequent sprayings with the garden hose during the hot days of July and August. This is best done at sundown and not in the heat of the day.

A Perennial Border is a long-term proposition. It takes 2 or 3 years to get the plants established and each following year there will be alterations and renovations. To obtain a pleasing and harmonious effect in the perennial border it is well to remember that the intense reds and orange colors should be used more sparingly than the paler shades. There are no hard and fast rules except to keep the rather difficult magentas away from the orange-reds and the salmon-pinks. The pale shades can be mixed up at will. Light blue is pleasing with pale yellow, and plants with white flowers can be used freely to tame down harsh colors and give harmony to the whole border.

Peonies, daylilies, and delphiniums need lots of room so don't overcrowd them or they'll become weak and the blooms will be poor. Water-logged soil will be disastrous for the shallow-rooted chrysanthemums and perennial asters.

Sedums and thymes have shallow roots and need to be carefully planted. If set too deeply the chances are they will rot. Make a trench an inch or so deep and 3 inches wide. I scatter a little sand in the bottom of the trench, set the division on the sand and fill in with well pulverized soil. I press the soil around each plant and scatter a bit more sand on the tops before I water them and put the shade on. Remove the shade in a week or so from these sun-loving plants.

Biennials include sweet williams, canterbury bells, hollyhocks, pansies and several others. Under the best conditions of soil and climate these biennials are inclined to linger for several years but as a general rule they seldom amount to much after surviving a second winter.

Leaf Spot disease on iris: Use Captan, 2 tablespoonfuls in a gallon of water to which is added a teaspoonful of detergent. The detergent is needed to make the chemical stick.

When peony buds have been blackened by botrytis there is nothing you can do about it but botrytis on lilies can be prevented or held in check if they are sprayed with Captan in June, using 2 heaping tablespoonfuls in a gallon of water. Repeat the application as required and don't forget to add a teaspoonful of detergent to make the chemical stick. If the weather is warm and humid the spread of botrytis can be very rapid, destroying leaves like wildfire and, in the process, the roots will be seriously weakened.

Flax straw decomposes very slowly and for this reason I have never favored digging it into the soil. When used as a summer mulch among the hybrid roses, clean it off in the fall and burn it.

The appearance of the lawn adds more to the grounds than anything else. The flower beds and shrub borders may be well laid out and well cared for, but if the lawn is neglected the whole garden will have a run-down look.

Large-flowered bearded iris. A few of the best and most reliable are California Gold, Ola Kala, Eros, Sable, Louvois.

The Highbush Cranberry is a prairie native with bunches of red berries and brilliant autumn foliage. It is tolerant of shade and moist soil but ready to adapt to full sun and drier conditions.

If dormant bulbs of Trumpet lilies are planted out in early May you can expect them to flower satisfactorily in July.

Tulips are far and away the best bet among Dutch bulbs for outdoor culture. The daffodils and the hyacinths are pretty chancy and certainly too costly for outdoor planting where they soon die out. The Darwin tulips and related varieties are best for prairie gardens. By related sorts I mean the Breeders, Rembrandts, Mendels, Triumphs, and the Cottage tulips.

Grape hyacinth is hardy and easy to grow if planted in well drained soil in a sunny spot. Another blue flower of exquisite charm is the Siberian squill with nodding bells on slender stems.

Chrysanthemums are not long-lived perennials unless you grow the hardy sorts and give them the right care. This means well drained soil, plenty of sunshine, and regular dividing and replanting.

The perennial asters and the tall autumn daisies are the last of the hardy flowers to bloom, often hanging on until October is well spent. The perennial asters include Michaelmas daisies with their smooth leaves and showy flowers in a wide range of colors. The most reliable so far is called Plenty, with large lavender flowers on healthy plants about 3 feet high. When weather is favorable some of the English varieties put on a good show and one of my favorites is Janet McMullen, with huge semi-double flowers in a soft shade of lilac-pink.

I have come to associate certain garden operations with certain events: the sowing of tender vegetables with the opening of the first blooms on the wild plum; the harvesting of gladiolus bulbs with the World Series; and the final covering of the tender roses around Remembrance Day. A day or two one way or the other is not going to make any great difference it's true but there's a right time, nevertheless.

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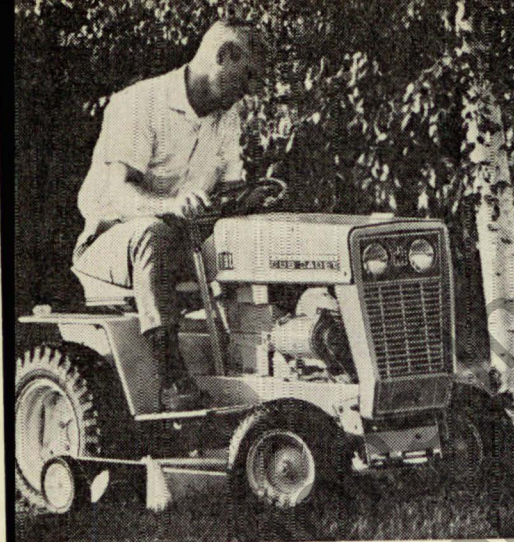


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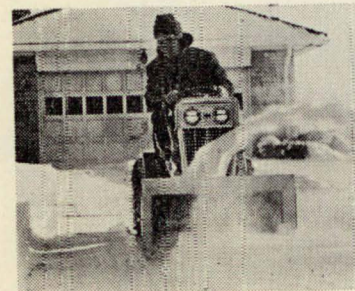
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Centennial Trees

By A. R. BUCKLEY

Horticulturist, Canada Department of Agriculture, Ottawa, Ontario

The publicity given the selection of the Almey and the Royalty crabapples as centenary trees is not only helping the nurserymen to sell more trees but is making the home owner aware of a splendid project that he can carry out all of his own to commemorate the Centennial. It won't take him long to realize that it is not quite so important what kind of tree he plants as long as it is one that will grow in his area and be a memorial to the first century of Confederation.

In this article I do not intend to describe the virtues of one selected crabapple over another. Rather I would entreat you to go home and be determined to plant a tree or influence a group to plant a tree for this splendid occasion. I do want, however, to assist you by describing a few trees I think would suit this occasion and also suit your home grounds.

First of all, I think the kind of tree you plant depends on where it is to be and under what auspices. A tree planted by a society or a municipal body should be substantial in size and longevity. The native red oak, white oak, red or sugar maple would be good choices. They can be depended upon to live not only through the next century but, with care, through the century



Almey crabapple at the Experimental Farm, Ottawa

The Russianolive (Elaeagnus angustifolia) growing in the arboretum at Ottawa

after. In a few cases communities may not have to plant a tree at all. It might be more desirable to select a prominent old tree in your neighborhood and arrange your Centennial program around it. Obtain a suitable plaque; keep the tree sprayed and fertilized; place a few seats or tables around it; and preserve it for posterity. Get one that you think saw the beginning of Confederation and might if looked after live through to the next.

If you wish to commemorate the Centennial by planting a tree in your own home grounds you can choose the selected crabapples Almey or Royalty or some other even more suitable trees. Select those which will be attractive and of small enough stature that they will not present problems for your children in later years. Consider too trees which will grow and live for a very long time, so that you can look back many years from now and be able to say that you planted it.

Alexander Smith wrote in his *Books and Gardens* over a hundred years ago: "If you have once planted a tree you have always in it a peculiar interest. You care more for it than you care for all the forests of Norway or America. You have planted it, and that is sufficient to make it peculiar amongst the trees of the world."

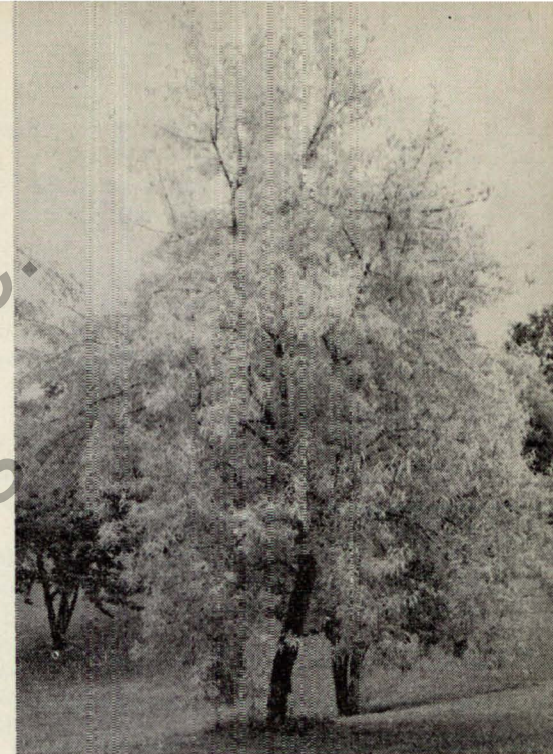
I would, then, select good, solid trees that will not grow too large for your garden, will not have to be sprayed several times a year; will grow with little maintenance and yet be attractive enough to play an important part in your garden and be an asset to your community.

I suggest that the time to plant your tree would be during April or May 1967. I cannot see anyone celebrating by planting a tree this year as some nurserymen suggest. But if you think that the stock of a particular tree you need will be limited by then, I suggest that you get it early and plant it in temporary quarters until the day you choose to plant it permanently. Then invite a few friends in and have a small ceremony. Later on you can get a suitable plaque which could be placed in the ground in front of the tree.

Recommended Trees for Small Home Gardens

*Crabapple Royalty. An outstanding variety with glossy, dark reddish-purple foliage, and wide petalled, purple flowers. Its fruits are small, oval in shape, and deep red outside with dark red flesh. It originated in Sutherland, Sask., where it was selected for its foliage color, outstanding flowers and resistance to disease. This was chosen by the Ontario Horticultural Association as their Centennial tree.

*Crabapple Almey. The Nursery Trades Association selected this variety as the Centennial Tree. Almey was named and introduced by the Canada



Department of Agriculture Experimental Station, Morden, Manitoba, in 1945. Its name honors J. R. Almey, the well known Manitoba horticulturist who selected this seedling as being the best of some 1,700 in flower under test at that time. This fine crabapple has very large deep rose-pink flowers with a white marking at the base of each petal. Its fruits are oval, Chinese lantern-shaped, deep red in color, and persist for a long time on the tree, sometimes overwinter until early spring. The shape of the tree at the Central Experimental Farm at Ottawa is slightly pendulous. Unfortunately the tree is susceptible to apple scab and powdery mildew and like all crabapples should be sprayed several times during the season as ravages of insects and diseases occur. A good dormant spray, usually in April, may be necessary every year.

Yellowwood (*Cladrastis lutea*). A hardy tree, at least to Ottawa, and one which will give great delight each year as it produces its abundance of white, pea-shaped flowers in long, wisteria-like racemes.

*Siberian Crabapple (*Malus baccata*). A deep-rooted tree which I think is superior to any crabapple for all-season glory. It has attractive white flowers in spring, good shade potential in summer, small, attractive fruits in fall which persist until the birds have consumed them in winter, a good fall foliage effect, and beautiful bark patterns in winter.

Sunburst Locust (*Gleditsia inermis* "Sunburst"). The golden-leaved honeylocust is slower growing than the other cultivars and has beautiful golden-green leaves. It grows well under dry conditions and in poor soil.

Juneberry (*Amelanchier canadensis*). A traditional Canadian tree with crisp, fresh, bronzy leaves in early spring changing to flamboyant crimson and bronze and yellow in fall. Needs careful pruning at the nursery stage to secure a single trunk.

*Shubert Chokecherry (*Prunus virginiana* "Shubert"). A good, small tree with leaves which start bright green in the spring but soon change to purplish-bronze, a color which is retained all summer. Like other chokecherries it produces an abundance of fruit which, although very quickly cleared by birds, might prove a maintenance problem.

Korean Mountainash (*Sorbus alnifolia*). Gives light shade and has moderate growth. It needs good, fertile soil. Has attractive white flowers and extremely beautiful salmon-pink fruits, and yellow and crimson autumnal foliage. Leaves are simple and similar to the alder.

Maple "Crimson King and Goldsworth Purple" (*Acer platanoides* var.). Both give dense shade, are slow-growing and shallow-rooted. They are more effective than the other maples because of their purple leaves which retain their coloring all summer. Goldsworth Purple has deeper purple coloring than Crimson King.

*European Birdcherry or May Day Tree (*Prunus padus*). A neat, medium-sized tree 35-40 feet high with deep green leaves and long racemes of white flowers. The flowers are followed by red-black berries which might cause some maintenance problems. Waterer's variety (*Prunus padus* "Watereri") makes a smaller tree with a more compact head and smaller but more heavily produced flowers.

*Amur Birdcherry (*Prunus maackii*). One of the best globe-shaped, small trees for home planting, with dark green leaves and racemes of small, white flowers. It forms a dense, round head, but its major attraction lies in its flaky, golden bark.

*Russianolive (*Elaeagnus angustifolia*). Grows very quickly and needs training to a single stem. Silvery leaves, stems and fruit, and throws moderate shade. Has interesting winter effect from its crooked stem and shreddy bark. Tolerates extreme salt air condition and drought.

*Amur Maple (*Acer ginnala*). One of the best small trees for small home planting provided that trained specimens are available. Very vivid fall coloring, green summer leaves and salmon colored fruit most of the summer. Little maintenance needed. Moderately fast growing and fairly deep rooted.

Dotted Hawthorn (*Crataegus punctata*). A very flat-topped, wide-spreading small tree with dotted yellow fruits. Dense branching habit and quite thorny. The trees at Ottawa are no more than 30 feet high after 60 years of growth. Moderate growth habits, deep-rooted, and recovers rapidly from transplanting. Flowers are quite attractive, creamy white, lilac-like; leaves are deep green and large; and the cherry-like bark is extremely attractive in winter. This tree flowers in summer and presents an added attraction by the persistence of golden bronze seed pods which last all winter.

Kingan Mulberry (*Morus alba* "Kingan"). A Tatarian mulberry that bears no fruits. Grows vigorously and fast, has lustrous, deep green leaves forming a dense crown. For extreme city conditions, drought-resistant, and requiring little maintenance.

*Amur Corktree (*Phellodendron amurense*). Makes rapid growth, but needs special training in the nursery to keep it to one stem. Shallow-rooted, often forming butts above the ground near the trunk. Foliage is deep shining green in summer changing to yellow in fall. Winter effect of the whitish-grey, corky bark adds considerable interest.

Katsura Tree (*Cercidiphyllum japonicum*). Slow growth rate, shallow-rooted and gives light shade. Grows to no more than 30 feet in Ottawa. Interesting leaf texture turns to red and yellow in fall.

*Nannyberry (*Viburnum lentago*). A vigorous small tree to 25 feet with shiny green, leathery leaves. Needs training to a single trunk 6 feet or more high so as to prevent the mass of twigs hanging too near ground level.

Marshall's seedless Green Ash (*Acer pennsylvanicum* "Marshall's Seedless"). Grows quickly and produces medium shade from its glossy grey foliage. This is a clonal selection that does not produce seeds.

Turkish Hazel (*Corylus colurna*). An extremely shapely tree with dark green foliage and interesting twiggy growth. A perfectly formal tree for small homes where larger trees should be planted sparingly.

Kentucky Coffeetree (*Gymnocladus dioica*). One of the most interesting medium-sized trees for small gardens. It produces light shade and the leaves turn yellow in the fall, but the winter effect of its interesting twig formation and sculptured bark gives it much greater appeal. Large seed pods are produced which eventually fall but do not become hazardous or untidy.

*All the trees except where otherwise mentioned are hardy at Ottawa and in most of Ontario. Those hardy on the prairies are indicated with asterisk.

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Rose Growing on the Prairies

By H. F. HARP
The Prairie Gardener

Many of the first Hybrid Perpetual roses planted at the Morden Experimental Farm lasted for 20 years. Their main show is in July and they include all shades of pink and the darkest red, with rich fragrance.

In Hybrid Tea roses I'm inclined to believe that there is a definite co-relation between resistance to disease and winter hardiness. In other words, a plant with strong shoots and tough, leathery leaves, such as the well known variety Peace, stands a much better chance of winter survival than a weak one with high susceptibility to disease.

Prairie Youth is one of the best rose introductions from Morden. The rather flattish blooms are salmon-pink fading to flesh pink. The vigorous shrub, 6 to 7 feet high, is fully hardy but rather sprawling in plant habit.

Prairie Dawn is an example of a hardy shrub rose which blooms on current year's wood. Whereas most of the hardy shrub roses have but one season of bloom, Prairie Dawn starts to bloom in July and usually has some bloom showing all through the season. The flowers are shapely in the bud stage and the petals are rich pink and sunworthy.

Morden Maid is a double-flowered cream rose with petals of good texture and medium green leaves which resemble the foliage of one of its ancestors, *Rosa spinosissima v. altaica*.

Morden Charm is a semi-double, pale pink rose with long, arching stems which are covered with bloom in the early part of July.

The best soil for roses is a slightly heavy loam, well drained and well supplied with humus and plant food. The main problem on the prairies is excessive heat in July and August, dry soil and low humidity, and cold, desiccating winds in winter. Watering usually is a weekly chore from July through August and sometimes longer. Soak the soil, keeping water off the foliage as much as possible.

If required as cut flowers keep the stems short, not more than a foot long, and remove the lower leaves before plunging the stems in warm water. Keep the cut blooms in the warm water for an hour or two, then store overnight in a deep container of ice water in the refrigerator or a cool cellar. This conditioning will keep the blooms fresh for a week or longer.

When transplanting, set the plants about 2 inches deeper than where the scion joins the stock and make sure you plant them very firmly. Cut the tops back to 3 or 4 strong buds with the topmost facing outwards.

In most parts of the prairies tender roses should be covered about the third week of October. First prune back the tall shoots to a height of 2 feet or so, gathering up the prunings, dead leaves and debris and burning the lot. Mound up your plants. Sawdust is one of the best protections. In a test comparing sawdust, peat, and soil, all the plants survived. Those under sawdust came out best and those under the soil the poorest.

Each mature rose plant will need at least a pailful of cover and extra large plants will need more. It may take 3 pailful to mound up a large Hybrid Perpetual to a height of a foot or a little better. It is false economy to skimp on the amount of covering material. It is cheaper to buy an extra bag of sawdust or peat than to replace a lot of winter casualties. The main thing is to use plenty of dry, well pulverized material and to get it on around the third week of October.

About 2 weeks after you mound up your roses the final cover of straw should be put on. Flax straw is excellent. Put on 2 or 3 feet of straw, spreading it deepest on the north and west sides of the beds where the winds are most penetrating. Leave the winter covering until the first week of May.

For summer protection against disease mix 2 teaspoonsful of Captan, one teaspoonful of Karathane, and one teaspoonful of Malathion in a gallon of water, adding enough detergent to make it sudsy, and spray.

Among the climbing roses, I have had the most success with New Dawn, Climbing American Beauty and Blaze. New Dawn tends to produce a few blooms on the current year's wood but by and large last year's shoots have to be carried over in good shape if we are to expect any show of bloom the following year.

* "Miss Canada" . . . a Canadian Rose for Canada's Centenary

By ARCHIE SELWOOD
Vancouver, British Columbia

Mr. Fred Blakeney, hybridizer of 'Miss Canada,' became interested in this fascinating branch of rose culture some 19 years ago while a resident of Ottawa. While he grew roses in his own garden on an ordinary city lot, his knowledge of hybridizing was rather sketchy and it was not until he chanced to read an article on raising new varieties of roses from seed that he felt the urge to take up hybridizing as a hobby.

He made frequent visits to the Central Experimental Farm at Ottawa where there was an excellent rose garden containing a representative collection of rose types, ancient and modern. Considerable rose hybridizing was done there, particularly by Miss Isabella Preston who has a number of rose originations to her credit.

He read, studied and experimented freely and while some of his early creations germinated and bloomed invariably they were winter-killed for lack of a greenhouse. Mr. Blakeney was not discouraged as his main object was to obtain experience and prepare for the time when he would retire and move to the British Columbia coastal area where climatic conditions are more favorable for successful hybridizing. He moved to British Columbia in 1952 and with the aid of a small greenhouse started hybridizing in earnest.

By this time he had learned a lot, particularly as to characteristics desirable in parent roses in order to get worthwhile seedlings, and quickly obtained some good results from his crossings, but for a time nothing quite good enough to put into commerce.

In 1955 Mr. Blakeney acquired Karl Herbst and was much impressed with its plant and foliage characteristics. Its parentage, Independence x Peace seemed to him to be a promising combination and he decided on Karl Herbst as one parent and gave a lot of thought to choosing a pollen parent. He wanted vigor, disease resistance and glossy leaves. Peace has all these qualities, but is one of the parents of Karl Herbst. Most roses, when closely inbred, give less vigor in their progeny, but Peace being a very vigorous rose he reasoned that a slight loss of vigor should not be a serious handicap and so he crossed Karl Herbst with Peace in 1957. The seedling that is now Miss Canada came from

this cross and germinated February 10, 1958. Its first blooms passed unrecorded because, in all probability, it did not show much promise.

But the plant was not discarded, and on September 3, 1958, the following entry was made: "Plant very robust, with several branches, each with a single (terminal) bud with a long, strong stem. Bloom opened this day. It is a bi-color of good exhibition form, high centre and sweet fragrance, with petals of good substance."

Budwood of the seedling was given to H. M. Eddie & Sons Ltd. for trial. This well known firm has many fine roses to its credit, having been hybridizing for many years. After testing the rose for 2 years Mr. J. H. Eddie informed Mr. Blakeney that without question he had a winner. Mr. Eddie gives the following description of the rose — "Spreading, upright plant habit, large, leathery, glossy leaves, vigorous growth to 50 inches, average hybrid tea hardiness. The flower bud is long and pointed. The flower is of good form, high centred, with 35 petals and measures 4½ inches to 5 inches across when fully open. The color is a pink blend, rose madder with silver reverse and the fragrance is good. The blooms are borne singly, several together or clustered; are long lasting and are freely produced."

Mr. Eddie asked for permission to propose the rose as the "Canadian Centenary Rose" providing he could interest the Canadian Association of Nurserymen. This permission was gladly given by Mr. Blakeney and at the annual meeting of the association, held at Niagara Falls in July, 1963, Mr. Eddie put the proposal before the meeting and it was passed unanimously. The Canadian Rose Society also gave unanimous support to the plan, as did its affiliate the strong Vancouver Rose Society. Both Mr. Blakeney and Mr. Eddie belong to these 2 societies and are valued members.

Budwood has already been sent by Mr. Eddie to some 20 of Canada's leading rose growers who are building up a stock of Miss Canada plants to be distributed in time for Canada's Centennial in 1967 under the sponsorship of the Canadian Association of Nurserymen.

It is gratifying to know that Miss Canada will take its place along with Burnaby and other fine Canadian originations in the Centennial International Rose Garden to be constructed and planted in connection with the Centennial Exposition to be held in Montreal in 1967.

From The Canadian Rose Annual, 1965. By permission of the Canadian Rose Society.

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Growing Roses in Flin Flon

By GORDON H. GRINDLE, Flin Flon, Manitoba

Flin Flon, on the Manitoba-Saskatchewan border, is north of the 54th Latitude parallel and is the rugged, rocky centre of our north country. Despite this, we have some very fine gardens here.

In summer our temperatures average 75 degrees; but the thermometer has climbed to around 90 degrees. In winter we may expect 40 degrees below zero; occasionally it is colder. Usually we have a good snow cover, the first big snowfall coming about November 1. Our spring probably is a little later than in the south because the ice on the lakes often stays until late May, and this tends to keep the area cool. But the growth is terrific as soon as the weather becomes warmer. There is so much more sunlight here.

In some sections of Flin Flon the surface is very rocky, and many people bring in soil with which to make a good garden. Where I live, on the outskirts of town, the soil is mostly heavy clay; but peat moss is plentiful and at planting time a good supply is added to the rose beds.

Planting procedure is much the same as in other parts of the province. A hole is dug to sufficient depth to accommodate the roots of the plant, and a layer of sharp sand or gravel is placed in the bottom of the hole; soil mixed with peat and leaf mold and a handful of bone meal is added, and lastly more good soil. The plant is set with the bud union about 2 inches to 3 inches below surface level and watered well. After the hole has been completely filled, peat moss is mounded around the canes; covering is removed when growth starts.

I planted my first roses in the spring of 1948. They were the hardy shrub roses and they grew wonderfully well. I have since taken a great interest in the more tender roses, planting my first three in 1954. Each year I have added a few more varieties, but I still have 2 of my first Floribundas, Independence and Fashion. I have also 2 Queen Elizabeths which were planted in 1956 and 1957 respectively. Each winter these roses have come through safely, and provide a fine display of bloom throughout the summer.

I fertilize my roses by digging in bone meal in late fall or in early spring and after growth starts RX-20 is used every 3 weeks until August 1. After that date, of course, it is unwise to encourage new growth. Diseases and insect pests are not a great problem here. There is very little blackspot; but there are aphids and they are controlled with a good rose dust or by Scott's Cure.

I have tried several different winter coverings for my roses but for the last few years have found dried peat moss satisfactory. I have very few losses but last winter some of the newer roses, such as Saratoga and Granada, did not survive. From my observations during the past few years I have decided that the roses on *R. canina* rootstock are hardier. This winter I have tried out a different method on a few plants; I have used dry moss and a mound of soil, topped by a box filled with dry leaves. Flax straw is a desirable final covering but I believe that the nearest supply is at The Pas, 100 miles or more from here.

In 1963 our horticultural society held its first annual rose show. It was a small beginning but interest in rose-growing has increased, and entries for 1965 were more numerous and of good quality. With the expected arrival of Miss Canada in the spring I feel that we will have many more new growers. Our society is sending in a group order for this lovely rose, because so many members want it. Plans are being made also to plant some specimens in one of the parks or flower gardens now being created.

In June, 1965, I attended the National Show staged by the Canadian Rose Society in Toronto. The show was opened by Mrs. Ena Harkness, for whom the fragrant, red rose was named by A. Norman in 1946. There was a wonderful display of roses; I had never seen such a profusion of perfect blooms. I drove over 4,000 miles to achieve my ambition to attend this show, but the journey was worthwhile. I learned a great deal about exhibiting and the staging of a good show; and this knowledge will, I hope, prove useful in my own community.

Some day I would like to see a rose show organized for the prairie region. It would encourage interest in rose culture in districts where people have felt that they were out of touch. After learning what can be done in Flin Flon, I feel that anyone with sufficient interest can grow roses in any garden. These plants are not as fragile as many people seem to think. I would like to urge those who have never grown roses to start with one or two of the hardier shrub types, with recurrent bloom, that have been developed on the prairies. After that, the step to hybrid varieties will be almost automatic and before long the beginner will have a beautiful rose garden.

At this time my roses are tucked under their winter covers, but I will be looking forward to next spring with the hope that I can say with an unknown poet:

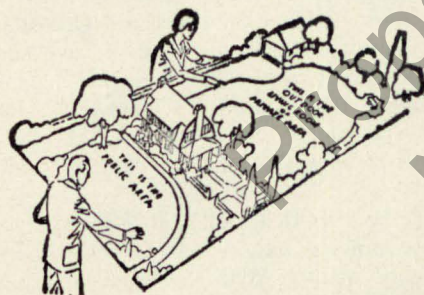
There are roses growing in my garden.
Roses growing, oh, so true.
There are roses growing, roses growing,
They will be blooming, all for you.

Mr. Grindle's entry, The Doctor, was awarded the Rosette for the Best Rose in the Show at the Winnipeg International Flower Show, August 24 and 25, 1965. Another entry, Pink Parfait, was given second place in the Grandifloras.—Ed.

Q. Galls on leaves of Silver Maple.

- A. An insect is responsible and leaves become unsightly when the galls form. Galls are not considered of great importance or as seriously affecting the development of plants. Willows, basswood and some other species usually are affected. It is a good plan to collect and destroy by burning all affected leaves. This should be of some help in preventing increased infestation.

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Hardy Shrub Roses Are Double-Purpose Ornamentals

By PERCY H. WRIGHT
Saskatoon, Saskatchewan

To argue that rose bushes as shrubs have more ornamental value than, say, lilacs, since they have two periods of attractiveness, is not difficult, simply because when you double the time factor you inevitably double the pleasure gained from any kind of enjoyment.

In the spring blooming season, shrub roses have but one kind of beauty, the beauty of their buds and flowers. In the fall, they may have two kinds. One, of course, is the same as that in the first blooming season, the buds and flowers; but this applies only to a select class of everblooming. The other is the beauty of the bright hips and the autumn coloration of the foliage. In general, few varieties have both kinds of autumn attractiveness.

In all the drier parts of the prairie provinces the big handicap to greater popularity of the shrub roses is the damage done by the rose curculio or snout beetle. If someone could wave a wand and make this most vexatious of rose pests completely extinct, shrub roses immediately would take a tremendous leap forward in popularity.

The bad habits of the curculio mean that the first period of attractiveness of many varieties is wasted, and worse than wasted, because the sight of so many blasted buds and punctured flowers is more painful than the beauty of those buds and flowers which escape is a pleasure.

The emphasis, unless rose varieties naturally immune or nearly immune to the curculio are made more worthwhile, will be increasingly upon the varieties which bloom so early in the spring that at least half their blooming period is over before the beetles appear and those which are particularly valuable in the fall.

As chance would have it, the comparatively recent introduction, Georges Bugnet's Theresa Bugnet, both begins its spring blooming season early, and blooms freely again in the fall. Considering the greater appreciation of varieties of roses with blossoms which are not destroyed wholesale by the snout beetles in late June and early July Theresa Bugnet seems to have a long-continued future.

The other roses which bloom ahead of the curculio are mostly the Scotch roses, particularly the species *altaica* and the recent varieties descended from it. My Hazeldean and Yellow Altai roses, for example, are not bothered by the curculio except for a few days just as their blooming season is ending. Seager Wheeler, the semi-double pink *altaica* hybrid originated by Seager Wheeler and named by me, annually is almost a sheet of white and pink, whether or not the year is going to be a bad one for the curculio.

Unfortunately the Scotch roses, which in general set large numbers of hips, have black or dark brown hips, and these are not nearly as attractive as the bright red hips or our own wild roses. A. J. Porter, of Parkside, Sask., has originated a new form of *Rosa altaica*, with bright red hips.

In point of fact, it is a question whether prairie rose growers who live in the districts with dry weather a probability in May and June, that is the districts where the curculio is most troublesome, are well advised to grow roses which produce hips at all. The tiny maggot which feeds inside the rose hips and even eats the seeds, does not multiply itself close at hand if one

plants only varieties which produce no hips for one reason or another. Persian Yellow, for example, never produces hips, nor does Agnes its hybrid with Rugosa. Other varieties, like the well known Hansa, are capable of producing 100 per cent of hips, but rarely do.

The chief reason why such roses do not produce many hips apparently is that the numerous petaloids in the centre of the flowers do not often uncover the pistils of the flowers and so allow bees access to them. Such varieties can be grown without providing nesting places for the maggots by picking off and destroying all hips at latest before they begin to color up.

Shrub roses which have good foliage color in the fall are not numerous. Those, like Aylsham, which are descended from the species *Rosa nitida* (native to the Maritime provinces), are likely to be most colorful in the fall. Anyone who has traveled the roads of the northern parts of the prairies during September and has kept his eyes open for foliage colors of trees and shrubs, knows how beautifully a small percentage of our native wild roses acquire color in the fall. The number of gardeners, however, who will plant shrub roses primarily for their fall colors (or any other shrubs, for that matter), is comparatively small. Floral beauty commonly is regarded as the all-important type of beauty.

In view of the presence of the curculio, it is altogether probable that "the wave of the future" among shrub roses belongs to the Altai hybrids which bloom early enough that the need for a spray program to control the curculio is minimized. Yellows which do not fade are now in existence, but most of the pinks fade too rapidly. In this class of roses, what rose breeders should strive for is double flowers of good substance which do not fade in the sun and do not ball in the rain.

Altaica itself is one rose species which can scarcely be improved for beauty and attractiveness. Its dazzling sheets of white can be changed by breeders to pink or yellow which give color variation, but who can say that they are more beautiful than *altaica* as it came from Nature's hand?

* * *

How serious is the Rose curculio in your district? Mr. Wright would appreciate a note from you.

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Landscaping of Urban Sites

By DONALD G. HOAG, Ph.D.

Associate Professor, Department of Horticulture,
North Dakota State University, Fargo, North Dakota, U.S.A.

When one attempts to create a landscape design for a typical urban site, the problem is invariably the same — the lack of desired area, and the need to create the illusion of space where not enough exists. With the high valuation of urban properties, it is seldom that the sites involved are sufficiently large to allow the freedom essential to the execution of certain designs.

Keeping the need to conserve space in mind, one must examine the basic categories in which all design elements fall. They may be symmetrical or asymmetrical and they may also be rigid, with strong, obvious lines, or they may be fluid, with soft and blending forms. Combining these two sets of attributes, we arrive at the following landscape design categories:

1. The rigid, symmetrical designs are those exemplified by such classic, formal gardens as Versailles, with perfectly trimmed hedges, shrubs and trees, each with a matching counterpart. Although this is a classic type of design, the very formality should restrict its use to homes of formal architecture on sites devoid of natural groves or waterways. In addition, the heavy demands for trimming and pruning to maintain the essential symmetry involve a level of labor that often is impossible for the busy homeowner or the avid golfer or fisherman.

In the few instances where complete formality is desired, care must be exercised to select those trees and shrubs that develop into rigid or compact shapes with a minimum of trimming, e.g., the better spruces, the columnar arbor-vitae, columnar Siberian crabapples, or grafted trees that may be expected to develop matched shapes, and compact shrubs such as the globe arbor-vitae, Clavey's dwarf honeysuckle and the Globe caragana. Plants of such types require only a minimum of trimming to develop perfect symmetry. Even then, the beginning designer should be cautioned that without considerable labor the rigidly formal design will be unkempt and undesirable.

2. The fluid, symmetrical design is a type that often is weak. Soft blending forms do not always lend themselves to the establishment of symmetry. In such cases the symmetry will not be immediately evident nor perfectly executed because of the blending of forms, so weakness is almost inherent in this design type. This category has the least to recommend it as a choice.

3. The asymmetrical, fluid design at its best is naturalism. Here all elements of the landscape scene, plants, rocks and water if used, as well as the shapes of turfed areas, are carefully chosen and arranged to copy Nature at its best. In a sizable park or even in the larger than average lot, the feeling of woodland with its gradual transition from trees through shrubs and flowering plants to the delightfully open clearing, complete perhaps with flowing water, may be easy to achieve. On small properties the necessary transition is almost impossible.

An exception to the latter statement exists in the gardens of the Japanese who can give the impression of naturalism by working on a miniature scale. It is, therefore, possible that the careful gardener could borrow ideas from the Orient without actually copying a Japanese garden. By using very small trees or tree substitutes, e.g., the Amur maple, the Japanese tree lilac, and even the Tatarian honeysuckle and the more popular lilac varieties carefully trimmed to single or perhaps 3 stems with no branches below head height,

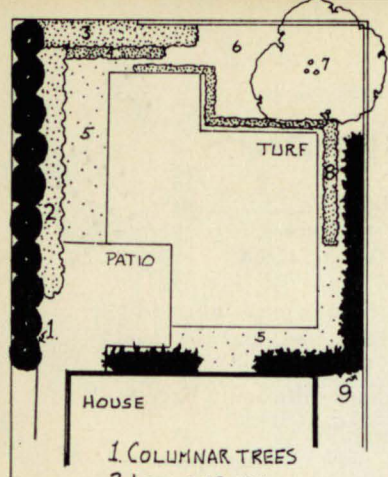


Fig. 1—A contemporary design with all lines parallel or perpendicular to property lines. (Also see Fig. 2)

1. COLUMNAR TREES
2. LOW SHRUBS
3. MEDIUM SHRUBS
- 4, 5, 6, 8. VERY LOW FLOWERS OR GROUNDCOVERS
7. INFORMAL TREE
9. MEDIUM SHRUBS

the perfect effect of miniature groves may be gained.

In this type of miniature naturalism, shrubs must be carefully chosen to be in scale with the miniature trees and yet not develop into rigid forms. Some of the low evergreens, the Dwarf Pfitzer junipers, Mugho pines encouraged to grow as asymmetrical rather than as compact mounds, and perhaps the Tom Thumb arbor-vitae would be useful to consider. New, dwarf spireas that may be usable are known on the market. A dwarf Garland spirea (*Spiraea arguta*) and Snowmound, a dwarf *Spiraea nipponica*, may both merit further evaluation.

An interesting true dwarf is *Spiraea lemoinei alpestris* which began blooming in my garden when 6 inches in diameter and only 4 inches high with pink clusters like a tiny Froebel spirea. Many of the bush cinquefoils or Potentillas, such as the somewhat sprawling, low Forresti with its larger than average flowers, could be valuable additions to the miniature garden. Other Potentillas might be chosen for their white flowers or silvery foliage.

The Meyer lilac, which matures at about 5 feet, often blooms when no more than 18 inches in height; judicious pruning might keep it as an interesting dwarf specimen for many years. In a few instances dwarf, flowering shrubs have been created by grafting but unfortunately these are exceedingly rare on the market. However, the interested gardener will find a wealth of dwarf material if he chooses to carefully search the commercial offerings.

Among the herbaceous perennials, many plants once offered as rock garden items are usable as small-scale substitutes for the more commonly used perennials. Today one finds offerings of hardy, dwarf tulip species, charming iris such as *Iris hyacinthiana* (with the slender grace of wild iris that grow along sunlit bogs but much smaller and hardy), and *Iris hookeri*, like a small Siberian iris. As the season progresses a greater selection exists among both the dwarf perennials and the many new dwarf annuals until, perhaps, the season is ended with very low chrysanthemums or perennial asters.

To achieve the effect, the gardener interested in miniature naturalism must choose plant material carefully and restrain all impulses to prune or trim in any way that will destroy a natural appearance of the tree or shrub.

4. The rigid, asymmetrical design is best illustrated by the contemporary design and often is best adapted to the small site, private home, commercial property or public grounds, wherever space is limited. In this type of design the rigid lines, straight or curved, may satisfy the desire for order inherent in many people, while the lack of symmetry reduces the degree of maintenance.

Such designs may be executed with lines that are either parallel or perpendicular to property lines, in which case the shapes of beds and planting areas will be rectangular. There must be sufficient variation in shape and size of bed to provide interest and to eliminate the possible suggestion of symmetry, but also sufficient relation in shapes to create an integrated design.

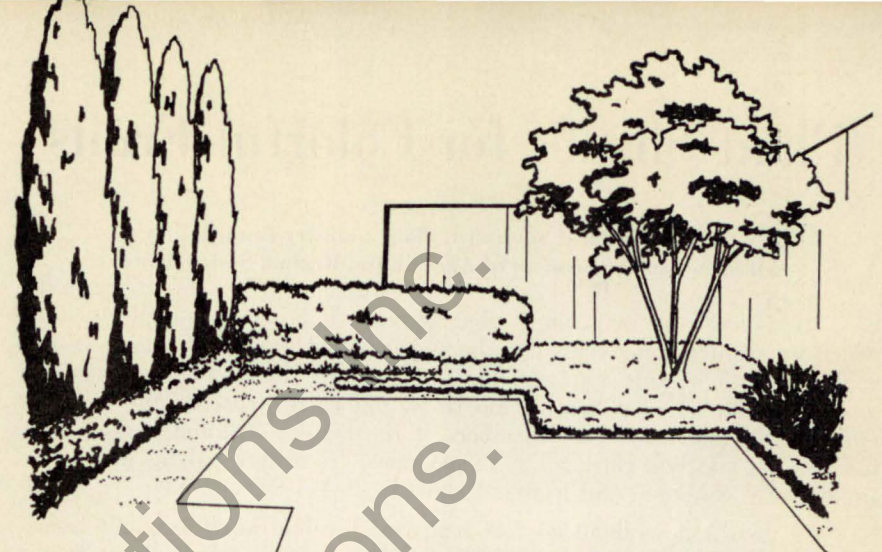


Fig. 2—An impression of the first design above. The lowest levels might be massed low flowers, ground covers, crushed rock areas or combinations.

The major lines, on the other hand, may be diagonals producing planting spaces that are mostly triangles. If the angles are variable in size the design will give the impression of greater freedom and less rigidity, even though each line is sharply defined. Diagonals are effective also in creating an illusion of greater width in narrow areas. Curved lines in combination with straight lines introduce even greater freedom.

Such contemporary designs are best executed with a high proportion of plant material that is rigid, compact — in general, tidy in appearance — so that the lines of the design are not obscured. Columnar trees, symmetrically rounded trees, trimmed hedges, and simple, contemporary walls or fences contribute to the rigidity; but masses of low shrubs, bedding flowers and groundcovers as well as such textural surface treatment as crushed rock, paving brick or blocks, may be used to carry out the shapes of the planting areas. Such asymmetrical (but balanced) designs can be carried out with a limited number of shrub and groundcover species in combination with gravel or rock for the lowest in maintenance efforts. The same design may be executed with a higher percentage of flowering shrubs and massed perennials and annuals as long as masses of like form are used to achieve reasonable rigidity. In the contemporary design, like the formal symmetrical design, rigidity is essential.

If many loose or sprawling plant forms are used the lines will be obscured and the design form will appear to crumble at the edges. If less shapely plants are used, they must be used in sufficient masses to disguise the individual plant form, or an occasional plant; perhaps a multiple-stem tree or an outstanding shrub with strong lines, may be used for contrast. Such an individual may serve to accent the clean lines of the garden, but if many are used they would compete with one another for attention, becoming an antagonistic element and destroying the total effect.

Of all the basic design types the rigid, asymmetrical (the contemporary) may satisfy the greatest number of people. Its rigidity satisfies the innate desire for order. Its lack of symmetry keeps maintenance to a relative minimum and the emphasis on clean lines and opposing shapes makes the use of contrasting textures, foliage, crushed rock or paving, not only possible but desirable. Perhaps most important is that the clean lines and compact plant forms conserve much needed space on small urban sites.

NOTE: Professor Hoag expects to have his book, *Trees and Shrubs for the Northern Plains*, off the press early in 1966.—Ed.

Plant Shrubs for Colorful Fruits

By S. SHEARD

Horticultural Specialist, Plant Industry Branch
Saskatchewan Department of Agriculture, Regina, Saskatchewan

The favorite plant in our garden at home is a scraggly apple seedling which we planted some years ago, hoping it would grow into a large-fruited apple. When it became apparent that the fruit was small and sour I decided to chop it out before it became too large. But each attack on the tree was repulsed vigorously by other members of the family, wielding garden hose, baseball bat and doll carriage, and each time I retreated soaking wet before any damage was done. And I guess I know when I'm licked.

The tree is now about 15 feet high and I would have to admit (somewhat reluctantly, of course) that it is the best ornamental we have in the garden. Every spring it puts on a dazzling display of blossom, and every summer, without fail, it produces an abundant crop of fruit but so sour that no young marauder would ever take more than one bite. In the fall the bright red and yellow fruit remains on the tree to provide splashes of color against the snowy winter background.

Along about February the Bohemian waxwings make their annual appearance to eat the fruit as it hangs on the tree. Sometimes one bird alone will appear, sometimes a dozen; occasionally 50 or more are in the tree at the same time. For a change of diet they will move to the Altai rose and the mountainash growing nearby while the more daring ones rob the Peking cotoneaster near the kitchen door. But always back to the crabapple and not once have they ever managed to pick it clean in any one winter. The fruits which they leave, now dark and shriveled, are still on the tree when it breaks out into bloom again in the spring. This is truly a tree with year-round color, utility and interest.

Most home gardens of course are too small to permit the planting of a wide assortment of ornamental shrubs. Plantings generally are restricted to a few shrubs around the house for foundation planting, possibly one or two shrubs or groups of shrubs at the borders of the front lawn and a limited number around the outdoor living room area to provide shelter, privacy and beauty. With this in mind the selection of those few shrubs for planting around the home grounds becomes extremely important. All too often when this selection is made, the fruit and the seed characteristics of plants are overlooked entirely. Prairie gardeners have available to them a considerable number of woody plants with colorful fruits and seeds and a few should be included in every home grounds plan.

Several of the stone fruits are excellent sources of food for birds as well as providing interesting ornamental fruits. The common chokecherry is well known. Less familiar to many gardeners are the yellow-fruited form and the purple-leaved Shubert chokecherry with fruits similar to those of the native plant. The European bird cherry or May Day tree, the Amur chokecherry, and the native pincherry also are of value. Lower-growing plants of the same group include Nanking cherry with bright red fruits, and the many forms of flowering almond. Of the latter, the named variety Prairie Almond is superior, both for the quality and color of its bloom and for the multitude of hard, woolly, red seeds or nuts which grace the plant until September.

Probably no single species of ornamental is attracting as much attention at the present time as is the crabapple. The many named varieties of Rosy-bloom crabapples have colored leaves, colored flowers and colored fruits, and provide year-round beauty superior to that of any other ornamental. Outstanding varieties include Royalty, Almey, Sutherland, Carmine Queen, Rudolph, Strathmore and many others. ♦

The bright red fruits of the native buffaloberry, the yellow fruits of the Russian sandthorn or seabuckthorn, and the silvery berries of the Russian-olive make an outstanding color display and will remain on the plants throughout the winter unless eaten or carried away by the birds. All 3 shrubs have silver-grey leaves which make striking contrast to the dark and light greens of other woody plants during the summer months. Both male and female bushes of buffaloberry and Russian sandthorn are necessary to provide a crop of fruit.

Familiar to all gardeners are the dark green, glossy leaves and blue-black berries of the Peking cotoneaster. Less well known is the European cotoneaster with larger red fruits and a lower, more spreading habit of growth.

The various species of mountainash are popular as specimen trees and their fruit is among the most colorful of any of our woody plants. The large clusters of orange and red berries provide an attractive food source for birds. The native highbush cranberry has ornamental red fruit as does its close relative, the nannyberry, though the fruit of the latter is darker and less attractive.

The fruits of many species and varieties of rose and hawthorn persist well into the winter. Altai rose is an old favorite with attractive purple fruits in abundance on the plant. Chocolate hawthorn is an upright, stately plant with attractive, chocolate-colored fruits enjoyed by many birds. Cockspur hawthorn is lower, more spreading, with bright red fruit that persists well on the plant.

The elongated scarlet berries of the Japanese barberry are attractive in fall and winter; and the cherry-red fruit of cherry prinsepia if not used for jelly will make a special Christmas treat for stay-at-home birds.

It should be noted here that while a few of the above plants have a suckering habit they should not be condemned because of this one undesirable trait. Our list of useful woody ornamentals would be drastically reduced if we eliminated all species which tend to sucker. Commercial nurserymen do their best to provide plants on non-suckering roots but where this is not possible a couple of strokes with a sharp spade or hoe during the growing season will keep suckers under control.



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Tree Fruits and Bush Fruits as Ornamentals

By J. A. MENZIES

Department of Plant Science, University of Manitoba, Winnipeg, Manitoba

In the prairie provinces, primarily because of the severe climate, the list of reliable ornamental trees and shrubs is restricted, compared to areas to the south and the east. The tree fruits and bush fruits are a welcome addition to this list. So often they are relegated to the vegetable garden or to some out of the way spot in the yard when they should really be used as landscape material. They are truly as valuable for their ornamental effect in the home landscape as they are for the fruit they bear. In the early spring they brighten the landscape with their colorful flowers, at a time when other bloom is scarce. In the late summer and early fall, when heavily laden with ripe fruit, they again delight the eye.

The list of fruits which make fine ornamental plants is extensive: apple, crabapple, pear, apricot and plum all make attractive small trees; the currant, gooseberry and sandcherry-plum hybrid make attractive medium-sized to large shrubs.

In the landscape the tree fruits are a welcome addition to the list of small trees, 15 to 25 feet in height. They are useful to add height and interest in the shrub border, for framing the home, as lawn trees, and as small specimen trees. They can be planted beside the patio, the terrace or some other sitting-out area to provide shade from the afternoon sun. The bush fruits are suitable for border plantings and as untrimmed hedges. One logical place to use them is as hedge or divider between the vegetable garden and the lawn area.

When these trees and shrubs are used as ornamentals there are certain characteristics which assume more importance than when they are grown for fruit. Winter injury, although acceptable to a certain extent when fruit is the object, will destroy the beauty and ornamental value of the plants, particularly the trees. Varieties therefore must be reliably hardy. In the case of the apple, the crabapple and the pear, the disease Fire Blight may produce also an ugly, misshapen tree and resistant varieties should be used if possible. Spider mites, although they will not kill the gooseberry or the currant, will cause considerable foliage damage. Spraying for spider mite control is almost a necessity, particularly in dry years, if the attractiveness of these shrubs is to be maintained.

The apple and the crabapple will produce the largest trees, in time 25 or more feet in height, and because of their size are probably more useful as shade trees than the other fruits. There are several hardy, reliable varieties among which are the crabapples Dolgo and Columbia, the apple-crabs Kerr and Rescue, and the standard apples Heyer No. 12 and Carroll.

The apricots make very beautiful, graceful, small trees, 15 to 20 feet in height. They are fast-growing, and generally somewhat pendulous in habit of growth with smooth, attractive reddish bark on the younger wood. The leaves are clean and attractive. The flowers, produced very early in the spring, are large and a soft pink in color. Because of the earliness of bloom they are not dependable fruit producers and for this reason alone are more important for their ornamental value than as fruit-bearing trees. Among the varieties, Scout and M604 probably are the most dependable. The two species the Manchurian

and Siberian apricots are hardier and more dependable. The fruit of the Siberian is not edible and the fruit of the Manchurian although edible generally is poor. These two species are mentioned here because they are very fine ornamental trees which should be used more than they are.

The pear reaches a height of 20 to 25 feet. The tree is upright and narrow when young but spreads out with age. The foliage is glossy, smooth and very attractive. A striking feature is the profusion of large, white blossoms produced very early in the spring. It is one of the earliest plants to bloom. Among the named varieties Autumn Spice and Pioneer No. 3 are good recommended varieties. The species the Ussurian Pear is hardier and more reliable but produces poor, inedible fruit.

The plums in general produce somewhat smaller trees, 12 to 18 feet in height. Rather than being pretty or graceful in appearance they are distinctive, having an old-looking, gnarled, twisted habit of growth, a habit which is one of their most important ornamental features. Many of the tree fruits have this form but it is most noticeable in the plum. Those who have seen old plum trees will remember this very distinctive characteristic. The plums bloom very early in the spring and are prized because of the color they provide at this time of the year. The ripe fruit is of ornamental value also. There are several varieties which make fine, small ornamental trees. Two which produce very ornamental trees are Pembina and Grenville. Bounty and Dandy are hardier but make smaller, bushier trees and ones which are not quite so attractive in form. Ptitsen No. 10 also produces a lower-growing, bushier tree with small, shiny, attractive foliage.

Among the bush fruits the sandcherry-plum hybrids although usually grown as low, spreading shrubs, can be grown on a single trunk as small, low-growing, bushy trees. They are quite spreading, well grown bushes of Manor becoming 10 to 12 feet wide. There are several hardy, reliable varieties, namely, Manor, Sapa, Opata and Dura. Dura makes a smaller, bushier plant than the other three. The sandcherry-plum hybrids, like the plums, bloom very early.

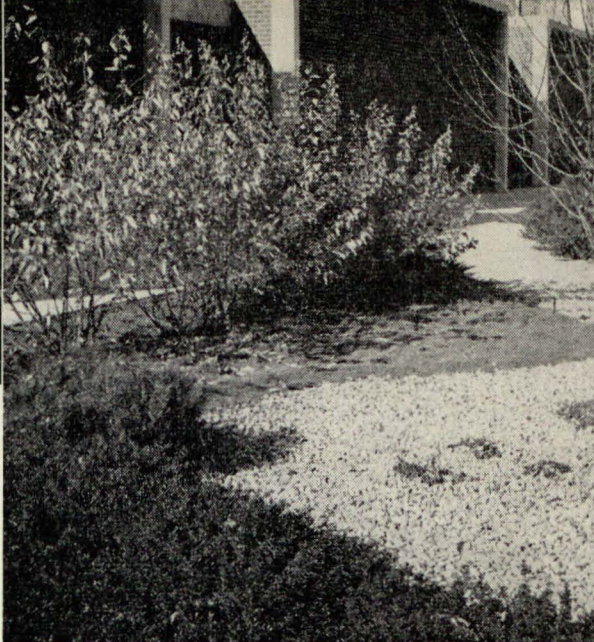
The gooseberries and the currants are very useful in the border or as a hedge. If fruit is important they must be pruned regularly if production is to be maintained and if used in the border or in an untrimmed hedge this is not a problem. A regular annual renewal pruning not only will ensure good fruit production but will maintain the form and beauty of the plants. There are many good dependable varieties. Among the gooseberries, Abundance and Pixwell are 2 of the best varieties. Among the currants, Stephens and Red Lake are 2 good reds, Kerry and Boskoop Giant 2 good blacks.

This has been a brief survey of the range of fruit plants which have great value as ornamentals. Not only do we have plants which will extend our ornamental lists, but some of the species are truly distinctive specimen plants which cannot be substituted for by other species. This is true of the apricots and the habit or form of the plums. Anyone who is planning to grow fruits certainly should incorporate them into the landscape planting.

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Above: Accentuation of the base plane with a variety of groundcover material, including gravel. Plant in flower is Arctic Phlox. At right: A close-up of groundcovers in the off-season—cliff green in foreground; woolly Thyme in background.



Why Not Grow Groundcovers?

By R. H. KNOWLES

Associate Professor of Horticulture, Department of Plant Science
University of Alberta, Edmonton, Alberta

If you are one of those people who are not the least bit concerned about those little spots where grass refuses to grow for lack of light, moisture, or because of competition; or if you should be a person who is not bothered by the sight of bare soil beneath deciduous trees and shrubs during spring and fall, then don't bother reading further. If, on the other hand, you are one of those people interested in those little sophistications that groundcovers can add to the home grounds, then read on. This article was meant for you.

There really is no need to point out that turf still is the most serviceable of all groundcover materials, but I would like to make it clear that many situations exist where other things can be substituted for grass with decided advantage. For example, heavily shaded areas seldom provide the necessary light to permit turf to maintain a satisfactory density, yet many other groundcovers will flourish under these conditions. In still other cases, situations exist where grass is of no practical value as a groundcover because the maintenance required far outweighs its usefulness.

To those who appreciate the value of groundcover materials, it must be really quite surprising to find that groundcovers in variety have yet to be widely used in the prairie provinces. I cannot think of a group of plants that is more interesting. Variability seems endless; textural quality is fascinating; and the possibilities for use are enough to stir the most jaded appetite.

So let me tell you about this group of plants! Since I have been assiduously comparing them with grass, I must first of all point out that most of the materials to which I shall refer are broad-leaved plants. Indeed, many of them fall into the category of broad-leaved evergreens. In stature and texture, they vary from the size and fineness of those little ground-hugging things like Woolly Thyme, to the size and coarseness of *Bergenia*, the Large-Leaf Saxifrage. In some cases they are flowering plants, such as the spectacular Arctic Phlox; in others, they are plants that have a particular

foliage color the year round like Multicolor Buglewood; and in still other cases they may be plants like the Golden Spurge that turns color at the sign of the first frost.

In spite of such variety, it would not be right for me to suggest that these Horticultural "V.I.P.'s" have any other function but to provide groundcover in places where groundcover is needed. However, I would re-emphasize that in doing this, they can add a degree of enrichment to the landscape that otherwise would be lacking.

But if a plant is to make a satisfactory groundcover, it must of course be capable of covering the ground completely and quickly without using more than a minimum number of plants per unit area. This means that plants meet minimum requirements if they cover the ground in one growing season when placed no closer together than 8 inches. Most plants on the list of materials discussed here actually will do much better than this. Those which cannot meet the minimum requirements as a rule are far too expensive for use and not really vigorous enough to compete favorably with the ubiquitous broad-leaved weeds.

In order to achieve maximum performance from groundcovers, each must be used in the proper site, some preferring shady, moist situations, others doing best in full sun. Generally speaking all groundcovers require a cool root run, which calls for a well prepared soil containing plenty of organic matter. Most recommended materials will do well when these requirements are met. Satisfactory at Edmonton are the following:

Groundcover Materials

1. For Sunny Locations

- (a) Plants greater than 12 inches high: *Artemisia*, Silver Mound; *Euphorbia epithymoides*, Golden Spurge; *Polygonum Reynoutria*, Fleece Flower.
- (b) Plants less than 12 inches high: *Cotoneaster adpressa*, Creeping Cotoneaster; *Duchesnea indica*, Yellow Strawberry (India Mockstrawberry); *Juniperus horizontalis*, Horizontal Juniper; *Pachistima canbyi**, Cliff Green; *Phlox borealis**, Arctic Phlox; *Thymus serpyllum lanuginosus**, Woolly Thyme.

2. For Partial Shade

- (a) Plants greater than 12 inches high: *Bergenia crassifolia**, Large-Leaf Saxifrage; *Cotoneaster rotundifolia*, Round-Leaf Cotoneaster.
- (b) Plants less than 12 inches high; *Ajuga reptans multicolor*, Multicolor Buglewood; *Cerastigma plumbaginoides*, Blue Cerastigma; *Pachysandra terminalis**, Japanese Spurge; *Mahonia repens**, Creeping Oregongrape.

3. For Deep Shade

- (a) Greater than 12 inches high: *Aegopodium podagraria*, Bishops Goutweed, Goutweed.
- (b) Less than 12 inches high: *Euonymus obovata*, Running Euonymus; *Vinca minor**, Common Periwinkle.

*Broad-leaved Evergreens.

Although there is great variety in this list, I find it difficult to put my finger on one particular favorite. Each seems to have its unique qualities. For instance, nothing would substitute for *Artemisia* Silver Mound when it comes to considering particular color and form, or for that matter when thinking of the combination of particular size, density, spring color, and autumn foliage of *Euphorbia epithymoides*. Nothing else is quite like *Poly-*

gonum reynoutria when it thrusts its wine red shoots above ground, first thing in the spring; and nothing can quite touch the wiry-woodiness of *Cotoneaster adpressa* in the appropriate location. *Duchesnea indica*, the Yellow Strawberry, though like its relative the strawberry of commerce, also remains unique; its flowers are yellow rather than white, and its berries though bright red and attractive, are really for the birds.

The well known Horizontal Juniper comes in many varieties of color and has a distinct textural quality that sets it apart from the broad-leaved evergreens. Cliff Green is truly a broad-leaved evergreen and even though its leaves are small it reads extremely well in mass. *Phlox borealis* likely is the most exciting plant on the list of spring-flowering types because of its bright pink flowers. Nothing is more delicate than Woolly Thyme, particularly when set off against a coarse-textured background, it looks not unlike a thick, deep-piled carpet.

Bergenia crassifolia is unique because of its large, coarse foliage. Such texture frequently is lacking in our prairie landscapes. The Round-Leaf *Cotoneaster* spills over the ground in loose herringbone fashion and provides a nice bit of color through its bright red berries. The Multicolor Buglewood hangs on to the ground firmly exposing a predominantly purple face to those who view it. *Ceratostigma plumbaginoides* is rivalled only by *Vinca minor* when it comes to flowers and foliage, nevertheless it should be noted that this plant blooms at a time when *Vinca* is not showing too much in the way of flower color. The Japanese Spurge is unlike anything else in that it provides not a mound nor a mat, but a dense, shin-high carpet of refreshing green foliage. *Mahonia repens* is a handsome coarse-leaved creeper with bright blue, grapelike clusters of berries.

Goutweed has foliage variegated white and green, and is a plant which does really well in the deepest shade, its color creating the unusual effect of light coming out of darkness. *Euonymus obovata* is a mat producer and one that seems at home in the deepest shade. The broad-leaved evergreen Periwinkle provides a magnificent display on north and east exposures with both dark green foliage and sky blue flowers contributing.

I don't think I need say more about why I have no favorites in the groundcovers; each has its place, and each has something pleasantly different to contribute. In the coming year I'm sure you will want to try them.

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Woody Climbers Make a Difference

By D. B. McNEILL, B.S.A.

Skinner's Nursery Limited, Dropmore, Manitoba

On the prairies our selection of Woody Climbers is limited in variety by our severe winter climate. We are, nevertheless, fortunate in having some real, top notch climbers that are completely hardy and vigorous, and will grow for many years without too much effort on the gardener's part.

There are many areas in the garden where climbers can be used to advantage and one has only to look around and use a little imagination to discover them. We often see a bare, blank wall on a home or other building where, because of lack of space, shrubs or perennials cannot be grown. Here is an ideal location for a Dropmore Scarlet Trumpet Honeysuckle or a Wild Grape which will blend the wall in with the surrounding landscape to enhance the overall picture. Other places, like garbage areas, clothes line poles and trees, may present problems to the gardener and these can often be overcome by the use of a Golden Clematis or a Virginia Creeper trained on a relatively inexpensive trellis.

Often we seek privacy around a patio and this can be gained quickly and at low cost with climbers. They will soon cover the area and offer good protection from both the sun and the neighbors. Many of the Clematis and Virginia Creepers make good ground covers in areas where it is difficult to grow grass because of poor soil, or where the terrain makes lawn mowing and maintenance difficult. Clematis Prairie Travellersjoy or Clematis Jouiniana left untrained will quickly and completely cover a large area.

One of the best of the woody climbers is Dr. F. L. Skinner's Dropmore Scarlet Trumpet Honeysuckle, adaptable in most prairie gardens and worthy of a place in any landscape. It flowers from June until freeze-up with masses of bright scarlet trumpets offset by the dark green foliage. It must be grown on a trellis because it is not a self-clinging type and requires some training, but if left untrained in the perennial border will add a lot of color all summer and will cover a large area quickly.

The Clematis family provide us the largest variety of woody climbers but here there is a great deal of room for improvement and new and improved varieties are needed. Our prairie plant breeders are taking up this challenge so that we may have new, superior varieties in the near future.

The Golden Clematis (*Clematis tangutica*), sometimes known as the Chinese Clematis, is very hardy, free-flowering and vigorous. Its bright yellow flowers are produced from June through to August and are followed by attractive silvery seed heads. It will grow to a height of 30 feet, seldom kills back, and does well in either full sun or shade. Clematis Mrs. Brydon and Clematis Jouiniana are 2 excellent climbers that are similar in habit and growth. Both varieties grow to about 10 feet high and kill back in some winters, but, due to their vigorous growth they revive rapidly in the spring. They flower in late season, Mrs. Brydon earlier by about a week, with small pale blue flowers but are grown mostly for their thick, dense foliage. These 2 varieties also make excellent ground covers, spreading out a thick carpet over a wide area in a very short time.

Clematis Prairie Travellersjoy is another of Dr. Skinner's recent introductions similar to our Western Virginsbower (*Clematis ligusticifolia*), but much more vigorous and making an excellent trellis plant. It too is useful as a ground cover.

The large-flowered varieties of Clematis do well in some areas but must be planted with caution by prairie gardeners. They require well protected locations and the best spot seems to be near the foundation where there is a certain amount of warmth during the winter. In most cases they kill back to the ground level each winter but where they survive can be counted upon to revive quickly during the summer and give an excellent showing from June on.

Clematis Jackmanni is the most popular of this type with its large, deep purple flowers, and generally can be counted upon to reach a height of about 8 feet. *Clematis Ville de Lyon* also is showy with large red flowers over a long blooming period during the summer. Others worthy of trial are *Clematis Ernest Markham* (petunia red) and *Clematis Violacea* (violet). The last two have done reasonably well at Dropmore with good protection.

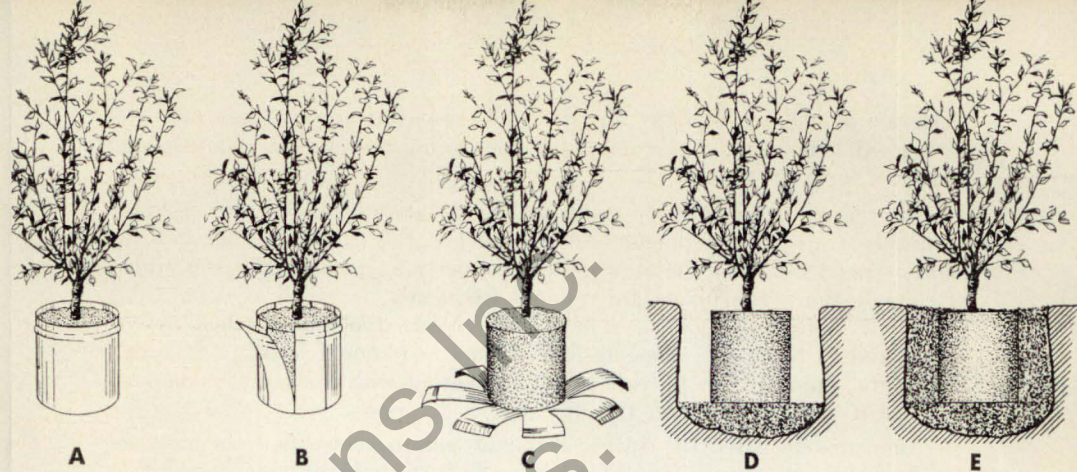
Virginia Creeper (*Parthenocissus quinquefolia*) is a well known, very hardy climber that has been an old standby for many years on the prairies. The variety Englemann Ivy (*Parthenocissus quinquefolia* var. *englemanni*) is gaining favor in some parts of the prairies but is still recommended only for trial. This variety has smaller foliage and is self-clinging. Both climbers provide excellent color in the fall with their bright red foliage.

Bittersweet (*Celastrum scandens*) is a hardy native vine that grows to 20 feet, with yellow-orange flowers and scarlet fruits that show up well in the fall.

Riverbank Grape (*Vitis riparia*) is a vigorous climber grown mainly for its shiny, leathery foliage. It produces small, dark blue grapes which are chiefly of ornamental value but can be used for making jelly or wine.

Many people enquire about climbing roses but these are not recommended for prairie gardens at present. They can be grown with some success in pots or pails and buried in the garden each winter but this is often more effort than it is worth and we have plants, such as the Dropmore Scarlet Trumpet Honeysuckle, that make this extra work unnecessary.

Most of the Woody Climbers do not require expensive or elaborate trellises but with some chicken wire or baling wire climbers will thrive and quickly cover a large area. Check with your local nurseryman regarding varieties best suited for your locality as he has been working with plants over a good many years and knows from practical experience which will do well. One should be cautious about purchasing varieties from more moderate climates; in most cases these plants are a waste of time and money.



(A) A typical shrub, in full leaf, in a can. (B) After you select your plant, the sides are slit in several places, as shown. Then the slit tin is wrapped for delivery to your home. (C) To plant the shrub, remove wrappings, fold down the slitted sides, as shown, and gently place the ball of soil into your prepared hole. (D) The hole should be 4 or 5 inches deeper and wider than the can. First place 3 or 4 inches of good soil on the bottom of the hole so that the plant will be about 1 inch deeper than before. (E) After placing the ball of soil with plant as indicated, fill the sides with good soil and firm it well. Leave a slight depression around the plant to aid in watering.

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Nursery Stock in Containers

By W. C. SHELMERDINE

Shelmerdine Nurseries Ltd., Charleswood, Manitoba

The time was when all nursery stock, except evergreens, was sold bare-root. If one went into a nursery in the months of June, July and August to order trees, the owner of the place probably would point to a specimen growing in a garden, or guide you around the nursery, or show a picture of the plant. The plant would arrive at your home in the fall or the following spring.

Nowadays all this is changed. In practically every nursery throughout North America it is possible to visit a nursery any time during the summer season, choose the actual plant, put it in your car, take it home and plant it.

This has been brought about by the introduction of plants in containers. The greatest impetus to this development was self-interest on the part of the nurseryman. In the old days he found that he was rushed to death in the spring and fall seasons, and had nothing to offer during the summer. In the southern parts of this continent, nurserymen had discovered early that they could hold plants in growing condition in removable containers until the customer felt ready to purchase. This idea worked north gradually until now we find that most plants are procurable at any time in the growing season, almost everywhere.

Some nurserymen propagate their plants in these containers, but for the most part container stock is a holding proposition. The plant remains in the container from 1 to 2 years. It is most logical for the nurseryman to grow the plant in a pot that will be no larger than necessary when it is sold, to keep down the cost, conserve space, and make it more easily handled.

Many types of pots are used but fiber pots and tin cans are the most popular. The pot must be the right size for the plant at selling time; it must be stable enough not to be blown over by the wind; and must last about 2 years. The 2 most common sizes are 1-gallon and 5-gallon cans. In

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western Canada, most plants are removed from the nursery bare-root and set immediately in these containers for sale during the current and following seasons.

In the more progressive nurseries special types of soil are used to ensure best root development. An analysis of this soil is made and the plant's special needs are determined. The proper mixture of fertilizer is added at canning time. The plants are watered frequently, as much as once a day during the hottest part of the summer. To replace the food leached by the water, and to bring the elements into balance, additional fertilizer is added during the summer. We have been experimenting with a wetting compound to make it easier to moisten the soil after a dry period.

Immediately after the spring dormant season ends the remainder of the heeled-in stock is canned and placed in a holding area until it is established. In the meantime, those which were planted in containers early in the season are brought out to replace this dormant stock in the nursery. This permits the customer to see the plants in full leaf, flower and fruit in a well classified, tidy and clean area.

Some of the advantages of canned stock to home owners are:

1. Stock may be planted at any time during the year.
2. There is no need to trim back.
3. The customer may set out the plants, still in their containers, and rearrange them until completely satisfied that they are in the best positions, before he finally plants them.
4. A sufficient quantity of good soil comes with the plant but the buyer should dig a larger hole for additional soil around the plant.
5. "Instant landscaping" is possible now. Homes bare in the morning may have the look of an established planting, in full leaf and bloom, by afternoon.
6. It is easy to plant immediately without the need of soaking the plants in water for an hour or more.
7. There is practically no loss in transplanting because the roots are not disturbed.
8. Plants that could be planted only at certain times of the year now may be set out from container stock at any time.

As far as the writer can see there will be no reduction in the amount of canning. In fact, it appears that in the not too distant future practically all plants will be sold in containers, including many varieties which are not ordinarily sold, such as raspberry and hedge plants.

We have successfully potted very large specimens of trees and shrubs in over-sized containers. This obviously is quite expensive and must await a public prepared to pay the high cost of this type of work.

In some of the larger centres, nursery stock is sold only in containers. To us this is an indication of what will happen here in the future.

Amateur gardeners want to feel free to plant when the spirit moves. Nurserymen want to keep busy all summer. The canned plant is the answer to both.

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Plant Shrubs for Fall Foliage Color

By P. D. HARGRAVE

Superintendent, Horticultural Station, Alberta Department of Agriculture
Brooks, Alberta

Color contrasts in the garden lend interest and accent during the fall and winter months. Painting this seasonal picture of the garden is done by choosing plant materials as you would colors in painting a picture. You can use foliage color, berry color, bark colors, tree shape, and branch character. Grouping, framing, blending and accenting with trees and shrubs can make the garden of as great interest during the last of the growing season and following it as in any other season of the year.

Picking out the arrangements of plant materials should take into consideration backgrounds, proportions, and views. Buildings finished in rough texture should have blended into them, or accented against them, shrubs with coarsely textured woods; finely finished buildings should have in similar locations shrubs of fine texture. An example of the former would be a home with a rough stucco finish against which you would plant a lilac of the American (Preston) group or a late Hungarian lilac.

The finely textured house would have against it a lilac of the French type with its smooth, finely textured leaves and stem. A house with a dark, rough wood finish or dark coarse brick might have contrasted against it the silver-grey foliage of a Buffaloberry or a Seabuckthorn. A house with white siding might have in comparison the acute-leaf Cotoneaster or the cut-leaf Black Elder; and a white house of stucco or white brick might use the Nanking Cherry, the Highbush Cranberry, or the Red Elder. Super-imposed on this type of thinking we now must introduce our fall colors and here you must gain some knowledge of plant materials with which you live and work. To help in this respect the trees and shrubs that might be used for this purpose during the fall and winter are listed with their characteristics.

Growing season-accent plants, for instance the Golden Elder, carry their colors into the fall and help to bridge the change from green to brilliant color. The first green-leaf shrub to make the change and lend accent is the Burning Bush which turns a flaming red before frost. Other reds and shades of red that accent themselves against the change are: Highbush Cranberry, Siberian Currant, Smooth Staghorn, Aromatic Sumac, Peking Cotoneaster, various rust-immune Barberries, and the red-leaved Crabapples. Foliages with red, orange and yellow are found in the Mongolian Cherries; the Mountainash, particularly the native form; Saskatoons, among which is the white-berried brilliant foliage of Altagold, Sandcherries; Amur and Tatarian Maples; Apricots; Siberian Pear; Chestnuts, Nippon Spirea; and the Manchurian Lilac.

Various shades of yellow and lemon to deep gold lend their background and accent. Trees and shrubs that bring these tints of sunshine to the garden background are: Poplars, Birch, Willows, some Apples and Cherries, Scrub Oak, many Hawthorns, and Chinese Cherries. Other background material that fits into the shrubbery for untrimmed screen planting are the common Chokecherry with its gold to crimson foliage colors, many species of Roses, and the two Hazels. The Manitoba Native Hazel with its brilliant fall colors of copper to crimson is distinctly different to the Beaked Hazel with its golden yellow foliage.

As background planting, or as contrast against the kaleidoscope of colors we can paint with these many shrubs, are the evergreens and the trees that do

not drop their foliage nor change color. Pines, Spruce, Fir, Cedar, and Juniper bridge the seasons from summer through fall and winter. The Laurel Willow, with glossy green leaves holding until well into snowfall, adds to the dark background against which we can recognize the leaves of the Silver Poplar which is similar in leaf-holding character to the Laurel Willow. There are also the pure silver foliage of the Russianolive, the Silverberry, the Buffaloberry, the Seabuckthorn, and the Coyote Willow. As individuals on the city lot, or in clumps in rural planting, these trees and shrubs with their sombre to blazing hues can extend the charm of the garden for many weeks after the snow falls.

If wisely chosen for their fruits, which many bear in profusion, they will also bring to your garden migratory birds to bid farewell to our summer season as they journey southward. Many shrubs hold their fruits well into or through the winter months and supply sustenance to the garden visitor during the extreme winter weather. Among the trees and shrubs that supply fall fruit color as well as winter berries are: Mountainash, Crabapples, Hawthorn, Chinese Cherries, Hansens Bush Rose, Russianolive, Highbush Cranberry, Silverberry, Shrub Roses particularly the Scotch, the Altai and the Turkestan Roses, Burning Bush, Bittersweet, Golden Clematis, Elderberry (red and black), and Seabuckthorn.

As the leaves fall you must look for continuing contrast in the garden so that there will be color during the months when the ground is white with snow. Here we find the black of the Russianolive; the red, golden and green of the Dogwood; the dark brown of the Cotoneaster; the silver and chocolate of the Birch; the bright, shining bark of the Japanese Lilac and the Amur Cherry; and the gold and oranges of the Golden and Redstem Willows. Opposite in color are the purples of the Purple Osier and the Dwarf Arctic Willows; the characteristic bark colors of the May Day tree, with its pattern; the branch character of the Red Elder; and the warm brown of the Manchu Cherry. When we can accent against the wall or in an open space, the branch character of trees, don't forget the Buffaloberry, the Seabuckthorn, the Sumacs, the Oak, the Birch, and the Chestnuts.

So, when you take up your pencil to sketch on paper the outline of your garden picture, bear in mind the design and the colors of the materials we have talked about. Over the years, as your picture is completed, you can have a garden scene extending through the spring, summer, fall, and winter seasons.

Winter Color (Berry)

Altai Rose, *Rosa spinosissima altaica*. Bittersweet, *Celastrus scandens*. Burning Bush, *Euonymus atropurpureus*. Crabapples, *Malus sp.* Golden Clematis, *Clematis tangutica*. Hansens Bush Rose, *Rosa laxa*. Russianolive, *Elaeagnus angustifolia*. Silverberry, *Eleagnus commutata*.

Fall Fruit

Chinese Cherry, *Prunus japonica*. Crabapples, *Malus sp.* Hawthorn, *Crataegus sp.* Mountainash, *Sorbus sp.*

Branch Character

Buffaloberry, *Shepherdia argentea*. Birch, *Betula sp.* Chestnut, *Aesculus*. Oak, *Quercus*. Seabuckthorn, *Hippophae rhamnoides*. Sumac, *Rhus glabra*, *R. typhina*, *R. aromatica*.

Wood

Amur Cherry, *Prunus maacki*. Birch, *Betula sp.* Cotoneaster, *Cotoneaster sp.* Dogwood, *Cornus sp.* Japanese Tree Lilac, *Syringa amurensis*. May Day Tree, *Prunus padus commutata*. Nanking Cherry, *Prunus tomentosa*. Red Elder, *Sambucus racemosa*. Russianolive, *Elaeagnus angustifolia*. Willow, *Salix*.

Foliage Color

Apricot, *Prunus armeniaca sp.* Barberry, *Berberis sp.* Birch, *Betula sp.* Buffaloberry, *Shepherdia argentea*. Burning Bush, *Euonymus atropurpureus*. Chestnut, *Aesculus hippocastanum*. Chinese Cherry, *Prunus japonica*. Chokecherry, *Prunus virginiana melanocarpa*. Cotoneaster, *Cotoneaster sp.* Coyote Willow, *Salix exigua*. Crabapple, *Malus sp.* Cranberry, *Viburnum trilobum*. Dogwood, *Cornus sp.* Elderberry, *Sambucus racemosa and S. nigra*. Golden Willow, *Salix alba vitellina*. Hawthorn, *Crataegus sp.*

Laurel Willow, *Salix pentandra*. Manchurian Lilac, *Syringa velutina*. Maple, *Acer sp.* Mongolian Cherry, *Prunus fruticosa*. Nippon Spirea, *Spiraea nipponica*. Oak, *Quercus macrocarpa*. Pear, *Pyrus sp.* Poplar, *Populus sp.* Purple Willow, *Salix purpurea*. Russianolive, *Elaeagnus angustifolia*. Sandcherry, *Prunus besseyi*. Saskatoon, *Amelanchier alnifolia*. Shubert Chokecherry, *Prunus virginiana melanocarpa "Shubert"*. Seabuckthorn *Hippophae rhamnoides*. Siberian Currant, *Ribes diacanthum*. Siberian White Willow, *Salix alba sericea*. Silverberry, *Elaeagnus commutata*. Silver Poplar, *Populus alba nivea*.



Woody Evergreens

by Grafting and Rooted Cuttings

By R. H. PATMORE

Patmore Nurseries Limited, Brandon, Manitoba

We are often asked why anyone would go to the trouble and expense of grafting an evergreen when they are grown so easily from seed. The answer is, of course, that there is much variation in any species grown from seed and most of them make very poor ornamentals. We graft to perpetuate the form and color of the best ornamental specimens.

For example, 100 Scotch pine grown from seed will produce about 90 trees that are almost worthless as ornamentals, though useful for windbreaks or timber. Of the rest, most will be acceptable, but probably only one or two will have the form of a first class ornamental. Most of the 100 also will lose color in the fall.

The same is true of Colorado spruce, often misnamed blue spruce. The vast majority of these when grown from seed will have no blue coloring whatever, and of those that do many will have poor form. Probably only one in a hundred will have the desired combination of good form and color. This is why real blue spruce are scarce and expensive, and almost unobtainable now that imports from Holland are shut off.

It is possible to create a good form in seedling evergreens by pruning, and the tree will retain this good form as long as this pruning is continued and done properly. Once it gets into the grounds of the home owner who does not know how to do it, nor the necessity for it, it will revert to its original inferior form.

Some evergreens, including White spruce and certain pines, usually are not grafted, though some outstanding specimens are, especially dwarf and columnar forms. Since grafting adds to the cost, the results can be obtained on a lesser scale by growing from seed and drastic culling. We find it necessary

to cull from 35 per cent to 50 per cent of Black Hill spruce and Swiss stone pine so as to leave only the better-shaped trees for ornamentals. With blue spruce and some others where a combination of color and form is rarely achieved, we find it cheaper to graft than to do the excessive culling required.

Colorado spruce can be taken as typical in the process of grafting evergreens. Roots (called rootstocks) for this purpose are grown from seed. We prefer Colorado seedlings, although other species such as Norway spruce often are used. These are grown for 3 years in beds, then potted up in the spring and left in pots until late fall. They are then 4 years old and about the size of a lead pencil above the roots.

After exposure to heavy late fall frosts they are kept in a greenhouse at a temperature of around 50 to 60 degrees Fahrenheit. They are ready to graft as soon as the roots begin to develop new white shoots. Shoots of previous summer's growth from the selected tree it is desired to perpetuate are used to graft on them.

There has been some argument in taking these shoots as to whether there is a factor of apical dominance in spruce and pine, a factor which in certain species, for example Yew and Araucaria, inhibits vigorous vertical growth in any shoots which were not growing vertically on the original tree. In these species a side or lateral shoot will not take on the functions of vertical growth or a leader. We have never found this factor to exist in spruce or pine, cedar, juniper or larch. Within a few years of grafting side shoots are growing upward as vigorously as terminal shoots, but it is necessary to select vigorous shoots wherever they are taken.

A clean, straight portion of the rootstock is selected for the graft about an inch above soil level in the pot. A sharp knife is used to remove a thin portion of the bark about one inch long on one side, just cutting through the bark and slightly into the wood beneath. This portion is not removed but is left attached to the root at the bottom.

The selected shoot is then prepared by removing the needles cleanly from the bottom 1½ inches. Total length should be about 3 inches. This is cut at the bottom so as to form a wedge-shaped piece about one inch long, and is fitted into the cut on the rootstock. The shoot (or scion) should be of such thickness that it fits smoothly into the cut with the outside edges of both rootstock and scion coming together on both sides. The cut piece of bark is then put back into place on the outside of the wedge and the whole is tied firmly together with a special type of cotton. The graft is then brushed over with melted paraffin wax.

Success in grafting depends largely on how the grafts are handled over the next 4 to 6 weeks. Usually they are placed under a plastic tent in the greenhouse in a spot where temperatures will not get too high. We use a humidifier in the tent to keep humidity close to 100 per cent.

Spruce present a problem at this stage due to the fact that new growth when it starts is very susceptible to fungus under high humidity and high temperatures, and this will kill the rootstock. This can be prevented only by keeping the temperature down and by grafting at the right stage when roots are just beginning to show white tips so that they will have at least 4 weeks to callus before susceptible new growth is forced into activity on the rootstock. They must be removed from the tent just before such new growth starts. Pine and juniper are most successfully grafted in this manner, although success with all species is variable. In some years they will be a total failure; in others a catch as high as 90 per cent has been obtained, even with spruce.

It is possible to graft out of doors in late spring, using what is called the inarching method. This can be done if it is not possible to finish them in the

greenhouse, or if the catch is poor. This method is troublesome, however, as it must be done when other work is pressing, and the roots require more care than in a greenhouse. This can be done only with established trees in a convenient spot, and not when scions must be brought in from distant sources.

We have avoided the fungus problem in spruce by grafting in late summer after growth has hardened off. This has been reasonably successful, but not as convenient as winter grafting, as it is difficult to control temperatures under glass at that time. In the spring these small, grafted trees are planted in nursery rows. From now on their life is uneventful beyond staking, hoeing, cultivating, and root pruning which is necessary to make them more easily transplanted without loss. Tops of rootstocks are cut off just above the graft at the end of the first summer when the grafts will be well established and able to feed the root.

From the time the seed is sown to produce a rootstock, these trees have been growing for 10 to 12 years, and are about 2 feet high. Fortunately slow growth is confined to the earlier stages. Another 10 years' growth will get them up to 15 feet or more if properly cared for; in no other line of business is it necessary to wait that long to get a return on an investment.

Varieties of blue spruce grown in this way include Koster's, Morden, Endtzi, Hoopsi, the Dwarf Montgomery and a new one of which we got scions from the Arnold Arboretum of Harvard University 2 years ago, called Baker's spruce. We were fortunate to get a good catch with these and hope to propagate them on a larger scale if they appear to have features that make them desirable.

Among new evergreens available for grafting is a dwarf compact form of Douglas fir which we are trying and which we hope to get into production in the near future. One of the most difficult trees to graft is the larch or tamarac. The selected Sutherland form of Siberian larch is an excellent ornamental but if we get 20 per cent to take we consider ourselves successful.

Certain juniper selections, including the columnar and dwarf blue forms of *scopulorum* must be grafted as they will not root from cuttings. These present a problem with rootstocks, as they will graft well only on their own species. They will not take well on the roots of Hetzi juniper which is preferred for grafting because of the bushier root system it develops. *Scopulorum* must be root-pruned more frequently to get this bushy root system.

Other species of juniper such as *sabina* and related species as well as all species of cedar (*Thuja*) take readily from cuttings. They can be rooted from new shoots under mist beds in the summer, or from winter cuttings in the greenhouse. We prefer the latter as it gives us more vigorous plants in a shorter time. Cuttings about 3 or 4 inches long are stuck in sand in greenhouse benches in October. They begin to root in late February or early March and are moved into beds out of doors in late May after danger of frost is over. After 2 years in beds they are transplanted into field rows to grow into salable trees.

The result from a rooted cutting is the same as from grafting. It perpetuates the desirable features in a selected ornamental specimen and all the variations in form and color that result in trees grown from seed are avoided.

Certain spruce will root from cuttings. These include the Montgomery dwarf blue and some forms of the Norway spruce such as the very attractive dwarf *mucronata*. We find that Montgomery has much more initial vigor when grafted and we prefer to graft them for this reason; also the catch is better than with rooted cuttings.

Landscaping for the Amateur

By JOHN A. WALLACE

The Beaverlodge Nursery, Beaverlodge, Alberta

In planning a landscape it is important that the planner be acquainted with the plants he is using if the full benefit of these plants is to be obtained. In the first place, he should learn what plant material is best suited to the area. Then he should choose from this listing those plants of rugged constitution for the exposed locations on the south and the west which are subject to our prevalent winds and sun. Winter winds can sweep protective snow cover away and the sun can cause violent changes in temperature when reflected from walls, causing serious injury to any but the hardiest plants. An east exposure is choice, and a much wider range of plants can be grown since this area gives good shelter and adequate summer sun for the well-being of most plants.

A north exposure poses problems since bright colors are required to obtain contrast because of poor lighting. However, there are ample species and varieties of plant material adapted to shady spots. Since midsummer sunshine in the north ranges from far to the north both morning and evening, most plants thriving in semi-shade may also be grown in a north exposure, unless wall projections or wide overhanging roofs interfere with this lighting.

Many owners find it most difficult to visualize a planting about their new home with only nakedness now apparent. For such owners, it is best that they exercise patience, obtain and study plant recommendations for the area, and visit local plantations with a view to acquaintance first-hand with the various plants. The Alberta Horticultural Guide and its counterparts in Saskatchewan and Manitoba are reliable sources of information and plant lists. Experimental farms, universities, parks and your local nursery firms are places to view a wide range of plant materials where lists of desirable plants can be made. The more visits through the plantations the better. Since few plants are at their best for more than a period each season, it takes a combination of plants to fill the complete year with interest. While compiling these plant lists, your local nurseryman's catalogue can be studied to advantage so as to gain further knowledge of chosen plants.

It is important to prepare a scale plan of your grounds before any serious planting is done, so that a jungle is avoided. This plan should be sufficiently large to accommodate symbols to indicate individual plants. A code number for plants is one way of saving plan space; each plant variety is given a number, and this number only is used on the plan, with the code entered on some blank space on the plan for reference. Guidance in the manner of placing lawn areas, screens, hedges and other plantings can be gained from Canada Department of Agriculture publications on the subject, obtainable free of charge from your nearest experimental farm or district agriculturist. There are also excellent books on landscaping that are well worth the small outlay for those who wish to do a good job of their plantings.

The general principles of landscaping, namely, using the dwelling as the picture, and the plantings as the framing of the picture, should be stressed. Large trees should form background and also height to the sides of the property. Smaller blooming trees and shrubs can be planted in front of these to add color to the green background. Low-growing and intermediate shrubs and evergreens are used in the foundation planting which ties in the lawn to the dwelling, and in side beds with perennial and annual flowers to complete

the picture. Properties with reasonably wide frontage may use 1 or 2 specimen trees towards the front and at the sides. It is wise not to plant trees in the front lawn and, while low and intermediate hedges were once used to divide the lawn from the street or road, it is better practice for lawns to continue to the front of the property.

Accent plants are very effective in breaking monotony of color, but should be used sparingly. These include Golden Elder, Shubert purple-leaf chokecherry and others of leaf color other than green. Winter bark color can be effective in combination with various evergreens; plants in this category include Amur chokecherry-bronze, Redosier or Red Siberian dogwood, birch, etc.

While following these general landscape principles, there is ample scope to vary the selection of plants and their placement. There is the happy thought too that annual and most perennial flowers, and some of the smaller shrubs, can be moved or replaced with other varieties from time to time. This is a way by which enthusiastic gardeners can try their hand at improving their plantings to suit their desires. But, the larger trees and shrubs should be planted for permanence as moving could cause them permanent injury. One esteemed perennial, slow to become established, also resents moving, and this is the peony.



Native Plants for the Flower Border

By H. H. MARSHALL

Head Gardener, Experimental Farm, Canada Department of Agriculture,
Brandon, Manitoba

The prairies of North America abound in colorful wild flowers. Early plant explorers were attracted to many species and sent a large number home to Europe for trial where undoubtedly selection took place. As a result many important ornamentals have been developed from North American plants. One eastern nursery lists 86 varieties of 26 perennial species originating in this manner.

A few species are useful border plants in their native state. Among these are columbine, New England and smooth asters, button blazingstar, prairie lily, false dragonhead, coneflower, and for foliage *Thalictrum* and ostrich fern. In general these are not as showy as more common garden flowers. Most gardeners will use them sparingly for special effects or for personal reasons.

A large group native to high, dry prairies are extremely drought-tolerant but do not thrive in cultivation. They are intolerant of prolonged wet conditions and require full sun to remain healthy. They may be shaded seriously by ordinary garden flowers or weeds because usually they are quite low-growing. Prairie anemone, locoweeds, dotted blazingstar, round-leaf bell-flower, penstemons, prairie bluebells and native cacti may be grown in a raised or south-sloping bed of porous soil in full sun. They will survive but may grow better if watered sparingly in the driest times. Do not attempt to keep them moist.

Named varieties have been developed from many native species which, in their unselected state, are much less attractive. This is particularly true in *Aster*, *Gaillardia*, *Geum*, *Heliopsis*, *Helenium*, *Heuchera*, *Lilium*, *Monarda*, *Penstemon*, *Rudbeckia* and *Solidago*. Unfortunately much of the selection was done with southern races in areas with a milder climate than ours and

that hardiness so essential in our Canadian prairie plants is lacking. Where hardiness or other characters are wanting in named varieties, the closely related native species may be a valuable source of genes for hardiness, early flowering, disease resistance, etc.

Work is underway to develop varieties adapted to the prairies. The Canada Department of Agriculture Experimental Farm at Morden has released several varieties of perennial asters. Interesting work with the many species of penstemon is being done by Glen Viehmeyer at North Platte, Nebraska. Several people have been working with lilies. New varieties of *Heuchera*, *Monarda* and *Geum* have been released or are under development at the Brandon Experimental Farm. *Heuchera* (Coral Bells) Brandon Pink was given an Award of Merit by the Western Canadian Society for Horticulture in 1965. A red Coral Bells is expected to be released soon.

Monarda (beebalm, bergamot) hybrids are producing attractive large plants. They flower in a wide range of colors from white through many shades of red and purple. Polyploids seem particularly interesting. Two varieties, Minnedosa, a white native, and Souris, a purple first-generation hybrid, were released to nurseries in 1965.

In the large genus *Geum* (avens) some difficulty has been experienced in crossing such varieties as Mrs. Bradshaw with native species. One fertile hybrid has been obtained but it is too tall to be really attractive. It might be useful as a parent in further crosses.

This is not a complete listing of native plants that could be grown in the border. If you wish to cultivate a particular wild flower, study the conditions where it is found and duplicate them as well as possible. Note the type of soil, the amount of moisture available, and the light conditions. Plants will tolerate some change in conditions but a large change will give poor results.

Many native flowers will not make satisfactory border plants and some thrive so exceedingly well that they take over the entire border and become unwelcome weeds. Native sunflower, goldenrod and aster species are outstanding examples in this group but others can be troublesome. If they are grown the gardener must be diligently ruthless in destroying unwanted plants.

Some plants require special symbiotic conditions to grow well. Lady-slippers thrive only in the presence of certain fungi which in turn are dependent on a supply of suitable organic matter in the soil. The Indian paint-brushes are root parasites on other plants and languish away from their host species.

Probably it is best not to attempt to cultivate rare species or those requiring very specific conditions unless they are in immediate danger of extinction by overgrazing or the plough. They should be left to grow where their ancestors have thrived for ages.

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Superintendent, Tree Nursery, Prairie Farm Rehabilitation Act
Indian Head, Saskatchewan

The Indian Head Tree Nursery (formerly the Forest Nursery Station) has played a major part in the landscaping of farm homes of the prairie region since 1904 by supplying trees for shelterbelts. However, nursery operations, like most horticultural businesses, are beset with problems which disrupt production of tree seedlings.

Supplies of viable seed must be procured and maintained to offset seed crop failures due to frosts, insects and diseases. Harvesting of immature seed results in storage losses and poor seedling stands so that indices of maturity must be resolved and utilized to ensure that only mature seed is harvested. For example, Colorado spruce should not be harvested until the cones have fallen to a specific gravity of 0.94 or when 9 of 10 cones will float in linseed oil. On the other hand, elm seed is not mature until the moisture content falls to 35 per cent; and will retain a viability of 80 per cent for several years when stored in polyethylene bags at 0°F, but only if dried to 5 per cent moisture.

Failures of seed to germinate and produce seedlings may be due to seed dormancy, damping-off diseases or insect infestations. Insect-infested seeds usually are removed by cleaning, and a pre-sowing treatment called "stratification" is required to break dormancy. Seed of Colorado spruce have been found to require storage in damp sand at 41°F for 15 to 30 days prior to sowing to break dormancy. Damping-off diseases may be controlled by seedbed application of Vapam at 150 to 450 pounds to the acre 2 weeks prior to the sowing of conifer seed, and post-sowing weekly drenches of Captan and Tersol at 2 ounces to the gallon reduce post-germination losses.

Weed control for nursery production is a serious problem due to the increasing cost of hand labor, and chemical controls with selective herbicides offer one alternative. The popular herbicides, such as 2,4-D and Simazine, are either lethal or phytotoxic to most tree species in the nursery. Regrettably, much work remains to be done to evaluate and select reliable and non-toxic herbicides for nursery operations. Two herbicides, DNBP and Tenoran, appear promising as pre-emergent sprays for weed control with caragana and elm. Nevertheless, to date no herbicide has been found satisfactory for general use to control weeds in hedges, shelterbelts or other ornamental plantings. The hand and the hoe remain the most reliable tools.

Storage of tree seedlings over the winter, and packing methods for distant shipments are other problems under study. Unfortunately, tree seedlings must be mature prior to lifting for best storage, and too frequently normal leaf-fall is not a true index of plant maturity, but most woody species are mature when the moisture content falls to 45 per cent.

Deciduous tree seedlings require high humidity and a temperature of 28°F for best indoor storage as bare-root plants, but heeling-in outdoors generally is more satisfactory storage for most plants if climatic conditions permit. Both deciduous and coniferous tree material must remain dormant until planted for best survival and growth, unless transplanted from containers. For

this reason it is essential that trees and shrubs be stored so as to maintain dormancy until packed and shipped to the planter.

Scarcity and cost of hand labor have been another major problem which forced mechanization of fall harvesting and spring packing operations. Pallets and fork lifts are used now to convey tree seedlings, replacing manual handling and moving. A complex tree lifter, which root-prunes, lifts and loads one million seedlings a day into pallets, has replaced the old U-plow and hand-pulling of seedlings. Seedlings are sorted and counted indoors then conveyed to mechanical tyers instead of hand-sorting and tying in the field prior to fall storage. Conveyor belts carry tree orders onto moss and pre-cut burlap, then to wrappers using pneumatic staples, to banders and to shipping vans, replacing manual carrying and sewing of bales. These mechanical operations have increased the speed and capacity of fall harvesting operations by 33 per cent, and of tree packing operations by 76 per cent, so that one million trees may be processed daily.

Other problems such as insects and diseases, irrigation, fertilization, drainage and salinity must be resolved for satisfactory nursery operations on the prairies. These and other related problems are being investigated at the Tree Nursery.



Maples in the Arboretum . . .

at the Morden Experimental Farm, Manitoba

By W. A. CUMMING

Research Officer, Ornamental Horticulture, Canada Department of Agriculture

In discussing the performance of maple species and cultivars at Morden, I have grouped them as to origin rather than botanical classification. Starting with native Manitoba species, then to other North American species, progressing to Asiatic species, and finally to those of European origin.

Besides those which are discussed in this article there are a number of species which are in the process of being established in the permanent plantings at the Morden Experimental Farm. The search for and the evaluation of hardy, woody ornamentals is continuous at Morden. In maples alone, seed of 18 species has been secured from various sources and planted within the last 3 years.

Native North American Maples

Acer negundo — Ashleaf maple, Boxelder, Manitoba maple. Of the 3 common names by which this maple is known Ashleaf is the most appropriate. The common name elder belongs to an entirely different group of plants. Manitoba is only a small section of its natural habitat which extends from the New England states through Ontario, the southern part of the 3 prairie provinces, and south to California. Undoubtedly it is one of the hardiest maples and was transplanted from its natural habitat along creeks and rivers by the early settlers who used it freely for street planting, specimen shade trees and shelter for the homestead. It has been widely used also as a shelterbelt tree on the prairies. Pioneers tell of tapping the trees and making syrup from the sap.

The Ashleaf maple is a fast-growing, relatively short-lived tree that quickly becomes scarred and ugly; some specimens are grotesque but might

even be considered picturesque by some people. Its prolific seeds germinate easily, seedlings often becoming a weed problem in adjacent gardens and ornamental plantings, as well as being subject to attacks by a number of insects. It is recommended only where other trees do not succeed, and does not appear on the Manitoba List of Recommended Trees and Shrubs.

The purple-twiggled form, *Acer negundo violaceum*, appears to be equally hardy but with the same faults as the species. The golden-leaved form, *Acer negundo 'auratum'*, originated in California and kills back severely at Morden. In 14 years it has grown only to 6 feet and remains a bright golden-leaved shrub.

Acer spicatum — Mountain maple. Is the only other species native to Manitoba. It grows to be a large shrub 8-10 feet high, with light green, lobed leaves. The flowers are borne on narrow, upright spikes; seeds are bright red for several weeks in the early fall. The leaves too are more or less tinged with red at this season. It is useful as a hardy, large, background shrub.

Acer saccharinum — Silver maple. Hardy strains of this eastern Canadian maple, whose natural habitat swings south through eastern Minnesota, grow into large trees in the more favored areas of the prairie provinces. The leaves are sharply 5-lobed, bright green above, lighter beneath with a silvery sheen. The bark is smooth, grey with a silvery tone in early spring, becoming furrowed as the tree gets older. Young branches and petioles have a reddish tinge. It should be secured from locally grown stock.

Acer saccharum — Sugar maple. Canada's National Emblem. Trees at Morden grown from seed from northwest of Detroit Lakes, Minnesota, the nearest native stand, have proved to be the hardiest geographic race. Third-generation seedlings, grown from seed produced at Morden, are now under test. By selection in each succeeding generation, a hardier strain will be developed. Trees grown from seed collected in the Fort William area are not as hardy as the Detroit Lakes strain; eastern Ontario strains are tender. We have reached the stage where the hardiest strains can be planted in the more favored areas of Manitoba with a very good chance of success.

Acer rubrum — Red maple. So far this species, which provides much of the gorgeous red, fall coloring in the native forests of eastern Canada and the United States, has not proved hardy at Morden. Plants received from Ottawa 10 years ago have killed back every winter to become multi-stemmed shrubs. Seed from a native stand 40 miles southeast of Kenora, along the highway from Kenora to Fort Frances, was collected in 1963; seedlings have been planted out at Morden and some have been sent to other test areas on the prairies. Dryness and alkaline soils may be a limiting factor in the successful establishment of this species.

Acer glabrum — Rocky Mountain maple. One specimen, planted in 1950, has shown no winter injury and has grown into a large shrub, 12 feet in height, but later plantings have failed to become established. Douglas's form of this species is of more northerly distribution and seedlings of it now on hand may prove better adapted.

Acer circinatum — Vine maple. Native to the west coast. One plant, which has survived for over 20 years at Morden, has consistently killed back to remain a 2- to 3-foot shrub.

Acer pensylvanicum — The Striped maple. A native of eastern Canada and the United States. It is a small, shade-loving tree with very conspicuous white striped bark. Seed from several sources has been obtained lately in an attempt to establish plants at Morden.

Acer nigrum — Black maple. Closely related to sugar maple but of more southerly distribution, has failed to become established at Morden.

Asiatic Maples

Acer ginnala — Amur maple. Native to northern and central China, Manchuria and Japan. This shrublike maple, from 10 to 15 feet in height, has become one of the most popular large shrubs on the prairies. Its bright red fall color of both leaf and seed add much to its landscape value. Except in poorly drained, heavy calcareous soils, where it is subject sometimes to chlorosis, it does extremely well. Careful selection of seed parents will greatly improve the fall coloration in this species.

Acer tataricum — Tatarian maple. Very similar to Amur maple except that it is taller with leaves not so deeply lobed. The seed is red in early autumn but the leaves turn golden yellow. This species hybridizes naturally with Amur maple and for this reason it is becoming increasingly difficult to obtain true specimens of the Tatarian maple.

Acer triflorum — Three-flowered maple. In 20 years this trifoliate maple grew to 25 feet in height, which, according to Rehder, is its mature height. Unfortunately these trees were removed to make way for another project and seedlings raised from them failed to become established at Morden. On the other hand, they appear to be doing well at the Provincial Horticultural Station at Brooks, Alberta.

Acer truncatum — Purpleblow maple, the common name referring to the purplish tinge of its unfolding leaves. Although this species killed back severely in its early years at Morden, it has now after 25 years reached mature height and has not shown injury in later years. For a maple it has rather striking, greenish yellow flowers about ½ inch in diameter borne in upright spikes. Its handsome leaves are dark green, 5-lobed and truncate at the base.

Acer mono — Mono maple. Kills back severely most winters and in 12 years has become a spreading shrub to 6 feet high. In more favored climates it is reported to grow 70 feet.

European Maples

Acer platanoides — The Norway maple. Is quite variable in hardiness even in seedlings produced from locally grown seed. The oldest trees at Morden, planted in 1941, have now reached a height of 35 feet. It should be possible to improve the hardiness of this species through selection in several generations such as we are doing with Sugar maple. It is possible also that seed from hardier geographic races can be secured. None of the popular red-leaved cultivars are hardy. 'Crimson King' has consistently killed back over a period of 12 years, to become a 6-foot shrub. 'Reitenbachii' has survived for 25 years but is less hardy than 'Crimson King.' 'Schwedleri' is slightly hardier having reached a height of 12 feet in 10 years.

Acer dieckii — A hybrid of Norway maple and Chalk maple. Appears to be quite hardy at Morden. It has grown into well shaped, small trees about 20 feet high in 12 years.

Acer campestre — Hedge maple. Fifteen-year-old plants have grown into dense, shrublike, small trees about 25 feet high and have proved quite hardy so far. A specimen of this species in Dr. F. L. Skinner's collection at Dropmore, Manitoba, was doing well until it was rooted out accidentally. The dwarf cultivar 'Compactum' has come through 2 winters unscathed at Morden and appears promising.

Propagation of Trees for Windbreaks and Reforestation

By J. CHEDZOY

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The Provincial Tree Nursery at Edmonton is responsible for growing annually approximately 2,500,000 trees for the Department of Agriculture Shelterbelt Program and for the Department of Lands and Forests for reforestation. In the spring of 1965, 1,992,835 trees were shipped to 4,952 farmers for shelterbelts, roadside plantings, and windbreaks; and 600,000 Evergreen seedlings were sent to the Department of Lands and Forests for planting directly in the bush on prepared sites. In addition to field-grown trees, 100,000 trees were grown and shipped to Forestry in containers.

Species of trees for the shelterbelt program are White Spruce, Colorado Spruce, Lodgepole Pine, Scotch Pine, Caragana, Boxelder or Manitoba Maple, Green Ash, Willows, Poplars, Late or Villosa Lilac, Honeysuckle and smaller numbers of other species and varieties. Trees grown for forestry are White Spruce, Lodgepole Pine, Douglas Fir, Scotch Pine, and Engelman Spruce. Most of the forestry trees are grown in seed beds until they are 3 years old. Evergreens for the shelterbelt program are transplanted once and usually shipped when they are 3-1 (4 years old), 3-2 (5 years old), and 3-3 (6 years old) transplants. All deciduous trees are either 1 or 2 years old when shipped.

Five main methods are used in propagating trees at the Provincial Tree Nursery, i.e.: Directly from seed; hardwood cuttings, from mature wood usually in the winter or spring; softwood cuttings, made in the summer or spring from the current year's growth; grafting; from seed grown in containers under controlled conditions.

Trees grown from seed are handled in 2 ways, one of which is direct seeding in the field either in the spring or fall. Species grown this way include Manitoba Maple, Green Ash, Honeysuckle, Lilac and Caragana. Other trees are sown in seed beds and later transplanted out in the field. Evergreens such as Spruce and Pine are stratified for between 30 and 60 days in damp peat moss at 32 degrees Fahrenheit before seeding. After stratification, the seeds are broadcast in seed beds, lightly rolled into the surface of the soil, and covered with sand to a depth of ¼ inch. After sowing, the seed beds are covered with snow fence for shade and left on until the second year when the snow fence is rolled back on cloudy days until the plants are light-hardened and then finally removed. Until the seeds have germinated they are watered frequently but great care is taken not to overwater. Overwatering is considered one of the major causes of damping-off in seedlings in their early stages.

Sand also is used to cover the seeds instead of soil; it helps to prevent damping-off by keeping the surface of the seed beds drier, and does not produce favorable conditions for the damping-off fungi. Some deciduous tree species also require stratification of their seed before sowing, for various periods. Apart from the stratification period the seeds are handled in the same way as evergreens in the seed beds. Snow fence is used to cover the seed beds sown with deciduous seeds, but is taken off after a few weeks as most deciduous trees do not require the amount of shade needed by evergreens.

All evergreens at the Nursery grown for the shelterbelt program are transplanted at the age of 3 years, and are shipped to farmers for planting as

3-1, 3-2, or 3-3 transplants. A few species of deciduous trees such as Mountainash, Hawthorn, and Roses, are transplanted for one year before distribution.

The Poplars and the Willows are propagated from hardwood cuttings made during the winter or spring and stored in polyethylene bags at 0 degrees Fahrenheit until ready for lining out in the field. Before the cuttings are planted the land is thoroughly worked to a depth of 6 inches. The rows are marked with a marker mounted on a tractor and the cuttings are pushed into the ground until only the top bud is showing (cuttings are 4 inches long with 3 or 4 buds). After the cuttings are lined out at approximately 2 inches apart, the field is watered very heavily until the soil is well packed around the cuttings. They are watered periodically until rooted, usually about 3 weeks. Cultivating is avoided during the rooting period as any disturbance of the cutting during this period is detrimental to growth. Hardwood cuttings are grown for one year only and are lifted in the fall of the same year as planted. After lifting, they are heeled-in for shipment the following spring, and during the winter the tops are cut off and used to make cuttings for the next year.

Softwood cuttings are made during the summer months from the current year's growth. Most trees at the Nursery grown this way are used in provincial parks and include species such as Juniper, Cedar, Potentilla, Spirea and others not readily started from seed. Two ways are used to root softwood cuttings; the first is rooting the cuttings under mist in sand with bottom heat; and the second, rooting them in sand under plastic tents. The mist system can be used in the greenhouse or outside. The mist-cycle is controlled either by a time clock or a sololral which switches on and off according to light intensity.

Most of the cuttings to be rooted are cut just below a node or in the case of most evergreens some of the previous year's growth is taken on the heel of the cutting. The cuttings are dipped in a hormone powder (various strengths are used for different species), inserted in a bed of sand with bottom heat of about 65 degrees Fahrenheit, and kept under mist until rooted. The time the cuttings take to root varies considerably with different species and varieties; some root in a few days and others need several months. After rooting, the cuttings are potted up and grown on to be lined out at a later date.

Cuttings rooted under plastic tents are handled in the same way as those grown under mist. The plastic cover is used for the same reason as mist, that is, to prevent desiccation and to promote a favorable environment for the cutting to root in.

Rootstocks for grafting are potted a year before needed and brought into the greenhouse a few weeks before they are to be grafted. Many types of grafts are used depending on the species to be grafted. The only grafting done at the Nursery is for the Department of Lands and Forests; and the grafts are from selected trees needed for future seed production and consist of Pine, Spruce, Larch, and Douglas Fir.

The growing of Spruce and Pine seedlings in containers for the Department of Lands and Forests is a comparatively new approach to the planting of trees in forest areas. Containers used at present are made of plastics of various strengths and are about 3 inches long and one inch in diameter. The container is constructed in such a way that it will either break or open as the seedlings grow. After the seedlings are between 12 and 16 weeks old, they are taken to the planting site and the containers with the seedlings in them are planted out at 8-foot spacings. The object of growing seedlings this way is to get them into permanent positions without too much root disturbance.

Various methods have been tried to get 100 per cent germination of seeds sown in containers, and the method that has given the best results to date

has been sowing the seeds in the containers in a good soil mix, watering well, and covering with a plastic. They are then stored in a refrigerated room between 34-36 degrees Fahrenheit for 60 days. At the end of that time they are moved to the greenhouse and placed under mist until the seed has germinated. After the seedlings have grown for 4 weeks, they are hardened off outside and kept at the Nursery until they are 12 to 16 weeks old when they are moved to the planting site.

Although container growing is done at present only for Forestry, it may in the future have an application in the growing of trees for farm shelterbelts.

*

Dwarf Hedges for the Home Lot

By H. T. ALLEN

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Modern homes, constructed on a minimal land area, do not allow much space for boundary plantings of hedges or shrub borders, nor do such plantings lend themselves to open unobstructed view as recommended in housing developments. Structural barriers saving space and upkeep costs, provide the home owner with a precious bit of outdoor privacy instead of the large hedge which has a definite place on rural properties. Where space is limited the low types may be considered.

A hedge may be required in the front property area to discourage pedestrian traffic from crossing lawns or other plantings. Hedges may be used also to demark driveways from expanses of lawn; to form backgrounds for floral plantings; to separate the front public area from the back private area; or to form a border between fruit or vegetable gardens and private or play grounds. We often see low hedges as foundation planting for long, low commercial buildings. Most homes do not lend themselves to such plantings but a low hedge might be considered as an aid to lowering the appearance of a high foundation, or to fill the space between a walk and the foundation which is too narrow for other plantings. The really dwarf hedge may be a border subject in a variety of situations.

First of all, the low hedge must be hardy and suited to the location for the very fact that the hedge is low in the first place does not leave much room for error if winter injury should occur. The plant material should possess small leaves and fine branches, and have a natural tendency to bushy growth. Other attributes worth considering are leaf texture, colorful bark and foliage, fall and winter color, spines, and interesting seed pods or fruit.

In gardening publications from warmer climates we are often shown illustrations of formal gardens where the Korean Box is used extensively as a border subject; unfortunately it is not hardy in the prairie region. The Peking Cotoneaster, *Cotoneaster acutifolia*, is hardy, has a wide range of adaptation, possesses small leaves with a highly desirable texture that color attractively in the fall, produces a bushy, fine-stemmed growth, and responds well to pruning. In most situations it is grown as a 2- to 3-foot hedge but where a hedge 6 to 8 inches high is required this species will do the job. The author has maintained a hedge at this low height for several years, in a northern exposure, as a border between a walk and foundation plantings. To achieve this, seedling plants were spaced 4 inches in the row, and although close cropping is required 3 or 4 times a season to maintain the desired height and

neat appearance, the chore is neither difficult nor time-consuming. Such hedge treatment may not be correct landscaping practice but it has served the purpose for which it was intended by providing a foundation planting effect in a difficult exposure. This species could be used as a low border hedge for formal gardens or as a low border between a walk or a driveway and floral plantings.

Two- to 4-foot hedges, 40 to 50 years old, of the Pygmy Caragana, *Caragana pygmaea*, are not uncommon. Thirty years ago the author helped to plant a hedge of this species as a border separating a lawn area and the public sidewalk. It has been maintained at a height of about 12 inches and is still a compact, neat-appearing hedge today. This caragana has very fine foliage; is low-growing and requires only a light trimming once a year; and has small spines which help to protect it from abuse. It could be maintained very well at a lower height for many years if so desired.

The Shortleaf Caragana, *Caragana brevifolia*, is recommended by the Canada Department of Agriculture, Morden Experimental Farm, Manitoba, for a dwarf hedge that can be maintained at a foot high. It is hardy, has fine leaves, and is less subject to red spider infestation than the Pygmy Caragana.

Two species of Euonymus, *E. nana*, Dwarf Euonymus, and *E. nana turkestanica*, Turkestan Euonymus, also are recommended by Morden. The former is the more dwarf and is well adapted to shade and soils that do not have much lime. It has been maintained as a foot high hedge at Morden for 30 years; it is a good dwarf shrub in central Alberta; and no doubt would make a satisfactory hedge. The Turkestan Euonymus is somewhat hardier and taller-growing and does well in either sun or shade. Both types are thin-stemmed and have long, narrow leaves that color well in the fall.

The Alpine Currant, *Ribes alpinum*, is well suited for a low hedge 1 to 2 feet high, and tolerates shade. The small, glossy leaves are attractive in the growing season, and fall coloration prolongs its ornamental value.

Several plants are noted for their flower color and possibly the best species for a low-growing, flowering hedge, is the Shrubby Cinquefoil, *Potentilla fruticosa*. It produces bright yellow flowers early in the season and may continue flowering throughout the summer. For maximum flower production it should receive a minimum of pruning and is best if allowed to grow in its natural form. Several species of Spirea and Roses also will form flowering hedges but for the most part are too tall for our consideration here. Froebel Spirea, *Spiraea bumalda froebeli*, could be used as a low-growing flowering hedge but should be cut back severely each spring to promote ample new growth on which the flowers are formed.

There may be a place in the landscape for low-growing evergreen hedges and 2 species that might be considered are the native White Spruce, *Picea glauca*, and the Rockymountain Juniper, *Juniperus scopulorum*. The former has shorter needles than the Colorado Spruce and thus is easier to maintain as a small hedge. Careful and timely pruning is necessary as evergreens do not recover from severe pruning as do deciduous species. The Rockymountain Juniper produces dense growth and makes a very good low hedge but should not be grown in areas where cedar-apple rust is likely to cause severe injury.

The species named here are readily obtainable and although there are more-dwarf selections of some, it would be difficult for the average gardener to secure plants in sufficient quantity for hedging. One of the secrets for a good dwarf hedge is close spacing, thus promoting compactness and a natural decrease in seasonal growth. Close spacing may modify environmental conditions, and to maintain a healthy hedge one must be ready to control insects and diseases, and maintain nutritive and moisture supplies when needed.



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A Tree Plantation of Interest

By D. LOCKWOOD

Saskatchewan Department of Natural Resources, Regina, Saskatchewan

In 1948, a co-operative afforestation project was started by the Canada Department of Agriculture Forest Nursery Station, Indian Head, and the Rural Municipality of Wheatlands, Mortlach. We can now look over the plantation and see how successful some of the species have been, and how they have grown over the intervening 20 years.

There are not very many plantations on the prairies in which so many species have been tried with periodic plantings over such a long period. My purpose in this article is to comment on the way some of the species have grown over the 20-year period. As I have no information on maintenance, weather after planting, etc., I will make no comments on survival.

This area is owned by the Rural Municipality of Wheatlands and lies north of the Trans-Canada Highway near Mortlach. It is a site comparable to many others on the prairies. The very light, sandy soil was ruined for agricultural purposes in the dry '30's. The area was one of sand hummocks and blow-out pits with a general southerly exposure. There is a good water table within reach of established tree roots.

Maximum height growth of a tree can be taken as an indication of the success of the tree on the site. Good height indicates that site factors are favorable to the growth of the tree or, looking at it the other way round, that the tree finds the site a satisfactory one on which to grow. We must remember that site factors include all the influences to which the tree is subject: weather, available moisture, soil type, and perhaps some human activities.

At least 5 species of evergreens and 27 species of deciduous trees were set out on this plantation. Species were planted in rows running north and south, most rows being of a single species. Planting started on the west end and continued eastward with rows of different species being added periodically. Altogether, about 225,000 trees were planted. The growth and present health of each species indicates how successful each can be on this type of soil in the prairie climate.

Scotch, Lodgepole and Jack pines, White and Colorado spruces were planted in several locations throughout the conifer and deciduous rows. As would be expected, the pines grew faster than the spruce. Of the pines, the Scotch has grown as much as 36 inches in one year and looks very healthy. Many Lodgepole pines are not far behind but the Jack did not look well and had much less growth. The Colorado spruce looked well, with growth between 6 and 12 inches per year. The White spruce grew a little faster but looked much less healthy.

Among the deciduous stock, the poplars over the years have grown very quickly. They show a few cankers but this does not appear to be a serious problem. The Saskatchewan, Dunlop and Northwest varieties or selections of poplars have exhibited good growth and form. The Manchurian elm, I believe, has done as well as the poplars for growth. It has been proved able to grow well in severely eroded areas and in areas of topsoil and sand accumulation. The Manitoba maple has grown into a branchy tree, almost a bush form. The form of the Green ash and the American elm is good but the growth is slow.

Some willows were planted and look healthy, but so far as form is concerned they are a mass of branches. The site would seem hardly suited

to willows. Several other trees and shrubs were planted but with mostly poor results, and they are hardly worthy of comment.

Of all the trees planted, the growth, form and health of the poplars, the Scotch and the Lodgepole pines appear to be the best, thus indicating the suitability of these species for this type of soil. The growth and the hardiness of Manchurian elm also are very outstanding; the less said about its form the better.

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Fertilizers for Ornamental Trees and Shrubs

The color and vigor of ornamental trees and shrubs are the best indicators of the need for fertilizer; large, healthy green leaves and vigorous new growth indicate a good supply of nutrients.

On fertile soils in the country where growing conditions are ideal, trees and shrubs usually will not require fertilizing; but in the city, especially when growing in sod, they will often respond. The best time to apply fertilizer to trees and shrubs is in the early spring just before growth starts. Application should be early to give the fertilizer time to get down to the roots before much new growth has occurred.

For established deciduous trees in sod, the best and simplest method of applying fertilizer is to make a series of holes 12 inches deep and 3 feet apart around the tree, starting 2 to 3 feet from the trunk and extending to the tips of the branches; 3 to 6 feet beyond the branch tips with old trees.

For small species such as Mountainash and Rosybloom crabapples, and for young trees of the larger species, pour 2 tablespoons of 16-20-0 or 11-14-7 into each hole, and for larger trees 4 tablespoons. After applying the fertilizer, place the garden sprinkler under the tree and let it run for several hours.

It is important to water regularly when fertilizing trees and shrubs since drought may induce fertilizer burning. Application by means of a series of holes is recommended in sod because broadcasting fertilizer over the surface of the lawn may be of little value, the grass taking up the fertilizer before it has a chance to get down to the roots of the trees.

Established trees in cultivated ground probably will not need fertilizer; but if it appears that some is needed (pale foliage, slow growth), broadcast and work lightly into the soil under the branches 16-20-0 or 14-14-7 at the rate of 2 cups to 100 square feet, or apply as recommended for trees in sod.

For established deciduous shrubs, broadcast and work lightly into the soil under the branches 16-20-0 or 14-14-7 at the rate of one cup to 100 square feet.

Evergreen trees and shrubs require less fertilizer than deciduous species. For established evergreen trees and shrubs, broadcast under the branches 16-20-0 or 14-14-7 at the rate of one cup for 100 square feet. The root systems of evergreens are very shallow and probably it is safest not to work the fertilizer into the soil.

Reprinted from Publication No. 418, Fertilizer Recommendations For The Home Garden; Department of Plant Science, Horticulture, Faculty of Agriculture and Home Economics, University of Manitoba.

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Rooting Response of Cuttings

to

Type, Mist, Season, and Hormone Application

By S. H. NELSON, Ph.D.
Department of Horticulture
University of Saskatchewan
Saskatoon, Sask.

The title is all-inclusive and the answer possibly is equally evasive. The rootings of cuttings, like most biological or growth responses, is not controlled by any one single factor, with the possible exception of inherent ability to root, but rather is a response to a number of factors and interactions between factors. The control exercised by any particular factor usually is expressed only when it becomes the limiting factor.

Possibly the first thing that should be considered in the rooting of cuttings is that microclimates at particular locations do affect results, and procedures adopted in a particular area may not be as rewarding when applied universally. The important facts to glean from new findings are the principles; but the application must be tested and possibly adjusted to be of benefit to any particular operator. Many unhappy experiences have resulted from the overnight conversion of techniques without prior small-scale testing.

Most of us have been taught that the proper cutting was one where the basal cut was made just below a node. For years, however, nurserymen have been making cuttings in groups without regard to nodes. Supposedly the lower rooting percentage was compensated for economically by reduced labor cost. In actual fact, however, experiments with apple rootstock cuttings under mist did not exhibit any reduction in rooting percentage when the nodes were disregarded, and this is further exemplified by the 100 per cent rooting of many ornamental cuttings similarly treated.

Automatic Misting

Next we come to the use of automatic misting devices for the rooting of cuttings. The high humidity created by misting is essential to the rooting of softwood cuttings, but misting is not the only way of achieving rooting. Cuttings have been rooted almost as long as there have been written records of our civilization, yet the first record of the application of mist was about 1937 in Trinidad and it really did not gain impetus until the early 1950's.

Mist is a "tool" that has gained popularity because the cutting beds do not require the personal attention needed in many other forms of propagation. Furthermore, it is the one form of propagation bed that allows the cuttings to be subjected to full sunlight, resulting in the maximum usage of solar energy. Although the writer does not want to discredit in any way propagators using mist, it is a form of plant propagation that needs less personal "know how" and experience as far as the rooting of cuttings is concerned.

Although as mentioned before, the use of mist in the propagation of cuttings is not the only way, it seems to approach most closely the ultimate in systems and gains further acclaim from favorable economical factors for the

nurserymen. It is not a cure-all for the rooting problem and there are a few plants that do not respond well under methods tested to date. Surprisingly, very few plant materials rot or develop disease under mist even with the abundance of moisture.

Use of Hormones

The use of hormones as an aid to the rooting of cuttings is nothing new and certainly dates back at least to the highly guarded secret of a pail of soaking oats in locked propagation houses on old English estates. Preparatory hormone mixes are readily available today but there is no universal recommendation for their application. Possibly in this area (Saskatoon), the greatest interactions enter in and affect the rooting of cuttings.

Different hormone concentrations are used for different plant materials, but within a particular plant material the hormone concentrations needed will vary with the stage of maturity of the cutting and the type of propagation frame used. In experimental results, often a particular hormone concentration may show marked beneficial effects in one propagation frame but may not show advantageous reactions in a propagation frame of increased efficiency, and even may prove detrimental under very favorable propagation facilities.

Rooting actually is a race for survival as to whether wilting or rot starts before rooting begins. There is no doubt that the application of hormone does speed up the rate of rooting. In relatively inefficient propagation frames, this greater rapidity expresses itself also as a rise in percentage of rooting because more cuttings root before they succumb to other factors such as rot or wilt. As the efficiency of the propagation frame increases, however, the spread in percentage rooting diminishes until it becomes nonexistent and, in some cases, toxic reactions set in and bring about a reversal of effect.

Heat from Below

The use of bottom heat also is a recommended procedure. It brings about a higher rate of rooting similar to that of hormones. The effects of bottom heat and hormone are not additive, however, and the response to hormone is less noticeable where bottom heat is used. The use of bottom heat is a good example of a method of increasing the efficiency of a propagation bed.

With specific reference to mist propagation, bottom heat in open, outdoor mist beds does improve the rate of rooting and also returns higher rooting percentages for reasons previously discussed. On the other hand, in areas where a complete envelope of plastic can be used over the mist beds, the heat build-up inside the tent precludes the use of bottom heat and, for the most part materials, hormones are not needed because of the marked rise in rooting rate.

Cuttings taken for mist propagation normally are more succulent than cuttings for other methods. Because wilting is not a problem (temporary wilt during sticking operation soon disappears), the cuttings are placed in the propagation structure much earlier in the season. In fact, relatively mature cuttings often fare poorly under mist because the leaves tend to drop and become a rotten mass around the base of the cutting.

It is hoped that in the allotted space, some insight into the rooting of cuttings under mist has been established. There is, essentially, no overall golden rule for mist propagation because of the many factors and interactions brought about by human manipulation. The only golden rule is that one should use what information he can from other sources, and even other operators in the same locale, but be prepared to modify and adapt the techniques to his own unique operation.

Ornamental Shrubs

Propagated by Soft-Wood Cuttings

By C. W. KUPERUS

Chief Propagator, Lacombe Nurseries Limited, Lacombe, Alberta

Propagation by cuttings has been and is one of the foremost means by which plants are multiplied. Propagation by cuttings insures a new plant true to variety and the stem, leaf and flower characteristics as the parent plant. It is also a more rapid form of propagation and thus is very important to the commercial growers.

Selecting cutting wood depends entirely upon the varieties to be propagated. For some varieties, such as *Potentilla*, *Spiraea bamalda* and others, the tops of the young shoots usually are the best material for cuttings. Other varieties will root more readily when a semi-hard wood is used, e.g. *Cornus*, *Lonicera* and *Syringa*. The ripeness of the wood greatly influences the results, and the material to be taken from the parent plant should be examined carefully. For example, the French grafted lilac will root much easier when material is selected which has the terminal bud on it. This is true also of some of the Preston lilacs.

The time element is very important for obtaining best results. *Syringa* varieties will root best from the middle of June until the end of June. Most other varieties will root easily during the first 3 weeks of July. The above periods are suited especially to the central regions of Alberta, but there could be some variations in other localities.

Two main types of cuttings are used. The 'simple cuttings' are made by the eye or node or just below the node of the cutting, and are the most commonly used. Varieties which root more easily from simple cuttings are: *Potentilla*, *Spiraea*, *Ribes*, some *Lonicera* varieties, some *Syringa* varieties, and others.

Secondly, we have the heel or basal cutting, cut as the name suggests at the base of the branch. A small part of the parent branch is included with the cutting so that it forms a small heel. A few varieties that come under this category will root quite easily also from the 'simple cut.' We have found by experience, as in some *Syringa* varieties, that one will root much better and easier with the basal cutting, and another with the 'simple cutting.'

The size of each cutting should seldom be more than about 6 inches long. The shorter cuttings usually root more readily and better than the longer ones. Flower buds should always be removed and unless absolutely necessary this wood should not be used; the flowers and buds will only exhaust its vitality. The bottom leaves should be trimmed off so that only 2 or 3 sets of leaves remain. When leaves are large, as in *Viburnum* and *Syringa*, they should be trimmed to half size.

Various kinds of hormones are on the market today and enable the grower to propagate varieties which otherwise would be almost impossible to grow. Hormones are essential to some varieties, and for others speed up the rooting process and produce a better and more fibrous root system. At the nursery in Lacombe we have been using 2 brands which have given excellent results. Experiments are conducted also with several other hormones. The two hormones are: Seradix, an English product, and Stimurhiz, a Holland product. Both come in either liquid, tablet, or powder form. The liquids and the tablets may be diluted; the powder hormones come in various strengths for soft, medium and hardwood cuttings. Only a very small quantity is required for

each cutting. The hormone is absorbed by the stem and stimulates it to form roots.

Success in the use of hormones depends greatly on the hardness or the softness of the wood, the type of hormone used, the temperature, the humidity, and the time the cuttings were taken. A few varieties which would be almost impossible to propagate without hormones are *Syringa*, *Berberis*, *Cornus*, *Cotoneaster*, *Prunus Cistena* and *Triloba flora plena*. Some which will root more rapidly and produce a better root system when the recommended hormones are used are *Lonicera*, *Euonymus*, *Philadelphus* and *Hydrangea*.

Although we can propagate the French grafted lilacs quite easily by softwood cuttings, they sucker badly when on their own root stock and we do not grow them from summer or soft-wood cuttings. Wounding the outer layer or bark lightly near the base of the cutting has proved an aid to better percentages in some varieties.

For many years river sand has proved the best rooting medium for propagation. Various peat moss and sand mixtures also have been used. For the last 6 years we have used a mixture of vermiculite and 'hi-press' peat moss. Three parts vermiculite and one part peat moss to a depth of about 5 to 6 inches has proved a most satisfactory rooting medium. It provides adequate drainage; holds necessary moisture for a considerable time; and is clean and free from organic matter which might be harmful to the softwood cuttings.

When cuttings are made they should be planted in well prepared and moistened rooting media as soon as possible. Both hormone-treated and untreated cuttings are planted in the same manner. A groove is made with a thin, 12-inch label or thin stick and the cuttings are inserted. The rooting medium is pressed lightly around each cutting, preventing the base from drying out. The cuttings are then watered thoroughly. At the Lacombe Nurseries' greenhouses the cuttings are next covered by placing windows over the frames in the greenhouse, thus providing the essential humidity necessary in the rooting process. The greenhouses should be shaded and the humidity kept high. Temperatures held at 75 to 80 degrees Fahrenheit during the day and 65 degrees at night are essential for best results.

A mist-spray system also may be used to keep the cuttings moist but in Lacombe we have had the most satisfactory results with what we call the old fashioned method of double glass and we are reluctant to use the mist spray.

Decaying cuttings or leaves must be removed immediately; because of the high humidity mold and decay can spread very rapidly. After a period of 2 or 3 weeks or even less, a spongy tissue will develop called a callus, usually before rooting starts and is a healthy sign in the growing of cuttings.

When cuttings are fully rooted they are lined out in frames to over-winter under shaded glass and remain in these surroundings until the following spring, usually late April when extreme frost is over. The glass is removed and the rooted cuttings grow on until the following fall. They will then be ready for field planting and are grown on until they reach market size.

*

ISABELLA PRESTON DIES AT GEORGETOWN

Miss Isabella Preston, internationally known hybridizer of lilies, roses and lilacs, passed away on December 31st in her 85th year. She was best known for her work as floriculturist at the Ottawa Experimental Farm where she developed strains of lilies suited to the Canadian climate. Miss Preston received her early training at London's Kew Gardens before coming to Canada in 1912, and worked at the Ontario Agricultural College before moving to Ottawa.

New Ways in Patio Construction

By GUNTER A. SCHOCH, A.I.L.A.
Landscape Architect, Parks Department
Metropolitan Corporation of Greater Winnipeg

In recent years pre-cast concrete blocks generally have been accepted as material for the construction of patios, but natural stone has its own charm and attraction. In southern Manitoba, Tyndall stone is the native material, preferred by many homeowners and by local parks departments.

The stone itself can be obtained at a very low cost if broken; irregularly shaped pieces are satisfactory. The largest expense in using this material, even if placed only on a sand base, is in the laying. A great deal of time is needed to fit the differently shaped pieces together and to set them level and solidly. It is difficult also to avoid the rather wide joints between these irregular slabs, often measuring up to 3 inches in width. These joints usually are filled with black soil and seeded with grass seed, and create a truly ideal transition between building and lawn area.

This is satisfactory for the home garden where the patio is not used excessively, but flagstone areas on public places and in parks may be walked on continuously. The narrow grass strip between the slabs is soon worn out and this type of patio is not the most comfortable walking area, especially for high heels.

In order to reduce these disadvantages of the Tyndall stone patio and to speed-up the laying of large patio and walk areas, the following method has been developed. The stone is cut on the construction site to the desired shape and size in order to allow a close fit with as narrow joints as possible. The basic random pattern is maintained, although the sides of each stone are more or less straight lines.

In Metropolitan Winnipeg's Assiniboine Park Zoo and Kildonan Park, extensive patio areas were constructed during the 1965 landscaping season. At first an electrical skillsaw with a 6-inch stone-cutting blade was used but the blade was too small to do a satisfactory job, and the unavoidable

(A) Lower left—Construction of patio with Tyndall stone cut to size on the construction site, at Kildonan Park Pavilion. (B) Lower right—Tyndall stone patio and walk area at the new sun-shelter, Assiniboine Park Zoo.



stone dust soon spoiled two saws. Finally, the Swedish-made Partner K12 power saw was purchased with a 12-inch circular, stone-cutting blade. This 7 horse power saw provided adequate power for the abrasive blade to do an accurate and speedy job. Just the one blade was used to do the necessary cutting for the construction of 3,500 square feet of patio area at the new Kildonan Park pavilion (see Illustration A). A similar patio area was placed at the sun-shelter of the newly constructed northwest section of Assiniboine Park Zoo (see Illustration B). This picture shows clearly the irregular slabs placed close together. The work was completed in a relatively short time with stone-cutting equipment.

Another possibility in speeding up the laying of Tyndall stone lies in the use of pre-cut material of standard widths but different lengths as exemplified at the Corydon-Osborne Plaza. Since the individual stones are narrow strips, material can be used which otherwise would be regarded as waste. This stone also is available at low cost. An interesting and effective pattern can be created by using stones of two different widths.

Although concrete slabs may offer an extensive color scheme, native Tyndall stone still is the most suitable material for landscaping purposes, and can be laid just as speedily and inexpensively if modern methods are used.



A pool is a fitting part of a rock garden

Choose Plants for the Rock Garden Carefully

By
R. C. PRAGNELL
City of Winnipeg
Parks and Recreation
Department

Perhaps a few notes on the construction of the rock garden will be appropriate before giving a list of plants to choose from for this type of gardening.

The site should be in the open, away from the deep shade and drip from trees, though a little filtered sunlight is not a bad idea. An east or a south aspect is preferred on a sloping bank, or failing this a mound of slightly sandy soil.

Use, preferably, weathered limestone and/or pieces of sandstone, but never granite or field stone boulders because these are too cold and hard for the plants. Especially avoid chunks of broken concrete. With limestone one can build to make the garden appear as a natural rock outcropping. Embed the individual pieces firmly into the soil, leaving pockets and crevices to give a cool root run for the plants.

Plants to choose from are many and varied, as will be seen from the following list:

Alyssum alpestre
Alyssum saxatile
Androsace sarmentosa
Anemone pulsatilla
Anemone sylvestris
Arabis albida
Aquilegia alpina
Aster alpinus
Aubrieta (easily grown from seed)
Campanula carpatica
Campanula garganica
Campanula pusilla
Campanula rotundifolia
(our harebell)

Dianthus alpinus
Dianthus deltoides
Dianthus neglectus
Dicentra eximia
Dodecatheon (Shooting Star)
Dryas octopetala
Draba aizodes
Draba olympica
Genista sagittalis
Genista septemfida
Gentiana acaulis
Gypsophila repens
Iberis (perennial candytuft)
Iris cristata
Phlox amoena

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Phlox divaricata
Phlox stolonifera
Phlox subulata
Phyteuma
Primula auricula
Primula cortusoides
Saponaria ocymoides
Saxifraga crassifolia (Bergenia)
Saxifraga decipiens
Saxifraga Macnabiana
Sedum acre
Sedum sexangulare

Sedum spurium
Sempervivum (house leek, a large group)
Silene alpestris
Thymus serpyllum
Thymus, various
Veronica incana
Veronica pectinata
Veronica repens
Veronica spicata
Viola cornuta
Alpine and Iceland Poppy

Bulbs, Corms and Tubers

Chionodoxa
Crocus
Fritillaria
Leucojum (Snowflake)
Scilla sibirica

Lilium duchartrei (Farreri)
Lilium tenuifolium
Lilium umbellatum
Tulip kaufmanniana

Evergreens

Mugho pine
Cotoneaster prostrata
Daphne cneorum

Euonymus nanus
Juniperus (Creeping Juniper)
Vinca minor

All the plants listed here are perennial and usually winter well; but the list does not comprise by any means all that are suitable for the rock garden.

Sources of supply are nurseries which cater to this type of gardening, and are listed in THE PRAIRIE GARDEN; catalogues may be obtained from some. Seeds also are quoted, and growing from seed adds interest to rock gardening.

Our Rock Garden

By W. R. LESLIE, LL.D.
 Landscape Consultant, Winnipeg, Manitoba

The rock garden is distinguished from other feature parts of the grounds in being noticeably associated with rocks. Plants, in small or larger masses, are growing among exposed surfaces of large stones. The whole unit is separated from other borders and gardens and must be so developed as to be completely free of any tones of artificiality. It must blend into the existing landscape and look as if it were a natural occurrence, as colonies of flowering and foliage plants of low stature living well amid outcropping of rocks. The aim of the gardener is to imitate scenes found up in the alpine regions.

Location and Terrain. The area must be well drained and should have the comfort of being somewhat sheltered. A shallow ravine with 2 hills facing each other is excellent, but such conditions are not usual on prairie home grounds. The ideal location is in the rear garden, in view of a window, on a southern slope, with a backdrop of some evergreen bushes or low conifer trees. It should be away from large trees which might compete for nourishment. Undulating land with slopes in different directions is desired.

Although most alpine plants like to be under the open sky and in full sun, some benefit from other exposures. For examples: while thymes, pinks and other sun-loving plants want the south, more fragile ones, like primulas and saxifrages, do best on slopes facing east or north. The task of the grower is to provide a congenial home for each plant. On flat terrain there is earth to move so that contours of alpine nature be formed. A hill-and-dale effect is sought. Excavation of earth for paths will enhance the height of the irregular mounds being built up at varying levels.

The background is important. The presence of shrubs of various heights, shapes and colorings, most of which may be conic-shaped evergreens, furnishes the rear nicely. The steep shape of some conifers suggests mountain peaks, their rounded companions form lower ranges of hills.

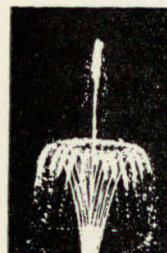
Soil. Alpine plants normally are found in rather lean soils that contain considerable grit. They require free drainage, soil that will allow surplus water to pass readily to lower levels. Where the garden soil is heavy clay, it is removed and replaced with a mixture of about 3 parts by volume of loam, 2 parts of crushed stone with pieces up to half an inch, 2 parts of humus such as peat moss or leafmold, and 1 part of gritty sand. Mix thoroughly and tamp tightly under and between the rocks. Thus troublesome air pockets are avoided.

Certain plants are fastidious as to the soil about their roots and special mixtures are made up for them. For cacti a large proportion is of silica sand. Acid lovers are given soil containing much peat and some sulphur and iron sulphate. Humusy soil is placed for gentians, primulas, lithospermums and

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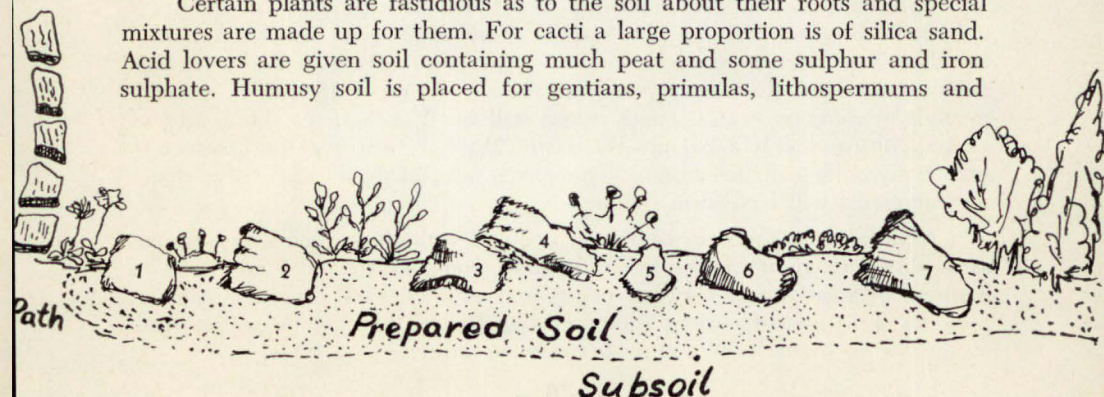
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others that like peaty conditions. Coarse limestone sand is added to the stock mixture for perennial plants that wish alkaline reaction. In contrast, granite rock chips replace the limestone sand for saponaria, campanula and others which dislike lime. Androsaces respond when the soil is composed of more than one-quarter grit. These special soil mixtures are placed in pockets where their plants are to be accommodated. Sedums, cacti and other succulents should have a layer of very coarse sand or fine pebbles spread on top of the soil to prevent trouble from crown rot.

Do not lard the soil with fertilizer. Rampant growth is foreign to alpine plants which are native to lofty areas above the treeline in the mountains. Stimulating feeding would make for unnatural rankness of growth in many plants and cause some to rot.

Rocks preferably are stratified kinds, limestone and sandstone. Those which are weathered, pocketed and carrying growth of lichens on their aged surface are first choice. Granites and other glassy field hardheads are not suitable. Select stones of different sizes and depths, of one color, and having one interesting side to be left exposed. Marble, concrete and synthetic rock would be out of place in this natural garden.

The rocks are to be at least 2 feet long. The smallest will weigh about 50 pounds and larger ones up to 200 pounds or more. A few really big ones are required to provide dominant effect at irregular intervals. Any broken surface is to be placed where it will be covered with earth.

Pathways are floored with flat limestone slabs. If the inter-spaces are to be planted with creeping plants, the flags or stepping stones are set about 4 inches above the surrounding soil to accommodate the floral carpeting.

Scree gardening which imitates a moraine — a mountain slope covered with small stones by rock slides — challenges the gardener. A scree may easily be incorporated in a spacious rock garden. It does call for peculiar plants, those with deep, cordlike roots.

Plan and Building. The rock garden begins with a plan on paper or with a scale model. The surface is brought to grade; soil mixtures are made up; stones are selected; paths are laid out; and building is started at the bottom.

In laying the stones choose the mossy, lichened face for exposure to the public. Have the vertical crevices between stones of V-shape, wide at the top. Slightly uptilt each rock at the front so that rain will seep into the soil and spaces between rocks rather than disappear as run-off. Have each rock set back somewhat from the rock beneath it, and lay one large rock on another only after packing rock chips and soil on the top of the first one.

Compose the rock garden so that rock shows at least over one-tenth but not more than two-fifths of the surface. Two or 3 large rocks are placed together, here and there, to make an accent point. There will be no high central peak, but the upper part will show a series of ledges or rounded mounds at different levels. Some stones will be 2 or 3 times the height of others. All are deeply sunk into the earth. Most of them will be one-half to two-thirds hidden in the ground. The soil is tamped firmly about the stones so that plants will have firm rooting.

A variance in the sizes of stones, coupled with their unequal placement as to distances apart, makes for a rhythmic composition and lends itself to harmonious relationship between plants and exposed rock. The arrangement provides soil areas of various dimensions so that plants can be set in drifts or masses as naturalistic groups in informal array.

Plants and Planting. Perennial plants are used to furnish the rock garden with its crevices and differing soil spaces. The well arranged rock garden has no space for nor need of annuals. The adapted perennials take up all the locations and clothe the ground the year around.

Rock garden plants are set out about the first of September or in spring-time. Care must be taken as to where very assertive, invasive plants, such as many saxifrages, cerastiums, aubrietas, veronicas, and sedums, are to be placed. Their tendency to rampant growth may overpower choice subjects planted close to them; the pruning knife can keep them all within bounds. The successful gardener devises little color pictures so that there will not be any dull periods at any time. Dwarf shrubs are of great service in this regard; the evergreens particularly are valuable. Scented paths result from using thymes and other aromatic ground covers between the flagstones. The possession of a pool gives a congenial setting for those plants which long for constant moisture.

Six groups of plants suitable for rock garden planting are listed in Canada Department of Agriculture bulletin, Making a Rock Garden, as:

1. Plants which grow in small tufts or mounds of foliage with erect-flowering stalks. These grow and look best in crevices, small pockets, or gravelly flat areas near the paths.
2. Erect-growing sorts which look best in large colonies where they will be viewed more often from a distance. When planted at the top of a slope they add the illusion of height.
3. Trailing or prostrate plants which sprawl over the face of rocks or cascade from pocket to pocket to form large drifts of color when in bloom.
4. Creepers which form close mats of foliage over level pockets or over the face of rocks; and plants which root at the joints and trace out each seam and crevice in a line of greenery.
5. Bulbs of low-growing species which should be planted in the fall in large colonies, or in the case of the smaller sorts cascading down the slope from pocket to pocket to form a waterfall of spring color. They may be planted together with late-flowering creepers to give a succession of bloom.
6. Low-growing shrubs and dwarf evergreens. In small gardens these are used at the top to act as a background, or at strategic points to give added boldness. In larger gardens groups are planted on bold promontories to divide the garden into smaller pictures.

According to Stephen Hamblin, the ideal rock plant is of low, slow, dwarf growth and of long life. It is adapted by root and leaf to an infertile soil in exposed places. It is of interest in flower, fruit, foliage or habit, and it is associated with wide open spaces rather than the usual flower border. "A long season of effective foliage is more important than a brief period of showy flowers."

Drooping plants which fall forward in irregular masses, such as most of the dianthus, iberis, arabis and some of the alyssums, play an effective part in achieving a commanding picture. Prominent among the creeping plants which form mats by rooting at their joints are thymes, ajuga, Phlox subulata, lysimachia, nepeta, junipers and sedums. Most gardeners restrict their choice of plants to those that are less than 1 foot tall. Other plantmen include a few that may reach up as high as 18 inches. The main considerations are to use plant types found in alpine regions, and to put stress on those which command interest over a long period of the year. Winter protection is given in the form of a spread of spruce, fir and pine boughs.

Fragrance in the Flower Border

By HECTOR MACDONALD, F.R.H.S.
Winnipeg, Manitoba

Most people are too apt to assess flower borders by their eye appeal and seldom, except in a minor way, consider the appeal of fragrance. The perfume of bloom will bring back nostalgic memories quicker than anything else, quicker even than music.

To blind people and folks with impaired sight, a scentless flower border, no matter how colorful, means nothing. To all people with a sense of smell there is nothing more charming than to enjoy the fragrance of flowers as the dusk closes in, and the darkness falls on a quiet summer night. Let us then accept that a flower border to be complete should have fragrance.

Flower borders should be planned to have perfume from late spring or early summer until frost. This means a mixed border of perennials and annuals.

The fragrance of a flower border is a blend of many scents and perfumes of flowers and leaves. Several aromatic foliage plants do not give off much perfume unless they are touched or pressed, the mints, thymes, and wormwoods for example, but they do add to the general fragrance even if untouched. Plants with scented foliage should be considered when planting.

One of the sweetest early-blooming perennials is Lily-of-the-Valley. Sweet William may be a bit temperamental at times, but is well worth looking after for its perfume. Tulips have a faint, delicate fragrance; and so do *Primula auricula* and cowslips; hardy strains of both are grown in Manitoba. Sweet Rocket, a bit nomadic in character, is strongly perfumed and early-blooming. Meadowsweet, an herbaceous spirea, is welcome too for its clean, hayfield scent. The lilies boast several sweet-scented varieties, notably in the trumpet types, and the little Coral lily has a delicate fragrance of its own.

The Dianthus family give us the clovey scent of carnations and pinks. There are perfumed varieties of peony and daylily. The perfume of baby's breath may not appeal to all.

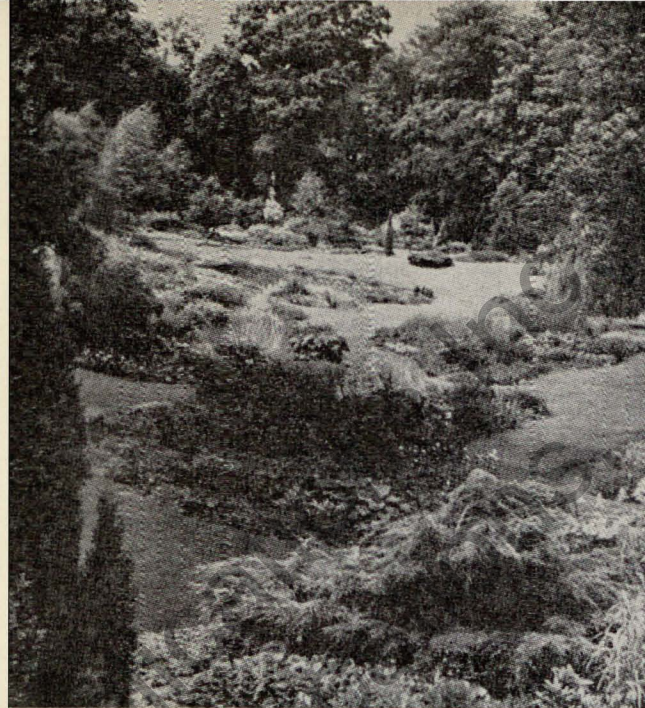
Among the border annuals are petunias, both colorful and fragrant; the scent of petunias adds a great deal to the pleasure of a garden. Mignonette is a plant whose perfume is its greatest asset; the flowers are attractive but not flashy or colorful, and the scent of mignonette has perfumed the gardens of long ago as well as those of today.

Stocks are colorful and sweet, old favorites too. There is a little, modest, inconspicuous stock with small bluish flowers that open in the evening, hardly a border plant but it should have a little corner where it can dispense its delightful fragrance. It is the Night Scented Stock.

Sweet Alyssum deserves the title sweet; it is worth a place for its perfume alone besides being one of the best edging plants available. Candytuft, that's a lovely name for this old fashioned favorite, and it's sweet. Nasturtium has a sweet perfume; its leaves may be used in salad, taste is spicy.

A very fragrant plant is heliotrope; a clump of this fills the garden with scent. Sweet Sultan, another descriptive common name for a lovely perfume plant, is good as a cut flower. Near the end of this roll call of scented flowers is nicotine, and it should be in every border for its perfume alone.

This selection of perfumed plants should give fragrance to the border throughout the growing season. There are others that could be added, such as Siberian wallflower, valerian and other species, but they are not listed generally and sometimes are tricky to grow.



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Perennials in Island Beds

By
J. R. ALMEY, F.R.H.S.
Winnipeg, Manitoba

It would be almost heresy to write an article on perennials for the flower garden and not, in the first sentence, refer to the perennial border. To grow many perennials otherwise is unusual. The growing of perennials in island beds, therefore, offers the landscape designer a newer, enlarged field to use his knowledge of form, shape, size, color and season with the most pleasing and gratifying results.

So much variation in shape and size of the island bed is possible, to suit either the land available or the number and variety of the plants the grower desires. For a site that is rolling, a valley, or a hill top, these island beds can be used advantageously. It is not necessary to develop first the standard high background of fence, wall or hedge. These beds can be anchored to the side of a residence, and then, in measured, irregular form, lead the strolling gardener over grass paths that know no width or straight edge. In pockets or curves, large or small, a site can be found or made which makes the sun dial, lily pond, or bird bath, belong and look at home.

The inclusion of groups of shrubs into beds can lend shelter from wind to the perennial beds without interfering with the continuity of arrangement or giving undue shade.

Groups of related species or varieties can be grown for comparison without giving a test-plot appearance. When one variety ends its season of bloom and is cut back, another variety on the other side of the group lends continuing color, offsetting the dull blank that otherwise would be present.

Tall-growing perennials can be utilized in the largest beds, and dwarfier kinds in the medium and small beds; even the so-called rock garden or alpine plants can find a place without the necessity of using rocks or stones.

With the vast improvement in recent years in farm home surroundings on the prairies, where spaciousness and size are almost unlimited, this type of arrangement gives an opportunity to the horticulturally minded farmer to extend his plantings and number of varieties to good effect.

The Latest in Annual Flowers

By LOUIS M. LENZ

Assistant Professor, Landscape Horticulture, Department of Plant Science
University of Manitoba, Winnipeg, Manitoba

Annuals are among the most popular garden flowers and their use is almost universal. Their popularity is due in part to the wide range of types and colors, and to the fact that effects are achieved quickly. Also, since they have many uses, they are suitable for planting in both large and small gardens. They are easy to grow and thrive under a wide range of soil types and climatic conditions. There are few kinds of plants that give such a handsome return for a small expenditure.

Although many varieties are available, and many of us have our favorites, new selections are introduced every year. These new selections may be new colors, new forms, or an improved selection of an old variety.

The following are some of the new introductions of recent years, including those available in 1966:

Ageratum: 'Blue Blazer,' F₁ hybrid, early-flowering dwarf (6 inches), mid-blue. Alyssum (Sweet): 'Navy Blue,' dwarf and spreading, dark blue selection. Asters (China): 'Early Bird,' extra early and wilt-resistant plants with large flowers in red, white and blue; 'Pompon New Improved,' 30 inches with spray of 2-inch blooms in separate or mixed colors; 'Spider,' 24 inches with cactus-type flower; the petals quilled and incurved; mixed colors.

Calendula: 'Pacific Beauty,' a heat-resistant strain available in separate or mixed colors. Celosia (Plume-type): 'Fiery Feather,' 12-inch dwarf with fiery red plumes; 'Forest Fire,' 30 inches, bronze red foliage with scarlet plumes; 'Golden Feather,' 12-inch dwarf with golden yellow plumes. Celosia (Crested-type): 'Fireglow,' 20 inches, large, velvety red blossoms. Cosmos: 'Sunset,' tall, Klondyke-type, with large, semi-double and double flowers of orange-scarlet.

Dahlia: 'Early Bird,' 12 inches, mixed colors, blooming 15 to 20 days earlier than Unwin Hybrids. Dianthus: 'Baby Doll,' 6-inch compact dwarf with large, single flowers in mixed colors; 'Bravo,' 8 inches, single scarlet-red flowers; 'Red Monarch,' 10 inches, biennial, flowering first year from seed with large, brilliant red flower heads; 'Wee Willie,' 4 to 6 inches, mixed colors. Delphinium: 'Connecticut Yankee,' a bush type of 30 inches, blooming first year from seed, flowers are shades of blue and purple.

Geranium: 'Nittany Lion,' comes true from seed and blooms in 90 days, flowers are single red. Marigolds (African): 'Crackerjack,' 30 inches, large, double, creamy white flowers; 'Hopeful,' 30 inches, large, double, creamy white flowers; 'Spun Yellow,' 12-inch dwarf plants with large, bright yellow flowers. Marigold (F₁ hybrids): 'Diamond Jubilee,' 20 inches, compact plants with large, sunny yellow flowers; 'Dolly,' 10-inch dwarf compact plants with 4-inch flowers in shades of orange and yellow.

Petunia (Grandifloras): 'Appleblossom,' a dwarf, free-flowering salmon-pink; 'Candy Apple,' an early-flowering bright red; 'Gay Paris,' a compact plant with variegated wine-purple and white flowers; 'Sunburst,' a free-flowering light yellow. Petunia (Multiflora): 'Butterscotch,' the nearest to yellow petunia; 'Meteor,' a scarlet-red and white bicolor; 'Moonglow,' dwarf compact plants with creamy yellow flowers; 'Starfire,' a compact dwarf with scarlet and white flowers; 'Strawberry Tart,' a double multiflora with scarlet

and white flowers; 'Sugar Pink,' a sister to Sugar Plum with candy pink on white.

Salvia: 'Evening Glow,' 20 inches, large flower spikes of brilliant old rose; 'Fireball,' 10 inches, extra early blooming dwarf plants with red flowers; 'Fireworks,' 15 inches, early blooming red; 'Violet Beauty,' compact dwarf plants with bright violet flowers; 'Blue Bedder' (*S. farinacea*), 24- to 30-inch plants with silver foliage and spikes of blue flowers. Snapdragons: 'Bright Butterflies,' 3 feet, the latest in snaps, an F₁ hybrid mixture with new penstemon-shape flower type; 'Floral Carpet,' 6 to 8 inches, an extra dwarf strain available in separate or mixed colors; 'Sprites,' 15 inches, semi-dwarf, compact, branched plants available in a variety of colors.

Zinnia (Giant-Flowered): 'State Fair,' a blend of the largest flowered zinnias in existence. Zinnia (Giant Dahlia-Flowered): 'Envy,' chartreuse-green flowers; 'Will Rogers,' deep scarlet flowers. Zinnia (Cactus-Flowered): 'Bonanza,' golden-orange flowers; 'Firecracker,' rich red flowers; 'Yellow Zenith,' medium yellow flowers.

Zinnia (Pompon): 'Pink Buttons,' salmon-pink flowers; 'Red Buttons,' scarlet-red flowers. Zinnia 'Old Mexico,' 12 inches, an improved Persian Carpet. Zinnia 'Ortho Polka,' 24 inches, an improved peppermint stick. Zinnia 'Thumbelina,' 6 inches, a dwarf, compact plant available in mixed colors. Zinnia 'Daisy Mae,' 6 inches, a dwarf plant with single, yellow flowers.



Pruning Late-Flowering Shrubs

By JOHN WALKER

University of Manitoba, Winnipeg, Manitoba

For a maximum of beauty and usefulness in the home landscape, perhaps no woody ornamentals respond to proper pruning more than those that produce blossoms in late summer. They blossom late because, under normal conditions of growth, their blooms are produced on current-year stems, rather than from buds on one-year stems as is true of flowering plum.

The vigor of the current-year growth and, subsequently, the quality and attractiveness of blooms, are governed by the extent and timeliness of pruning. By proper pruning the shrubs in question also fulfill their proper role as ornamentals with reference to height, spread and attractiveness of plants throughout the year.

The best time to prune late-flowering shrubs is in early spring just as new growth is revived. Chief aim of pruning these shrubs in early spring is to cut back *all* stems to near ground level so that new shoots may be stout and vigorous. This treatment is not likely to delay time of blossoming and certainly will result in the development of healthy foliage, a more striking display of attractive blossoms, and plants which have a more uniform appearance.

Species for which severe early-spring pruning is desirable are: *Amorpha* species, *Cytisus austriacus*, *Hydrangea arborescens*, *Hydrangea paniculata*, *Rosa* F. J. and Pink Grootendorst, *Sorbaria sorbifolia*, *Spiraea bumalda* (varieties), *Tamarix pentandra*.

It is hoped that information given in this brief note will result in a more active interest in the species listed and that their contribution to the home landscape will be more satisfying and pleasing.

Testing the Survival of Tulips

By E. W. TOOP, Ph.D.

Department of Plant Science, University of Alberta, Edmonton, Alberta

Since the autumn of 1962 the University of Alberta has been involved in a tulip-testing project as one of 16 co-operating institutions at locations throughout Canada and the United States, under the direction of the Netherlands Flower-Bulb Institute, Inc., of New York City.

The purposes of the project are three-fold: To determine those varieties most suitable to a given region; To determine optimum planting conditions for best flowering results; To determine the number of years a given variety will flower.

At the beginning of the project 50 bulbs each of 155 varieties of tulips, representing 13 tulip classes or types, were supplied to us by the Netherlands Flower-Bulb Institute. These bulbs were planted 6 inches apart in rows 12 inches apart. Twenty-five bulbs of each variety were planted 8 inches deep and mulched during the winter months with 2 inches of peat. The remaining 25 were planted only 6 inches deep and were not mulched. Duplicate sets of bulbs were received and planted in the fall of 1964 and again in 1965. These duplicate plantings differ from the original planting in that the rows have been spaced 24 inches apart to facilitate cultivation for weed control.

Since records have now been compiled for 3 seasons on the original planting, and for one season on the second planting, some interesting comparison and summary data can be tabulated. Unfortunately, for some unknown reason, the bulbs planted only 6 inches deep in 1962 did not survive the first winter. The poor survival rate apparently was due to some soil factor and not to differences in variety response. This particular treatment in the 1964 planting survived the first winter very well (80 per cent to 100 per cent survival for 140 of 152 varieties planted).

With respect to the 1962 planting in which the bulbs were planted 8 inches deep and mulched with peat, 133 of the 155 varieties planted came through the first winter with 80 per cent or better survival. By the second spring this number had dropped to 80 varieties, and by the third spring to only 43. The 43 varieties to survive well through 3 winters without being transplanted are listed under their respective class headings in Table 1.

Table 1

Varieties of Dutch tulips surviving 3 winters in Edmonton with an 80 per cent or better survival rate

Single Early (4)	Species (14)
Prinses Irene	<i>Tulipa fosteriana galata</i>
	<i>T. purissima</i>
Mendel (5)	<i>T. greigii</i> 'Royal Splendour'
Athleet	<i>T. kaufmanniana</i> 'Johann Strauss'
Orange Wonder	
Single Late (25)	Darwin Hybrid (14)
Ivory Glory	Gudoshnik
Magier	Holland's Glory
Marshal Haig	Lefeber's Favorite
Marjorie Bowen	Oxford
	Spring Song

Triumph (23)

Arabian Mystery
Bandoeng
Bingham
Crater
First Lady
Kansas
K & M's Triumph
Olaf
Preludium
Red Giant
Rhineland
Sulphur Glory
Topscore

Lily Flowered (9)

Aladdin
White Triumphator

Parrot (10)

Orange Favorite

Darwin (33)

Anjou
Aristocrat
Gander
Golden Age
Mamasa
Most Miles

Double Late (11)

Livingstone
May Wonder
Mystaris
Nizza
Symphonia

Breeder (1)

(poor survival)

Rembrandt (2)

(poor survival)

Double Early (4)

(poor survival)

() Indicates number of varieties planted for each class.

Because a tulip bulb survives the winter does not mean that it will produce a flower the following spring, or that the flower produced will be normal in appearance and of good quality. Of the 80 varieties which had a good survival rate over 2 seasons, only 21 also had a high percentage (80 or higher) of the surviving bulbs produce flowers, as well as ratings of good or excellent in overall quality (see Table 2).

Table 2

Varieties of Dutch tulips with a high survival rate (80% +), high percentage of blooms (80% +), and good quality ratings after 2 winters

Single Early	Darwin
Bellona	Golden Age
Triumph	Darwin Hybrid
Arabian Mystery	Dover
Diorama	Gudoshnik
First Lady	Oxford
Preludium	Lily Flowered
Rhineland	Aladdin
Topscore	Captain Fryatt
Crater	Single Late
Olaf	Ivory Glory
Double Late	Marshal Haig
Nizza	Ossi Oswald
Orange Triumph	Halcro

The number of top varieties drops to only fourteen 3 years after planting (see Table 3).

Table 3

Varieties of Dutch tulips with a high survival rate (80% +), high percentage of blooms (80% +), and good quality rating after 3 winters

Triumph	Darwin
Arabian Mystery	Golden Age
Crater	
First Lady	Darwin Hybrid
Olaf	Gudoshnik
Preludium	Oxford
Rhineland	Lily Flowered
Topscore	Aladdin
Double Late	Single Late
Nizza	Ivory Glory
	Marshal Haig

It would be foolish to say that only those varieties listed in Tables 2 and 3 will perform well in the prairie provinces or even in Edmonton. Much depends upon weather conditions, soil conditions and cultural practices. However, as more performance data are collected over the next few years a more reliable list of varieties which consistently perform well will be possible. At the present time it appears that there are many varieties worthy of consideration for prairie gardens.

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Spring-Flowering Bulbs

By WM. J. TANNER
Winnipeg Horticultural Society

One of the greatest thrills a gardener experiences is to see some of the smaller bulbs poking their heads through the ground in the early spring soon after the snow disappears.

Snowdrops are the first to appear but are not too reliable in our climate. They are followed by the hardy scillas and grape hyacinths and next the tulips which do not bloom until later, depending on the varieties planted.

The earliest-blooming tulip is Red Emperor, a beautiful red tulip not very tall but one which will make a striking display in any border. There are many varieties in the tulip family, all beautiful and well worth getting them established in your garden. Each has its own time of blooming; after Red Emperor come the early varieties, both single and double, followed by the Cottage, Parrot, Darwin, and Breeder varieties.

Spring-flowering bulbs are not hard to grow and require little attention after planting. Buy only top-quality bulbs. Next comes preparation of the beds where the bulbs are to be planted. The ground should be dug thoroughly to a depth of at least 12 inches, and must be well drained or the bulbs are liable to rot. If the soil is on the heavy side, it can be lightened by the addition of some peat thoroughly mixed in.

Generally speaking, the following table is about right for planting depths in our western provinces; but if the soil is very light add 1 or 2 inches to the depths given:

Crocus	4 inches deep and about 4 inches apart
Scillas	4 inches deep and about 5 inches apart
Grape Hyacinths	4 inches deep and about 2 inches apart
Snowdrops	3 inches deep and about 3 inches apart
Hyacinths	6 inches deep and about 6 inches apart
Daffodils	6 inches deep and about 6 inches apart
Tulips	6 inches deep and about 6 inches apart

Bulbs should be pressed firmly into the soil, pointed ends up, to ensure that there will be no air pockets below the bulbs. If the soil is dry, give a good soaking to start root growth. Small bulbs, like the scillas, crocus, etc., should be planted as soon as available, anytime after the first of September; but tulips and hyacinths should not be planted too early, October 10 to 15 is early enough. This will give ample time to start root growth, and there is less likelihood of top growth being too far advanced and being damaged by freeze-up. Although not absolutely necessary, it is a good idea to apply some mulch to all spring-flowering bulbs, particularly new plantings, after the ground is frozen. The mulch may be cleared in the spring after growth has begun.

Tulips should be given a sheltered location if possible to prevent damage to the blooms by high winds in the spring. They do not have to have full sunlight, and will do quite well in partial shade. For best results, plant groupings of the same variety rather than mixed varieties. If mixed, the different varieties will bloom at different times and will not give the massed-effect display of single colors or varieties.

After blooming, the flower stems should be cut off to prevent seed pods forming and using up the energy being accumulated in the new bulbs. The

foliage should be left growing until it dies down, this is how the bulb receives its nourishment for the following year. Tulip bulbs may be left undisturbed for several years, but may be lifted and stored after the tops have died down, and replanted in the fall. If it is necessary to move the plants before the tops have died down, they may be lifted carefully, replanted in a trench and kept growing until the tops die down naturally, and then taken up, dried off and stored. If the bulbs are not planted too close together, they may be left undisturbed and annual plants planted among them. As the tops die down the annuals take over, and the border is well established by the time the tulips have disappeared.

If you have never grown daffodils outdoors, I suggest that you experiment with a few. The hardiest daffodil is the variety King Alfred, and once established it will last for years if not disturbed. Hyacinths are not too hardy in our climate, but it may be worth trying out a few bulbs. Crocus are not too reliable either. Some people plant them in the lawn, but you cannot mow your grass until after they have finished blooming.

Small bulbs are not expensive and it does not cost much to experiment with a few of the bulbs generally procurable in the fall. This is the best way to find out what can be grown in your own garden.

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Phlox and Other Late-Flowering Perennials

By C. W. CARLBERG

Head Gardener, Experimental Farm, Canada Department of Agriculture,
Swift Current, Saskatchewan

A well planned perennial border will have some plants in bloom from the time the snow leaves in the spring until severe frosts end all bloom in the fall. This article will deal with those perennials which bloom in late August, September and occasionally into November. The removal of faded flowers lengthens the blooming period of most plants and this is particularly true of the late-flowering kinds.

Perennial phlox will grow 2 to 3 feet tall and produce large clusters of colorful bloom. It will do well in full sun or semi-shade; likes good soil and plenty of moisture; and is propagated by division every 2 or 3 years to keep the plants from becoming too large. Ada Blackjack and White Pyramid are old, reliable varieties and new varieties from western nurseries are well worth trying.

Fall asters will do well in all but the shadiest part of the garden. They have no special soil requirements but need a steady supply of moisture for best results. Most kinds begin to bloom in September and tolerate considerable frost so usually will bloom through October. As they do not come true from seed it is best to obtain named varieties. Little Boy Blue and Morden Fay do well at Swift Current.

Gaillardia aristata (Blanket Flower) is a perennial which blooms all summer and well into fall if flowers are removed as they fade. It is a common wild plant throughout most of the Canadian prairies, is of easy culture, and will tolerate a wide variety of conditions. Because few nurseries carry plants of *gaillardia* it will be best to grow it from seed. Favorite plants may be propagated later by dividing early in the spring.

The daylilies with their grasslike foliage add an interesting change of texture to the flower border. Individual flowers last only a day or two but new flowers open almost every day. Colors range from yellow, through shades of orange, pink, brown, and mahogany to red. Daylilies may be grown from seed but selected colors must be propagated by division.

Morden Pink, Morden Gleam, Morden Rose and Dropmore Purple are names of *lythrum* which provide wands of pink or purple flowers in the garden. Because Morden Pink is almost completely sterile, it blooms for the longest period. *Lythrums* are easily propagated by taking slips or cuttings in the spring, so should be in every garden. The pruning provided by snipping the cuttings makes the parent plant more branching and compact.

Monkshood is less commonly grown but its upright spikes of blue, white, or blue and white are most attractive. The species *Napellus* is completely hardy if given a moist location. It blooms in July and August; later blooming species have not been recommended here.

The tall Golden Glow is prized for its double yellow flowers which continue into late fall. The vigorous plants, which spread slowly but persistently by underground stems, require good soil and ample moisture or the lower parts of stems will become bare and brown by autumn. It is best used in the rear of the flower border or to hide something like the garbage cans. Its creeping habit is easily controlled by an annual spading about the plant. If bushier plants are desired this may be achieved by shearing the plant back to half its height in mid-June.

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Time and Method of Planting Are Important with Lilies

By A. J. PORTER
Parkside, Saskatchewan

I shall begin by apparently contradicting my title and say that lilies may be transplanted successfully at almost any time during the growing season. This presupposes, of course, that the lily is to be moved with a good ball of earth and minimum disturbance of the roots. Done carefully, a lily may be moved in full bloom but naturally only in special circumstances.

Fall is the most satisfactory time for planting hardy lilies. At that time the bulbs are as dormant as lilies ever become. Lilies do not become completely dormant, as do tulips and gladiolus, but continue to make root growth as long as conditions of temperature and moisture are favorable. The best time would be as early in the fall as bulbs are obtainable.

But the bulb grower cannot dig until his bulbs are properly matured for, like potatoes, immature lily bulbs will not keep well out of the ground. This will put his digging time about the last half of September, with some variation according to the season. The bulbs then have to be sorted and cleaned before they can be shipped, so it would likely be early October before they are available. In the home garden, one would not have to wait so long, but may dig and move his bulbs as soon as the tops show signs of dying down.

Lily bulbs will do well planted any time in the fall that the ground is still not frozen. I have broken 3 inches of frozen crust with a crow-bar and planted the bulbs under the frost line with no losses, though probably not as vigorous growth was made the next summer as if they had been planted earlier. In 1964, an open fall, we planted lily bulbs right up to November 15. That night the ground froze hard but the bulbs came through with flying colors the next summer, most of them blooming nicely.

If your soil is heavy and likely to heave, mulch the newly planted bulbs with loose, weed-free material. Corn stalks, dry leaves, coarse sawdust, shavings, sphagnum moss, etc., have all been used. If available, there is nothing better than the boughs of evergreens. If nothing else, crumpled newspapers held down with a bit of wire netting will give the protection needed to prevent heaving. If your mulch is inclined to mat when wet or is unsightly, remove it in the spring before growth starts. We are fortunate here in Parkside in having a good, sandy loam soil that does not heave so use no mulch on fall-planted bulbs.

Lilies may be planted in the early spring provided that you can obtain near-dormant bulbs that have been held in cold storage, or you can get them nearby from your own or a neighbor's garden. It is not practical for a commercial grower to dig and ship bulbs in the spring. They are sprouting when he digs them. The sprouts continue to grow while he cleans and sorts, and during the time the bulbs are in the mail. When the bulbs reach the customer these delicate sprouts could be 6 or more inches long, and if one is broken off in handling, that bulb will not grow again until it has gone through another winter.

Cold-storage bulbs are satisfactory if they have been stored properly and are the bulbs offered by commercial firms in the spring. As they come

out of storage unsprouted, they will travel safely with little sprouting while in transit. A spring-planted bulb will not grow as tall or carry as many blooms as one of the same size and variety planted the previous fall.

Now for the actual planting: We will assume you have chosen a well drained spot where the lilies will receive sunshine for the greater part of the day during the summer. If your soil is a good, rich, sandy loam, such as ours, you are lucky. You can plant the bulbs directly into the ground as you do potatoes. In heavier soils, or in any soil that has been recently manured or fertilized, drop a handful of sand or some sphagnum moss under and around the bulb so that the soil does not come into direct contact with it. The sand should be clean, such as beach sand, and if moss is used it should be fresh. Bulbs that come into direct contact with manure sometimes will rot, and any raw fertilizer coming into contact with them can burn them.

If your soil is so heavy that water cannot pass through it, a special bed should be made to give good under-drainage, or the bulbs should be planted in raised beds. In heavy soils, the hole in which the bulb is planted may become a cup that holds water around the bulb in the spring. This is bad. Lilies do not like "wet feet." Good lilies can be grown in any soil that will grow good potatoes, with a few rare exceptions. If you are planting cold-storage bulbs in the spring, there may be mold spots on some of the scales. Remove these scales before setting the bulb.

Most of our hardy lilies make stem roots as well as roots from the base of the bulb. The bulb must be set deeply enough so that these stem roots have a chance to form between the top of the bulb and the surface of the soil. Usually 3 or 4 inches are sufficient, though some lilies sometimes are planted deeper to hold back their growth in the spring thus lessening the danger of spring frost damage. Don't overdo it, though! A large bulb can push up its stem quite readily through 6 or 7 inches providing the soil over it is not baked into a hard crust. If your good soil is very shallow it is better to prepare a deeper bed than to plant the bulbs too close to the surface.

To sum up, plant in the fall if you can, or in the early spring if you can get dormant bulbs from a reliable dealer, or can obtain freshly dug bulbs near at hand. Plant in a sunny, well drained location at the proper depth. Put clean sand or moss around each bulb when planting. Mulch fall-planted bulbs to prevent heaving.

Note: Semi-hardy and tender varieties such as the Aurelians and the trumpet lilies, should be planted outside only in the spring in this climate. Fall-planted bulbs of these types usually fail to show up the next spring but once established often will winter well for several years in sheltered locations.

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Growing Prize Tuberos-Rooted Begonias

By F. STAN GUGIN, B.S.A., Minnedosa, Manitoba

Tuberos-rooted begonias are considered by many to be the most beautiful of the summer-flowering bulbs. They are easily grown; the tubers will last for many years; and they will bring color and beauty to shaded locations where other plants would not bloom. Success or failure with begonias depends primarily on the location of the begonia bed in relation to the sun. Begonias require the greatest amount of light possible without too much direct sunlight.

Good locations for tuberos begonias are the north side of buildings, under filtered shade from trees, in lath houses, plastic houses, or whitewashed greenhouses. Never attempt to raise begonias in the house or under a solid roof outdoors. They must have light overhead as well as from the sides.

The first thing in the successful growing of prize tuberos begonias is to have good tubers of good varieties. If you want large blooms you can get them only from varieties capable of producing large blooms.

Tubers may be bought at different prices but as in buying anything else you get only the quality that you pay for. Belgian begonias, long the standard, are the least expensive and are easily obtainable at most garden and department stores. They give fine blooms in good, clear colors and are suitable for mass bedding, but they will not attain the size of the newer hybrids like the California Hybrids, the Pacific Giants, or the English Exhibition Begonias which are more expensive.

There are many begonia types: the double rose form, the camellia, the giant ruffled, the two-toned picotee, the double carnation, the singles in crested and fringed forms, the pendula or hanging basket begonias, and the multiflora or cluster begonias. In the hanging types there are two distinct forms, the Belgian pendulas with tiny, fragile blooms; the California Hybrid pendulas and the English strains have large, double blossoms.

A good selection of colors is obtainable now in most types, ranging from purest white through yellow, apricot, orange, salmon, pink, crimson, rose, red, dark red, etc., and two-toned combinations of pink and white, red and white, red and yellow, etc.

The tubers should be started about the third week of March, no earlier, or they may become spindly before they can be set out in the garden. The objective is to have sturdy, stocky 6-inch plants with large leaves when setting-out time comes, and to attain this they must not be started too early. They must be grown at a temperature of around 65 degrees in good, bright light but with little direct sunlight.

To start the tubers into growth bring them out of storage temperature to room temperature. When the pink growth buds appear and the shoots are about a half inch long or less they are ready for planting. If the pink growth buds appear too early they may be held back by keeping them at 50 degrees.

They may be started in flats or boxes; the ideal medium is coarse leaf mold, or leaf mold and coarse sand. Or you can use half peat moss and half coarse sand, or one-third peat moss, one-third soil and one-third coarse sand. Fill the flat or box with your medium and moisten thoroughly, then set the tubers in this, covering them over except for the tips of the shoots. Be sure to leave enough space between the tubers for good root development as this is a most important factor in growing prize begonias. Shoots grow from the top of the tuber as well as from the bottom and sides. Set the flat in a warm location with bright light but shaded from direct sunlight. A temperature of 65-75 degrees is about right for starting growth.

If you are growing for exhibition all of the shoots but one can be removed and the wounds dusted with sulphur. With the pendulous begonias retain all of the shoots; if the shoots are not branching sufficiently, they may be pinched back at about 3 inches high to induce branching.

When the first two leaves have developed to the same size the plants are ready for potting. If you are going to grow them in pots plant them now into 6- to 8-inch pots (the bigger the pot the bigger your blooms will be). If you are going to bed them out or put them in your planter they could be planted now into the largest size of peat pots or in a deep flat.

Having the right soil mixture is important. Here is the mixture I use: 7 parts black garden soil, 5 parts leaf mold or peat moss, 3 parts fine manure (well rotted), 1 part coarse sand, 1 part vermiculite. I generally add a few cupsful of bone meal or fish meal and one cup of Vigoro to a tub of potting soil or one teaspoonful of 11-48-0 ammonium phosphate per pot. A simpler and probably equally good mixture recommended by one firm is two-thirds partly decayed oak leaf mold and one-third coarse sand to which is added one-quarter cup of fish meal to the soil below but not touching the tuber.

When they are removed from the starting medium the tubers will be well rooted; and when carefully lifted a ball of peat moss or leaf mold mixture will be clinging to them. Leave this on, it will protect the new roots. Pot up, covering the tuber with one-half to one inch of the soil mixture and, of course, being sure that you have good drainage in the bottom of the pot. Leave one inch clear at the top of the pot to facilitate watering.

Continue to grow the plants in good light until the days become warm outside. I grow mine in pots and sometimes have them outdoors by mid-May or by May 24th if the weather is warm. The advantage of having them in pots is that they can be taken into the garage or indoors if there is a threat of frost. It is probably not safe to bed them out until the first week of June.

Outdoors they thrive best with full overhead skylight but with little direct sunlight. The north side of a building is best, or north of trees or a hedge. The direct sunlight in early morning or late evening will not hurt. The pendulous types will stand a little more sun than the uprights, and the multifloras will take half a day of sun (preferably morning). Too much sunlight will produce dwarfed plants with leaves curled and shiny or yellowed and burned, and small flowers or no flowers at all as the buds may drop off. Having the correct lighting is important in growing prize tuberos begonias. Some protection from wind also is essential. If you do not have a suitable location one can be built of laths; a begonia house partially enclosed and covered with plastic or plexiglass will make a good location. (See THE PRAIRIE GARDEN 1964, page 71.)

A weekly feeding of a complete fertilizer, or liquid fish emulsion in a weak solution, after the buds begin to develop, will reward you with larger blooms, but be sure not to overfeed them. Too much fertilizer will cause the leaves to curl at the edges and to turn blue-green in color. If the leaves are pale green the plants are short of nitrogen and require more fertilizer. The largest blooms are obtained when the plants are slightly underfed and the leaves are dark green. Most authorities recommend removing the female flowers which usually are smaller and single and borne on either side of the large male bloom. They are removed when in bud and as early as possible to encourage larger development of the main bloom. I generally leave them on as occasionally they will be double and they add considerable color to your showing without taking much from the main blooms, but they should be removed before they form seed.

Let's Have More Gladiolus Exhibits at the Shows

By W. J. SINCLAIR
Winnipeg Gladiolus Society

Remember when placing the pots or plants to have the leaves pointing to the front of your bed; the blooms will face the same direction as the leaves point. If you are using pots they can be sunk into the soil up to the rim but be sure to provide good drainage below the pot. Staking and tying each plant with concealed green stakes and twistems or cloth is a wise precaution as they are brittle and may be broken by high winds or the weight of the blooms. Mulching the plants in a bed or border with peat moss helps to retain the moisture and keep the soil cool.

Begonias are troubled by few diseases or insects but they do love humidity and if the weather is very hot and dry a light spraying of the leaves with water will keep the plants in good condition. Rain water especially is good if a supply is obtainable for watering. Mildew will develop on begonias (a white, powdery form, on the leaves) under poor conditions where the plants were started indoors too early, when the soil is too heavy and remains wet and soggy, and where there is poor air circulation. A light dusting with sulphur once a week will help control this.

Sometimes the buds will drop during periods of very high temperatures and low humidity, or from shock if the plants have been taken indoors and have spent a few days in a hot, dry building. A light spraying of water on the leaves will keep the humidity up and help prevent this. A complete drying out of the plants may cause buds to drop. Fallen leaves or blooms should not be left lying on the leaves as this will mark them.

With regular watering and reasonably good conditions begonias will provide you some of the most exotic blooms of any plant. I have had blooms over 9 inches in diameter and have read where it is possible to grow them to 13 inches. A window box or a planter of tuberous begonias on the north with upright types at the back and pendulous begonias at the front makes a beautiful display. The blooms may be used for cut flowers; they are excellent in arrangements and if floated or contained in a rose bowl may last a week or more. They are fine also for corsages or boutonnières.

With the first light frost dig the plants and put them in boxes in the basement. If you have them in pots they may be moved into the garage or indoors when the first frosts occur, then moved out again when the weather warms as we often have a month of fine weather after the first frosts. Sometimes I have had them out until near the end of October. The pots are taken into the basement for the winter and can be given a little water to keep the plants alive for awhile; allow them to dry down naturally. The storage temperature should not go below 40 degrees F., preferably between 40 and 50 degrees F.; below 40 degrees the tubers may become dormant and not start growth in the spring.

Sometime during February I remove the tubers from the soil and store them in perforated plastic bags with some peat moss or in a flat of peat moss. This may have to be done earlier under warm storage temperatures and will have to be done sooner when the plants were dug from beds. The tubers must not become too dry or lose too much weight. They will soon be ready to bring to warmer storage and the pink growth buds will show and they are ready to start the new season. Some of my tubers are more than 6 years old and grow bigger and better each year. Tubers may be divided or new plants may be started by rooting the extra shoots that develop.

Tuberous begonias can be the star attraction of any garden. With good tubers and location, good soil high in organic matter, shade and protection from the wind, and a regular supply of water and nutrients, these plants will provide a long display of brilliant color unequalled by other plants. Your collection may well become your most cherished garden possession.

No flower and garden show is complete without a good section of gladiolus exhibits. These stately flowers add a mass of color to any show and it is always interesting to note the number of visitors who examine the outstanding spikes, record variety names and exclaim at the beauty and majesty of the new things they see. Of course the baskets, vases and arrangements of glads provide a setting of beauty for the other less spectacular flowers.

Many articles have appeared in previous editions of THE PRAIRIE GARDEN on the culture of gladiolus. Pamphlets and information on this subject are available also from the provincial Departments of Agriculture, the local and international horticultural and gladiolus societies, and the Public Libraries. The purpose of this article will be to encourage the showing of glads at our annual flower shows, and to give some instruction on preparing prize-winning spikes.

To grow a good spike you must start with a good bulb, preferably 2 or 3 years old, of a good, named variety. Be sure also to keep a record of the variety name as all good shows insist on the exhibitor naming his entry. Theoretically the purpose of a show is to "improve the breed," so an entry without a name is worthless as an exhibit.

Most varieties, especially the large sizes, will have to be staked prior to cutting to prevent wind damage, and to keep the plant growing straight. Most exhibitors use a wooden stake about three-quarter inch square, about 6 feet long, sharpened at one end. This stake should be placed just as the spike emerges from the sheath, the point being inserted carefully into the ground as near the plant as possible without damaging the bulb. The plant is tied to the stake with a twist-em, fairly low down. Never tie the spike tightly to the stake, especially at any point where the spike is still stretching. It grows as much as an inch or more overnight and if tied too high will crook for sure or even may break off.

The general purpose of staking is to keep the spike upright so that it will grow straight on its own. Some exhibitors do not believe in staking. They concentrate on keeping the plants absolutely upright and take their chances on damage by wind. All glads tend to grow straight, but on a hot day when they are soft if the plant is leaning the spike will bend that way, and when it hardens up at night the bend will become permanent. It is almost impossible to remove a crook once it has occurred.

Some exhibitors place a heavy stake at the end of each row, then run a wire around the stakes and on each side of the plants in the row, at about the height where the spikes emerge from the sheath. This system works fairly well to hold the plants erect. Individual plants may be attached to the wires with twist-ems as an additional method of keeping them absolutely upright.

Most varieties take approximately 10 days from the time the spike emerges from the sheath until they are ready for judging on the show bench. This is a rough guide which varies widely according to weather conditions and varieties. Many varieties produce the spike after the eighth leaf appears and generally a plant produces a leaf every week. This also varies widely but is a rough guide. Exhibitors keep records of blooming times of the dif-

ferent varieties in the hope that they can plan the number of days to bloom of a variety before the show date. This system may be better than no system at all. Luck plays an extremely large role in the production of a grand champ—but even luck must be combined with showmanship for this ultimate reward.

Assume that you have a well grown spike with about 2 florets open about 48 hours before judging begins. You should cut this when it is full of water, either in the morning or late evening, take it indoors and harden it further in some warm water for a couple of hours. Then place it in a deep container with about 2 inches of water in the bottom, and keep it in a dark, cool place until you are ready to move it to the show. Every time you place a glad in water you should first take a fine shaving off the end of the stem at an angle; this ensures that the spike can keep on absorbing water freely. Most good exhibitors tie every spike to a thin stake with twist-ems, immediately after it is cut. (A 5- or 6-foot length of screen mold is good for this purpose.) The first tie should be just under the lowest floret; the second half way up the spike (always below the part which still has to stretch); and the third at the bottom. It may be necessary to put one more very loose tie at the tip, but be careful here or you can ruin the spike by restraining the growing tip held by the tie.

When cutting, it is desirable to cut sufficient stem and leaves to allow the spike to be exhibited with a 20-inch "handle" (measured from the bottom of the point of attachment of the lowest floret to the bottom of the stem). Most shows now are specifying that large varieties be exhibited with not more than a 20-inch handle, making for uniformity on the show bench and presenting a pleasing appearance to visitors. So try to keep as close as you can to 20 inches, but always below 20. If you have difficulty getting enough handle without cutting too many leaves, measure to the point you want and nick the spike at that point through the leaves; it will be found that by manipulation the spike may be broken at the point of the nick, and with a twisting motion and by pulling the lower leaves away slightly the spike will come free with 2 or 3 leaves which should be left on. A spike without leaves looks terrible and will surely offend the eyes of the judges and the public.

When your spike is cut and attached to the light stake, it may be possible to move the florets slightly so that they present their best facing on the stem. Small pieces of tissue placed behind the florets help to hold them in place but must be removed before placing on the show bench. Placement and facing can be improved while the spike is still in the garden by pushing the buds into place during the time of day while the spike is soft. Sometimes spikes may be helped to grow straight by running them between the thumb and the forefinger in an upward motion. There is only one time of the day for this, just before sundown in the late evening and just as the plants are starting their hardening process. Even then great care must be taken or a beautiful head will break off. This is effective only early in the growth of the spike before it starts to really stretch.

Do not go to all this trouble and then spoil it by being careless in transporting your spikes to the show. Handle them with care! Many a beautiful spike has been ruined or even broken by careless handling an hour or so before being placed on the bench. Some exhibitors transport them dry in florist boxes. The sticks may be wired to the top, bottom and sides of the box and so hold the spikes in position no matter how far they have to go. Other exhibitors place the stems in milk cartons and lay the stake on the edge of the back seat of a car. They may be held in position by running a piece of wire or a twist-em between the coat hooks in the car and tying each stake

in place along the wire. Your own ingenuity will suggest other methods. Glads can take a lot of punishment as long as you do not damage them physically.

Most shows have classes for novices and new exhibitors where the competition may be a little less strenuous than in the open classes. A new exhibitor should always make himself known to some of the experienced people. It is unusual to find an experienced showman who is not delighted to welcome and help a newcomer.

Large sizes are at their best if they have 20 or more buds, with 8 open, 6 buds showing color, and 6 tight buds. The inflorescence measured in inches through the half-opened buds should be 50 per cent of the total flowerhead. Small sizes (specified as those with the lowest floret less than 3½ inches across) should have 18 buds with 6 open, and a maximum flowerhead length of 26 inches. Florets are considered open if they are half or more the diameter of the next lower fully open floret.

All this may seem like a lot of work but, believe me, if your spike makes its way to the court of honor it will be worth the effort. So now it's up to you—let's fill our shows with spectacular beauty by exhibiting more glads.

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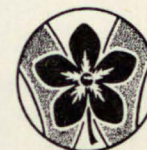
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Work-Study Horticultural Training for the Prairies

By **B. J. GODWIN**

**Senior Instructor in Horticulture, Alberta Department of Agriculture
Olds, Alberta**

Are you interested in training in Horticulture? The Agricultural and Vocational College at Olds is now offering the only course in western Canada designed to train young men and women as semi-professional workers in the horticultural field.

Graduates will qualify as foremen, assistants, and technical workers in horticulture. They will have a knowledge of the general commercial fields of nursery practice, landscaping, flower and vegetable production, and parks planning and development. With this background and with additional experience, many will become managers of their own enterprises or of commercial concerns.

The Horticultural Department of the college is housed in a new Plant Science building and offers an exceptional classroom and laboratory program. Modern facilities provide field, herbarium, and greenhouse work. Three thousand six hundred square feet of glass have been erected for this program in the last 2 years and more is planned. Equipment and library facilities have grown rapidly.

Three instructors devote a major share of their time to horticultural instruction but, fortunately, because the course is one of several in a college environment, specialists in other departments share in teaching Horticulture students. By the time graduation arrives, 10 or more instructors have had a stake in the program.

Students are required to take English, Mathematics, Public Speaking and Recreation, in addition to their Horticultural studies. The extensive lecture and laboratory course in Horticulture includes: Plant Physiology and Plant Breeding; Floriculture and Floral Design; Landscaping and Surveying; Commercial Vegetable Production; Fruits; Soils and Fertilizers; and Plant Pests, including diseases, weeds and insects. The course is rounded out with time devoted to Mechanics, Business Administration, Plant Classification, and Seminars. Students spend over half of their time in the greenhouses, in the laboratories and on the grounds. Here they learn about plant growth, management, and uses. There is a strong demand for graduates.

The two-year program provides both classroom and on-the-job training for students. On-the-job training is an important part of course work. From April to September during each of the 2 years while on course, students are placed with approved co-operating employers who strive to give trainees as broad experience in horticulture as their particular enterprise allows.

The need for such a course was discussed at a meeting in 1959 attended by Dr. W. T. Andrew, Head of the Division of Horticulture, University of Alberta; Prof. R. H. Knowles, University of Alberta; Mr. P. D. McCalla, Supervisor of Horticulture, Alberta Department of Agriculture; Mr. Jack Wright, Superintendent, Parks and Recreation Department, City of Edmonton; and Mr. A. DesChamps, Department of Extension, University of Alberta.

In 1960, their thoughts and some preliminary planning were presented to the Alberta Horticultural Advisory Committee, a provincial committee

advisory to the Minister of Agriculture on horticultural matters. They obtained strong support, and a sub-committee was established with Dr. Andrew as chairman. The committee prepared a brief which was presented to the Alberta Government in 1961; the new course became a reality in 1963, less than 2 years later. Today the course receives the benefit of guidance from an advisory committee of 11 men who represent branches of the horticultural industry in the west.

They are: H. Allen, Horticulturist, Canada Department of Agriculture Research Station, Lacombe; P. D. Hargrave, Superintendent, Provincial Horticultural Station, Brooks; W. Johnstone, Regional Director, Western Region, National Parks Branch, Canada Department of Northern Affairs and National Resources, Calgary; T. Peterson, General Manager, Alberta Canning Company, Magrath; B. Andrews, Director of Operations, Parks and Recreation Department, City of Edmonton; Associate Professor R. H. Knowles, Superintendent of Site Development, University of Alberta, Edmonton; John McDonald, Manager, Lacombe Nurseries, Lacombe; C. H. Harvie, Chief Planner, Provincial Parks Division, Department of Lands and Forests, Edmonton; J. Deak, Manager, Frache Bros., florists, Lethbridge; J. E. Birdsall, Principal, Olds Agricultural and Vocational College; B. J. Godwin, Senior Instructor in Horticulture, Olds Agricultural and Vocational College.

The main requirement of the course is the desire to learn horticulture and to work in the industry. The staff select students on the basis of practical experience in horticulture, maturity and academic background. A personal interview is standard procedure and both men and women are acceptable candidates. One young woman has graduated and 3 more are presently enrolled. The course is not restricted to Alberta applicants; qualified candidates from any area are considered.

Response from applicants, and from the horticultural industry, has been extremely gratifying. Today, 25 students are studying in the classroom and the first class to graduate are at full-time work in many and varied phases of the industry. Indeed, the future for this new course looks very bright green!



Saskatchewan Horticultural Societies

By **D. R. ROBINSON**

Extension Division, University of Saskatchewan, Saskatoon, Saskatchewan

During the past 20 years there has been a gradual rise in the number of horticultural societies in Saskatchewan. Likewise, it would be fair to say that society activity during this period has grown noticeably. In 1945 there were 12 active societies in the province; today, there are 40 active societies. Our most recent records, 1964, indicate an overall membership of 4,806. An increase in membership is expected for 1965.

To a certain extent society activities follow well established, and perhaps routine, lines; the annual August show, urban garden competitions for adults, and educational meetings are sponsored by almost all of the Saskatchewan societies. Perhaps some of the relatively uncommon or unusual society projects would be of interest to our readers. Both the W. Willoughby Society of Parkside and the Last Mountain Lake Society of Bulyea rotate their annual

shows between 3 different communities, thus extending their influence over a relatively large area.

In 1965 the Indian Head and the Regina societies sponsored children's garden competitions with 140 and 107 entries respectively. Perhaps other societies could give greater emphasis to children's garden competitions. During the past year, 12 societies sponsored short courses. Quite recently, societies at Regina, Saskatoon and Yorkton co-operated with Extension personnel in staging one-day courses for horticultural show judges.

Horticultural societies, like other organizations, require money to carry out worthwhile programs. In 1964, 10 societies obtained revenue from plant sales. Annual flowers, such as petunias and snapdragons, made up a considerable part of the material sold. In certain instances, bulbs, corms, perennial flowers and vegetable plants were offered for sale.

In recent years certain members of the Prince Albert Society have given a series of springtime talks on gardening over the local television station. Also, these same people have written articles on home gardening for the local newspaper. Similarly, at Swift Current horticultural matters are discussed by society directors on television. A new project has been undertaken recently by societies at Saskatoon and Sturgis. Immediately after the urban gardens have been judged the Saskatoon Society charters a bus and a goodly number of people visit the prize-winning gardens. Along similar lines, the society members at Sturgis have a tour of some of the outstanding rural gardens in their district.

Perhaps at this time brief mention should be made of the annual societies' convention and related events. Each summer, in late August, one of the large societies plays host to the provincial flower, fruit and honey shows, and also to the two-day convention. This combined event is growing in popularity. Last August it was held in Melfort with 140 persons in attendance. In 1966 the shows and convention will be held in Rosetown.

In conclusion, perhaps a few general comments may be in order. A society, to operate efficiently, must have an active board of directors. One or two new members should be added to the board each year; do not leave all the work to be done by a few of the old 'regulars.' A year-round program is needed in order that the interest of the members may be maintained. In this connection, I wonder sometimes if we are spending too much money on the big two-day flower show and not enough on other projects. Undoubtedly, there is a place for the horticultural society in your community. With the rapid growth of urban centres and the scores of new homes being built the horticultural society should be in a position to assist the new homeowners with their gardening problems.

In the immediate future, the societies, through their members, can and should play an active part in the testing of new horticultural varieties. This activity might be described as a long-term project but it is one that should yield worthwhile dividends to the societies. Quite recently a considerable number of varieties of tree fruits and herbaceous perennials have been released to the nursery trade. Here is an opportunity for the societies to play a part in the growing and testing of these plants. (Actually, other plants such as bulbs and ornamental shrubs also could be mentioned.) At least 5 of the Saskatchewan societies have invested money in fruit trees, mainly apples and plums. These fruit trees for the most part have been sold to members at half price. We are hoping that this project will be taken up by other societies in 1966 and, as indicated above, it could very well be expanded to include many other horticultural plants.

Program of Works for Horticultural Societies

By P. D. McCALLA

Supervisor of Horticulture, Alberta Department of Agriculture
Edmonton, Alberta

I am often asked "how can we encourage young people to join our Horticultural Society?" There is no single answer to this question, but I hope that when you have finished reading this article I shall have given you some ideas which may help if your society or club has this problem. The people we wish to attract are the new home owners, many with young families and community responsibilities, and the last thing most of them are thinking about is joining another organization.

If we agree that this is the group we would like to encourage, and know the main reasons why they do not appear interested, what do we have to do to get their support? Most of them own homes with a garden, a lawn and some landscaping. The majority know little about the use and care of horticulture plants and grass, and the growing of a garden. Where do they get the answers now to their many questions? Probably from a neighbor who seems to have a 'green thumb'; or is it a strong back? Many excellent books and periodicals are available, but most are written for a different climate to prairie Canada. Radio, newspapers and television all provide information, but these programs can easily be missed.

To me the group to provide the information these people need, particularly in the smaller communities where there are often no professional people, are the horticultural societies. These societies are composed of men and women who have a knowledge and an interest in one or more aspects of horticulture and can help new home owners to plant and care for their grounds. Why then do the people who most need the help not join the club which can help them?

The main reason I believe is because of the kinds of programs we offer. For example, many of our societies hold no winter educational meetings. Most stage an annual bench show and generally this affair is well supported by the community. But in this connection let me ask a few questions. How many new exhibitors did we have last year? Were all the entries labelled so that the visitor could write the prize winners in his notebook as a reminder of what to order next spring? Were the exhibitors given the opportunity to meet the judges in order to hear their constructive criticism? I leave these questions with you.

How then do we make our meetings more attractive to the general public? In my opinion, the programs have to be designed to meet the needs of your community. There is little use in having, for example, an expert talk on the fine points of exhibiting gladiolus if what the people need is information on how to build and care for a lawn. The following suggestions for a series of winter meetings are given to provoke ideas for your group:

October or November—An illustrated talk on your winter storage of vegetables, dahlias, gladiolus and other horticulture plants. If time permits, a brief discussion on the growing of house plants.

January—New seed and nursery catalogues are arriving and a discussion on varieties would be helpful. This meeting could save the home owner money because he would be cautioned against purchasing plants which are not suited for the area.

February—The starting of bedding plants and all that this entails, using display material at the meeting.

March—A general discussion on planning and planting the home grounds. This subject of course could be used for a whole series of winter meetings if desired.

April—Preparing the garden for spring and summer. A demonstration on pruning ornamentals and fruits, spring care of lawns, and many other subjects that come to mind for this meeting.

At these meetings keep business to the absolute minimum. The executive should look after most of this. Always start right on time. The chairman is a very important person, because if he does not handle the meeting with understanding and enthusiasm the whole evening may be wasted. Always provide for a question period, and if possible conclude the evening with a cup of coffee.

Never let the meeting drag or continue too long. Send the audience home wanting more, not so weary that they will never come back. Probably you are thinking "why is he taking so long to stress the obvious?" I am sure many of you have been guest speakers at horticultural meetings which did not start until 9:30 p.m. when the meeting had been called for 8:30 p.m.; and then dragged on until nearly midnight. This is not fair to your members and visitors, and certainly most unfair to your speaker.

During the summer months visits to outstanding gardens, experimental farms, and other public and private beauty spots are educational and can be the excuse for an informative and enjoyable day. Of course the whole membership will be busy preparing for the horticultural show to ensure that it goes off without a hitch.

I feel confident that if a society or a club operates along the lines outlined above, it will win active support from many members of the community.

There are many other services a 'live wire' society can do for its community: a lending library of periodicals, bulletins and books available to members; providing reliable information to local-government officials regarding all phases of town and rural beautification; for example, boulevard planting, planning and planting small parks, and beautifying school grounds. The demand from the general public for information on all phases of horticulture grows at a rapid rate. Government agencies are hard pressed to provide the personnel to look after these requests. Local horticultural societies and garden clubs can help significantly to meet this demand and, because of the favorable publicity which would result, to increase their membership.

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Horticultural Society Projects

By F. J. WEIR

Provincial Horticulturist, Manitoba Department of Agriculture and Conservation
Winnipeg, Manitoba

There is an old saying that "if you want a job done, go to a busy man" and this saying is apt if referred to the activities and projects of a Horticultural Society. The following list of projects has been made up from the activities of the different horticultural societies in Manitoba over the past few years. Many societies already are engaged, in one form or another, in over 80 per cent of the projects listed, and, in almost every case, find little difficulty in securing assistance and co-operation from other local organizations and individuals, no difficulty in getting a good complement of members. Their interests continue to grow from year to year.

In this list no further mention is made of such projects as the provincial shows, or competitions, as the policy for these is set by the parent organization or the Provincial Department of Agriculture.

Junior Activities

If we are to encourage new and younger members to join the society, we must start early and provide leadership and encouragement by: (1) Assisting with 4-H program or other Youth organization program by: providing leadership for 4-H Garden, Potato and Fruit Clubs, assist in obtaining seeds for Juniors; sponsor Achievement Days or entries in the annual show. (2) Judging junior gardens. (3) Arranging for a program of meetings for juniors. (4) Sponsoring junior Scrapbook Competitions.

Competitions and Shows

Many societies are content to have only one show during the year. In many cases where seasonal shows have been held, interest has been retained for the full year, rather than for a 10-day period in the summertime. Special shows can be staged for: Peonies; House Plants; Bulbs; African Violets; Lilies; Roses; Gladiolus; Dahlias, and others.

In addition to these special shows, emphasis should be placed on making the annual show more meaningful by having different displays staged each year. Educational displays could be made up on the proper use of chemicals, propagation, flower identification, weed identification and control, conservation of wild flowers, farm safety, etc.

Everyone is interested in competition, whether it be a competition in which anyone can join, or a competition for self-improvement. Most urban horticultural societies in Manitoba already sponsor an Urban Home Ground Competition and the majority in rural parts of the province sponsor both Urban and Farm competitions. The list of possible competitive projects is almost unlimited. Competitions can be organized for: Private home grounds, urban and rural; Industrial grounds; Vegetable gardens; Flower gardens; Lawns; Boulevards; Window boxes or planters.

In addition, more societies each year are sponsoring competitions for: Christmas lighting; Outdoor garden lighting; Colored slides.

Educational Program

The main purpose in having a horticultural society organized in the community is to encourage horticultural development in that area. There are many ways in which these aims can be achieved.

1. General Meetings: Lectures on individual horticultural subjects; Panel discussions making use of members, parliamentary procedure, etc.; Film and slide presentations; Short Courses, Exhibitors' Schools, Judges' Schools, etc.; Discussion of garden problems, control of diseases, insects and weeds, etc.

2. Demonstrations: Flower arrangements, using fresh flowers and foliage, dried material, driftwood, corsages, etc.; Plant propagation, seeds, bulbs, cuttings, root division, etc.; Selection and preparation of exhibits for the show; Pruning; Budding and grafting; Transplanting; Growing plants under artificial light.

3. Tours: To Experimental Farms; To Parks, Industrial Grounds; To Individual Home Grounds; To Nurseries, Commercial, Government (P.F.R.A. Tree Nursery, Indian Head, Hadashville); International Peace Garden.

Community Service

A few projects in community service which have been successful are:

(1) Sponsoring the development or improvement of a local park or roadside park. (2) Landscaping the grounds of hospitals, churches, schools, senior citizens homes. (3) An anti-litter program, cleaning up vacant lots, car cemeteries, camouflaging lagoons, etc. (4) Clean-up, paint-up campaign. (5) Providing garden reference books to libraries. (6) Co-operating with local Parks Boards, and boulevard and street tree planting. (7) Co-operating with local service clubs or other organizations in any community improvement program. (8) Providing flowers for hospitals and churches. (9) Preservation of wild flowers.

Society and individual members can be of service to others, individually, or as a group.

(1) Membership campaign for new and young members, particularly new home owners. (2) Providing baby-sitting service, so that new and young members can attend meetings. (3) A year's program printed and copies distributed to members in advance. (4) Co-operating with neighboring societies in joint programs. (5) Providing judges for neighboring societies, and for competitions. (6) Supporting International Peace Garden Arboretum. (7) Participating more widely in horticultural shows of neighboring societies. (8) Distributing a monthly newsletter to members. (9) Purchasing bulbs, seeds, nursery stock, etc., in bulk for distribution to members. (10) Continuous use of government and university bulletins. (11) Distributing to each member, every year, the annual book on prairie horticulture THE PRAIRIE GARDEN.

Publicity—Public Relations

If a society has sponsored a successful worthwhile project, it certainly is no sin to let the community know about it. The local paper should always be kept informed on horticultural society activities. In most rural areas, the Agricultural Representative or the Home Economist has a regular news column which can be used for news items of horticultural society activities. Radio and television stations appreciate having news items of interest. Use members able to pass on their knowledge to others on radio and television programs.

Actually the selection of a horticultural society program boils down largely to the community needs. How these needs are met depends on the abilities or the capabilities of the members, the time available for community activity, and the interest of the members in the improvement of their community. Where these conditions are satisfied, the horticultural society can do the job and justify its organization and existence.

Test-Plot Gardening in St. James, Manitoba

By J. P. DE WET
Winnipeg, Manitoba

During the summer of 1965 the St. James Horticultural Society provided a number of test plots for interested suburban home owners. Several promising new Vegetable varieties under trial at the University of Manitoba were grown in co-operation with the Plant Science Department.

This has given the Society a broader field of general usefulness, and its members a fresh keenness in their hobby. Here was an activity whose ends went further than the home kitchen and the freezer. It directed their interest into knowledge of the new varieties as well as some of the scientific factors involved in the breeding and production of varieties superior to the presently known ones. Society directors intend that the test program begun in 1965 shall continue in the years ahead.

St. James gardeners organized themselves into a society in 1914. This was the year of the outbreak of the First World War when the call went out that all should supply their own individual needs with Victory gardens and many plots were put under cultivation during the war years. In November 1929, the Society applied to the Manitoba Government for a Certificate of Organization under the Manitoba Horticultural Societies Act, and received Certificate No. 8, dated December 1, 1929.

Through succeeding years Society members had their garden plots in different areas of the municipality; in the early 1940's access to the present area was given by the City of St. James, then titled the Municipality. Cultivation of the area has been continuous ever since and moreover is likely to continue in perpetuity. Because of its proximity to the Winnipeg International Airport, the land must be kept permanently free of buildings.

The idea of the test plots arose out of a discussion at a meeting of the Society directors as to possible new projects for the approaching summer; the suggestion was acted on without delay. Professor L. H. Shebeski, Head of the Department of Plant Science (now Dean of the Faculty of Agriculture and Home Economics) was contacted. He referred the matter to Dr. J. D. Campbell who got in touch with the Society.

The land in question, lying north of Silver Avenue and between Albany and Lyle Streets, is divided into 78 individual plots, each 30 feet by 60 feet in size. The gardening area is typical Red River Valley heavy, high-lime soil. The Society had it well cleaned of garden trash and ploughed during October; there is now sufficient new ground ploughed to provide an additional eight plots in 1966.

Application for plots is restricted to Society members who pay \$2.50 rental in addition to their annual membership fee of \$1.00. The plots are allocated at an open meeting in March, and subsequently are staked out and labeled with the names of the respective applicant members.

In all, 30 gardeners were allotted 210 seed packages by Dr. Campbell. The varieties ranged through peas (2), beans (2), corn (2), carrots, cucumbers, squash and potatoes. In addition, a number of broccoli and cauliflower transplants were provided for evaluation.

Seeding followed during the week of the May 24 holiday; harvesting was completed by the end of August. One should add here that entries of potatoes, beans, beets and squash from the test plots won first prizes in

their respective classes at the Society's annual show during the second week of August; and a plot holder's display of vegetables was rated the best display entered.

Cultivation of the plots during the growing season was supervised by a special committee of Society directors; and the Society president, R. D. Morgan, reported his high satisfaction at the special care given plots. The holders used their own choice of fertilizers and interest was carried as far as rivalry by some as to who had the cleanest plot and could produce the best returns.

Each test-plot holder was required to report in detail on the vegetables grown on his individual plot, on special forms supplied. These details included: Comments on soil preparation; special problems and treatment; weather; crop; variety; seed source; dates of seeding, transplanting and harvesting; emergence; percentage of stand; appearance, quality and general rating. The scores used were the numbers 1-5, with one being the least and five the most desirable characteristics. In addition there was space for remarks, including, where possible, comparison with older, standard varieties.

Since the plots are about a mile south from the Winnipeg International Airport Meteorological Station, the station's monthly summary reports will be of interest here:

June: Temperatures were near normal and precipitation at 2.37 inches much below normal (3.19 inches). Most of the rain came early in the first week and late in the fourth, with only a few light showers in between. There were some cool days with temperatures in the 60's, but thermometers reached 70 to 80 degrees every day from the 10th to the 27th, and there was abundant sunshine and low humidity. Unfortunately what would have been almost perfect summer weather was marred by strong winds and those who complained that the wind never stopped blowing found their complaints justified when the mean wind speed for the month was calculated at 14.3 miles per hour, the highest on record.

July: The coolest July since 1918; the mean temperature was 64.4 degrees; in 1918 it was 62.5 degrees. Except for the third week of the month when there were a few days of warm, very humid weather, temperatures were below normal most of the month. Afternoon temperatures climbed as high as the low 80's on only 6 days. Precipitation (3.15 inches), sunshine and windspeed were near normal. There were severe thunderstorms in the vicinity early in the evening of July 1.

August: Temperatures were above normal for the first 2 weeks, with the second week the warmest of the summer. The 95.6 degrees on the 13th was the highest of the summer. Except for 8 days when maximum temperatures were in the 80's, the second half of the month was very cool with

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afternoon temperatures mostly in the low 60's or the low 70's. On the 28th, the thermometer dropped to 33 degrees, the lowest August temperature in 50 years. The monthly mean temperature was 3 degrees below normal (66 degrees), but there was abundant sunshine (314.9 hours), light winds, and light precipitation (1.36 inches; normal 2.76 inches), making the month not unpleasant. Only two Augusts since 1900 have had more sunshine; August, 1961, the sunniest on record, had 323.6 hours.

In addition to the test plots, the area administered by the St. James society includes ten 8 feet by 10 feet plots cultivated by children competing for the Waugh Shield, a competition founded in 1908 by the late R. D. Waugh, a former mayor of Winnipeg, to promote children's interest in gardening. Also, several parents set aside portions of their plots for the use of their children. Beans, carrots and beets, and centaurea, marigolds and zinnias, are the varieties grown. The Society buys the seeds and distributes them to the children at cost. These plots are under the supervision of the Society's Waugh Shield Committee who advise on improving competition standing.

Dr. Campbell had the following to say about this co-operative project: Here at the University we have been trying for many years to improve vegetable varieties for Manitoba. One method is through a breeding program; another by improving cultural practices. But one of the most fruitful methods is by the careful evaluation of new varieties developed anywhere in the world. We hope in our variety trials to spot those with unusual characteristics and superior to the standard ones now being grown. But before we can recommend them for general use, we need wider evaluation, and co-operative trials such as this one appear extremely promising. They bring together researchers, companies who provide the seed, and some very enthusiastic vegetable growers. We are delighted with this first year's results. We would like to see other societies throughout the prairies join the St. James society in this worthwhile endeavor.

Ten crops involving 13 different vegetable varieties were grown and evaluated by 15 members. A table containing results of this co-operative test is available from THE PRAIRIE GARDEN, 445 Queenston St., Winnipeg 9. We are pleased to acknowledge with thanks, the excellent assistance from seed companies who supplied the seed on very short notice.

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Ten Musts in Flower Arrangements

By MRS. A. W. LYONS
Winnipeg Horticultural Society

When asked to contribute this article to THE PRAIRIE GARDEN, I had to ask myself just what are the "Ten Musts in Flower Arrangements?" Normally one makes an arrangement to please oneself and the word "must" doesn't enter into it. Finally I concluded that it is only when arranging for show purposes that we must stick to certain basic rules.

Therefore this article would have to be written from the "arranging for the show" point of view. The rest of the time, if it gives you pleasure and satisfaction to make an arrangement of fuchsia-colored gladiolus in an orange teapot with rhubarb leaves, go ahead! Your friends probably will put it down to your contemporary approach to flower arranging.

1. **Composition.** Our first must is Composition and since a good composition embraces Design, Balance and Scale I shall deal with them in turn.

Design is the plan or pattern of an arrangement and includes all materials used. Have in mind a picture of your completed composition, as well as the location in which it is to be used. Some of the basic lines used in design are: Perpendicular; Hogarth line or S bend; Circular (or all round arrangement); Crescent; Triangle; Half Circle; and Side Angle.

Balance can be symmetric, where weight is equally distributed on either side of an imaginary centre line; or asymmetric, in which the two sides can be different but balance is achieved by a visual effect of equal weight.

Scale is the size relationship of all materials to each other and to the location. A good rule is to keep the arrangement approximately one and one-half times the height of the container, or one and one-half times the width of a low container.

2. **Harmony.** A harmonious composition is achieved when materials used are suitably related. Do not use a heavily textured container for sweet peas, or link gypsophila with zinnias, and expect the result to be harmonious.

3. **Rhythm.** Create rhythm in your arrangement by using material with curving lines and graduating sizes, leading the eye toward the focal point or centre of interest and again throughout the whole arrangement.

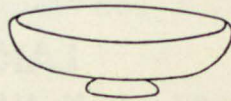
4. **Focal Point.** The point where all stems meet is the centre of interest or heart of the arrangement. It should therefore consist of the most dominant material used in the composition. Light-textured and colored material should be kept to the outside of the arrangement, graduating to darker-colored and heavier-textured flowers at the focal point. There are exceptions, however; the size and the shape of the flowers at the centre of interest are of more importance than color.



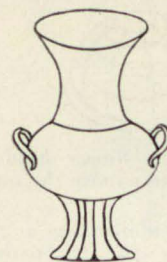
Footed Dish



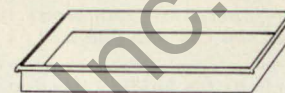
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Low Shallow Bowl
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Pedestal Urn



Shallow Dish



Driftwood

5. **Unity.** All materials must unite with and complement each other. Be careful not to overdo any one color or flower. Make sure your container does not distract from the arrangement. The composition as a whole must draw attention, rather than any one single factor.

6. **Texture.** Even the inexperienced eye would be quick to notice the unattractive quality of large dahlias arranged with light, airy foliage in a dainty container. Keep delicate materials for dainty containers such as china, glass or silver. Save the more robust flowers for pottery and wooden containers.

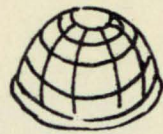
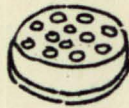
These first six "musts" are defined in most articles and books on flower arranging, and probably are familiar to many flower arrangers. The next four I consider extremely important, particularly at show time, and may prevent some new exhibitors from making the same mistakes that I did when I first entered arrangements for show.

7. **Originality.** Do try to be original. Beginners are inclined to copy something they have seen and admired. If you do this, you will find that your arrangements look stiff and unattractive; it is simply because you are using someone else's ideas. Be creative! You will be much happier with the results, and so will the judges. Try not to use the same idea too often, or you will find yourself getting into a rut. I am very fond of footed containers and pyramid-type arrangements and have to remind myself at times to try something new.

8. **Containers.** Once you have been bitten by the flower arranging bug you will find shopping for containers will become almost an obsession. You will haunt china departments, antique stores, auction sales and even junk shops in search of something, anything in fact that will hold water.

I feel more emphasis should be placed on containers when an arrangement is being judged. The container is part of the overall design, but should not draw attention from the arrangement. Make sure that your container is in keeping with the occasion and location. Do not, for instance, use a kitchen utensil for an arrangement which is to be placed in the living-room. Consider color carefully. Repeat the color of your container in your focal point. Harmonize the color of the flowers with the container. Examples are: autumn shades in copper or brass; sweet peas in delicate, tinted glass; geraniums in driftwood or pottery. Make sure that the texture of the container is in keeping with the flowers and foliage. While white containers are considered safe to use as they will not compete with other colors in an arrangement, I have found that using containers which harmonize and blend with an arrangement can be much more effective.

My choice of six containers would be a pedestal urn for mass arrangements; a low, shallow bowl in silver or brass suitable for table arrangements; a shallow, square or oval dish for Japanese or side-angle arrangements; a footed dish for pyramid arrangements. A formal, pedestal container, supported by a figurine or a cherub, is delightful and can be used on so many occasions; so is one made from driftwood with a small salmon tin fastened to the driftwood



For a stable arrangement—there are numerous types of flower holders that you can use. Try as many as you can and you will be able to choose the ones that suit you best.

Needle point holders—excellent for holding the flowers at almost any angle. The holder can be secured to the bottom of the container, if it is dry, with a worm of plasticine. When buying this type of holder be sure it is rustproof.

Glass holders—not too satisfactory, because holes are upright or almost upright.

Wire domes or cages are similar, but more effective because stems can be inserted in a greater number of positions. Fasten to dry container with plasticine.

for holding water. These, I think, are the six which can be most satisfactory, but the scope is unlimited; almost anything that will hold water may be used.

9. **Condition.** An arrangement that shows signs of wilting will lose points immediately. A little experimenting with different arranging mediums can save a lot of disappointment at show time. A pin holder used with chicken wire is the ideal medium; it will hold an arrangement firmly in place and allow the material an ample supply of water. Oasis is a delightful medium to work with, permitting unlimited scope for arrangers. You will find, however, that it dries out quickly and needs to be kept well moistened. Woody-stemmed material will not do well in it at all.

Poppies, heliotropes, etc., which exude a milky liquid, should have their stems burned or singed, and be plunged into cold water for a few hours before arranging. It is a good practice to fill hollow-stemmed material with water. This can be done with an eyedropper; the stem end is next covered with a finger and set in water. This prevents air bubbles from forming in the stem, a common cause of wilted material.

10. **Understanding** the prize list rules is a must when arranging for show purposes. Be sure to read and understand all the rules, because it is most disappointing to find a beautiful arrangement disqualified on some minor technicality.

Flower arranging is a relaxing hobby that more people should engage in. Self-expression and beauty are as necessary to the soul as food is to the body. Expressing oneself through the appealing beauty of the wonderful range of floral material that Nature has endowed us with so generously, is doubly satisfying.

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Something New in African Violets

By MRS. C. W. BEATTIE
Winnipeg African Violet Society

The African Violet world is enjoying a new and very exciting development. For many years, hybridizers have worked to produce a violet leaf which would be pliable, replacing the rather brittle foliage of the plant as we now know it. Granger Gardens, the largest violet breeders and the major shippers in the world to florists, have pioneered this experiment through a long and involved process of breeding.

After many years of breeding, a double pink was developed and this color involved more time and effort than any other development. The hybridizers then worked on Girl foliage. These plants had been developed for over a dozen years, but were apt to have the blooms very bunched and the trusses did not come up clear of the foliage. This clearance finally was achieved with many Girl foliage plants holding their blooms high above the foliage.

By crossing these dominant double pinks with the Girl foliage with blooms held high, Granger Gardens finally achieved the pliable foliage. Three of these, Chanticleer, Pink Oak and Maid Marion, were released last year. With these successes behind them, they began a program to obtain other colors and this year released Matador, a black-purple.

Lyndon Lyons, one of the foremost breeders, together with many others in the business, is working now on further F₂ hybrid developments and expects to release a number of varieties this year. Pliable foliage opens up a whole new world from the grower of one pot of violets to the breeder of thousands of plants.

At one of our regular meetings* this year, we were very fortunate, through the courtesy of K. D. Barnes, to be given a demonstration of these leaves. They can be rolled or bent and will not break because they are soft and pliable, yet this pliability does not change the appearance of the foliage.

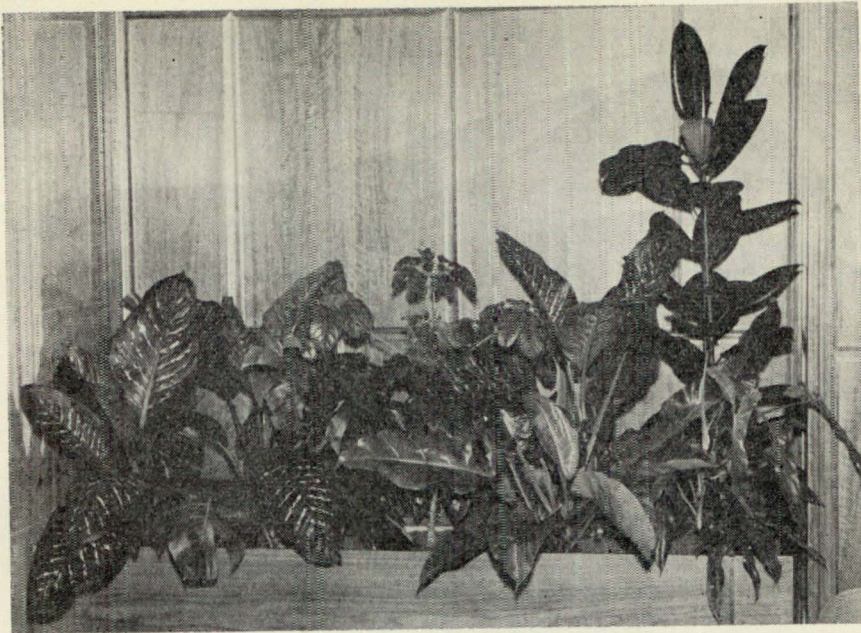
There are of course endless possibilities ahead. No need to fear dropping a plant or moving it too close to an object which normally would damage the leaves and, most important of all, the problem of transportation has been lessened to a very great degree, as pot and foliage now can be rolled up without fear of damage.

The Winnipeg African Violet Society has ended another very busy year. Judging from the exhibits in both the 1965 Red River Exhibition and the 1965 Winnipeg International Flower Show, it also was a very successful year. The quality of the exhibits in both shows was excellent and this year we had the largest number of entries we have ever had in both. We like to think that the success of these shows is a direct result of membership in the Winnipeg African Violet Society and urge all readers who are not members to join us.

While we were pleased at the large number of entries in the shows we were disappointed also that there were no exhibitors from outside the Metropolitan Winnipeg area. The entry fee is small and membership in the Society is not a requirement. As the ultimate aim of the Society is an African Violet Show independent of the Red River Exhibition or the Winnipeg International Flower Show the interest of all violet growers in Manitoba is required to make it a truly good show.

Perhaps the reader is not aware that many magazines publish articles on problems pertaining to violet growing and breeding, diseases, etc., one of which is a Canadian publication Chatter.

*Winnipeg African Violet Society, division of the Winnipeg Horticultural Society.



Box arrangement of tropicals located in a foyer of the Great West Life Assurance Building in Winnipeg, includes, left to right: Dieffenbachia, Monstera, Schefflera, Philodendron, Dieffenbachia, Ficus elastica and Philodendron.

Care of House and Foliage Plants

By JACK BOUWMAN
Winnipeg, Manitoba

House plants have long answered the desire for living color indoors, and over the years have brought cheer and enjoyment to countless persons. House and foliage plants will be healthy and show to best advantage when given the conditions under which they thrive best.

Let us take a look at light conditions in the average home and find out how much light the different species require. Not all homes or city apartments are blessed with a window with a southern exposure, so we will separate house plants into those that will do well with partial sun, and those that are content with plenty of light but little or no sun. Plants may be moved about to secure their required light or sun and it is better to grow only such species as are suited to the conditions they must live in.

Full Sun. The following list is not complete but is intended as a guide to the type of plants and flowers which require at least 5 hours of sunlight daily: Astilbe japonica, Indica azalea, cactus varieties, calla lily, calceolaria, Cape bulbs, cineraria, clivia, Dutch bulbs, gardenia, geraniums, heliotrope, hydrangea, impatiens, Jerusalem cherry, and poinsettia.

Partial Sun. Plants requiring 2 to 3 hours of sunlight daily: begonias, coleus, dracaena, anthurium, fuchsia, cyclamen, primrose in variety, periwinkle, and any of the foliage plants in the following list.

Little or no Sun. This list includes the foliage plants with inconspicuous or no flowers, such as ferns, palms, dracaena, pandanus, vines as Wandering

Jew, and many others; also African violet, aloe, Begonia rex and the tuberous-rooted varieties, Chinese Evergreen, araucaria, philodendron, Rubber plants, aspidistra, schefflera, dieffenbachia, sansevieria, aralias, crassula or Jade plant, Boston fern.

Decorative Plants. In using house plants as part of a decorative scheme, keep in mind that texture and form play as important a part as color. By choosing plants for boldness of form, growth habit, or vibrant coloring, you can achieve dramatic effects. Dracaena, phothos, peperomia, Chinese Evergreen, sansevieria, and many philodendrons adapt readily to nearly all types of homes. Where a delicate effect is sought, lacy ferns and fine-leaved ivies are good.

Most house plants generally get along in ordinary room temperatures. Geraniums, Christmas cactus, fuchsia, and some begonias do better if kept in a cool room and brought out to be admired when in flower. Night temperature should be 5° to 10° lower than daytime.

A number of foliage plants require considerable humidity and this may be supplied by standing their pots on pebbles in water-filled saucers or trays, or in moist sand, gravel or vermiculite. Moisture requirements vary with each plant, overwatering is a common mistake. Soil that is continuously soaked is not desirable. A spray bath is helpful in cleaning off accumulated dust, and a soft brush works well on rough or hairy leaves.

Fast-growing plants benefit from repotting every year. For most plants you may use one quarter topsoil, one quarter very old barnyard manure, one quarter peat moss and one quarter sand. For tropical and sub-tropical plants the peat moss can be increased to 40 per cent in the mixture. A loose soil provides aeration and quick drainage, and the growing medium will not become waterlogged.

Insects and other house plant pests are their greatest natural enemies. Although able to cope with heat, drought, cold and starvation to some extent, a concentrated attack by insect hordes in many cases proves fatal. An insecticide spray or dip is recommended for the control of common house plant pests. Sprays or dips are preferred since they cover the plant more thoroughly and are less likely to drift to nearby plants. When the insecticide is applied at the first signs of infestation, and reapplied 10 days later if it continues, the plant will have every chance for successful recovery.

Adult mites are too small to be seen with the naked eye, but under a magnifying glass appear oval, tan-colored and semi-transparent. Mites are found mostly in protected places on young, tender stems, leaves, buds or flowers, and crawl from plant to plant where the leaves touch. White flies have white, wedge-shaped wings and resemble paper ash swirling in the air. In their immature stages they attach to the under side of the leaf. Both adults and young suck the plant juices.

Sometimes it is more convenient to dip plants than to spray them. Mix insecticide and water in a pail or pan large enough to dip the plant's foliage. Turn the plant upside down and immerse the foliage in the mixture for a few seconds, using two teaspoons of Malathion to one gallon of water as a solution. (Use rubber gloves).

Remember, insecticides are poisonous. Store them in closed, well labeled containers, away from children, pets and foodstuffs. If possible, move plants outdoors in the open air when dipping or spraying.

After-Care of Gift Plants

By W. H. GRAY

Supervisor Florist, Assiniboine Park Conservatory, Winnipeg, Manitoba

Each year many, many thousands of dollars are spent on gift plants, both the flowering and foliage varieties. Most people appreciate them but many fail to realize that a little extra care can prolong the life and beauty of these gifts.

One point I would like to make at the very start of this topic is that we kill more plants with kindness than in any other way. Very often we hear people claim that their plant was sick or even dying when it arrived from the florist. In nearly all such cases this is not true and very unfair to these businessmen whose livelihood depends on healthy material; to do otherwise would be financial suicide. In most cases, if we use a little common sense and patience, and let our plants grow, we will have much more success in raising them.

Incorrect watering causes most house plant troubles. Most people are far too kind to their plants and think they have to water every day. Some plants require more water than others. If the soil feels dry to the touch, water thoroughly and then leave until dry again. Poor drainage and placing potted plants in receptacles such as jardinières which hold excess water around the pot, are common faults which should be avoided. The watering will depend also on the type of plant, the season of the year, the type of soil, and the atmosphere conditions in the room.

Most plants like a period of rest during the winter months. Lower temperatures and shortened days give this rest, and during these months it is advisable to use very little, if any, plant food. It is foolish to try to stimulate growth of flowers at this time. Be sure to follow the manufacturer's directions to the letter when using any of the liquid or dry fertilizers. There is no sense trying to feed a sick plant any more than a sick person would need or be able to use food. Neither do such things as aspirins or tea leaves and the like have any value. In fact, the odds are that they could be harmful if used to excess.

Potted chrysanthemums are fast becoming the most popular of all gift plants. If kept in a cool place and not allowed to become too dry, they will provide much color for 4 to 6 weeks. After they finish blooming, they should be cut back to about 2 to 3 inches above the soil and never allowed to dry out. Make sure that the pot has good drainage and never over-water nor stand in water. Let them start growing again.

A program of fertilizing should be started now; once a week, feed any well balanced fertilizer lightly. During the summer months set the pot in the garden; in winter, place the pot in a window but keep rotating so the plants will not be drawn to one side. The question is often asked about growing these plants right in the ground. This is fine but the majority will not be hardy enough to stand our winters. It is hard to grow potted chrysanthemums well the second time, but even so one can still get a good deal of bloom.

The **Poinsettia** is a popular gift at Christmas, with which it has been so closely associated these many years. It is a delicate plant and does not like to be in a direct draught or in front of a hot air register. The bloom will last for several weeks if the plant is kept moist and in a fairly cool room. After the plant has finished blooming, it should be kept dry and cool for

several weeks. Some of the top stems may be pruned back but this is not absolutely necessary. In May prune back fairly hard and start into growth again by watering and setting in a greenhouse or a window.

As soon as these shoots are about 4 inches long, they can be started like geranium cuttings. When the cuttings are rooted, they may be planted in small pots, using a mixture of three parts loam, one part each of cow manure, leaf mold or peat moss, and sand. As they make growth they should be moved into larger pots or several plants into pans. Weekly fertilizing with a balanced fertilizer may be started as soon as the plants are established in their final pots and continued until the bracts are well developed. A minimum temperature of 55 degrees to 60 degrees is required. Poinsettias resent draughts and are easily damaged by spraying with insecticides. They need short days and long nights to bloom. Light at night prevents flowering and the formation of bracts.

Although **Cyclamens** are among the most beautiful of all gift plants when in bloom and some varieties have lovely foliage, they are not generally long-lasting in our modern homes. They prefer a moist atmosphere. The plants are started from seed and take about 15 months to reach maturity, consequently they are fairly expensive in the florist shops. When the flowers are over in the spring, the plants usually are discarded but it is possible to keep the old plants from year to year. They must be watered until the leaves dry up and as the leaves dry the amount of water is decreased.

During the summer months, the tubers are left in the pots but the pots are turned on their side to keep free of moisture until early August. The tubers are then taken out and repotted in fresh soil but should never be potted too deeply. They should be set in a cool, shady place and will soon start into growth if the soil is kept moist. They like a soil mixture like that used for begonias but with extra bone meal and charcoal. Cyclamen tubers will live for many years when cared for like this, but the blooms will be smaller than those of young plants.

Azaleas in bloom are the most attractive of all gift plants. Most people do not realize that they are evergreens and should never be allowed to dry up. As soon as the flowers have faded, they should be carefully picked off. The plants should be knocked out of the pots and repotted with a rich

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soil mixture pressed fairly hard around the root ball. They like a temperature of about 55 degrees and should be syringed daily.

After danger of frost, the plants should be set outdoors in semi-shade. If the pots are sunk into the garden soil it will help to keep the roots cool and moist, and also prevent the wind from blowing the plants over. A weekly feeding of a balanced fertilizer (RX 15 is good) will assist them to grow and produce blooms freely. During the summer months, it is very necessary to keep them outdoors, syringing daily and above all never letting them become dry. Very little pruning is required but long branches should be cut back to give better shape to the plant.

Hydrangeas usually are Easter gifts and require a fair amount of water while blooming. After the blooms fade, the plants should be pruned and set outdoors in their pots during the summer. In pruning, remove all old flowering stems down to a point on the stem from which strong new growths are developing. Under no circumstances should hydrangeas be pruned in late fall, winter or spring, if flowers are desired. Regular feeding is required during the summer and the soil should be kept moist. About August 15 the plants should be brought indoors, stored at a temperature of about 50 degrees, and kept dry. These plants will drop their leaves. In early spring they should be top-dressed with a rich soil; then begin watering and give a regular fertilizing every 10 days. They like a sunny spot.

Easter Lilies are a very popular gift but really not too useful when kept after they bloom. There are 2 ways to hold them over. The easiest is to reduce the amount of water and let the top of the plant dry up. After 4 weeks, cut the top off and move the plant into the flower border; it will produce a bloom late in August. Another way is to let the plant dry, then store in a cool, dry place. In November bring the plant up, check the drainage, top-dress with rich soil, and start watering. It will be very difficult to time the bloom and these second blooms usually are small.

Foliage plants usually give a great deal of enjoyment to the receiver. If one follows some of the ideas outlined in the opening paragraphs these plants may live for several years.

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Soil Improvement for Better Gardens

By G. S. EMMOND

**Agronomist, Soil Fertility-Horticulture, Experimental Farm,
Canada Department of Agriculture, Indian Head, Saskatchewan**

A balanced soil improvement program is essential for maximum garden production. The purposes of such a program are to improve soil aeration, tilth, water-holding capacity and micro-organism development, while at the same time to supply the necessary nutrients for plant growth. To accomplish this not one but several practices must be adopted. For example, barn manure, ideally suited for improving soil friability and increasing soil nitrogen and minor element supply, usually is low in phosphorus. To counterbalance this excess of nitrogen, barn manure should be reinforced with phosphate fertilizer if top-quality vegetables and flowers are to be produced.

The first practice to consider is the addition of organic material to the soil. Besides reducing soil crusting and improving soil workability and water infiltration, organic material also is a food supply for micro-organisms. The activity of these micro-organisms in turn releases plant nutrients from both the organic matter and the mineral portion of the soil. The major nutrient released from organic matter decomposition is nitrogen. Sources of organic material are compost, barn manure, or residues from growing of sod crops.

Compost can be made from such materials as peat, straw, hay, grass clippings, weeds, leaves and garden refuse, provided they are free from harmful insects and diseases. Both compost and barn manure should be stacked in trim, compact piles, kept moist, and if necessary protected from excessive moisture to prevent the leaching of valuable plant nutrients.

Compost material and barn manure for garden use should be well rotted, applied preferably in the autumn, and immediately ploughed or spaded in deeply. Compost or cow, horse, and sheep manures applied at 10 to 20 tons per acre for flower gardens and at 20 to 40 tons per acre for vegetable gardens, are quite satisfactory. Poultry manure is considerably richer and should be used with care and at lower rates. Manures and compost are ideal also for potting plants, top dressing of lawns, and working into the soil around shrubs and trees. In succeeding years the amount of organic material may have to be reduced if flowering plants and such crops as tomatoes show evidence that soil nitrogen is becoming too high.

Another suitable method of increasing soil organic matter is to grow soil-improvement crops such as field peas and oats, sweet clover with or without oats, and alfalfa with or without a grass crop. These crops are either ploughed under as a green manure when in rank growth, (i.e., before flowering), or are removed as hay and the stubble or sod ploughed under. It is essential that the seed of all legume crops be inoculated prior to sowing to ensure nitrogen fixation from the air.

Organic matter, a natural source of most plant nutrients, often fails to supply all the nitrogen and minerals required by the crops in this day of close plant spacings and frequent irrigation. Thus, a second practice, the addition of plant nutrients through commercial fertilizer, should be used where soil tests and crop growth indicate that more plant food is needed for optimum production. Commercial fertilizers do not directly improve soil structure.

Consequently, fertilizer is most effective where the level of organic matter is kept high and good soil tilth is maintained. Since different soils vary in their fertilizer requirements soil tests are necessary to arrive at definite conclusions on what to use and how much. Information on the approximate rate of fertilizer for flower and vegetable gardens can be found in Garden News, a publication by the Indian Head Experimental Farm. For more specific information, soil samples should be sent to the Soils Department of your local University.

Generally speaking, nitrogen fertilizers (e.g., 27-14-0) stimulate growth of leafy parts of the plant; phosphate fertilizers (e.g., 11-48-0) hasten maturity and promote the growth of flowers, seeds and roots. Prairie soils normally have a sufficient supply of potash and trace elements. Forest soils and soils under intensive production through the use of frequent irrigations and high rates of nitrate and phosphate fertilizers, may require potash as well as certain minor elements.

Commercial fertilizer should not come in direct contact with seeds or the roots of newly transplanted plants. Ideal placement is below or in a band to the side where the roots can intercept the nutrients early in their growth. The readily accessible and available nutrients from the fertilizer produce a starter effect until the root system of the plants becomes established or developed and the soil warms up sufficiently for the soil nutrients to become available. One method of fertilizer placement is to dig the seed trench or transplanting hole somewhat deeper than usual, spread the fertilizer in the bottom, cover with at least an inch of soil, and then sow the seed or transplant the plant in the normal manner. Or the fertilizer may be placed to the side of the seed bed or transplanting hole. Surface broadcasting of fertilizer, particularly phosphate, gives the poorest results.

The third practice in a balanced soil-improvement program is proper and timely tillage. Tillage does not affect soil fertility directly, but it does exert a tremendous effect on soil aeration, tilth, moisture and workability; and these in turn have a marked influence on plant growth and response to fertilizer application. For example, soil ploughed, rotovated or spaded to a depth of at least 8 inches promotes root penetration and plant growth by eliminating impervious layers and improving soil aeration. Heavy clay soils, well manured and ploughed or spaded in the fall, break down into a friable condition by the action of frost. Light sandy soils, well manured, ploughed or spaded and harrowed or raked in the spring, retain more moisture for seed germination and plant growth.

It is essential that all tillage and planting operations during the year be conducted only after the ground has dried sufficiently so that the soil below the surface will not compact. A compacted soil is difficult to work, is poorly aerated, and has a tendency to puddle, thus reducing water infiltration. Sandy soils and those with a high organic matter content can be worked at a higher moisture content than heavy clay soils. Soil that sticks to garden tools usually is too wet. A satisfactory test is to squeeze a handful of soil; if it sticks together in a ball and does not readily crumble under slight pressure by the thumb and finger, it is too wet for working. It is important to test the soil both at and a few inches below the surface.

Although the addition of organic matter appears to be the key practice in any soil-improvement program, other practices add appreciably to the performance of the garden. Both the reinforcement of nutrients by commercial fertilizers and the practice of proper tillage techniques are essential for a balanced soil-improvement program and a healthy, vigorous and productive flower or vegetable garden.

Potato Breeding at Scott

By W. A. RUSSELL

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Canada Department of Agriculture, Scott, Saskatchewan

Scott is a small town about 100 miles west of Saskatoon. In an area devoted largely to the production of wheat and livestock, one is bound to wonder about the story behind the potato-breeding and isolation station at the Canada Department of Agriculture Scott Experimental Farm. It is not an area devoted to potato growing, nor is it likely ever to be one; yet it is very important in the potato-breeding work for Canada and particularly for the prairies.

Prior to 1947 breeding and improvement for Canadian potato growers was pretty well the responsibility of individual federal, provincial and university institutions. Improved selections were passed from institution to institution, but there was no concerted effort to evaluate varieties widely. Changes in ideas following the Second World War speeded up the tempo of living and a whole new line of concepts developed. The potato industry shared in this reawakening and it became important to look at testing from the national level so National Potato Trials were started in 1947, with the Central Experimental Farm in Ottawa sending to branch farms across Canada, potato varieties for wider testing.

From 1947 to 1955 the National Potato Trials assisted in spreading new introductions and sending selected seedlings to the various testing institutions. But the trials lacked uniformity and individual stations found that they were duplicating effort. Further, even though test plantings were in tuber units which facilitate roguing, it was found that the incidence of disease infection was so high on some stations that the true picture of the value of a seedling or variety was difficult if not impossible to obtain.

During this time new uses for potatoes were becoming important. Potato chip production had been developing gradually since 1934 from processors handling batches of 10 to 15 pounds at a time, to a multi-million dollar industry. The commercial production of frozen French fries was in its infancy, and reconstitution had still to wait for a dehydrating technique to produce an acceptable mashed potato.

These new industries were requiring potatoes with special characteristics. They needed qualities which differed markedly from those demanded by the fresh potato market. At the same time marketing improvements were changing the image of a good market potato. The discriminating housewife began to make her views known. The industry demanded high starch content,



From each tuber (upper left) a single eye is taken and numbered. The plant grown from this eye establishes the disease freedom of the tuber.

low reducing sugars, high yields and low waste. The fresh market insisted on eye appeal, a quick turnover, and freedom from deterioration on the shelf. The housewife wanted cooking qualities but would not accept a fresh potato that lacked eye appeal. The grower needed to meet the demands of his various consumers and still have high yield, good storage ability, and freedom from disease.

By 1955 it was felt that the large National Trials were not quite meeting the needs of this new, alive and pulsating potato industry. To make it less unwieldy, 5 regional groups were formed: Atlantic, Quebec, Ontario, Prairie and British Columbia. These were co-operating groups combined of those units in the federal research, provincial research, or in the universities, who were conducting breeding and testing work with potatoes.

Each year, in each region, the members of the co-operating units meet to discuss progress and to plan for future research into the needs of this expanding industry. Each year representatives from all the various regions meet to obtain a national view and bring problems into national focus. At this time selections which have shown advantages in one or more respects over existing varieties on a national scale or on an important local scale are recommended for licensing in Canada.

The Scott Experimental Farm had been co-operating in the National Potato Trials since their inception in 1947. In 1955 because its isolation gave it an advantage in maintaining freedom from disease, because of the availability of a laboratory for testing for disease, because of the availability of greenhouse space, irrigation facilities and a staff experienced in testing potatoes, Scott was established as the Isolation Station for the Prairie Regional Trials.

Here all seed potatoes for trials by prairie co-operators are produced as free as possible from disease. Each year the tubers are indexed and only those showing no indication of disease are retained. Each year only tubers of the highest quality are forwarded to the 7 stations conducting primary adaptation trials, the 9 stations carrying out replicated trials of advanced selections and varieties, and to stations growing block trials of the most promising seedlings and introductions. The most promising material from all of these trials is then grown in grower trials on a larger scale on the farm of a selected table stock grower. If the new seedling or introduction is better than all previous licensed varieties in one or more respects after this exhaustive testing, if it has run the gauntlet of the adaptation and replicated trials, of block and grower trials, of the plant pathologists and the food technologists, and come up with an improved characteristic for the potato industry, it is recommended for licensing for sale in Canada.

Also included in the potato work at Scott are growing true potato seed and testing the potatoes from seedlings for adaptability to the Canadian prairies. The Research Station, Fredericton, N.B., had developed as a major potato-breeding station nearly 2 decades ago. They have always been most co-operative in sending seedlings to be tested under prairie conditions. The prairie regional co-operators had found that most of their selections were made with the particular needs of the Atlantic growers in mind and often were not suitable for prairie potato industry needs. To overcome this difficulty, several crosses asked for by prairie breeders have been made at Fredericton and the seed grown at the Scott Experimental Farm. The first selections from this breeding work, only 35 from more than 3,000 original true seedlings, reached adaptation trials on the prairies in 1965.

Altogether, more than 14,000 seedlings from true seeds have been grown and selected at Scott. Seven hundred and eighty-two seedlings have been

received from Fredericton. These seedlings, although preselected at Fredericton, are reselected under prairie conditions before inclusion in prairie regional adaptation trials. About 170 selected seedlings have been received from the breeding programs of prairie potato breeders. About 110 named varieties and advanced seedlings from other parts of Canada or introductions from the United States and Britain have been distributed for testing. In 1965 alone a total of 1,152 varieties and numbered seedlings were grown at Scott for primary selection or for increase to distribute to testing stations on the Canadian prairies.

New federal regulations affecting the production of seed potatoes include tests for bacterial ring rot as well as for eye indexing. Advancements in knowledge of techniques to identify latent as well as visible virus diseases have been made and are being incorporated in the Scott Isolation Station program to improve our production of disease-free seed.

The National Trials have been operating in Canada for about 20 years. These have been years of changing ideas and changing needs. To meet these needs the Canada Department of Agriculture has developed a very comprehensive potato-breeding program at the Research Station at Fredericton, and regional potato research groups with inter-group co-operation and co-ordination at the national level have organized comprehensive breeding and testing programs. In this cross-Canada searching for better potato varieties, the Isolation Station at Scott plays an important part in breeding, selecting and increasing disease-free potatoes for the prairie region. Since its inception in 1946 the National Trials have tested and recommended for licensing such varieties as Avon, Canso, Cherokee, Chinook, Fundy, Grand Falls, Hunter, Kennebec, Keswick, Manota, Norland, Pontiac, Sable and Waseca.

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Aster Yellows

By CLAUDE BERNIER, Ph.D.

Department of Plant Science, University of Manitoba, Winnipeg, Manitoba

Aster yellows is one of the most widespread virus diseases of plants. It acquired its name early in this century when it became conspicuous and destructive on China asters in many parts of the United States. Prior to 1950, aster yellows had been reported only occasionally in Manitoba but since then the disease has been present in most years, and losses varying from 10 to 100 per cent in lettuce and 10 to 15 per cent in flax, have occurred on a number of occasions. Because of these heavy losses, the disease has received considerable attention in recent years.

Aster yellows has a wide host range. The known hosts represent more than 200 species in 40 plant families. Besides asters, it occurs on many herbaceous species such as marigold, zinnia, gladiolus, chrysanthemum and delphinium. Among the vegetables it is commonly found on lettuce, celery, carrot, onion, parsley, potato and tomato. In field crops, it occurs on flax, barley, wheat, sunflower, rape, alfalfa and sweet clover. Common weeds such as sow-thistle, plantain and dandelion, also are susceptible.

The symptoms of the disease vary somewhat with the host plant but in general infected plants show yellowing or chlorosis of the foliage, proliferation, malformation and stunting of shoots, and transformation of the floral parts into foliage.

The first sign of the disease on asters is vein-clearing in the young leaves. The leaves then become more chlorotic as they develop. Dormant buds in the axils of the leaves are stimulated and weak, chlorotic branches develop. The main stem of the plant is stunted and the flowers are misshapen.

On carrots, excessive proliferation of axillary buds at the crown leads to bushy, yellowish tops. Hairlike roots form in great profusion on the root and retain the soil when the plant is pulled from the ground.

The outer leaves on young lettuce plants remain normal in size although their edges may be changed in color to various shades of red or purple. The inner leaves turn yellow, are dwarfed, and have small, brown specks along the margins. The long outer leaves and the short inner ones create the effect known as rabbit-ear. On head lettuce, the plants also are stimulated to bolting and do not form normal heads.

Field onions have flattened stalks marked with yellow and green stripes but very little twisting and curling. Affected celery grows more petioles than normal and usually these interlace. On plants like tomato and potato the leaves curl and turn purple or yellow. The whole plant is stunted; the petioles are borne at wide angles; and extra shoots are borne in their axils. On potato stems, aerial tubers often form in the leaf axils.

The aster yellows virus is transmitted only by leafhoppers, and experimentally by grafting. The six-spotted leafhopper, *Marcrosteles fascifrons*, is the only known vector of the virus in Manitoba. The virus can live from one year to the next in certain perennial weeds such as sow-thistle and in winter annuals like stinkweed.

The virus multiplies both in the host plant and in the insect. When a leafhopper feeds on an infected plant, the virus must develop in its body for 9 to 21 days before it can be transmitted to a healthy plant. The insect retains the virus for the remainder of its life although it cannot transmit

Measures for Combating Dutch Elm Disease

By F. J. WEIR

Provincial Horticulturist

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Dutch elm disease was first reported in the United States in 1930, but the number of diseased trees found at the time indicated that it had been present for several years and there was reason to believe the disease had been introduced from Europe in imported elm logs.

At the present time it is found from New England to Minnesota in the United States, and from western New Brunswick through southern Quebec to southern Ontario in Canada. In some communities in these areas, the disease has killed up to 90 per cent of the elm population. As far as is known, St. Paul and Monticello in Minnesota are the nearest points to the Canadian prairies where the disease has been found.

Dutch elm disease is caused by a fungus that is transmitted mainly by bark beetles or through root grafts, and once an elm tree is infected there is no known treatment that will save it. As soon as the disease has been confirmed by laboratory tests (the only positive way of separating Dutch elm disease from other, less virulent diseases showing similar symptoms), the trees should be removed and destroyed, because the disease can be spread by moving a diseased tree or any portion which harbors bark beetles. Because of this danger, regulations prohibiting the movement of elms in the form of trees, logs or lumber, within and between provinces, have been enforced following first reports of the presence of the disease in Quebec.

The beetles referred to are the native elm bark beetle and the smaller European elm bark beetle, both of which transmit the disease by carrying the spores on their bodies from one tree to another. In Canada the European species has been found only in southern Ontario and the native species throughout all except the fringes of the range of the American or white elm in Canada. In 1965, Canada Department of Agriculture entomologists collected the native beetle as far north as The Pas in Manitoba, and as far west as Outlook in Saskatchewan. Adults of both species are dark brown to black in color and are about $\frac{1}{8}$ inch long. In southern Ontario the European beetle has been found to be much more vigorous and prolific than the native one, though in Monticello, Minnesota, the latter has proved to be just as efficient a carrier. It is hoped that the climate in western Canada may have some deterrent effect on the establishment of the European species, or upon the disease organism itself.

The native elm bark beetle, like its smaller European cousin, breeds in dead and dying elm trees. It overwinters mainly as adults that emerge in early May to feed in healthy trees and to construct brood galleries in dead and dying trees. Breeding occurs from May to July, and the eggs are laid in niches along both sides of a gallery cut across the grain of the wood in the shape of a broad V. The larvae feed in the inner bark and on the surface of the wood in tunnels cut at right angles to the galleries. The new adults emerge during the late summer and feed in the bark of branches and stems of healthy trees until late fall when special hibernation tunnels are cut. A very small number of the fall adults construct brood galleries and lay eggs that give rise to overwintering larvae which do not emerge as adults until the following June.

Spores of the fungus are introduced into the cells which conduct nutrients and moisture to the leaves as the beetles feed. The fungus multiplies and clogs

it during very hot weather. The virus cannot be transmitted from leafhopper to leafhopper through the egg.

The virus requires an incubation period in the plant also. After the vector has fed on a host plant, a period of 8 to 40 days is required for the virus to multiply sufficiently to cause symptoms and to furnish further inoculum to other leafhoppers.

The high incidence of aster yellows in lettuce and flax in the early 1950's led entomologists at the University of Manitoba to investigate the source of the leafhopper infestations. They found that the number of leafhoppers which overwintered in Manitoba was relatively low and that large numbers of adults rarely were found before early June, indicating that the leafhoppers migrate from the south.

The epidemiology of this disease thus is similar to that of stem rust of wheat. The adults overwinter in fields of winter wheat in southern United States and by spring migrate northward with strong southern winds, through Wisconsin, Minnesota, North Dakota and eventually Manitoba. The size of the leafhopper population and the number of insects that carry the virus determine the severity of the disease. In most years, less than one per cent of the leafhoppers arriving carry the virus. In 1957 the leafhopper population was greater than usual and up to 15 per cent of the insects carried the virus so that the disease reached epidemic proportions.

Virus diseases such as aster yellows which are transmitted by migrating insects, are difficult to control. Attempts to reduce the incidence of aster yellows by using insecticides such as Malathion and DDT to eliminate the vector, have been successful in spring and summer crops of lettuce in Manitoba. But no protection was obtained on the summer crop in years when the leafhopper population was large and had a high percentage of infective leafhoppers. To be effective the insecticide must be applied at 3- to 4-day intervals throughout the growing season and this is feasible only on crops that have a high cash value.

Flowering plants such as asters often are grown to maturity under cloth screens that have 22 threads to the inch. This can be done in the home garden also to protect susceptible flowers in years when the disease is severe. Although the effectiveness of insecticides will vary from year to year, they should be used in the home garden to keep the leafhopper population in check.

RESUME

La jaunisse de l'aster est une maladie à virus très répandue. Elle est transmise d'une plante à l'autre uniquement par la cicadelle à six points. Les plantes hôtes plus communément atteintes par cette maladie sont l'aster, la tagète, la laitue, le céleri, la carotte et le lin. Les symptômes de la maladie s'expriment chez la plupart des plantes hôtes par une chlorose du feuillage, une prolifération des branches, un rabougrissement de la tige et une transformation des parties florales en feuillage. Les résultats de recherches récentes ont démontré que les épidémies de cette maladie se produisaient lorsque les cicadelles émigraient du sud des Etats Unis en grand nombre et qu'un haut pourcentage de celle-ci portait le virus. Il est difficile d'obtenir un control absolu de cette maladie, mais les pertes peuvent ordinairement être réduites considérablement en employant des insecticides tel que le Malathion pour éliminer les cicadelles. Cependant, à cause du coût, les insecticides ne peuvent être employés que sur les cultures de haute valeur. Les plantes ornementales peuvent être cultivées jusqu'à maturité à l'abris des cicadelles en les recouvrant d'un tissu fin.

up these vessels, prohibiting movement of food and water to the upper portions of the branches. Thus the first symptoms appear in smaller branches where the leaves wilt and turn yellow due to lack of nutrients. The disease moves very rapidly in the spring or early summer during the period of most active tree growth that coincides with the period of intensive feeding by the beetles.

Theoretically, control of the disease can be achieved by growing elm trees that are resistant to the disease. Although some progress can be reported in a breeding program in this field, this is a long-term proposition that offers no solution where trees are already diseased, and therefore is not applicable at the moment. Some resistance to the disease has been noted in the Siberian or Manchurian forms of the elm. The American elm is in a category of its own when shade, hardiness, and general performance are considered. Additional research is required before recommendations can be made along these lines.

Another method is to control the beetles by spraying all trees each year with an insecticide such as Methoxychlor or DDT. This has been done in some areas where Dutch elm disease has appeared, but certainly is not practical in areas where there are large native stands of elm trees. Spraying therefore is not recommended due to the cost involved unless the disease has been found. But it has been demonstrated in many locations in the United States and eastern Canada that control of the beetles by insecticide spraying is much more economical than to allow the disease to run its course, followed by the removal and destruction of valuable trees and their replacement.

At the present time there is considerable interest in the use of systemic insecticides to control these insects. A systemic is injected or introduced into the circulatory system of a plant to control insects which may feed on any part of the plant. Unfortunately, many such chemicals are toxic to plants unless care is taken that the correct amount of chemical is administered at the proper time of the year. In some cases the insecticides must be handled very carefully because they are toxic to humans. However, considerable progress can be reported and successful large-scale demonstrations of the use of such chemicals encourage optimism among research workers and arborists.

Much work has been done by researchers in Ontario and in the United States with growth regulators or plant hormones. They have found that these chemicals caused a slowing down or inhibition in the formation of the large spring vessels which carry sap and nutrients upwards. In addition the production of starchy materials in these vessels was stimulated, limiting the spread of infection. Work is being continued with these chemicals, as well as with those that will kill or control the fungus. Although it is too early to make

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recommendations because of the need for further work, the latter method shows considerable promise.

Natural control of an insect vector can often be simplified if the control is connected with the life cycle of the insect. Control of the elm bark beetles can be accomplished by removing and destroying diseased or dying elm trees that harbor overwintering beetles. The removal of such trees is simply good forest or tree management. Unthrifty trees should be removed whenever seen. Damaged branches should be removed. If the bark is cleared from dead or dying trees, the adult beetles are deprived of sites for rearing the broods. If there is a possibility the trees have been killed by Dutch elm disease, the bark should be sprayed with DDT in oil before removal from the area for burning.

Care should be taken that pruning of elm trees be done efficiently. Branches should be cut off cleanly to avoid leaving ugly stumps; and cut surfaces should be covered with asphalt or water soluble paint. It is important to remember that trees are living things and will respond to good cultural treatment. Root damage from earth-moving machinery should be avoided, and care should be taken that roots are not covered excessively by sidewalks or pavement. Trees should be kept in a healthy state by controlling other insects and diseases which might weaken them.

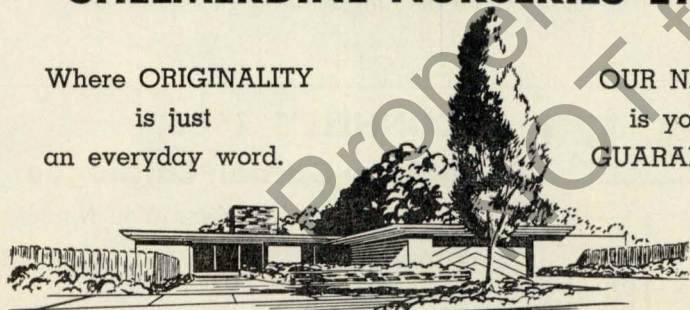
As citizens we should be on the alert for symptoms indicating presence of the disease, and ensure that such cases are reported to municipal, provincial or federal officials. We should encourage inspection and survey of elm trees in public areas.

The substitution of other species of trees for shade, boulevard, shelter-belt and specimen planting has been suggested. But the American or white elm is a most favored species and even in areas where many other suitable species can be grown successfully, trees killed by the Dutch elm disease are being replaced with more elms. We may be forced to follow a similar course on the prairies where only a few other species can be successfully grown, but we should provide them with the right cultural conditions, give them optimum spacing, and control insects and diseases which might weaken them. We should also take care of the trees that we have, see that they are trimmed properly when this is required, and be on the alert for any symptoms which might suggest the presence of Dutch elm disease.

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Safe Use of Insecticides

By A. J. KOLACH
Entomologist, Manitoba Department of Agriculture
and Conservation, Winnipeg, Manitoba

A thorough knowledge of insecticides is the key to their proper and safe use whether on the farm or in and about the home or backyard garden. The farmer understandably usually is more familiar with the safe use of insecticides because he uses them more often and in greater quantities. The backyard gardener may not be as familiar as he should be in the safe use of insecticides because he uses small quantities and only occasionally on his garden produce. The need for a thorough knowledge of insecticides by the home gardener is important.



Always Read the Label

All insecticides on the market are registered by the Canada Department of Agriculture at Ottawa, establishing that the product is safe and effective if used according to the directions on the container label. If this is done thoroughly and the label is followed exactly, no problem will be encountered.

Some users of insecticides tend to use higher rates than recommended on the container label. The idea is basically that twice as much will be twice as effective. This is a practice that can result in serious consequences. The recommended rate given on the label should be used exactly—not any more and not any less!

In mixing the correct rate, special care should be taken to avoid spillage on the hands, skin or eyes. The least exposure to the insecticide is advisable, and avoid breathing its vapor. Always wash thoroughly after accidental contact and after use.

Too often insecticides are used without realizing that they are toxic not only to insects but also to humans. Insecticides may be toxic to humans by inhaling the vapor, absorption through the skin or eyes, or accidentally swallowing the insecticide. For this reason, extreme care must be exercised at all times with the least possible exposure of the insecticide to humans.

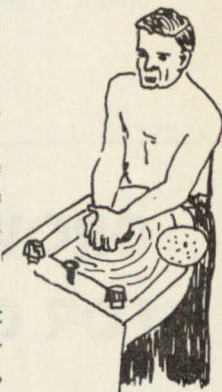
The use of the same spray equipment for both insecticides and herbicides is not generally recommended. In case this is necessary, cleaning the sprayer thoroughly with detergents after herbicide use is extremely important. Even traces of a herbicide can cause serious injury and the death of a plant.



Always clean equipment
before re-use

The storage of insecticides sometimes can present a problem. They should be stored in their original labeled containers at room temperature in a dry place that is out of view and reach of children.

Some insecticides are packed in containers that appear useful for other purposes. It is bad



Wash immediately
after use with
soap and water



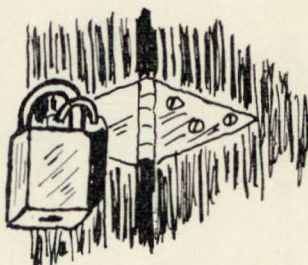
Dispose of empty insecticide containers

practice to re-use empty insecticide containers for there is no such thing as an empty insecticide container unless it is properly decontaminated. There will be traces of insecticide remaining which could contaminate other products. Empty insecticide containers should be properly disposed of, either by burning or burying.

If burned, avoid contact or exposure to the smoke or fumes which may be poisonous.

On the market today are so many different insecticides that it becomes difficult for the average home gardener to decide what is best for a particular insect problem. For this reason, obtaining a correct up-to-date recommendation is advisable. These recommendations are available from Agricultural Representatives or from the provincial Departments of Agriculture.

Remember—When you find it necessary to use insecticides, treat them with great respect. They are only as effective and safe as the person using them. Always read the label before use and never take a casual attitude to any insecticide.



Keep insecticides in a safe place

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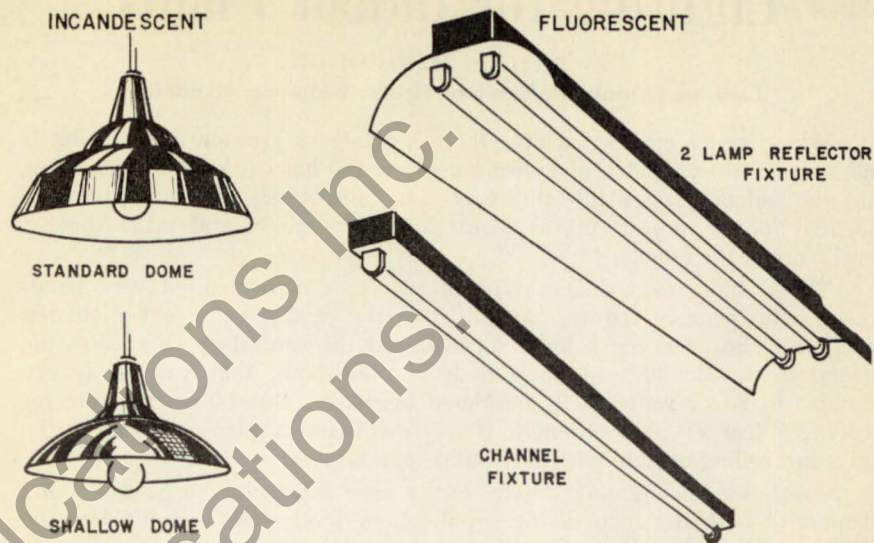
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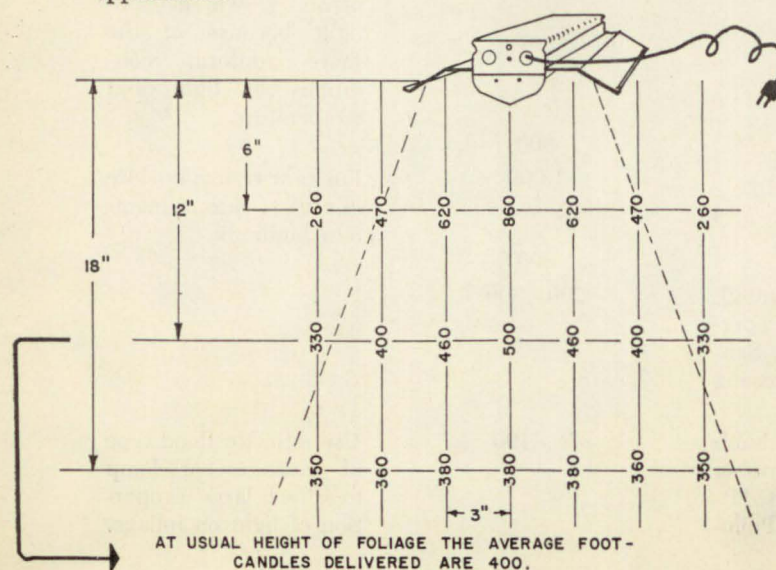
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REFLECTING EQUIPMENT



Incandescent lamps are used for growing plants indoors, especially for controlling day length. Lamp sizes varying from 60 to 500 watts are used in plant-control applications. Reflectors are required and the standard dome reflector pictured here is the one most often used with incandescent lamps. Where wider light distribution is required, the shallow dome is recommended.

Fluorescent lamps differ from incandescent in that they offer higher light efficiency; there is more light per watt of power with less heat. Also, the life of a typical fluorescent lamp is 12,000 hours as compared with 1,000 hours for standard incandescent lamps. For best results in growing plants indoors, daylight or cool white lamp colors are recommended. Lamp sizes range from 20 to 215 watts with the standard 40 watt lamps being used the most. Reflectors shown are the industrial fixture and the channel fixture which may be installed in banks, and are those most commonly used in plant growth applications.



Approximate footcandle values on plants 6 to 18 inches from two 40 watt lamp fluorescent fixtures.

Lighting for Indoor Plants

By PHYLLIS M. THOMSON

Lighting Consultant, Manitoba Hydro, Winnipeg, Manitoba

When winter comes and everything is white or grey outside nothing is more cheery than a patch of growing green in the hallway or the living room, and the indoor planter fills this need very attractively. Proper lighting is essential for the growth of the plants and to highlight and make them a focal point of the room.

The average room-divider type of planter can be lighted very handsomely with pendant fixtures hanging from the ceiling, using either colored or white globes. Too much light can wash out the natural appearance of the plants, so usually 60 watt lamp bulbs are sufficient; they can always be changed to larger wattages if considered necessary. One 60 watt fixture for every 2½ feet of planter length is a good basis to plan on; and if the lights are ceiling-mounted 75 watt bulbs may be used.

Overhead downlighting usually is the most satisfactory way of lighting planters of both the room-divider or the floor level style, except when the planter is more than 18 inches wide, then outdoor flower bed light fixtures can be used to good advantage. This applies also to planters built in corners of hallways, foyers, and recreation rooms using the rockery idea.

Many types of incandescent and fluorescent lamps are employed to grow plants indoors and out. Lamps can be used in combination to provide all of the sun's rays, visible, ultraviolet, and infrared, but the portion of the spectrum utilized chiefly by plants is the part known as light:visible radiation.

The lighting level required for growth indoors depends, of course, upon the characteristics of the particular plant being grown. The following table gives a few typical examples.

Plants (ornamental)	Footcandles	Remarks
African violet	600	Usually superior to plants grown in sunlight because of the more uniform conditions of light and temperature.
Gloxinia	800	
Orchid	1,000	For best results enclose in a glass case to maintain humidity.
Episcia (foliage)	600	
Philodendron (vining), Pothos (vining), Peperomia, Aglaonema, Sansevieria, small Dracaena and Aucuba	200 - 300	
Dieffenbachia (dumb cane), Ficus (rubber plant), Podocarpus, Pittosporum and Philodendron (large)	50 - 100	Use reflector flood type of incandescent lamp to direct large proportion of light on foliage.

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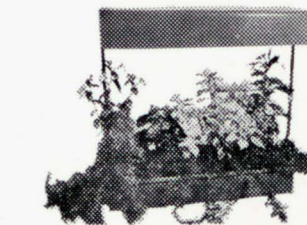
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Correctly used, you will find that Plant Growth and Gro-Lux lamps will mature plants earlier than usual. They'll have sturdy upright stems; blossoms will grow larger, colors become more vivid and leaves become vibrant and lush in appearance. Flowering and non-flowering plants react in the same manner because these lamps provide far more 'growing rays' than natural sunlight.

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