The Fuchsia Breeders Initiative

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Halfway through the season

Contents of this issue:

Contributions for the next issue, which is scheduled for the end of December 2017, should be in the editor's possession ultimately on 10 December 2017.

Please send your contribution in Word, with the photographs attached separately. Large contributions can be transferred by uploading the file by e.g. WeTransfer.

Any new Fuchsia cultivars being released? Please provide a photograph and some descriptive information, and it will be seen and get attention all over the world.

Photograph on front page:

***F.* 'Pauline Devereux'**
(Goulding, 2015)

Editor of The Fuchsia Breeders Initiative

Mario de Cooker

Already half of this year's fuchsia season has passed. Time's flying, and seems to go even faster as we get older.

It seems to be a continuing story: the first part of the summer has brought both some serious ups and downs. As judging from the temperatures in May and June, climate change seems to manifest itself more and more. In the South of The Netherlands we have already suffered from three local heat waves. Impact on our fuchsias depends on growing conditions. If properly sheltered, they will normally be only little affected, although blooms often will develop less satisfactory and grow appreciably smaller. If grown in full sun (as many of my fuchsias do for at least a substantial part of the day) they could however be severely damaged. I then have to move a couple of the most vulnerable plants to a more shaded area nearby the house. Some cultivars are however capable of withstanding even the most severe and cruel attacks by sun and high temperatures. An example is described in this issue of the Breeders Initiative.

For our fuchsias, one of the consequences of high temperatures is the nearly complete ceasing of pollen production, often for a period of several weeks. Being a hybridist this is not where we are eagerly looking forward to. But we are not in a hurry, and there's nothing to worry about. It can be managed, because best crossing results are obtained from September onwards, when temperatures go down and humidity increases. Disadvantage of making late crossings is that it could take even until January/February in the next year for the berries to ripen.

Highlights of the first part of the season have been for me the opportunities to give some talks to enthusiast fuchsia growers from the UK. In March the Reading & District Fuchsia Society has made their almost traditional trip to Holland, which provided an excellent opportunity for meeting them again and giving a talk. In June I had been invited to give a talk to the BFS Special Interest Group in Normandy (UK) which I have also highly enjoyed. Meeting fuchsia enthusiasts from other parts of Europe, as is also one of the goals of EuroFuchsia, adds an extra valuable dimension to our fascinating hobby.

I wish you all the best for the remaining part of the season, and let's make a little prayer that weather conditions will stabilize at acceptable levels.

Mario de Cooker

QUOTE and CLICHET

By Edwin Goulding

Photographs by Edwin Goulding

"I keep six honest serving-men
(They taught me all I knew);
Their names are What and Why and When
And How and Where and Who."

This well-known quotation comes from Rudyard Kipling's Just So Stories and is found at the end of The Elephant's Child. It illustrates for me just how important it is to ask the right questions, lots of them, and not to assume we know everything. However, for the purposes of this article, perhaps you will excuse me if these "six honest serving-men" are placed in a different order. It suits our purpose better.

1. WHAT ?

What is the plant's name and its purpose?

Some names seem to describe the beauty of a Fuchsia bloom better than others. For most people these flowers are graceful, seemingly delicate and attractive, in a 'ballerina' kind of way. This beauty is particularly visual in its appeal.

The longer and more complicated names are less likely to appeal. This is important in view of the fact that the majority of new plants are acquired as young cuttings, when flowers are non-existent. Photographs and pictorial labels can compensate somewhat for this loss but cannot give an impression of the overall size of well grown plants in full bloom.

It may surprise some readers to know that there are definite trends in purchasing choices based on colour. These are rarely the same for men as they are for women. The latter generally prefer doubles with pastel shades, especially pink and pale-mauve; names can accentuate or detract from imagined beauties. So much is anticipated by a name.

Lastly, of course, the title ideally can suggest the use to which a Fuchsia is most suited; if it doesn't or can't then descriptions in catalogues or on-line classification may help in this respect. There is little point in placing a pendulous type into the garden border where the beauty of its flowers cannot be appreciated.

Over time lovers of the Genus tend to develop a wider taste in the range of plants they prefer. In general they become more adventurous as experience is gained. The modern, younger, gardener is still likely to have less time to spend hours fiddling with such things as nipping-out growing points. Simplicity and mental imagery are the name of their game.

Basket types

'Swingtime'
(Tiret, 1950)

'Pink Marshmallow'
(Stubbs, 1977)

Summer bedding

'Koralle'
(Bonstedt, 1905)

'Blue Waves'
(Waltz, 1954)

2. WHO?

Who bred it? (describe their traits)

Many specialist nurseries omit the hybridist's name from their publicity. This could infer it is one of their own introductions or they might attach no importance to this detail. However, for other hybridists this is one of the most important facts they can have about a *Fuchsia*. Who has not heard of Bert Brown or of Hermann de Graaff? Their introductions are in no way similar but are different and complementary.

Most of us acquire special favourites over time. Quite why we have such preferences is not always obvious. Those who are only interested in planting permanent garden displays will not want to use triphylla hybrids. Encliandras and species are also unlikely to be used. Hybrids that are based upon Sections *Fuchsia* and *Schuffia* will not withstand cold to the extent of those derived from Section *Quelusia*.

The question of hybridist becomes more important when we search for the authentic parentage of any hybrid. Many introductions are raised from seed pods picked randomly from flowering plants. Pollen parentage is especially suspect in such cases.

The depth of knowledge displayed by each hybridist is shown to be vital when we see the vast range of look-a-likes introduced to the market each year; beauty is about quality and novelty. Special skills are involved in long term success.

**'Margaret'
(W.P. Wood, 1937)**

**'Phyllis'
(Brown, 1938)**

**'Marcus Graham'
(Stubbs, 1985)**

**'Mood Indigo'
(De Graaff, 1987)**

**'WALZ Jubelteen
(Waldenmaier, 1990)**

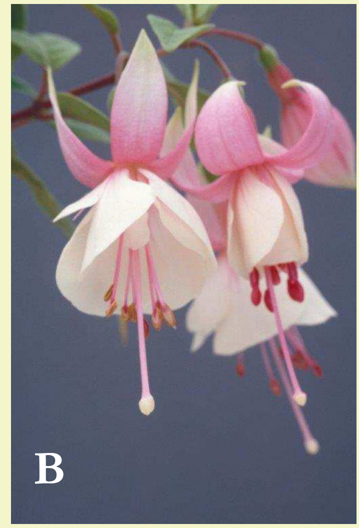
**'Rodeo
(Stannard, 1993)**

3. WHEN?

When was it distributed first to the public?

Another important and frequently omitted detail is the date of introduction. We do not expect that new 2016 cultivars will look like run-down imitations of those released in 1906. Newness must involve change and improvement. It is not just about a vague notion of beauty. It must not be just 'More of the same'. Nor should it be about bushiness alone.

Once we can see all the relevant details it becomes possible to see the style of each hybridist, and their progress. Many people will release one, or a few new plants. The experts and real enthusiasts exhibit a pathway of development in their plant breeding. They are keenly aware of the output of others and constantly strive to produce cultivars that are 'Better and Different'. The trick is in finding new approaches to hybridising that prove successful and appealing to a wider range of markets



Many years ago I was asked to judge a Fuchsia competition in Kent, England. The class for six blooms had seventy four entries. Most of these were flowers with four petals, singles, because they remained fresh-looking for longer once placed in water. It struck me then that if anyone removed the identification labels it would be impossible to re-name them by sight alone.

Look-a-likes roam our Fuchsia universe.

4. WHY?

Why am I interested? (describe its special features)

The question must be "Why am I interested in growing this Fuchsia?" It could be because it is new. Many growers like to try something different each year. Catalogues thrive on this. Even without pictures an introduction with the current year's date will appeal to lots of enthusiasts. Many of these plants will fail to live up to expectations but we all live in hope. Perhaps there is something of the gambler in each of us.

It may be that we want to acquire an old favourite. Plants like 'Swingtime' and 'Pink Marshmallow' have a perennial appeal when displayed at eye level. Most of us have a list of these old favourites. Sadly, however, time takes its toll of many of these and they become increasingly difficult to obtain as specialist nurseries decline in numbers. Of course, the bulk of purchases each year come from plants that are produced by the millions in wholesale nurseries. Unfortunately, their range is severely limited and changes little from year to year. Further, species and other specialities like encliandras and winter flowering cultivars are rarely available from them.

'Nettala'

(Francesca, 1973)

'Gay Parasol'

(Stubbs, 1979)

'Patience'

(Gouldings Fuchsias, 1987)

'Flying Scotsman'

(Gouldings Fuchsias, 1985)

'Firecracker'

(Ridding, 1987)

5. **WHERE?**

Where is it obtainable from?

The question of obtainability can be impossible to answer on occasions. Many web-sites are assembled by amateurs who have not verified their facts, relying on outdated material to bulk-up their information. We still receive catalogue requests eighteen years after Gouldings Fuchsias closed. Sometimes, also, stock carried by specialists fails to deliver the amount of cuttings required; this can be especially troublesome when magazines run unsolicited articles and advise readers where plants can be obtained. Even the time of year can make a significant difference in such cases. Photographs displayed in full colour near the end of a season do not mean hundreds of plants are waiting for immediate dispatch.

Fortunately, the Royal Horticultural Society compiles a '*Plantfinder's Guide*' each year. This gives names, addresses and phone numbers of specialist nurseries for each Genus of plants. This is also available in Great Britain at many large garden centres. They will frequently help those with particular requirements to locate sources if unable to satisfy that demand themselves. Many nurseries have excellent web-sites that display the wide range of wares on offer. On-line sources also frequently carry excellent photographs of plants in bloom.

One large advantage of the Internet is that trade is not restricted to local customers.

International sources are now available and delivery is usually fast and efficient. All it requires is that orders are placed in good time, money is transferred appropriately and communication is business-like. My own stock is often obtained from Kwekerij Van der Velde in Holland. They carry many of the plants seen in this on-line publication, *Fuchsia Breeders Initiative* as it evolves over time.

'Purcellian Elegancy'

(De Cooker, 2015)

F. decussata

'Straat Final'

(De Boer, 2017)

'Pauline Devereux'

(Goulding, 2015)

6. <u>HOW?</u>

<u>How</u> does it perform compared with others?
(include fertility, ♀ and ♂)

Our final honest serving man is the question, How? This allows us to quantify the qualities of each new introduction in relation to others we have grown. With the passage of time and increasing experience it allows us to make better informed decisions. Let's list some of the relevant facts that need to be commented-on.

<u>Growth</u>
There are many otherwise striking additions to the range of *Fuchsia* introductions that are sadly lacking in this respect. If plants are impossible to grow they will not appeal to the nurseries or to masses of interested gardeners in the world. Perhaps we expect this of some species like *F. pringsheimii* but it is unacceptable in hybrids.

'Texas Longhorn'

(Fuchsia-La, 1960)

<u>Side shoots</u>
Closely allied to this is the natural production of side shoots. These allow nurseries to grow plants without making huge losses. Where the general gardener is concerned there is a very apt saying that goes like this, "No one but a fool or a horse likes work." Competitions tend to give the impression that there is a virtue in constant nipping-out of growing points; how much better if plants generate their own side shoots spontaneously. As part of the process of evaluating the introduction's habit we can see whether it is best described as a trailer or an upright and if it is strong or weak growing. Many cultivars are happiest in semi-shade rather than in full sun.

'Isle of Mull'

(Tolley, 1978)

<u>Flowers</u>
Some details will become obvious rapidly. The size and colour of blooms is one of these. The majority of novice enthusiasts naturally prefer larger flowers. We have already discussed some colour preferences among gardeners.

'Gipping'

(Gouldings Fuchsias, 1988)

<u>Petals</u>
Single corollas will be immediately obvious to all experienced growers. Double ones are usually preferred by the general public. The shape of each corolla can be quite different. Singles can have saucer-shaped skirts, cup-shaped ones, cornet-shaped ones, completely flat or non-existent petals. The latter, being reduced in size tend also to appeal less to our eyes and, after all, "Beauty is in the eye of the beholder".

Sepals and Tubes

Tubes and sepals tend to be grouped together. This is not necessarily a good thing. Some sepals adhere together like lanterns, some are long and twisting, others are short and blunt. Tubes, too, may be miniature like the Encliandras or extremely long like those of 'Tres Long'. Triphylla hybrids are usually thought of as having long tubes but this is a question of relativity between the tubes and the sepals; we could hardly describe mini-Triphyllas as having long tubes. Again the colour of each component part is an essential part of its individual beauty.

Colour

Here I digress for a moment. Charting colours by letter and number doesn't 'cut-it' for me. There is something sterile about the whole procedure; like the difference between reading poetry and a dictionary. The two might have their uses but these are definitely not identical. Furthermore, any experienced grower will tell you that colours change with light intensity, wind, fertilizers used, the time of the year and stock chosen. In other words there can only ever be an approximation to 'correct'. We all know that pictures tell us more than a thousand words. The quality of photographic equipment and material available nowadays is quite remarkable. This always supposes that flowers are not displayed at un-natural angles and that light is not heavily and artificially amplified from below. Here, the photographer's skill has a part to play in the end result.

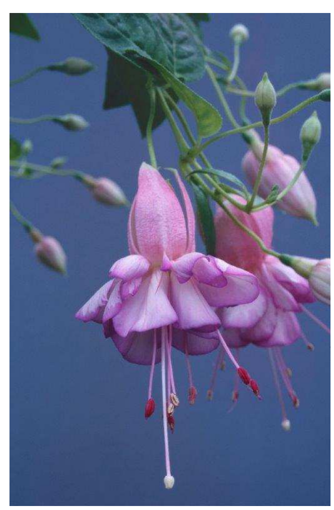
'Hidden Treasure'

(De Graaff, 1977)

7. Summary

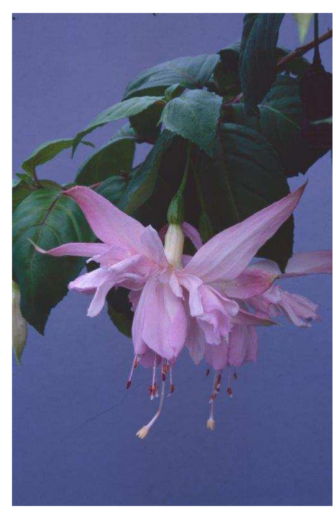
It might be assumed at this stage that all our questions have been adequately described but this is far from true. Hybridists will still seek an answer to the question, "Is it fertile?" If so, are we talking about it being used as a seed bearer (mother plant) or a pollinator? Things have moved on since Kipling's day.

In our next article I want to examine a further aspect of *Fuchsia* growing that can affect us much more than most people even dream of. In this case we will not be asking a question as much as describing a feature; in doing so we will also describe the work of one of Holland's principle hybridists, Jan de Boer.



'Martin's Double Delicate'

(Beije, 1999)



'Alison Ruth Griffin'

(Gouldings Fuchsias, 2000)

Going through the Learning Curve

By Mario de Cooker

The learning curve is a well known concept in Science & Technology. It is an S-shaped curved, picturing the performance or amount of knowledge acquired on a certain subject as a function of time. The more experience is gained on a certain subject, the better its performance will be understood, and the better its performance will usually become.

The learning curve be applied to a multitude of subjects. It applies to all kinds of products and processes. Examples are the many novel introductions in electronics, such as the TV and cell phone.

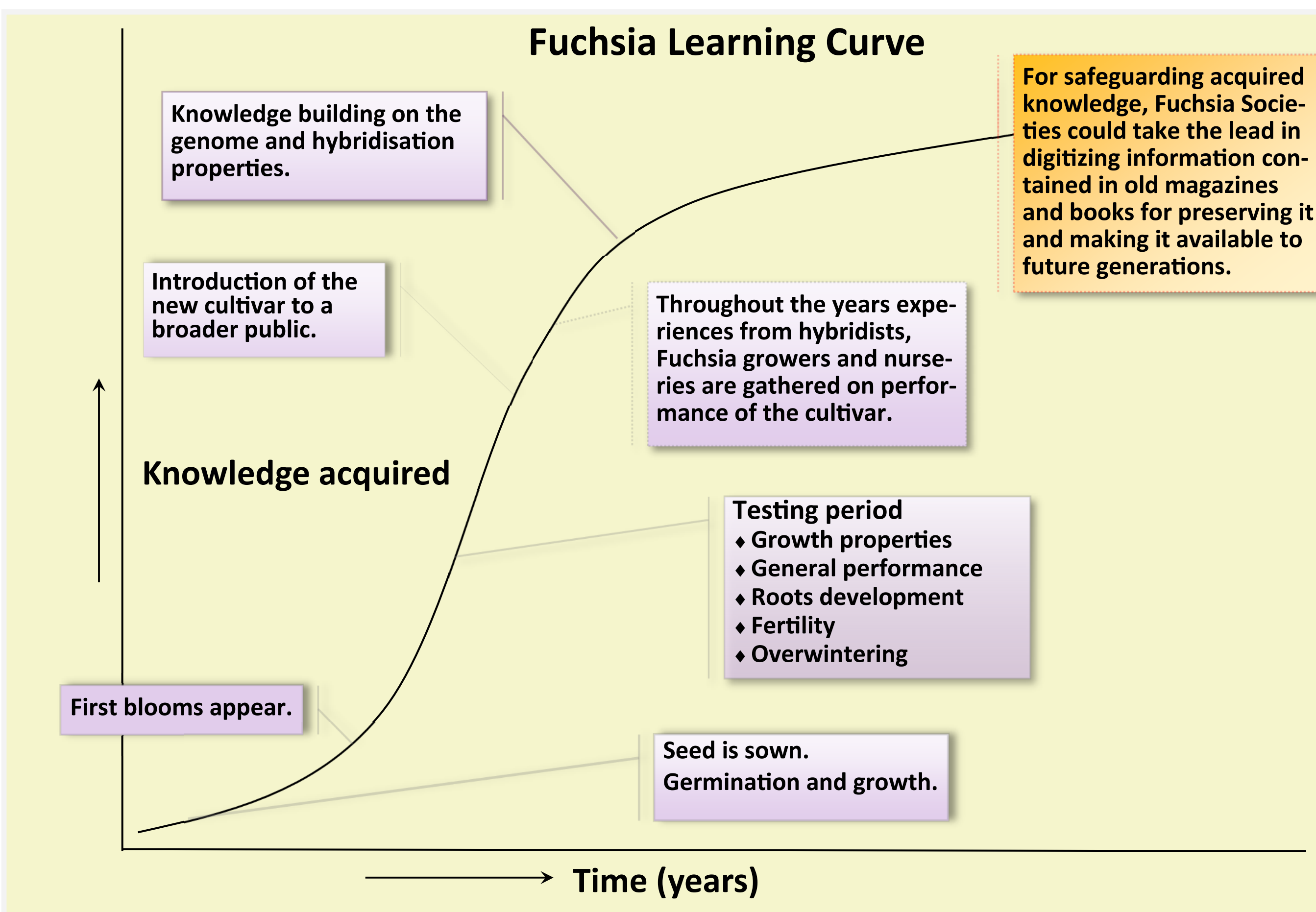
Initially some prototypes are developed. Then introduction starts, and the more apparatus have been produced and sold over time, the more knowledge is acquired, and the better the performance will become even at a lower sales price. At a certain moment a breakthrough innovation occurs, and a new learning curve starts with other types of TVs and cell phones, based on a new technology and having new features and superior performance.

Learning curves can be flat or steep, depending on the speed of development and learning.

Preservation and documentation of acquired knowledge is of decisive importance. If knowledge is not properly captured it will erode and ultimately disappear.

Also for any specific *Fuchsia* cultivar a learning curve exists. Once a seed has been sown and has germinated, the seedling develops and we start to learn about its growth properties. After a short period of time the first blooms will show up. Then learning speeds up. We learn more about taking cuttings and the effect of pinching. We learn about its floriferousness, we acquire knowledge on qualities such as its fertility and how it behaves at high temperatures and in sun or at shady conditions and if relevant on its performance at cold frost conditions.

As an example the learning curve of *F.* 'Scarlet Jester' is pictured on p. 10.

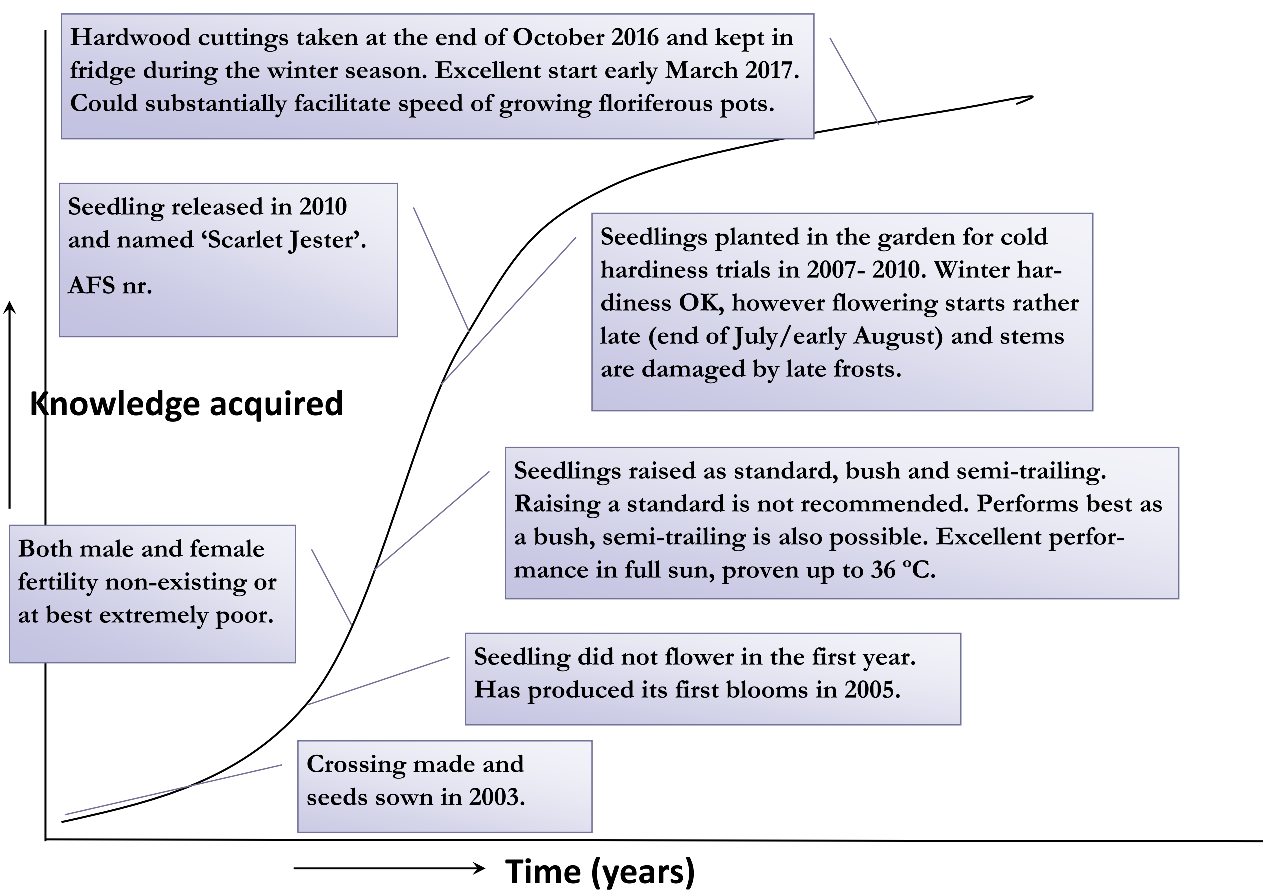


Learning curve of *Fuchsia* 'Scarlet Jester'

Fuchsia 'Scarlet Jester' (De Cooker, 2010) is a triphylla fuchsia originating from a crossing of an unnamed triphylla hybrid seedling 'Göttingen' x 'Our Ted' and *F. magellanica* 'Alba', the latter being one of the most hardy fuchsias available. 'Scarlet Jester' has inherited *F. magellanica* 'Alba' 's hardiness properties, but has preserved a clear triphylla flower. Flowering is proliferous and continues till the start of the winter season. It can be grown in full sun for the whole day even at temperatures above 30 °C without being damaged.

'Scarlet Jester' can best be grown as a wide upward growing fuchsia, 5 – 10 cuttings in a large container. It can also be grown as a semi-trailing plant. Growing it as a standard is difficult, and is therefore not recommended because the result will be disappointing.

It is one of the easiest to grow fuchsias. Best way of growing an older plant is cutting back all branches to 1 – 3 cm above ground level at the end of October,



and from that moment on leave it growing in the greenhouse on its own, without doing any pinching as it is perfectly self-branching. The plant can be pinched (e.g. for taking cuttings) till the end of January without noticeable delay of flowering time. From the end of June onwards, the plant will then be overloaded for months with literally many hundreds, even thousands of scarlet flowers.

If grown from autumn cuttings, a satisfying display can be achieved already in the first season. For achieving an optimal flowering plant, some more patience will however be required. The older plant will, after two to three years, provide an optimal and excellent display. This process can be speeded up by raising plants from hardwood cuttings (see text box below).

If grown outdoors as a hardy fuchsia, Scarlet Jester is most probably best fit for garden cultivation in an environment with rather mild winters with an early start of the spring season (as is customary in, e.g., part of the United Kingdom), because otherwise flowering will start only rather late. Furthermore, young shoots could be seriously damaged by late frost which would retard flowering even more.

The name ‘Scarlet Jester’ is inspired by the famous English snooker player Mark Selby, also nicknamed ‘The Jester from Leicester’.

Triphylla *Fuchsia* ‘Scarlet Jester’ grown in full sun (31 July 2011)

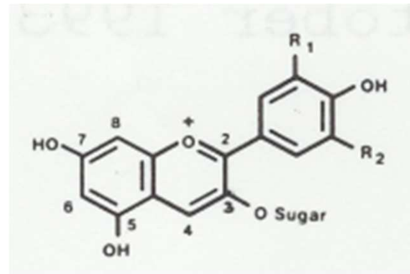
A number of 10-15 cm hardwood cuttings has been taken at the end of October 2016. They were stored in a plastic bag in the fridge for 4 months at 5 °C. On 1 March 2017 the cuttings have been potted up in standard potting soil (3 or 4 cuttings in a pot) and kept at about 20 °C for one month. They soon started growing well. On the photographs above, at the left the cuttings are shown on 27 March 2017 when they were moved to the greenhouse. At the right the cuttings are shown on 9 June 2017. Already several flower buds are developing well.

Identification and genetics of Fuchsia color pigments

By Henk Waldenmaier

Flower pigments present in the genus *Fuchsia* are anthocyanidins, with one exception, the yellow flower tube of *F. procumbens,* which is probably a carotenoid pigment.
The dominant flower color in species is orange, in contrast with the dominance order of the pigments (orange -> pink/red -> blue/purple). This is related to bird pollination (hummingbirds) of long tube fuchsias.

Table 1 provides an overview of anthocyanidin pigments present in *Fuchsia*.



Basic sceleton of anthocyanidins

In fuchsias there is always a glucose molecule on position 3. If no other glucose molecule is present, they are 3-monoglucosides. If a second glucose molecule is present on position 5, they are 3,5-diglucosides. The latter have the same colour as the monoglucosides, but are brighter in colour.

Pigment name	Color of pure pigment in ultraviolet light	Color of pigment in Fuchsia flower
Pelargonidin-3-monoglucoside	dull orange red	orange
Pelargonidin-3,5-diglucoside	fluorescent yellow	bright yellow
Cyanidin-3-monoglucoside	Brick red	red
Cyanidin-3,5-diglucoside	bright red	bright red
Peonidin-3-monogluciside	Brick red	pink
Peonidin-3,5-diglucoside	fluorescent pink	bright pink
Delphidin-3-monoglucoside	purple	blue
Delphidin-3,5-diglucoside	bright purple	bright blue
Petunidin-3-monoglucoside	purple	lilac
Petunidin-3,5-diglucoside	bright purple	bright lilac
Malvidin-3-monoglucoside	purple	purple
Malvidin-3,5-diglucoside	fluorescent cerise red	bright purple

Table 1

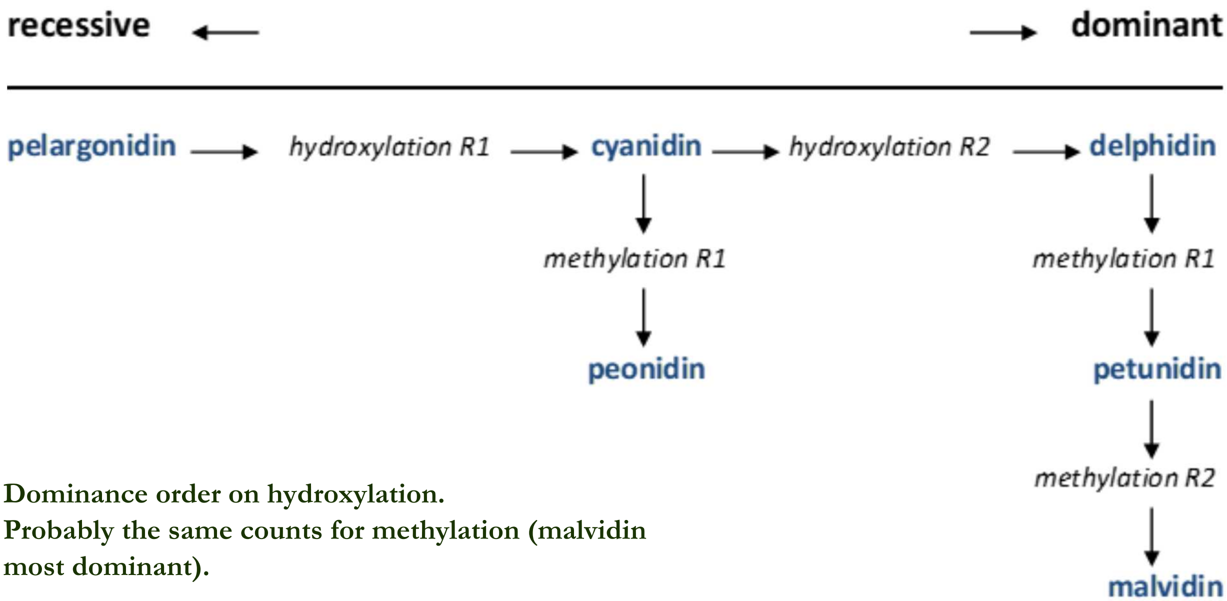
Overview of anthocyanidin pigments present in *Fuchsia*

If no hydroxylation has taken place, the pigment is pelargonidin. The other Fuchsia flower pigments have further hydroxylation and methylation as shown in Table 2.

Pigment name	Molecule position R1	Molecule position R2
pelargonidin	-H	-H
cyanidin	-OH	-H
peonidin	-OCH3	-H
delphidin	-OH	-OH
petunidin	-OCH3	-OH
malvidin	-OCH3	-OCH3

Table 2

Overview of hydroxylation and methylation in *Fuchsia* flower pigments.



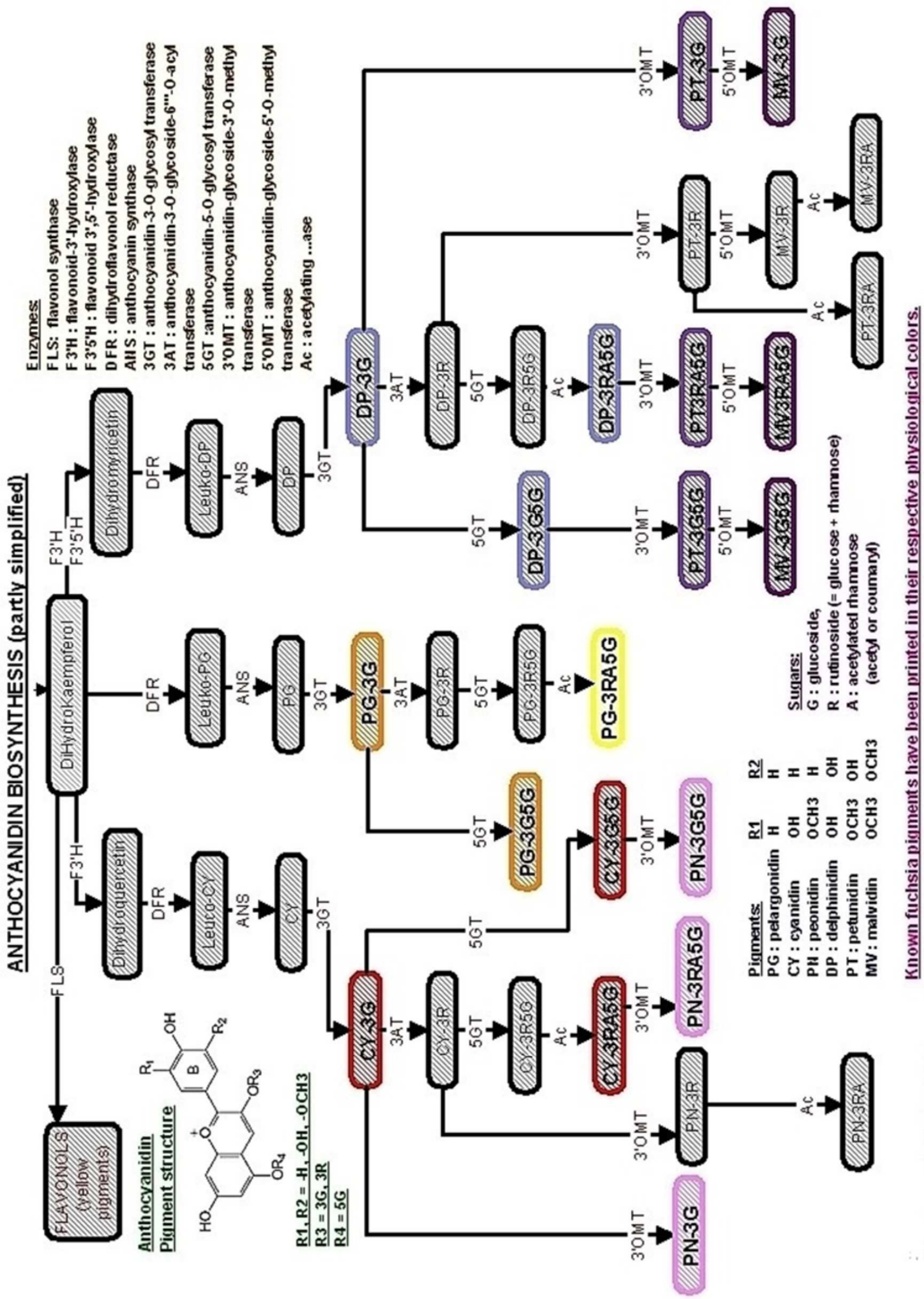
Dominance order on hydroxylation.
Probably the same counts for methylation (malvidin most dominant).

From the delphidin pigment only traces are to be found in some fuchsias.
The recently 'new' flower color 'aubergine' found in descendants of fuchsia species from the *Skinnera* Section reveals to be an excessive amount of malvidin pigment.
Sometimes position 3 in the skeleton is acetylated. The acetylated pelargonidin is yellow in color under uv-light. Maybe this will prove the way to get a yellow fuchsia flower in the future.

White fuchsia flowers lacks an enzyme necessary in the anthocyanin synthesis. There are several intermediate stages where this is possible. Crosses between whites lacking the same enzyme have all white descendants. If they are different enzymes the cross between them results in a F1 with flower colors as was expected based on the genotype of the parents. White flowers exposed to full sunshine show shades of the color they possess genetically. Full sun stimulates anthocyanin production.

Cultivar 'Herps Saar'.
Aubergin petals and white with red shades tube and sepals.

Genetic control of hydroxylation is usually tissue specific, being limited in most cases to floral organs. E.g. sepals may have different anthocyanidins compared to petals. Even when genetic control affects pigment synthesis throughout the plant, the expression of the genes may differ from one tissue to another.



Anthocyanidin biosynthesis (partly simplified)

Ref: Floriculture, Ornamental and Plant Biotechnology Volume I 2006 Global Science Books, UK, chapter 33 Flavonoid Compoounds in Flowers: Genetics and Biochemistry.

Anthocyanidin analysis

Anthocyanidins can be separated and analyzed by using HPLC (High Pressure Liquid Chromotography).

The method I used (International Analyst Febr. 1988 vol. 2 issue 2 pag. 28 ev.) is as follows:
Equipment : HP 1090
column: Lichrosorb RP18 25 cm 1 x 4,6 mm i.d.
column temperature: 35 degrees Celsius
mobile phase: gradient A: 0,6% perchloric acid in water, gradient B: methanol

Mobile phase gradient

Time in minutes	%A	%B
0	80	20
6	77	23
14	70	30
19	60	40
27	50	50
30	5	95
35	5	95
Hereafter start situation	80	20

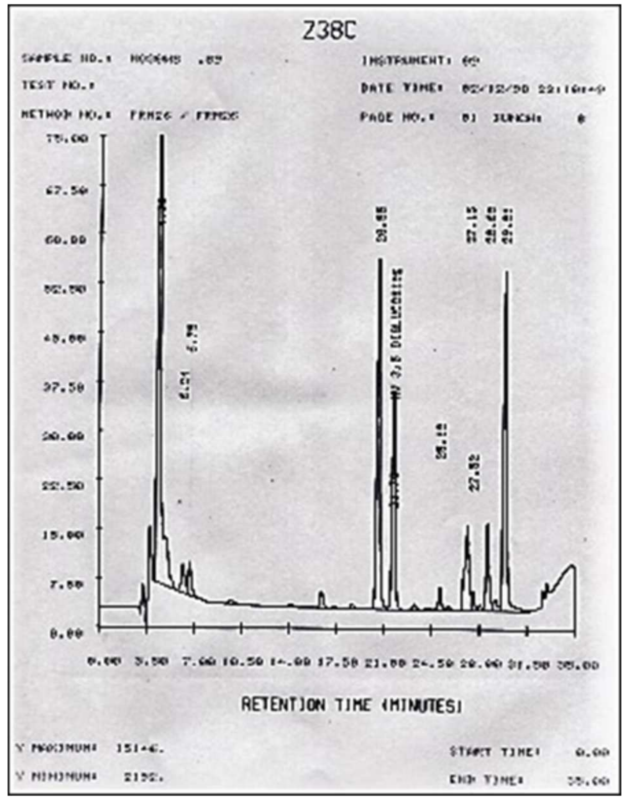
Detector: Lamba max Waters type 481 : 520 nm. **Recorderoutput**: 0,2 V - 1 V. **Integrator**: Perkin Elmer LCI – 100; **Injection volume**: 10 - 50 microliter.

As standard I used pure Malvidin 3,5 diglucoside. HPLC relative retention times (relative to Malvidin-3,5) of the found pigments with lower and upper limits are shown in Table 3 on p. 16.

The unknown pigments in Table 3 are probably acetylated anthocyanidins.

From most *Fuchsia* species and a lot of cultivars I have determined the types of anthocyanidin pigments and their relative quantity (relative to the standard malvidin 3,5 diglucoside).

For additional information the reader is referred to **http://members.home.nl/ henkwaldenmaier/fuchsiapigments.pdf**



Example of retention times and peaks of petal-anthocyanidins of cultivar 'WALZ Bergtop'. Peaks at the left are not relevant. Peaks with retention times higher than 10 minutes are anthocyanidins.

As an example of the usage of pigments and **flower color inheritance** the following cross has been chosen: 'Rosea' x *F. fulgens* var. *grandiflora*. I raised 25 cultivars from this cross and all these seedlings were examined by HPLC (see Table 4 on page 17.)

'Rosea' x F. *fulgens* var. *granfdiflora*

Table 3

HPLC relative retention times (relative to Malvidin-3,5) of the found pigments with lower and upper limits.

Pigment	Lowerlimit retention time	Upperlimit retention time
? Unknown Nr. 1	0.400	0.474
? Unknown Nr. 2	0.475	0.535
Delphinidin 3,5-diglucoside	0.536	0.588
Delphinidin 3-glucoside	0.589	0.667
Cyanidin 3,5-diglucoside	0.668	0.766
Petunidin 3,5-diglucoside	0.767	0.821
Pelargonidin 3,5-diglucoside	0.822	0.893
Cyanidin 3-glucoside	0.894	0.908
Peonidin 3,5-diglucoside	0.909	0.975
Malvidin 3,5-diglucoside (= reference)	0.976	1.005
Petunidin 3-glucoside	1.006	1.080
Pelargonidin 3-glucoside	1.081	1.145
? Unknown Nr. 3	1.146	1.173
? Unknown Nr. 4	1.174	1.234
? Unknown Nr. 5	1.235	1.242
? Unknown Nr. 6	1.243	1.256
? Unknown Nr. 7	1.257	1.275
? Unknown Nr. 8	1.276	1.298
? Unknown Nr. 9	1.299	1.345
? Unknown Nr. 10	1.346	1.374
? Unknown Nr. 11	1.375	1.390
? Unknown Nr. 12	1.391	1.407
? Unknown Nr. 13	1.408	1.453
? Unknown Nr. 14	1.454	1.520
Peonidin 4-glucoside	1.521	1.562
Malvidin 3-glucoside	1.563	1.750

Table 4

Found pigments in petals of crossings 'Rosea' x *F. fulgens* var. *grandiflora*

Rel. No.	Seedling	PG 35	CY 35	PN 35	DP 35	PT 35	MV 35	Σ 35	PG 3	DP 3	PT 3	MV 3	Σ 3	petal color	Total pigment
1	B89-958	31		27			9	67				9	9	orange	297
2	B89-980 = WALZ Lucifer	55		13	3			71				13	13	orange	501
3	B89-945	56		10				66	4			11	15	orange	279
4	B89-971	50		27				77	4			6	10	orange	366
5	B89-948	10		54				64			6		6	lilac/red	418
6	B89-959	3		26			38	67	3				3	lilac/pink	963
7	B89-942 =WALZ Wolk-breuk	48		9				57				17	17	orange	301
8	B89-967	14		50			17	81					0	lilac/red/orange	595
9	B89-946	4	1	35			42	82	1				1	red/purple	1361
10	B89-974	6	1	36			37	80	2				2	dark red	1392
11	B89-955	63		9			12	84	3			8	11	dark orange	663
12	B89-932	5	1	44			29	79	1		1		2	lilac/red	1001
13	B89-972	56		18			9	83	2			7	9	red/orange	969
14	B89-968	48		9			8	65				9	9	lilac/red/orange	750
15	B89-973	3	1	27	2		38	71	2				2	purple/red	1719
16	B89-944	5	2	55			17	79					0	red	1121
17	B89-934	11	2	32	1		42	88	2				2	dark red	2001
18	B89-983	52	3	20				75	6			5	11	lilac/red/orange	491
19	B89-947	49		18			9	76				13	13	lilac/red/orange	300
20	B89-952	45		17			10	72	2	3		9	14	lilac/red/orange	651
21	B89-979		4	33	2	10	38	87	1				1	lilac/red	1122
22	B89-981	45	2	10	2		8	67	5	2		9	16	lilac/red/orange	452
23	B89-975	5		27				32			42		42	dark red	320
24	B89-965	14		39			38	91					0	red	591
25	B89-935	14		46				60			23		23	salmon/pink	408

The best approach for making the pigments inheritance pattern as found in these investigations accessible to other interested hybridists, would be to score the seedlings on the basis of found anthocyanidins. However, since chemical analysis of pigments present in cultivars is difficult to perform for private persons, and consequently not practical, classification was done based on the phenotypic outcome of the cultivars. This phenotypic outcome can be correlated with the anthocyanidin distribution as shown in Table 4 above.

This has resulted in the pigment classes distribution as shown in Table 5 on page 18.

Table 5

Classification of found pigments in petals of 'Rosea' x *F. fulgens* var. grandiflora crossings based on phenotypic outcome of the cultivar.

Color phenotype	Rel. seedling Nos.	Total number	%	Pigment class
orange	1-2-3-4-7-11	6	24	PG = 28%
red-orange	13	1	4	
salmonpink	25	1	4	CY = 44%
lilac-red-orange	8-14-18-19-20-22	6	24	
lilac red/pink	5-6-12-21	4	16	
red	10-16-17-23-24	5	20	DP = 28%
redpurple	9-15	2	8	

Genotypic identification

To simplify the calculations, pigments are divided into three classes based on hydroxylation (see Table 5):

- no hydroxylation (class Pg),
- hydroxylation on R1 (class Cy) and
- hydroxylation on both R1 and R2 (class Dp).

There are two loci coding for pigmentation of the petals (see Table 6)

- F3H (hydrolysis at R1) and
- F35H (hydrolysis on [part of R1 and] R2).

These loci are coded A and B respectively.

On basis of these classes of pigments the genotypes of the specimens involved in the crossings can be described as follows:

'Rosea' is a cross between *F. magellanica* and *F. lycioides*.

F. magellanica is a tetraploid species with 50% MV3G5G pigment (and 50% others) in the purple petals. Genotype AAAABBBB.

F. lycioides is a tetraploid species with orangepink flowers. No pigment analysis was performed. This species has its original habitat in the desert (exceptional for fuchsia species). This might be the reason why the orange color is slightly moved to the pink direction (pH?). Genotype aaaabbbb.

'Rosea': genotype 100% AAaaBBbb (AAAABBBB x aaaabbbb), actual pigments found: 25% PN3G5G, 50% MV3G5G, 25% others.

F. fulgens var. *grandiflora* is a diploid species with 100% PG3G pigment in the orange petals. Genotype aabb.

Table 6

Loci and alleles coding for pigmentation of the petals.

Locus	Allel	hydrolysis
F3H	A	100% OH on R1
	a	No OH on R1
F35H	B	100% OH on R2
	b	No OH on R2

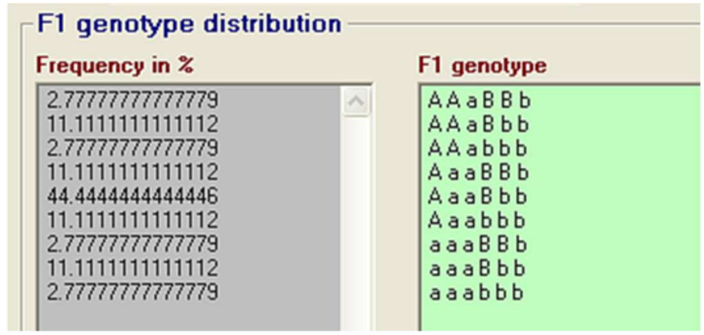
Calculations

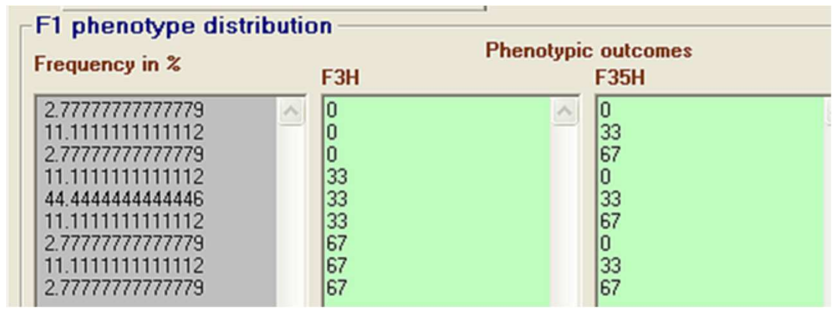
With the computer programme F1GenCalc genetic calculations have been performed on the colour distribution of the 'Rosea' x *F. fulgens* var. *grandiflora* crossing products.

The results of the calculations are shown in the F1 genotype and F1 phenotype distributions.

Conversion of F1 geno-/phenotypes to real phenotypes results in the colour distributions as shown in Table 7 below.

As can be seen, an excellent match exists between predicted and actual colour distribution.





The figures 0, 33 and 67 indicate the percentage of the dominant alleles per locus.

Table 7

Calculated versus actual colour distribution.

F1GenCalc					Actual distribution
Genotype	Phenotype F3H-F35H	%	Color (estimation)	Σ %	
aaabbb	0-0	2.8	orange	27.8	28
aaaBbb	0-33	11.1	orange		
aaaBBb	0-67	2.8	orange		
Aaabbb	33-0	11.1	orange/pink		
AaaBbb	33-33	44.4	lilac-red-orange	44.4	44
AaaBBb	33-67	11.1	lilacred	27.8	28
AAabbb	67-0	2.8	red		
AAaBbb	67-33	11.1	redpurple		
AAaBBb	67-67	2.8	purple		

'WALZ Lucifer' (1992)

'WALZ Wolkbreuk' (1991)

In this issue of The Fuchsia Breeders Initiative we have learned a lot about flower pigmentation in the Genus *Fuchia*. However, without genetic manipulation we will have to do with the colour pigments that have been provided to us by nature.

Being hybridists, several colours from other plant genera could easily make us enormously jealous. A couple of examples are shown on these photographs.

Photographs: Mario de Cooker

Blue daisy
(*Cichorium intybus* L.)

Black mullein
(*Verbascum nigrum* L.)

Contents of the next issue

The next issue is scheduled for the end of December 2017.

Multiflowering

(by Edwin Goulding)

It has been famously said that if something can be measured it can be improved. Next time we will look at a feature that effects both the quantity of blooms and the length of flowering season. "It effects every Fuchsia grown", says Jan.

Some polyploidization and interspecific hybridization aspects in *Fuchsia* species.

(By Henk Waldenmaier)

Hybridist Mr. Henk Waldenmaier has performed much work on making crossings using natural or induced polyploid fuchsias. He will share with us his some of his experiences.

Want to learn more about all this? Then stay connected!

Your contribution to the The Fuchsia Breeders Initiative is highly appreciated. Contributions for the next issue should be made available at the latest on 10 December 2017.

The Fuchsia Breeders Initiative

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