

# UNIVERSITY OF PITEȘTI TULIPS COLLECTION

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## Abstract

The Tulip Collection of Horticulture Department, University of Pitesti was founded in autumn 2008, with 35 species and 253 varieties. The bulbs were purchased from a certified facility for production and marketing of propagating material, to assure the authenticity of species and varieties. For each species and variety were planted 10 bulbs, following the bulbous planting technological sequences: depth 10 cm, distance between bulbs/row – 10 cm, distance between rows – 25 cm and numeric labeling. To eliminate the risk of bulbs' damage, they are removed from the soil every year, are sorted, treated and stored properly.

Keywords: bulbs, tulip varieties, blooming, size, purification

## 1. INTRODUCTION

The tulip, queen of gardens and parks in the spring season is among the species that Pitesti city forged them a magnificent history over time. The multitude of varieties that “explode” in a large pattern of shapes and colors turns the city each year in a real center of attraction both for the connoisseurs and general public through “The Tulip Symphony. The 38 years of tulip cultivation experience has allowed the establishment of a collection that brings together a large number of species and varieties, addressing both to specialists and flower lovers (Oprea M.I et al., 2010).

## 2. MATERIAL AND METHOD

The criterion for choosing the collection varieties was that they belong to three groups:

**I. EARLY TULIPS** - with blooming between 1 and 15 of April;

**II. SEMIEARLY TULIPS** - with blooming between 15 and 30 of April;

**III. LATE TULIPS** – the blooming in May.

Within the groups, the tulip varieties belong to several types:

**1. Single Early Tulips:** These tulips include old varieties, with the stem length between 25 and 40 cm and the blooming between 1 and 15 of April. Only three varieties are present in the collection: “Christmas Dream”, “Red Revival” and “Purple Prince”.

**2. Double Early Tulips:** Due to their abundant flower, the double early tulips are seen with some surprise. It is probably the most controversial section. Historically, they have been mentioned since 1665 (Killingback S., 1990) ; however, significant information about them occurred only after centuries. They bloom in mid-April, growing to 25-30 cm tall.

For the collection, they have been selected the next varieties: “Double Dutch”, “Double Sensation”, “Foxtrot”, “Golden Nizza”, “Mondial”, “Monte Carlo”, “Montreux”, “Peach Blossom”, “Princess Madelleine” and “Zouave”.

**3. Greigii:** the basic species, *Tulipa Greigii* Rgl., has orange flower and has veins on leaves, sometimes purple, sometimes brown. Greigii tulips arrived in Western Europe before those form Kaufmanniana type. The collection included a large number of varieties for this type: “Addis”, “Annie Salomons”, “Baumaux”, “Big One”, “Budapest separate”, “California Sun”, “Calypso”, “Cape Cod”, “Casa Grande”, “Compostella”, “Corsage”, “Double Red Riding Hood”, “Dreamboat”, “Easter Surprise”, “Floradale”, “Für Elise”, “Gig One”, “West Gold”, “Golden Tango”, “Greig”, “Greigii Type”, “Lovely Surprise”, “March of Time”, “Margaret Herbst”, “Mary

Ann”, “Melody d'Amour”, “Pinocchio”, “Princesse Charmante”, “Quebec”, “Queen Ingrid”, “Rob Verlinden”, “Rockery Master”, “Rosanna”, “Sombbrero”, “Sweet Lady”, “United States”, “Waterlly”.

**4. Kaufmaniana:** *Tulipa kaufmanniana* Rgl. is the earliest flowering species (March). To enhance the varieties of this species were chosen for collection: “Albion Star”, “Corona”, “Daylight”, “Giuseppe Verdi”, “Johann Strauss”, “Scarlet Baby”, “Shakespeare”, “Stressa”.

**5. Fosteriana:** *Tulipa fosteriana* Hoog., the species which formed the basis to obtain most of the varieties from Darwin Hybrid group. The Fosteriana varieties bloom between 1 and 15 of April and were represented in the collection by the following hybrids: “Candela”, “Flaming Purissima”, “Juan”, “Orange Emperor”, “Oriental Beauty”, “Purissima”, “Robassa”, “Rose Emperor”.

**6. Darwin Hybrid Tulips:** originally, they were the result from breeding Darwin tulips and *Tulipa fosteriana*. Nowadays, they are hybrids resulted from hybridization with other tulips and botanical tulips, which don't have significant wild traits.

Many of the Darwin Hybrid varieties have been discovered by D.W. Lefeber (Killingback S., 1990). His favorite variety was “Oxford” (red colored variety). In fact, most of the Darwin hybrids were originally red. Later, came other varieties and colors: “Golden Oxford” (yellow); “Orange Sun” (said to have the purest orange color of all the tulips), “Pink Impression” (pink) and yellow and red combinations, like “Olympic flame” and “Juliette”.

“Holland's Glory”, “Lefeber's Favorite” and “Red Matador” varieties appeared in 1942. Long time, “Holland's Glory” was the favorite variety among the tulip growers, but the high price limited its popularity (Killingback S., 1990).

For collection they have been selected the following varieties: “Ad Rem”, “Ad Rem's Beauty”, “Apeldoorn”, “Apeldoorn's Elite”, “Apricot Impression”, “Banja Luka”, “Beauty Apeldoorn”, “Burning Heart”, “Daydream”, “Garant”, “Golden Apeldoorn”, “Golden Parade”, “Juliette”, “Lighting Sun”, “Olympic Flame”, “Orange Bouquet”, “Parade”, “Pink Impression”, “Red Parade”, “Silverstream”, “Survivor”, “Tender Beauty”.

**7. Single Late Tulips:** Single late tulips have been known since 1554, year which marked the first arrival of tulips from Turkey to Western Europe (Killingback S., 1990). They include a very long list with the popular Darwin tulips together with those cultivated in gardens, propagated especially by the English and Dutch people. Originally, lily-flowered tulips, Viridiflora and Fringed varieties were included in this group, but were removed over time, forming separate groups.

They were represented in our collection by: “Atlantis”, “Avignon”, “Baroness”, “Belle du Monde”, “Big Smile”, “Black Swan”, “Bleu Aimable”, “Blushing Beauty”, “El Nino”, “Fostery King”, “Ivory Floradale” and “Queen of Night”.

**8. Triumph Tulips:** These varieties are a cross between the single early tulips and single late ones. They are more robust than those of Darwin Hybrid, with the stem of 40-55 cm tall and the blooming period in April, 5 to 25. The Triumph Group did not appear in the classification list of varieties until 1939. In 1981 the number of varieties of this group has increased considerably by transferring all the Mendel tulips with late blooming and some of the early varieties. For enhancement of this group it has chosen a large number of varieties in a wide range of colors: “Abu Hassan”, “African Queen”, “Anna Jose”, “Barcelona”, “Bastogne”, “Bing Crosby”, “Blenda”, “Cairo”, “Capri”, “Cassini”, “Cherida”, “Don Alfonso”, “Don Quichotte”, “Dr. Plesman”, “Dynasty”, “Fats Domino”, “Fidelio”, “Francoise”, “Gavota”, “Golden Melody”, “Happy Generation”, “Hemisfere”, “Ida”, “Ile de France”, “Jackpot”, “Judith Leyster”, “Jan Reus”, “Kees Nelis”, “Kikomacki”, “Kiss”, “Kung Fu”, “Luky Strike”, “Mirella”, “Mistress”, “Monarh Beauty”, “Negrita”, “New Design”, “Ninja”, “Ollioules”, “Orange Princess”, “Orange Cassini”, “Oscar”, “Palestrina”, “Park's Purple Passion”, “Passionale”, “Paul Scherer”, “Prins Willem Alexander”, “Princess Irene”, “Purple Passion”, “Prior”, “Ronaldo”, “Scagit Valley”, “Shirley”, “Striped Sail”, “Sugar Love”, “Sun Child”, “Sweet Desire”, “Sweet Harmony”, “Sweet Love”, “Sweet Rosy”, “Tennessee”, “The Mounties”, “Veronique Sanson”, “Washington”, “White Dream”, “Yellow Flight”, “Yokohama”.

**9. Lily-flowered varieties:** This group impresses with its elegant shape, wide range of colours, the tulips being used to decorate parks and gardens and also in floral arrangements. The varieties which pleased our view in the collection are: “Ballade Dream”, “Ballade”, “Ballerina”, “Burgundy”, “Captain Fryatt”, “China Pink”, “Claudia”, “Elegant Lady”, “Fly Away”, “Holland Chic”, “Jacqueline”, “Jane Packer”, “Lilyrosa”, “Maytime”, “Mona Lisa”, “Typhoon”, “West Point”, “White Elegance” and “White Triumphator”.

**10. Parrot Tulips:** unlike other groups, the Parrot Tulips have always had their own section. Not all of them are late tulips, but all are other varieties’ hybrids. There are known only a few things about their origin, but for centuries it is known that they can’t be reproduced by seeds. A theory of their origin suggests that they have been induced by a virus, but there are no clear evidences on this purpose (Killingback S., 1990). The collection included 8 varieties: on this: “Fantasy”, “Flaming Parrot”, “Holland Happening”, “Karel Doorman”, “Orange Favorite”, “Pink Panther”, “Texas Flame”, “White Parrot”.

**11. Fringed Tulips:** The tulips with fringed petals have been promoted between the years 1959 and 1975, by Segers brothers. The varieties represented in the collection were: “Burgundy Lace”, “Canasta”, “Carrousel”, “Cool Crystal”, “Cummins”, “Davenport”, “Fancy Frills”, “Hamilton”, “Lambada”, “Madison Garden”, “Maja”, “Mascotte”, “Red Wing”, “Ruby Crystals”.

**12. Double Late Tulips:** They are frequently called the peony flowered tulips. There were selected 20 varieties for the collection which show the beautiful colours and the esthetical qualities of the double late tulips: “Abigail”, “Allegretto”, “Black Hero”, “Black Parrot”, “Blue Diamond”, “Blue Flag”, “Blue Spectacle”, “Boule d'Or”, “Double Dutch”, “Freeman”, “Lilac Perfection”, “Miranda”, “Monsella”, “Monte Beau”, “Monte Parrot”, “Peach Melba”, “Queen of Marvel”, “Renown Unique”, “True and Fair”, “Uncle Tom”.

**13. Viridiflora varieties:** *Tulipa viridiflora* (yellow and green) is one of the pseudospecies which has never been seen in wildness. It is cultivated since 1700. *Viridiflora Praecox* is very large earlier group, with more pale colours of yellow and green (Killingback S., 1990). The Viridiflora Tulip beauty was revealed in the collection by the varieties: “Artist”, “Doll’s Minuet”, “Golden Artist” and “Spring Green”.

**14. Other Species or Tulipas:** in this group are the so-called „wild tulips”. They have been brought in the Western Europe two or three centuries ago. However, the fact that these are included in Other Species group they should not be considered less important. But even if crossbreeding does take place, only just 20 years ago some species (*T. batalinni*, *T. eichleri*, *T. marjoletti* and all *T. tubergeniana* hybrids and varieties) had their own section in the classification list. (Killingback S., 1990).

The collection included a large number of species and varieties, as follows: *T. acuminata*, *T. alba regalis*, *T. albertii*, *T. aximensis*, *T. batalini* “Bright Gem“, *T. batalini* “Red Hunter“, *T. batalinii* “Yellow Jewel“, *T. clusiana* “Cyntia“, *T. clusiana* “Sheila“, *T. clusiana* “Tubergen's Gem“, *T. eichleri* “Clare Benedict“, *T. eichleri* “Excelsa“, *T. gesneriana* “Spathulata“, *T. greigii* “Aurea“, *T. greigii* “Saulriets“, *T. hoogiana*, *T. humilis* “Lilliput“, *T. humilis* “Persian Pearl“, *T. humilis* “Pulchella Albocaerulea“, *T. humillis* var. *violacea* “Black Base“, *T. ingens*, *T. kolpakowskiana*, *T. kurdica* purple, *T. Lady Jane*, *T. marjoletii*, *T. orphanidea flava*, *T. praestans* “Zwanenburg Variety“, *T. schrenkii*, *T. Tangerine Beauty*, *T. tubergeniana* “Keukenhoof“, *T. turkestanica*, *T. viridiflora*, *T. praestans* “Van Tuberge Variety“, *T. subpraestans*.

During the phenophase have been noted the observations: the blooming period, the mean size of the flower stalk and the corolla diameter.

The purpose of this collection was first of all, the study of the biological and ornamental features of varieties, especially those newly created, in order to recommend their widespread use in the floral decoration of green areas of the Pitesti city. Second, the collection has an important educational purpose for students and the general public and it is seen also as a recreation area.

### 3. RESULTS AND DISCUSSIONS

For the safety of species and varieties authenticity, the bulbs were purchased from a licensed establishment in the production and marketing of propagating material.

For planting, in the second half of October, the land was prepared with a deep ploughing (28-30 cm), followed by grinding and levelling. To enhance the soil structure, on the 15 cm opened trench was placed a 3-5 cm layer of sand. Planting bulbs in the trenches was done at a depth of 10 cm (Selaru E.,2002).

The planting of bulbs was done in the first decade of November. Until the coming of the ground frost, the bulbs had optimal rooting conditions (temperatures of 5°-7° C and sufficient soil humidity).

For each species and variety were planted about 10 bulbs, following the bulbous planting technological sequences: depth 10 cm, distance between bulbs/row 10 cm, distance between rows 25 cm and numeric labeling. To have a clear record, for the 35 species and 253 varieties were assigned numbers from 1 to 288.

Bulbs have benefited from the cold period of at least 12 to 14 weeks, necessary to obtain uniform plants, quality flowers and bulbs and to reduce the risk of the flowers' abortion

In the spring had been performed the following attendance works (Oprea M.I et al., 2008).

- ✚ soil mellowing and weeds destruction; the work was performed at the cone leaves emergence at the ground and repeated three times
- ✚ watering was done by sprinklers whenever it was needed;
- ✚ further fertilization was achieved with foliar products administered in two halves: before flowering for stem development, increasing resistance to diseases and pests and increased flower color, and the second, during bulb maturation. Were used the following products: Folimax Blue 0,3% și Folimax Rose 0,3%;
- ✚ disease control was made by applying three treatments:  
1<sup>st</sup> first at the leaves emergence, with Mirage 45 EC 0.1%;
- ✚ 2<sup>nd</sup> - before blooming, with Bravo 500 SC - 0.2%;
- ✚ 3<sup>th</sup> - after flowers tearing, with Topsin M 70 - 0.1%.

We have paid particular attention for the works:

- ✚ purification to remove the impurities and the plants affected by viruses;
- ✚ tearing flowers after purification, in order to have a good bulb development.

To eliminate the risk of bulbs damage, they were removed from the soil every year, were sorted, processed and stored properly (Selaru E., 2007).

For results systematization and presentation ease, observations were conducted in groups.

#### 1. Single Early Tulips

Single Early Tulips are between 25 cm (“Red Revival”, “Purple Prince”) and 40 cm tall (“Christmas Dream”) and usually bloom between April 1 and 15.

They are very beautiful, due to flower bright colors, but they are sensitive to extreme temperatures (Figure 1).

#### 2. Double Early Tulips

They bloom beginning with the 12<sup>th</sup> of April, with size reaching between 25 and 30 cm. This category was dominated by the variety “Murillo”. It was obtained in 1860, which produced many hybrids in a wide range of colors, which we meet nowadays: “Peach Blossom”, “Orange Nassau”.

Another representative variety is “Cardinal Scarlet” which was the parent plant for the valuable variety “Monte Carlo”, very popular among tulip growers and a custom plant in floral decorations designed in green areas in the center of Pitesti city. Decorative are the varieties: “Double Dutch” and “Double Sensation” because of their vivid and brilliant color. Generally, double early tulip varieties are more attractive and more robust than the simple early tulips. They have a good disease and pest resistance and a high adaptability to local environmental conditions (Figure 1).

### **3. Greigii**

They were noted by their vigorous stems, about 25 cm tall, bigger and wide-opened flowers (12 cm in diameter). They bloom during April, 5 to 20. Among varieties there is also a multiflower one "Toronto". Although they are robust don't produce many bulbils and do not support heavy soils. They are prone to pest attack (*Limax* sp.).

The brightest Greigii Tulips were "Roseanna", "Cape Cod", "Pinocchio", "Calypso" and "Mary Ann" (Figure 1).

### **4. Kaufmaniana**

The varieties of this species bloomed starting with the 20th of March, in the autumn of 2008 and the 25th of March in the autumn of 2009 respectively. At these tulip types leaves are large and close like a rose. Stems are less vigorous, not higher than 10 cm bearing top flowers whose shape and color remind of water-lily flowers: internal tepals are lemonish yellow with dark spots at the base, the external ones with back side streaked with external blue tepals at the base, purple on the top. The first variety to bloom was "Giuseppe Verdi", followed by "Sressa". Blooming duration is generally brief, from 10 to 12 days. "Albion Star" and "Johan Strauss" were noted for their delicate shape (Figure 1).

### **5. Fosteriana**

They had lively colored large flowers, worn by rigid flower stalks, medium sized (30 cm). Representative for this section were "Purissima", "Candella", "Robassa", "Rose emperor" varieties, which impressed by their purity and vigor. The blooming last 2 weeks and began on the 28<sup>th</sup> of March in 2008 and the 1<sup>st</sup> of April in 2009 (Figure 2).

### **6. Darwin Hybrids**

Varieties of this group can reach up to 60 cm tall and bloom during April 5 to 25. The disadvantage is that in shiny and higher temperatures days, they open to the maximum; sometimes the tepals reflects and we can see the stamens and the pistil (Figure 2).

### **7. Single Late Tulips**

Single Late Tulips have tall flower stalk (50 cm) and they bloom on the second half of April ("Big Smile", "El Nino", "Baronesse"). This group also contains the famous black variety "Queen of Night" (55 cm) (Figure 2).

### **8. Triumph Tulips**

It was the most represented group in our collection. It included a wide range of varieties, with different colors, the dominant one being violet purple. Their size varied between 40 cm ("Princess Irene", "Kees Nelisse", "Blenda", "Francoise", "Hemisfere", "Purple Passion") and 50-55 cm ("Ollioules", "Gavotte", "Golden Melody", "Happy Generation", "Black", "Paul Scherer", "New Design"). The most popular was "Atilla" variety and the most spectacular "Blue Orchid" variety. The dominant trait of this group is the corollas shape (conical) that lasts during blooming (2-3 weeks, depending on weather conditions) (Figure 2)

### **9. Lily-flowered varieties**

Usually, their size exceeds 50 cm and bloom after the 22th of April. Distinct through their elegant form and the wide range of colors were the following varieties: "China Pink: (pink), "Elegant Lady", "Fly Away", "Holland Chic" (cream-colored with pink edges), " West Point" (yellow), "White Elegance" (white), "Maytime" (purple with yellow streaks)(Figure 3).

### **10. Parrot Tulips**

The varieties are spectacular through tepals shape and color combination. They bloom later (from April 15 to 20), depending on weather conditions, they are 30 cm tall to "Texas Flame" variety, 40 cm ("Fantasy" and "Orange Favorite") and 50 cm to "Flaming Parrot" and "White Parrot" (Figure 3).

### **11. Fringed Tulips**

Medium-sized varieties, (40-45 cm) which impresses by consistency, vigor, fringed tepals. They bloom in the second half of April. It can achieve successful combination of varieties:

**1. Single Early Tulips (SE)**



E - "Christmas Dream"

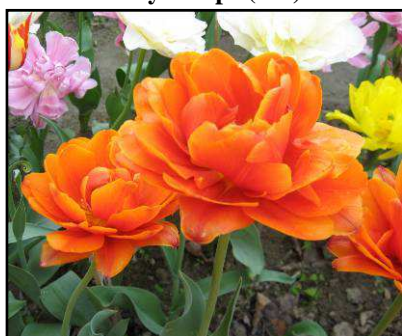


SE - "Purple Prince"



SE - "Red Revival"

**2. Double Early Tulips (DE)**



DE - "Double Dutch"



DE - "Princess Madelleine"



DE - "Monte Carlo"

**3. Greigii (G)**



G - "Floradale"



G - "Roseanna"



G - ansamblu Greigii

**4. Kaufmaniana (K)**



K - "Giuseppe Verdi"



K - "Day light"



K - "Johan Strauss"

*Figure 1. Single Early Tulips, Double Early Tulips, Greigii and Kaufmaniana Tulip Varieties*

**5. Fosteriana (F)**



F- "Purissima"



F – "Madame Lefeber"



F – "Candella"

**6. Darwin Hybrid Tulips (DH)**



DH – "Golden Apeldoorn"



DH – "Olliules"



DH – "Apricot Impression"

**7. Single Late Tulips (SL)**



SL- "El Nino"



SL – "Big Smile"



SL – "Baronesse"

**8. Triumph Tulips (T)**



T- "Sugar Love"



T – "Jackpot"



T – "Prinses Irene"

*Figure 2. Fosteriana, Darwin Hybrid Tulips, Single Late Tulips and Triumph Tulip Varieties*

**9. Lily-flowered varieties (L)**



L- "Balade Dream"



L - "Holland Chic"



L - "Burgundy"

**10. Parrot Tulips (P)**



P- "Carel Doorman"



P - "Holland happening"



P - "Texas flame"

**11. Fringed Tulips (F)**



F- "Mascotte"



F - "Hamilton"



F - "Lambada"

**12. Double Late Tulips (DL)**



DL - "Monte Beau"



DL - "Miranda"



DL - "Lilac perfection"

*Figure 3. Lily-Flowered Tulips, Parrot Tulips, Fringed Tulips and Double Late Tulip Varieties*



### 13. Viridiflora varieties (V)



V – “Doll’s Minuet”



V – “Spring Green”



V – “Golden Artist”

### 14. Other Species (OS)



OS – *Tulipa alba regalis*



OS - *T. turkestanica*



OS – *Tulipa kurdica*

**Figure 4. Viridiflora Varieties and Other Species of Tulips**

“Hamilton” (yellow), “Fancy Frills” (pink streaked with white), “Lambada” (orange streaked with yellow), “Canasta” (red and white). Outstanding by their ingenious design and combination of colors are the varieties: “Cummins”, “Davenport”, “Mascotte”, “New Crystal” (Figure 3).

### 12. Double Late Tulips

Although they are of great ornamental value, some varieties have feeble stems and the flower bends due to the weight (“Miranda”, “Monsella”, “True and Fair”, “Double Dutch”). This limits their use in arrangements such as rounds and massives. They have different color palette (red, yellow, white, orange) and many bicolor varieties, the most popular one being “Lilac Perfection”. They bloom starting with the second half of April (April 10 for “Monsella” and “Double Dutch”, 15 April for “Miranda” and “True and Fair”) and size varies between 30 cm in “Monsella”, 40 cm in “Double Dutch” and “True and Fair” and 50 cm in “Miranda” (Figure 3).

### 13. Viridiflora varieties

Viridiflora tulips are not very vigorous, but have a special purity and delicacy, and therefore many varieties of this group have won numerous awards. They bloomed after April 20, and their size has not exceeded 30 cm. they are very well suited for borders, but also for flower arrangements. “Golden Artist”, “Doll’s Minuet” and “Spring Green” varieties were noted by a good pest and diseases resistance and a long flowering period (Figure 4).

### 14. Other Species

This group contains the so-called “botanic tulips” or “wild tulips”, which sensitizes with their purity and delicacy. The first blooming species is *Tulipa pulchella humilis*, on the first half of March, followed by another two multiflower species: *Tulipa biflora* and *Tulipa turkestanica*.

Representatives are also the hybrids and varieties of *Tulipa praestans species* (well grown and 6 flowers on the stalk). Their size is up to 10-12 cm, like *Tulipa humillis* var. *violacea* “Black Base”, *Tulipa humilis* “Lilliput” and *Tulipa kurdica*, the so called dwarf species, but the section contains also a few varieties with tall size, like *Tulipa tubergeniana*, 50 cm. (Figure 4).

#### 4. CONCLUSIONS

The observations noted on tulips species and varieties from the University of Pitesti collection helped us to reach the following conclusions:

1. Pedoclimate conditions of Ștefănești – Arges area insure the capitalization of biological potential for the majority of species and varieties.
2. Among the soil traits, the texture requires improvement by the incorporation of sand.
3. For the groups Single Early Tulips, Fosteriana and Kaufmaniana, in springs with low temperatures, the blooming period is shorter with 8 to 10 days.
4. Temperature differences between day and night causes the phenophase shortening in early flowering varieties: Single Early Tulips, Fosteriana, Kaufmaniana and Greigii.
5. Semiearly Tulips like Triumph, Fringed, Double Early Tulips and Darwin Hybrid had a normal progress of vegetative stages.
6. Among the late varieties, the peony-flowered type developed a bigger floral cup, the stem bending under its weight.
7. Due to reduced size and rustic character, the botanical species can't be used in combination with other groups' varieties.
8. In these two years of collection existence, we were concerned to enrich the species and varieties assortment, with emphasis on the phenophases.
9. In the further studies will take into account the scale of analysis and determinations.

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