The Fuchsia Breeders Initiative

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Contents of this issue:

Contributions for the next issue, which is scheduled for the end of July 2016, should be in the editor's possession ultimately on 10 July 2016.

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

Photograph on front page:

F. 'Misha Charlotte' (De Cooker, 2015)

I'm Dreaming of a White Christmas

Editor of The Fuchsia Breeders Initiative

Mario de Cooker

"I'm dreaming of a white Christmas, Just like the ones I used to know".

Although some promising presages have occurred during the year, Bing Crosby's famous evergreen will for sure not materialize this Christmas. In The Netherlands, spring seems to be in the air.

But there have also been much colder periods. Following this year's rather cold pre-summer period in May and June, also October did not please us by having continuously very low temperatures. One of the consequences has been, that many *Fuchsia* berries hardly showed any growth or ripening during this period. Of course, ripening not only depends on temperature, but also on the properties of the female parent. Sometimes the ripening process proceeds very fast, taken only some 6 weeks. On other occasions, ripening requires more time, even up to 6 months. By becoming familiar with the habits of the plants used in hybridization we can take this into account in the timing of making our crossings.

It can be tempting using not only smaller plants, but also older large bushes and standards for making certain crossings. This year some of us have been punished for doing so. Smaller plants can be taken inside the house at the end of the season for further ripening, of the berries, e.g. by putting these under artificial light at room temperature. Many fuchsia's don't have any problem with this and even flourish, like several Triphylla fuchsias do. Large plants, however, require much more space, so taking these inside is hardly an option. As a consequence, I had to prune several large plants carrying still only small berries. Next year these crossings will have to be repeated, but I will make sure to perform these crossings with smaller plants.

Harvesting of *Fuchsia* seeds still continues even in December, as does the sowing of the seeds. For being successful in developing the promises of these tiny prodigies (e.g., having dark foliage as described in the first article), every hybridist uses its own approach, procedures and systems. In this issue of The Fuchsia Breeders Initiative, Mr. Edwin Goulding, based on his extensive experience, describes one of such proven systems.

I wish you and your family a very Merry Christmas and a Happy New Year with lots of successes in breeding and growing exciting new fuchsias.

Mario de Cooker

Making Triphylla cultivars with dark foliage

By Mario de Cooker

Photographs: Mario de Cooker

Introduction

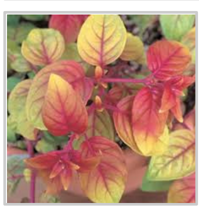
Dark foliage is an attractive feature for garden plants.

Many garden plants owe their popularity to having dark foliage as an attractive feature. Besides being attractive already by themselves, dark flowers and foliage can also accentuate other colors in the garden. A wide range of dark plants -bulbs, annuals and perennials, shrubs ad trees- is available for sale to the gardener nowadays. They have been developed in plant hybridization by recurrent selection of foliar and flower pigmentation. Recent information on the garden value of plants with dark foliage is provided in the December 2015 issue of the RHS magazine The Garden [1].

In the fuchsia assortment, cultivars having dark flowers are abundantly available. However, only a small number of cultivars with relatively dark foliage are comprised. The majority of these are found in the Triphylla assortment, examples being the Triphylla cultivars 'Göttingen', 'Strike The Viol', 'Touch The Lute' and 'Andenken an Heinrich Henkel'. Example of a non-Triphylla cultivar with beautiful ornamental foliage is 'Autumnale'.

Up to now, fuchsias having real dark purple or brown foliage during the whole growing season are still missing in the Triphylla assortment.

In this paper, recent work on developing Triphylla fuchsias with dark foliage is described. Especially the route via 'Göttingen' x 'Our Ted' crossings seems to offer promising perspectives. It has already taken many years of hybridization work to make only a few small steps forward to achieving the ultimate goal, which is creating a fuchsia with a stable leaf color resembling the color of *prunus cerasifera* 'Nigra'. But for achieving this, there is still a long way to go.



***F.* 'Autumnale'**

Dark purple foliage of Triphylla *Fuchsia* N 02-14 in the cold greenhouse (5°C; 14 January).
N 02-14 = 'Göttingen' x 'Our Ted'

Fuchsia seedlings, showing a large diversity of colors (23 May).

Triphylla *Fuchsia* 'Touch The Lute' has attractive dark foliage.

The color of fuchsia flowers and foliage is determined by the concentration of anthocyanin pigments.

The color of flowers and foliage of a large number of plants is determined for the greater part by a broad diversity of anthocyanin pigments[2],[3, p. 169-175]. Color and color intensity depend on type of pigments and their concentration. The concentration of these anthocyanin pigments is influenced by temperature and light intensity. High light intensity causes the anthocyanin production to increase. High temperatures, on the other hand, cause the anthocyanin production to reduce [4, 5]. See also the text box on page 4.

This phenomenon can easily be observed in the garden as regards the color of many dark colored garden plants. Dark leaves change their color at higher temperatures, and frequently transform from brown and purple into green during the summer season. Also blooms tend to become paler at higher temperatures.

Also our Triphylla fuchsias show this behavior. Dark brown or purple foliage is quite common and frequently found at young Triphylla seedlings and young cuttings, or at older plants in certain stages of development.

Young seedlings and cuttings often make a start with displaying dark colors in their foliage. This dark color is eventually lost during growth and ageing in the summer season. Also many mature, pruned Triphylla cultivars often display attractive brown and purple coloring at both the upper and underside of the leaves when they start growing in January / February at low temperature (5 degrC) greenhouse conditions. The pigmentation at the underside of the leaves is mostly retained during the whole season. The upper side of the leaves, however, will loose part of its pigmentation. It changes color from brown and purple to green as the days grow longer and the temperature rises. Preservation of the latter at higher temperatures is also genetically controlled.

The color of the blooms is also temperature dependent. As an example, general experience is, that the best white fuchsia blooms are indeed obtained at high temperatures when anthocyanin concentration is reduced, especially if the blooms are sheltered from direct sunlight. If placed in direct sunlight, the blooms tend to become more pink, which is reinforced at lower temperatures.

Influence of direct sunlight on the color of fuchsia blooms.

Left: seedling N 08-01 sheltered from direct sunlight. Right: seedling grown in direct sunlight.

N 08-01 = seedling originating from 'Roger de Cooker'

In creating Triphylla fuchsias with dark foliage, main challenge is to retain the dark color at higher temperatures not only at the underside, but specifically at the upper side of the leaves.

Lines and crossings

Starting material

Starting material consists of the fuchsia cultivars 'Göttingen' and 'Our Ted'. 'Göttingen' has relatively dark foliage, green at the upper side, red/brown at the underside of the leaves. 'Our Ted' has green foliage without any redness in its stems and leaves.

Both of these cultivars are presumably pentaploid specimens [6]. Contrary to expectations, several pentaploid *Fuchsia* specimens, including 'Göttingen', 'Our Ted' and their joint progeny are not sterile, but have moderate to excellent fertility. This is also found at various other fuchsias and many other plant species. Example in the genus *Fuchsia* is the seedling B 83-05 = *F. magdalenae* x *F. fulgens* var. *rubra grandoflora* from Henk Waldenmaier. Starting from this seedlings a large number of new cultivars in the WALZ series has been developed. Examples of other highly fertile odd-ploid varieties of plant species are found in specimens of tomato and barley.

Photograph by Sigrid van Schaik

***F.* 'Göttingen'**

Photograph by Edwin Goulding

***F.* 'Our Ted'**

The interpretation of the outcome of such odd-ploid crossings is rather complex. Straightforward Mendelian inheritance cannot cope with this complexity.

A number of research papers by Isabelle Henry *et al.* [7, 8, 9, 10] on the species *Arabidopsis thaliana* have served as an important source of understanding and interpretation of the results of the pentaploid *Fuchsia* crossings under investigation. Extensive citations derived from these publications will be used frequently throughout this article.

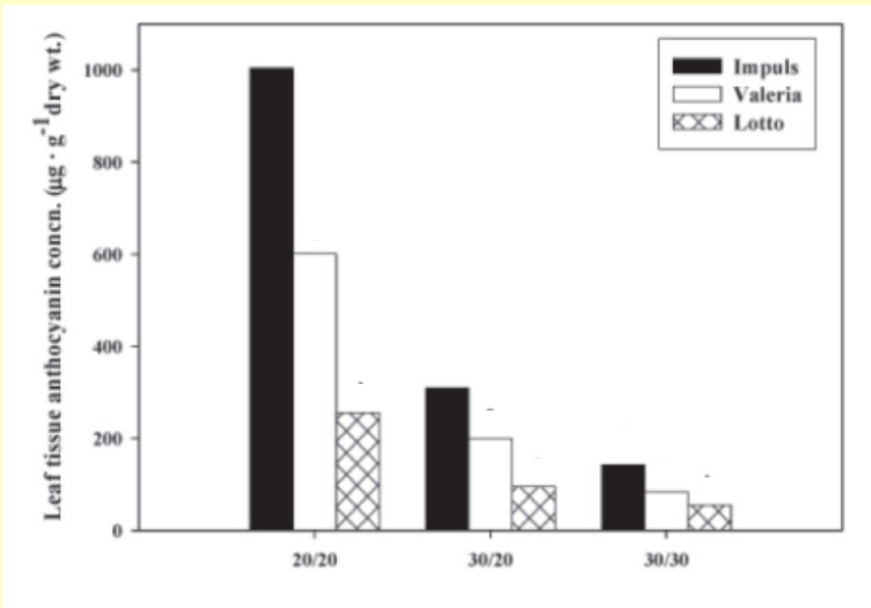
'Göttingen' originates from the crossing *F. triphylla* x *F. fulgens*, and has moderate fertility both as the male and the female parent. 'Our Ted' has resulted from a selfing of 'Thalia'; it has a rather poor male and female fertility. From the crossing 'Göttingen' x 'Our Ted', a set of first generation seedlings has been obtained, largely consisting of pentaploid specimens [6] having moderate fertility. Subsequently, next generations have been raised by making selfings and sibling and pseudo back crossings.

Many of these seedlings have dark foliage, with a dark green color at the upper side of the leaves (sometimes with a faint purple hue) and a dark red/brown color at the underside. A selection of these seedlings is presented on page 7.

If we pay for brown lettuce we want to get brown lettuce, don't we?

In an experiment, performed by Aparna Gazula *et al.* at the Ohio State University [4], the anthocyanin pigment concentration of three closely related Lollo Rosso lettuce cultivars: Impuls, Valeria and Lotto, has been measured as function of growth temperature. These cultivars, varying primarily in the number of genes controlling anthocyanin concentrations, were subjected to different air temperatures in controlled environments. Fifteen-day-old seedlings previously grown at 20 ºC day/night (D/N) were transplanted into growth chambers maintained at 20 ºC (D/N), 30/20 ºC (D/N) and 30 ºC (D/N) air temperatures. Twenty days later, leaf tissue was sampled for measures of pigment concentrations.
The data provide strong evidence that lettuce leaf pigment concentrations and growing temperatures are negatively related.

Anthocyanin (as well as chlorophyll) concentration substantially decreases at higher temperatures.



The origin of the dark leaf color of 'Göttingen' and its progeny is not clear.

It is not clear what causes the dark colored leaves of 'Göttingen' and its progeny. Inheritance of dark foliar pigmentation is complex, involving the action of multiple genes, encoding via a quantitative inheritance pattern. Both *F. triphylla* and *F. fulgens* might play a role in this.

F. triphylla itself has a relatively dark colored red/brown underside of the leaves. The foliage of many *F. fulgens* varieties is (light) green at both sides. *F. fulgens* var. *michoacans* is an exception, having green leaves with a strong purple hue.

By making a series of selfings of *F. fulgens* var. *gesneriana* it has been investigated if this species comes

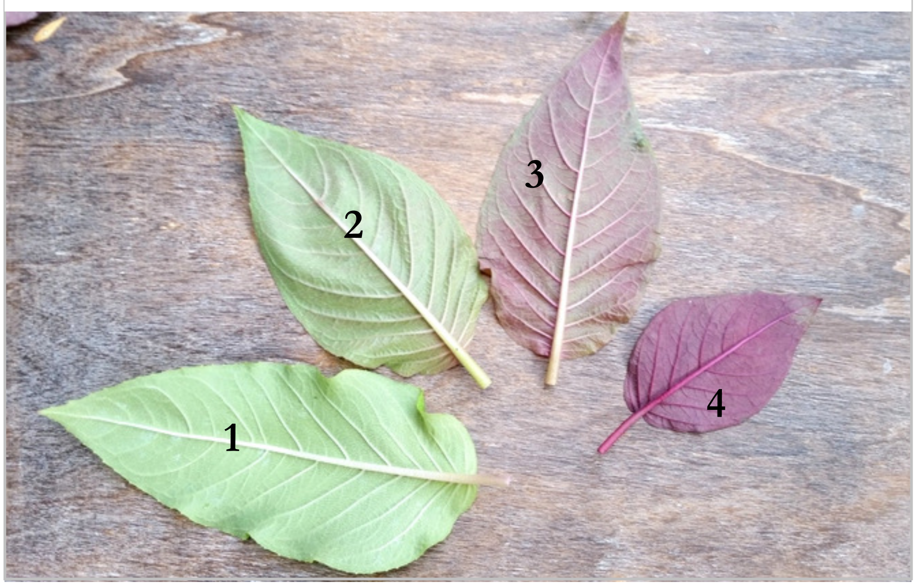
Lollo lettuce

true from seed. Surprisingly, the foliage of the seedlings is highly variable, ranging from (light) green (analogous to the parent) to leaves having a broad range of purple hues. As the origin of the *F. fulgens* varieties is often unknown or unclear, it seems not unlikely that at least part of the *F. fulgens* varieties, including *F. fulgens* var. *michoacans*, could fall within the range of natural variability of *F. fulgens* leaf colors.

From the range of leaf colors of the *F. fulgens* var. *gesneriana* selfings it can be concluded that *F. fulgens* may well have contributed to the dark leaf color of 'Göttingen'. Moreover, from neo-allopolyploid specimens it is known that many traits may become expressed in the progeny in a rather unpredictable way, even differing from both parents. Traits might be strengthened, might be reduced in their expression or might even be completely silenced, sometimes brought about by epigenetic influences [11]. Such effects may have contributed as well to the dark leaf color of 'Göttingen'.

F. fulgens var. *gesneriana* seedlings.

At the left: seedling with purple hue (3); at the right: green seedling (2).



Underside (photograph above) and upper side of the leaves (photograph below) of *F. fulgens* var. *gesneriana* seedlings.

1 *F. fulgens* var. *gesneriana* parent
2 Green seedling
3 Seedling with strong purple hue
4 *F. fulgens* var. *michoacan*

Odd-ploid crossings produce a swarm of aneuploid seedlings, which provide a pool of phenotypic variation.

Extensive research on odd-ploidy inheritance has been carried out by Isabelle Henry *et al.* from Prof. Luca Comai's department of Biology, University of Washington. Specifically triploid inheritance in the species *Arabidobsis thaliana* has been subject of investigation.

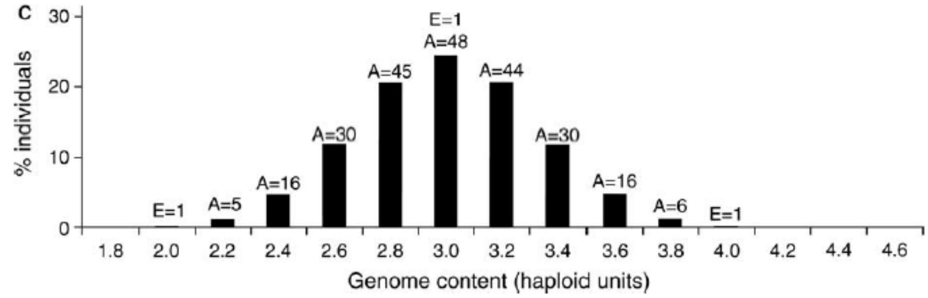
Odd-ploid plants have some characteristic properties, which make them fundamentally different from specimens with an even set of chromosomes such as diploid and tetraploid plants.

Triploids are often phenotypically normal plants, but are meiotically unstable. Meiosis and chromosome pairing are particularly complicated for triploids in which three sets of chromosomes must be resolved to two poles. This results in frequent chromosome loss and chromosome fragmentation. Even if chromosome pairing is successfully resolved, independent assortment produces mostly aneuploid gametes. As a result, the immediate progeny of triploids can be composed of a complex swarm of various karyotypes, which differ in the number of copies of each chromosome.

The genome of aneuploid individuals contains incomplete chromosome sets. In humans and animals, only a few types of aneuploid karyotypes are viable. Plants are more tolerant of aneuploidy for reasons that remain unclear. Although dramatic alterations of phenotype are associated with aneuploidy, this condition can be compatible with efficient function and even fitness.

The progeny produced by triploids of different plant specimens varies in the extent and frequency of aneuploidy. For autotriploid *A. thaliana*, the aneuploid progeny of selfings and pseudo backcrossings has been thoroughly investigated [7, 8, 9, 10].

During triploid meiosis, three sets of chromosomes must be allocated to two poles, producing mostly aneuploid gametes. The progeny produced by such gametes consists of a swarm of aneuploid types ranging from near diploid to near tetraploid.



Expected distribution of genome sizes in the F2 progeny from a triploid assuming random distribution of the chromosomes during meiosis and the absence of selection. Above each bar are indicated the number of euploid (E) and aneuploid (A) types contained in each genome class.

The graph has been taken from I.M. Henry *et al*, [7]. For experimental results on the agreement between theory and experiment, the interested reader is referred to the original publication.

Aneuploid individuals provide a pool of phenotypic variation

Aneuploid individuals provide a pool of phenotypic variation not present in the euploid population. In case of aneuploidy, the balance between chromosome types, and the genes they encode, is comprised, resulting in altered expression of many genes, including genes with dosage-sensitive effects on phenotypes [8,9].

From pentaploid fuchsia crossings a large variety of aneuploid seedlings will originate.
It is to be expected that large similarities exist between the outcome of triploid and pentaploid crossings. Also from selfings and sibling crossings of pentaploid plants a swarm of aneuploid types will be produced [12].

The progeny of a fertile pentaploid fuchsia will consist for a large part of aneuploids of different type. The dosage changes connected to aneuploidy will result in interesting changes and may substantially affect the phenotype of the fuchsia progeny.

In the Genus *Fuchsia* the haploid chromosome count amounts to 11, whereas for *A. thaliana* the haploid chromosome count amounts to only 5. Consequently, the range of possible aneuploids is substantially larger in such pentaploid fuchsia crossings than produced in the progeny of triploid *A. thaliana*. A complicating factor in the fuchsia crossings as explored in the program under investigation is, that these are allo-pentaploid specimens. Pairing and recombination at meiosis of chromosomes originating from different species in the allo-pentaploid *Fuchsia* specimens may also substantially affect the outcome [12].

The majority of the aneuploid progeny of the fuchsia crossings will not develop into viable seedlings. However, some of these will survive, and will ultimately grow to viable seedlings with divergent phenotypes.

Results and discussion

Creating dark foliage via 'Göttingen' x 'Our Ted' crossings.
The overview on page 7 shows the upper- and underside of the leaves of a range of first generation 'Göttingen' x 'Our Ted' crossings (the N 02- xx seedlings) and seedlings subsequently produced by sibling and pseudo back crossings starting from the first generation progeny.

Roughly, the progeny in next generations of 'Göttingen' x 'Our Ted'

Seedlings derived from 'Göttingen' x 'Our Ted'

1 **'Göttingen'**

2 **N 02-14 = 'Göttingen' x 'Our Ted'**

3 **N 02-16 = 'Göttingen' x 'Our Ted'**

4 **N 05-32 = N 03-01 x N 02-14 = 'Strike The Viol'**

5 **N 12-18 = N 05-32 x N 03-01 = 'Touch The Lute'**

6 **N 14-34 = N 02-14 x N 05-31**

7 **N 11-07 = N 05-31 x N 05-31**

8 **N 05-31 = N 02-16 x N 03-01**

9 **N 05-37 = N 02-16 x N 03-01**

10 **N 07-04 = N 02-16 x N 03-01 = 'Butterfly Dance'**

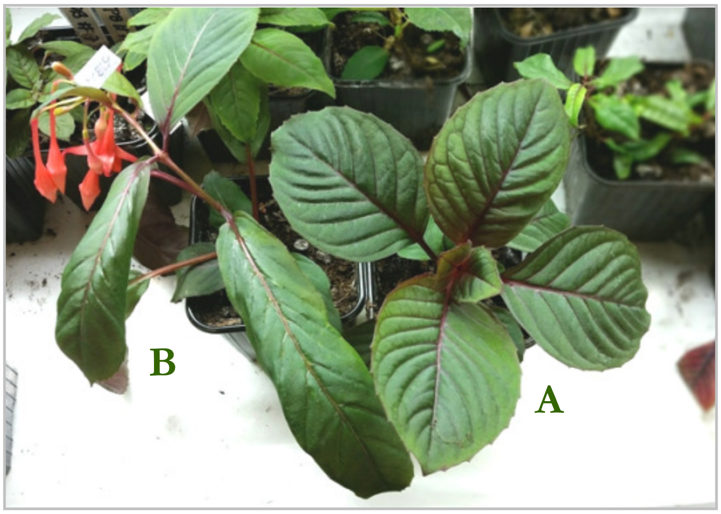
11 **N 08-10 = N 05-32 x *F. splendens* = 'Wake The Harp'**

12 **N 11-34 = N 08-10 x N 05-31**

N 03-01 = 'Göttingen' x 'Our Ted' *This seedling has been lost* crossings segregates into seedlings having two types of leaves and flowers:

1. Type A seedlings, having leaves resembling Göttingen, and different kinds of relatively small flowers. Seedling N 02-16 serves as a type A example.

2. Type B seedlings, having longer leaves and flowers with longer tubes. Seedling N 05-31 serves as a type B example [13].



Type A (N 02-16) and type B (N 05-31) seedling

Evidently, the Type B seedlings have more *F. fulgens* traits in their genes than the Type A seedlings[14]. If applicable, this will be investigated further by flowcytometry.

Both Type A and Type B seedlings display a rather broad range of leaf color. An example is seedling N 05-37, which hitherto is one of the best dark seedlings with a purple hue produced in the 'Göttingen' x 'Our Ted' crossing program. Unfortunately, it has only little fertility, and blooms which sometimes fail to open properly. Another seedling: 'Butterfly Dance' has, at the other side of the spectrum, a rather light colored underside of the leaves.

Part of the progeny derived from various combinations of Type A and B seedlings produces hard and dark green leaves, sometimes with a purple hue. An interesting seedling with such dark green foliage is N 14-34, having relatively small leaves and small, crispy flowers. It has taken as long as 3 years for the original seedling (dating from 2010) to produce its first flowers. Cuttings taken from this seedling are also still rather late flowering, but produce large racemes already in the first season. Interesting additional information, derived from

Seedling N 05-37 (early May)

Seedling N 05-37 and *Lysimachia ciliate* 'Firecracker' have comparable leaf color and appearance

Seedling N 14-34 has hard, dark leaves and crispy flowers. Buds have a near-white color.

the N 14-34 phenotype, suggests that uncoupling of the color of blooms and leaves should in principle be possible, which could offer opportunities for developing Triphylla cultivars having dark foliage in combination with light colored flowers.

Creating dark foliage via breeding other species or cultivars into Göttingen' x 'Our Ted' seedlings. Breeding of desirable traits of other species or cultivars into the 'Göttingen' x 'Our Ted' seedlings might have a substantial influence on the geno- and phenotype of the progeny, not only by introduction of their different genes, but also by inducing changes in gene expression and dosage-sensitive effects.

As an example, from the crossing 'Strike The Viol' x *F. splendens* the cultivar 'Wake The Harp' has been derived[15]. Subsequently, the crossing 'Wake The Harp' x N 05-31 has produced seedling N 11-34. This seedling has attractive, nettle-like foliage, exhibiting a dark purple color at the upper side of the leaves also during a large part of the summer season. As it seems to have only little or no fertility, it will most probably not be fit for being part of follow-up crossing program. It has proven, however, that inbreeding of a third species might result in a better and more stable purple foliar coloring.

The way forward

From the results of the crossing program up to now it has become clear that, in the program under investigation, a couple of promising routes exist for developing Triphylla *Fuchsia* cultivars with attractive dark foliage. The first route is making dark green leaves via 'Göttingen' x 'Our Ted' selfings and sibling mating. The second route is via breeding genes from other species or cultivars into the 'Göttingen' x 'Our Ted' seedlings. This route might offer the best future potential for obtaining a stable, purple color at the upper side of the leaves. Chances for success are, however, still unclear.

The inheritance pattern of traits producing phenotypes with dark foliage needs further investigation.

Seedling N 11-34 (mid May)

Seedling N 11-34 (early July)

Aneuploidy and related dosage-sensitive effects might play a decisive role in in this.

As suggested by Edwin Goulding, breeding with *F. alpestris* might produce dark foliage in the progeny [16, page78].This route will be further explored.

Introducing desirable traits of specific cultivars might work as well. As an example, *F.* 'Yannik Kaya' has a reasonable stable brown to purple colored upper side of the leaves also at higher temperatures, and might probably be used in the program [17]..

'Yannik Kaya'

Also this route will be investigated further.

Complicating factor is, that many of the 'Göttingen' x 'Our Ted' seedlings displaying dark foliage produce no pollen and have only little or at best only moderate female fertility, which substantially limits the possibilities of making those highly desirable selfings or sibling crossings.

From the odd-ploid 'Göttingen' x 'Our Ted' crossings a swarm of aneuploid seedlings is produced. Many traits in these aneuploid seedlings may become expressed in a rather unpredictable way, even substantially differing from both parents. Traits might be strengthened, they might be reduced in their expression or might even be completely silenced, which will lead to a large diversity of the phenotypes.

Only little information is available on the genetic stability of such aneuploid seedlings, nor if dosage-related effects can be transferred to the next generation. Several years of trial & error and careful observation will most probably be needed before further exploration of the potential of the different routes will deliver additional noticeable and satisfactory results.

First (a) and second (b)generation 'Göttingen' x 'Our Ted' seedlings

1 Göttingen 2 N 02-14 (a)

3 N 03-01 (a) 4 N 05-31 (b)

***F.* 'Wake The Harp'**

Early September

References and remarks

[1] Nigel Colborn, The Garden, December 2015, p. 36-41.

[2] Henk Waldenmaier: Overview of *Fuchsia* pigments; http://members.home.nl/henkwaldenmaier/pigmentanalyse.htm

[3] David S. Ingram, Daphne Vince-Prue and Peter J. Gregory (editors); **Science and the Garden**, Blackwell Publishing (2008), ISBN-10: 1-4051-6063-2.

[4] Aparna Gazula *et al.,* Temperature and Cultivar Effects on Anthocyanin and Chlorophyll b Concentrations in Three Related Rollo Rosso Lettuce Cultivars, HortScience 40(6):1731-1733 (2005)

[5] W.B. Phippen and J.E. Simon, Anthocyanin Inheritance and Instability in Purple Basil (*Ocimum bailicum* L.);The American genetic association, 91: 289-296 (2000).

[6] M. de Cooker, to be published.

[7] Isabelle M. Heny, Brian P. Dilkes, Kim Young, Brian Watson, Helen Wu and Luca Comai; Aneuploid and Genetic Variation in the *Arabidopsis thaliana* Triploid Response; Genetics **170**: 1979-1988 (August 2005).

[8] Isabelle M. Henry, Brian P. Dilkes and Luca Comai; Genetic Basis for Dosage sensitivity in *Arabidopsis thaliana*, PLoS Genetics, Volume 3, Issue 4, e70, 593-602, April 2007.

[9] Isabelle M. Henry, BP Dilkes, AP Tyagi, H-Y Lin and L. Comai; Dosage and parent-of-origin effects shaping aneuploid swarms in *A. thaliana*. Heridity (200), 1-11.

[10] Isabelle M. Henry, Brian P. Dilkes, Eric S. miller, Diana Burkart-Waco and Luca Comai; Phenotypic Consequences of Aneuploidy in Arabidopsis thaliana; Genetics **186**: 1231-1245 (December 2010).

[11] Luca Comai, The advantages and disadvantages of being polyploid; Nature, November 2005, Volume 6, p. 836-846.

[12] Luca Comai, personal communication to M. de Cooker

[13] From flowcytometry measurements it follows that the genomic composition of seedling N 05-31 is presumably a diploid (recombinant) *F. fulgens* genome. As the female, N 05-31 has good fertility towards *F. fulgens* var. *gesneriana*, however rather poor fertility towards 'Göttingen' x 'Our Ted' seedlings.

[14] As can be seen in the overview on p.7, the first generation seedling N 03-01 has played an important role in creating next generation seedlings. Unfortunately, this seedling has been lost a couple of years ago. As its tube is somewhat longer than found in the other first generation seedlings (see also the photograph above), it is not unlikely that its genome encompasses some more *F. fulgens* traits than the other seedlings of the F1 progeny.

[15] Both foliage and flowers of *Fuchsia* 'Wake The Harp' have clear *F. splendens* traits. As yet, however, it is not clear if these *F. splendens* traits have been passed on to seedling N 11-34. The foliage of seedling N 11-34 suggests that this has been indeed the case, but it needs further investigation.

[16] Edwin Goulding, **FUCHSIAS, The Complete Guide**; 2nd edition (2002); B.T. Batsford, ISBN 0 7134 8664 3.

[17] Early this year *Fuchsia* hybridist Mr. Wade Burkhart from Germany (www.fuchsien-burkhart.de) has provided me with cultivar 'Yannik Kaya' (Burkhart, 2014) for exploring its use in making Triphyllas with dark foliage. I'm very grateful for this gesture. 'Yannik Kaya' seems indeed, as the female (it produces not any pollen), to have some fertility towards Triphyllas, but it needs further investigation.

New fuchsias from Hans van Aspert (NL)

Photographs: Hans van Aspert

***Fuchsia* 'Jaspers Marga'**

Fuchsia 'Jaspers Marga'

Fuchsia **'Jaspers Marga'** (Van Aspert, 2015) is a Triphylla cultivar, originating from the crossing 'Göttingen' x 'White King'.

It is a self-branching, floriferous fuchsia variety, carrying its flowers in large racemes. After having produced its first flowers, it develops numerous secondary racemes, comparable to e.g. *F. boliviana*.

Overwintering is without any problems. The cultivar is best grown as a semi-trailing bush or lash standard or pillar. It prefers a location with bright filtered light, away from direct sun.

'Jaspers Marga' is named after a friend of the hybridist's wife.

***Fuchsia* 'Jaspers Marieke'**

Fuchsia 'Jaspers Marieke'

Fuchsia **'Jaspers Marieke'** (Van Aspert, 2015) is a Triphylla hybrid cultivar, originating from the crossing *F. triphylla* 'PB#7' x 'Sparkling Whisper'.

It is a self-branching, floriferous fuchsia variety, carrying its flowers in large racemes. It has relatively dark leaves with depressed veins. After having produced its first flowers, it develops numerous secondary racemes. It is recommended to keep it well-fertilized when flowering for preventing yellowing of the foliage.

Overwintering is without any problems. The cultivar is best grown as a semi-trailing or lash bush, away from direct sun.

'Jaspers Marieke' is named after the hybridist's daughter-in-law.

***Fuchsia* 'Suna-May'**

Fuchsia 'Suna-May'

Fuchsia **'Suna-May'** (Van Aspert, 2015) is a Triphylla cultivar, originating from the crossing 'Göttingen' x 'White King'.

It has light-green foliage and needs to be pinched at least twice for proper shaping.

Overwintering is without any problems.

The cultivar is best grown as a semi-trailing or lash bush as the branches bend down by the weight of the flowers, comparable to e.g. 'Annabel'.

'Jaspers Suna-May' is named after a friend of one of the hybridist's daughters.

Sometimes Fuchsia crossings have a spectacular outcome

By Jan de Boer

Photographs: Jan de Boer

Several *Fuchsia* hybridists do not walk the beaten path. Instead, they look for seldom used or difficult to hybridize species and cultivars for making something really new and different. It is not the most easy way to make new *Fuchsia* cultivars, and many attempts fail. But it can be highly rewarding!

Jan de Boer, a renowned Dutch hybridist, is an example of a *Fuchsia* breeder taking such challenging approach. Jan is always keen on exploring new ways, and has not any fear to fail. His reward has been the breeding of many extraordinary new cultivars, starting from, amongst others, *F. procumbens*. Sometimes such crossings surprise us with a spectacular outcome.

The fuchsia shown on the photographs has originated from the crossing *F. encliandra* x (*F. procumbens* x *F. paniculata*) x (*F. fulgens* x 'Alaska').

The cross is the result of hundreds of efforts and the outcome is spectacular. From only one leaf axil, flowers keep appearing throughout summer and autumn. In some cases more than 20 flowers per axil are produced.

No seeds have been obtained, but in very rare occasions the pollen is fertile.

It seems that such behavior can also be induced by growth conditions. This observation arises from experiences with 'Prosperity'.

Placed in full sun, but sheltered by glass in an environment conditioned at about 23ºC and 70% air humidity (the plant was grown in Singapore), it continuously produced new blooms from one and the same leaf axil.

F. 'Icicle' (De Cooker, 2015) has been renamed into ***F.* 'Icicles Chandelier'**

The reason is, that *F.* 'Icicle' has already been registered at the AFS by Paskesen in 1968.

Didn't I check the name on beforehand? Of course I did, and I even searched in several databases. And to be honest, I was a bit surprised that it had not been registered before. But soon after I found out that in the search I had misspelled the name, and had searched after 'Icecle' instead of 'Icicle'. And the computer just does what it has to do! In the July issue of The Fuchsia Breeders Initiative I have made the revision, and used the right spelling. But you could easily guess what went wrong then: I forgot to check the name having the right spelling for its registration.

***F.* 'Icicles Chandelier'**

Occasionally e-mail addresses change

When sending around the copies of The Fuchsia Breeders Initiative, sometimes a reply from the mail administrator is received that the e-mail was undeliverable because the address does not exist (anymore).

As not any possibility is available to check your correct address, you are kindly requested, if you change your e-mail address and still want to continue your subscription to TFBI, to send a message to the editor indicating your new e-mail address .

New fuchsias from John Allsop (UK)

Photographs: John Allsop

Fuchsia 'Tylor's Trophy'

Fuchsia 'Tylors Trophy'

Fuchsia **'Tylors Trophy'** (J. Allsop, 2015) is a large double. The tube is red. The sepals are red and fairly short. The corolla is purple, red at base and streaked red. This opens to a full flare. It is a natural trailer. Parentage is: seed parent 'Un-named Seedling' and the pollen parent is 'Grandad Fred'. It is very heat tolerant if shaded, with long lasting blooms.

'Tylor's Trophy' is named after the hybridist's Great Grandson.

Fuchsia 'Glamorous Glennis'

Fuchsia 'Glamorous Glennis'

Fuchsia **'Glamorous Glennis'** (J. Allsop, 2015) is a medium size double. The tube is yellow green. The sepals are thick. Pink with green tips. The corolla is white/pink with deeper pink veining. A natural trailer. Parentage is: seed parent 'Jade's Gem' and the pollen parent is 'Julie's Gem'. Self branching with very strong growth. Very free flowering. Makes a really good hanging basket.

'Glamorous Glennis' is named after a family friend.

Fuchsia 'Rylee's Reward'

Fuchsia 'Rylee's Reward'

Fuchsia **'Rylee's Reward'** (J. Allsop, 2015) is a medium size double. The tube is red. The sepals are red tipped green. The corolla is red, splashed mauve with red tipped mauve petaloids. A natural trailer. Parentage is: seed parent "Dancing Flame" and the pollen parent is "Lena". It flowers very early for a medium size bloom, and the blooms are long lasting. Holds shape and color well.

'Rylee's Reward' is named after the hybridist's other Great Grandson

Fuchsia 'Samantha's Smile'

Fuchsia 'Samantha's Smile'

Fuchsia **'Samantha's Smile'** (J. Allsop, 2015) is a medium size double. The tube is red. The sepals are red. The corolla is white, fused and veined pink, with petaloids, white fused pink. A lax upright, but will make a good basket. Parentage is: seed parent "Jade's Gem" and the pollen parent is "Grandad Fred". Early profuse flowering. Beautiful color combination. Holds bloom and shape well.

'Samantha's Smile' is named after one of the hybridist's Grand Daughter in Law.

The System

By Edwin Goulding

Photographs by Edwin Goulding

System

On Tuesday 14th December 2014 the celebrated surgeon and writer, Atul Gawande, gave the second of his Reith lectures entitled 'The Century of the System'. He went on to argue that better systems could transform global healthcare, radically reduce the chances of mistakes, and increase the chances of successful outcomes. If this is true of healthcare it is equally true of many other 'care' systems.

Purpose

It has been said, quite rightly, that there is little point in anyone re-inventing the wheel. There is great relevance in improving the quality of that product, of its performance, and of its trouble-free longevity; perhaps, even, of its adaptability or re-cycleability. In my lifetime, systems have revolutionised much of industry and an excellent example is to be found in auto-manufacturing.

Predictable

The whole point of a system is that it is supposed to provide regular and reliable quantities and qualities with predictable outcomes (costs and sale figures). While the last two might not prove to be exact, because of things like fluctuations in global currency markets, they are much better than uninformed guesses, even in the most experienced hands. Aims provide goals. Success can be measured.

Horticulture

There are huge gulfs between amateur and commercial horticultural enterprises. Often these are most apparent in matters of scale. As enterprises increase their size and complexity they also need more complicated quality control systems. One small mistake in a massive greenhouse can have catastrophic results. A very little thing, when multiplied by a factor of thousands of units can result in huge losses; perhaps making the difference between success and failure.

Amateurs

Amateur horticulturalists may think it is more relaxing if they don't worry too much about the quality of their work. After all, they already have to succeed without the availability of many commercially available products and detailed controls if they grow plants like *Fuchsia* under glass. One thing remains true, however, that if they want time to sit and enjoy their success, systems can provide shortcuts in terms of time and more predictability in relation to outcomes.

Reflection time

We can see that the provision of an excellently thought out system, if adhered to carefully, can free us to ponder many inter-related factors impacting on *Fuchsia* care and open up the chance of re-balancing the complex world in which we are interested. If we consider, for example, a system for sowing seeds and raising seedlings, it helps if there is also time to think carefully about which stock plants are grown and which crosses to make; to create a meaningful pathway along which advances can be made.

Parts

Any system is only as good as the parts on which it relies for its operation. This is as true of sowing *Fuchsia* seeds and of raising our own seedlings as it is of any more complex industrial process. Further, those parts need to be placed in the correct position relative to each other if they are to operate perfectly as a system and in order to provide 'Excellence'. Each part serves a particular but complementary purpose.

Purposes

The list of parts comprising a system is dependent upon being clear as to the purposes to be served by each one. This is a much more complex subject than most growers are prepared to accept. It also requires a certain determination and perhaps financial ability to ensure it is comprehensive enough to give the ideal results that most of us would really like. This article is about one such system although many others could be equally successful.

Stock

Suitable *Fuchsia* stock plants are essential if deliberate crosses are to be made possible; no stock plants = no seed or seedlings. It is obvious also that enough space is necessary for these to thrive. This space must be protective in the extremes of wind and weather, heat and cold, if suitable conditions are to prevail. For most growers this space and protection is provided, at least in part, by a greenhouse.

Light

For plants with chlorophyll to grow, adequate light with the right wavelengths is essential. The duration of the light within each twenty four hour period must be long enough for growth to take place and for the necessary chemical reactions to proceed. Often, the normal intensity of winter light is inadequate for *Fuchsia* plants to grow; warmth on its own is not enough. Plants like these have small chlorophyll-saturated photo-operated cells upon which growth depends.

Moisture

This not only means adequate water at the roots but also sufficient atmospheric moisture, particularly in the case of germinating seeds. Even brief spells of drought, once seeds have started into growth, will cause their death. As they say, 'Many a slip 'tween cup and lip'. Humidity meters help maintain the correct greenhouse balance. Other protection is required, small in scale, to care for seeds and new seedlings.

Temperature

Fuchsia seeds are surprisingly resilient. Even two leaved seedlings will withstand quite low temperatures. High temperatures are more lethal in the very early stages of germination. Where there are low temperatures everything moves forward at much slower rates but, very low levels of heat and light, combined with very high levels of atmospheric moisture, quickly encourage botrytis and other cultural problems.

Quality

Achieving high quality results is all about providing a balance between Stock, Light, Moisture (especially atmospheric) and Temperature. Healthy and vigorous plants are most likely to supply the best germination rates and strongest seeds and seedlings. The greater the light levels and longer they persist each day (within reason) the more growth is encouraged. Moisture helps to swell the germinating seeds and their growing and multiplying cells. As temperatures rise, so do the requirements for increased moisture and light.

1 Greenhouse **2 Lighting gantry**

3 Temperature & humidity gauge **4 Dehumidifier**

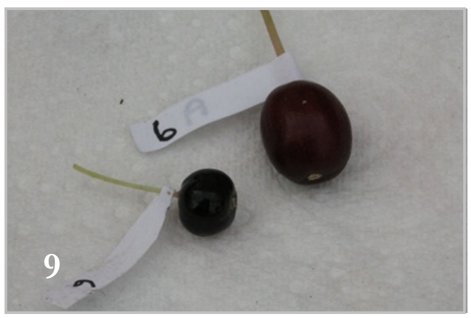
The photographs, accompanying and illustrating the consecutive stages of the process, are self-explanatory.

Optimum levels

We can see from the forgoing comments that we are not talking about one standard level for each of these envi-

5 Clip-top box
6 Template & cocktail stick
7 Kitchen roll
8 Coffee filter paper
9 Seed pods
10 Squashed pod
11 Seeds in box
12 Labeled lid
13 Seedling growing

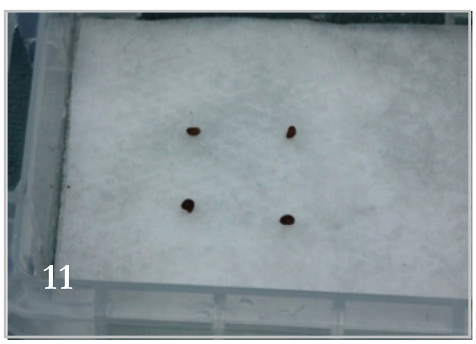
ronmental factors but, ideally, they operate on a sliding scale. This system seeks to provide enough light for about eight hours a day. Temperatures around 10°C to 20°C are maintained throughout germination and subsequently. Atmospheric moisture is controlled to around 60% to 80% if at all possible. Germination boxes and root moisture are attended to every day.

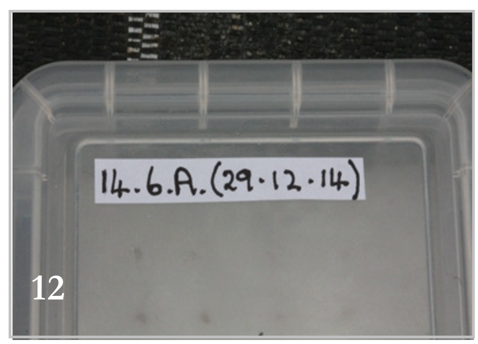


Growing-on

Once the seeds have chitted and have their first two seed leaves (*Fuchsia* is a dicotyledonous plant) it is time to move them from their seed box. At first, it is wise to place them in compost in a shallow tray in order to encourage further fibrous spreading roots. As they grow larger they are teased from this compost and potted into individual pots and watered carefully from below (allowed to draw water up slowly).

The early compost mix is of 1/5 of sterile soil and 4/5 of fine, chipped and composted bark (by volume). Composting helps to get rid of all the unwanted toxins and any pathogens





present in the timber. The partly decomposed product that remains is remarkably stable in moisture level and also quite effective in providing a slow gradient to any root-level temperature changes that occur.

Success

This has been a description of one example of a *Fuchsia* seed raising system, suitable for most amateur enthusiasts to install and operate. Like all systems, it is improved by usage and feedback: trial and error without too many of the latter. As with bringing up a baby, it is obvious that neglect is not on the agenda at any of these early stages in life. Constant attention to detail is the best way to gain experience, and to learn. Then we will find that the harder we work the more good luck will seem to follow.

14 Fine chipped bark*

15 Sterile sifted loam

16 Seedlings in a domed tray

17 Initial stages

18 Coarse chipped bark*

19 Larger pots

20 Seedling in flower

*) *Sciarid fly might be present in chipped and composted bark if it has not been sterilized. Before using the mixed rooting compost, watering with boiling water will cure the problem .*

New fuchsias from Mario de Cooker (NL)

Photographs: Mario de Cooker

Fuchsia 'Misha Charlotte'

Fuchsia 'Misha Charlotte'

Fuchsia **'Misha Charlotte'** (De Cooker, 2015) is a *Fuchsia* cultivar which has originated from the crossing('Strike The Viol' x 'Delicate White') x {(Checkerboard x Machu Picchu) x (Checkerboard x Machu Picchu)}. It has been raised as a spin-off of the program for developing white Triphylla cultivars.

'Misha Charlotte' is a relatively slow growing cultivar with very short internodes. Blooms are long lasting and have a pale pink to pink color , depending on growth conditions. Flowering starts rather late in the season at around mid to late July. It can best be grown as a (semi-trailing) bush or small standard. It has a robust root system and tolerates sun. Overwintering is without any problems.

'Misha Charlotte' is named after the hybridist's Grand Daughter who loves (as many Grand Daughters do) the color pink.

***Fuchsia* 'Misha Charlotte'**

Misha playing with Aphaia

Fuchsia 'Frans Boers'

Fuchsia 'Frans Boers'

Fuchsia **'Frans Boers'** (De Cooker, 2015) is a *Fuchsia* cultivar originating from the crossing {'Winter Charm' x (Playboy x ?)} x {(Checkerboard x Machu Picchu) x (Checkerboard x Machu Picchu)}. It has large blooms with a dark rosy red corolla and a marked green belt on its tube.

'Frans Boers' is a vigorous grower and should be carefully pinched for obtaining a good shape. Tolerates sun. Best grown as a semi-trailing bush or pillar. If grown from autumn cuttings and left unpinched, first blooms appear in a massive display around mid June.

Fuchsia 'Frans Boers' is named after the President of the local South Limburg Fuchsia Society 'Limburgs Belleke'. Frans is an enthusiastic fuchsia lover and former Whippet dog breeder

***F.* 'Frans Boers', unpinched**

Mr. Frans Boers, Chairman of Fuchsia Society Limburgs Belleke

Photograph: Michel Wijnands

***Fuchsia* 'Frans Boers', late August, grown from spring cuttings.**

New fuchsias from Burgi Klemm (AT)

Photograph: Burgi and Rainer Klemm

As announced in the previous issue of The Fuchsia Breeders Initiative, Burgi and Rainer Klemm have ceased their Fuchsia hybridization activities. Because from previous years still some new Fuchsias were available, they have decided to introduce these in 2015 and 2016. A compilation has been drawn up and send around to interested Fuchsia lovers. The photographs show one of these new Fuchsias.

***Fuchsia* 'Mein Gärtner'**

Fuchsia 'Mein Gärtner'

Fuchsia **'Mein Gärtner'** (Klemm, 2015) originates from the crossing 'Lavaglut' x 'Rohees Alioth'. It is a self-branching, (semi-)trailing, floriferous fuchsia variety. Its blooms are double or semi-double and have a decent and elegant red purple color. Mein Gärtner means: My Gardener.

Mrs. Burgi Klemm writes about this fuchsia: *"This will most probably be my last new fuchsia introduction. With a tear in the eye it makes me thankful for all the hybridization work I have been able to perform over the years. I want to dedicate this fuchsia to my husband Rainer. Without his help and support I would never have been able finding the courage to carry out all the hybridization work".*

***Fuchsia* 'Pavilion Princess' (De Cooker, 2014), beautifully grown by Mr. and Mrs. Koos and Manny Poffers, starting from three small March cuttings.**

It was second prize winner in the Jhr. Ir. van Suchtelen Trophy category at the NKvF 50th anniversary meeting in August. Congratulations with this achievement!

Beautiful embroidery: Fuchsia with Hummingbird. Made by Simone Lomet, member of the Société Nationale d'Horticulture de France (SNHF). Donated by her to the editor of The Fuchsia Breeders Initiative.

Many thanks for this wonderful gift!

Herman de Graaff with the Diplome d'Honneur, awarded to him by the SNHF for his many distinguished contributions to the Fuchsia world.

From left to right: Mrs. Simone Lomet, Mrs. Loeky de Graaff, Mrs. Vreny Schleeweisz and Mr. Herman de Graaff.

Contents of the next issue

The next issue is scheduled for the end of July 2016.

It ain't necessarily so.

In the words of the song from the musical "Porgy and Bess", things are often not what they are assumed to be. In this article by Mr. Edwin Goulding a contrarian policy for hybridists is discussed.

Making mini-Triphyllas

As discussed in this issue's article on making Triphyllas having dark foliage, odd-ploid crossings may produce surprising results. Unexpectedly, using long-tube specimens in odd-ploid Triphylla crossings sometimes induces the formation of mini-Triphyllas, having tubes as small as 10 mm.

Making white Triphylla hybrids.

Making white Triphylla hybrids without involvement of magellanica's has proven to be feasible. More about this in next issues.

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

Your contribution to the contents of The Fuchsia Breeders Initiative is highly appreciated. Contributions for the next issue should be made available at the latest on 10 July 2016.

The Fuchsia Breeders Initiative

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