The Fuchsia Breeders Initiative

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Issue 4, December 2014

Has 2014 been a great Fuchsia year?

Editor of The Fuchsia Breeders Initiative

Mario de Cooker

Have our fuchsias flourished well this year? Well, it depends, could be the answer. If you put this question to a hundred fuchsia growers, you will probably get a hundred of different opinions.

The very mild winter brought both advantages and disadvantages. Hardy fuchsias have easily survived this winter and have set flower already very early in the season. However, probably caused by the same mild winter conditions, problems with Fuchsia rust have surfaced more widespread and much earlier than in other years. As is mentioned in the BFS newsletter, already early in the season rust has appeared (even in the glasshouse) instead of outdoors much later in the season. In my own garden I did not experience any rust problems for about 15 - 20 years, but this year it suddenly resurfaced already in June. By pruning the new branches of the affected plants rigorously, and continuous careful inspection afterwards, the problem could be effectively kept under control. Despite the heavy rainfall for weeks in August, many fuchsias have thrived and flowered for the whole summer, sometimes even better than ever before. So yes, all in all the Fuchsia year has been very satisfactory.

Despite catching thousands of these slimy creatures during the last years, the slugs and snail mob is still not under control. In what must have been a moment of mental disorder, we had therefore decided last year to remove most of our hostas from the garden. However, when my wife and I were sitting in the garden on a nice summer evening, we looked at each other, and experienced both the same unhappy feeling: *a garden without hostas is really extremely dull.* Now we have again purchased a lot of new hostas, as much as possible to some extent 'slug & snail proof' and rearranged the garden.

So the battle continues. But what might be an even bigger problem has now shown up. The stone marten (*Martes foina,* a beautiful animal) is thriving in The Netherlands since the last decade. It has now discovered my (as well as my neighbors'') garden as its playground, and has destroyed already several times many plants, amongst which the remainder of the hostas, older fuchsias and young fuchsia seedlings. I would welcome any suggestion for measures that could be taken to minimize the damage.

The autumn has been long and extremely mild this year. As a result, many trees have kept their foliage much longer than in other years. When the nights became colder, but still without any frost, the foliage has developed into an explosion of colors that has persisted until December. Also the 20 year old beech in my front yard (*Fagus sylvatica* 'Dawyck Purple') has colored beautifully for a long time, which brought a lot of pleasure.

Fagus sylvatica 'Dawyck Purple'

It has been a good year, without any dull moment. I wish you, your family and your friends all a lot of happiness and Fuchsia pleasure in the year to come.

Mario de Cooker

Contents of this issue:

Contributions for the next issue, which is scheduled for the end of July 2015, should be in the editor's possession ultimately on 1 July 2015.

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

Photo on front page: *Fuchsia* 'Sappho Phaoon' (De Cooker, 2011)

New fuchsias from Mario de Cooker (NL)

Photos: Mario de Cooker

***Fuchsia* 'Aphaia'**

Fuchsia 'Aphaia'

Fuchsia 'Aphaia' (De Cooker, 2014) originates from the crossing {'Roger de Cooker' x ('Checkerboard' x 'Machu Picchu') x ('Checkerboard' x 'Machu Picchu')} x 'Blush of Dawn'. It can best be grown as a semi-trailing fuchsia or a (lash) bush, both as an older plant or from young cuttings. If grown from autumn cuttings it makes a nice floriferous pillar if it is left unpinched. Overwintering does not cause any problems and regrowth and flowering starts early in the season. The colouring of early flowers is however not at its best, as this needs some higher temperatures. Heat and sun are tolerated, but the plant performs best in filtered light.

The cultivar's name is derived from the now 2 year old Irish Terrier, our youngest Terrier scion in the family.

Airedale Terrier Delphobe (at the right) nurturing young Irish Terrier Aphaia

***Fuchsia* 'Touch The Lute'**

Fuchsia 'Touch The Lute'

Fuchsia 'Touch The Lute' (De Cooker, 2014) is a Triphylla cultivar originating from the crossing 'Strike The Viol' x ('Göttingen' x 'Our Ted'). Flowers are produced in many racemes. Its dark green foliage with a bronze underside of the leafs adds to the attractiveness of this cultivar. It is best grown as a bush in a somewhat sheltered position, in any case in filtered light at high temperatures during summer. Overwintering is without any problems.

'Touch The Lute' is moderately fertile both as the male and the female. Its name is -as the third in a row, following 'Strike The Viol' and 'Wake The Harp'- based on a part of the British composer Henry Purcell's music piece *Come, ye sons of art*, an ode, written in 1694 in honor of Queen Mary II of England's birthday.

F. 'Touch The Lute' has an attractive dark green foliage

***Fuchsia* 'Marble Crepe'**

Fuchsia 'Marble Crepe'

Fuchsia 'Marble Crepe' (De Cooker, 2014) is a Triphylla-type cultivar, originating from the crossing 'Roger de Cooker' x tetraploid *F. fulgens*. Its name is derived from the faint marble-like upper side of the leaves, and the crepe paper-like appearance of the corolla. It is best grown as a bush (preferably from autumn cuttings) and tolerates heat and sun. Overwintering is without any problems. The cultivar produces no pollen, nor is it fertile as the female.

F 'Marble Crepe' grown as a bush from an autumn cutting.

***Fuchsia* 'Winter Hymn'**

Fuchsia 'Winter Hymn'

Fuchsia 'Winter Hymn' (De Cooker, 2014) is a Triphylla cultivar, originating from the crossing {(Göttingen' x 'Our Ted') x ('Göttingen' x 'Our Ted')} x (*F. inflata* x *F. juntasensis*).

Its main natural flowering period is from September - April. It will loose part of its foliage in the winter season. However, if grown from non-pinched autumn cuttings, flowering starts already at the end of July. Autumn cuttings that have been pinched once will start flowering mid August.

'Winter Hymn' can be grown as a semi-trailing or lash bush fuchsia. The plant performs best in filtered light.

For obtaining an attractive display the whole summer through, 6 to 9 plants, grown from autumn cuttings, should be placed together in a pot or basket. 1/3rd of the cuttings should be pinched twice, 1/3 rd once and 1/3rd should not be pinched at all. In this way a display can be obtained that will produce flowers from the end of July till April/May in the next year. It continues flowering at a glasshouse temperature of 5◦C.

F. 'Winter Hymn' grown as a lash bush. Early October, 2014

Fuchia 'Winter Hymn' is one of a series of three

Fuchsia 'Winter Hymn' is one of a series of 3 winter flowering Fuchsias, which encompasses also *F.* 'Winter Charm' and *F.* 'Winter Joy'. As a common ancestor these cultivars have a *F. inflata* x *F. juntasensis* seedling in their parentage: *F.* 'I 90-01', made by the Dutch Fuchsia hybridizer Jan van den Bergh in 1990.

The natural flowering period of these cultivars is from September/October - April. *F.* 'Winter Hymn' can be trained to set flower in July/August. Occasionally, *F.* 'Winter Charm' sets flower already in August, depending upon the way it has been pinched and trained.

Fuchsia 'Winter Charm' (De Cooker, 2011, AFS 8167) originates from the 1997 crossing (*F. inflata* x *F. juntasensis*) x *F. magdalenae*. It is moderately fertile. The Fuchsia cultivars 'Remembering Claire', 'Delphobe' and 'All Summer Beauty' have its sister seedling in their parentage. *F.* 'Winter Charm' makes long branches, which can be tied up in the top of the glasshouse during the winter season. It can also be grown as a lash bush fuchsia. The plant performs best in filtered light.

Fuchsia 'Winter Joy' (De Cooker, 2011, AFS 8168) is a selfing from the seedling *F.* 'I 90-01' = *F. inflata* x *F. juntasensis*, the female parent of *F.* 'Winter Charm'. It is moderately fertile. It makes long branches, and can best be grown as a stiff semi-lash bush or standard. It makes an attractive display during the winter season in the glasshouse at 5◦C.

All these three winter flowering Fuchsias are not really easy to grow and shape. However, they will provide a lot of pleasure to the more experienced Fuchsia grower on gloomy winter days.

2014 seedling originating from F. 'Winter Charm'. It clearly shows the influence of F. inflata, one of F. 'Winter Charm"s parents.

F. 'Winter Charm' in the glasshouse. Early November 2011.

F. 'Winter Joy' in the glasshouse, grown as a standard. Early April 2013.

On the fertility of fuchsia pollen

By Edwin Goulding

Part III: Pollen's promise

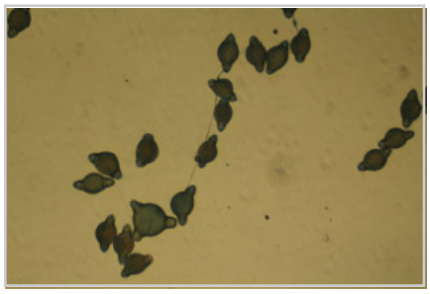
So far, in previous sections we have considered why examining pollen might be helpful. We have considered how to prepare and interpret microscope specimens.

Next came how to define and display the most relevant information. Building a database that could be used over a long period of time, not relying just on memory, was considered. Photographic evidence can be an extremely useful adjunct.

We can see that examination of pollen does not give a "One shot fix all" solution. It adds another dimension in our armoury as hybridists.

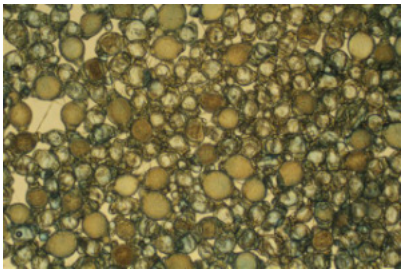
Here, I want to point out that *Fuchsia*, in the wild, is variable. These plants are not clones (ie. identical in every respect to each other). Like a ripple in a pool, variability is likely to be greatest at the outer limits of the largest circles of their natural habitats. This is the substance of Darwin's theory, allowing life to adapt and change.

With this in mind, I want to mention the *F. fulgens* that I grow. This species has been tested on two separate occasions with different results. On the first occasion only 20 grains were found and no viscin threads were present. You can see the exact details on the chart on page 6. Notably, fertility rose but aperture variation reduced.



F. ravenii pollen

F. lycioides is a naturally occurring tetraploid (having 44 chromosomes). All my pollen carried 3 apertures, on pollen grains that were remarkably even in size and shape.



F. paniculata pollen

The *F. paniculata* I use is also a tetraploid. You will see from the chart that it has both 2 and 3 aperture pollen grains. Just because a plant has highly variable and fertile pollen, we should remind ourselves this is no guarantee of its success as a seed-bearing parent; this is still an area of trial and error.

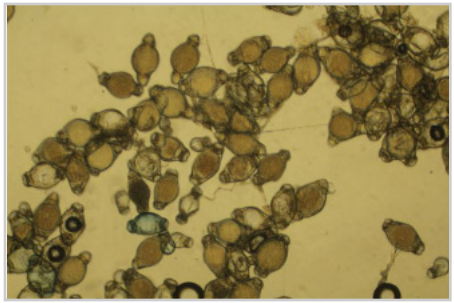
The chromosomal value of most species is known, so too, is that of many older hybrids. The relevance of this information can be found in the series of articles produced by Gerard Rosema for the Dutch Fuchsia Society (see Note). Suffice it to say here that pollen grains will carry half this number (haploid), as will egg cells.

We use tests for pollen fertility and variability to assess the likelihood of chromosomal variation (increase), it being impossible to halve 11 chromosomes.

Last of the species to be mentioned here is *F. ravenii*. Coming from section Encliandra we might expect that pollen grains would all have two apertures but this is not the case.

Careful observation has shown that 'Globosa' is not a species. In fact its pollen had, when tested, from 2 across the spectrum to more than 5 apertures. The fertility level too, did not correspond with the high level found in species. Another interesting feature of this hybrid, with its 66 chromosomes, is that it does not appear susceptible to rust; this is contrary to my observations on other cultivars with this number.

F. 'Globosa'



F. 'Globosa' pollen

Mr. Edwin Goulding is a renowned British specialist in fuchsia hybridization. His former nursery 'Gouldings Fuchsias' has introduced many beautiful own-bred triphylla hybrid fuchsias, for example the famous near white triphylla hybrid Fuchsia 'Our Ted'.

This article is the third and final in a series of three on the fertility of fuchsia pollen.

Daryn John Woods' was the result of Bonstedt's 'Koralle', (originally my 'Thalia'). Given that its other parent was *F. juntasensis* it is unlikely to be a diploid. So far, in spite of its 40% fertility, I have raised no seedlings from it.

F. 'Daryn John Woods'

'Blush of Dawn' is an old but highly successful hybrid. My feeling is that it probably has 77 or 88 chromosomes. You can see the variability present in the pollen grain apertures from the chart. Not only has this cultivar proved highly fertile in practice, both ways across a wide range of other plants, but, it tends to produce progeny that have as many or more petals than it does itself.

At this stage, I would like to mention the iconic hybridist, James Lye. Four of his hybrids were tested in our chart and these are illustrated: 'Loveliness', 'Lye's Elegance', 'Lye's Own' and 'Lye's Unique'. We can see that all his introductions appear to come from the same parents. Nevertheless, their individual success as parents differed widely. 'Lye's Unique' has produced the widest range of exciting hybrids.

F. 'Lye's Unique'

F. 'Lye's Elegant'

F. 'Loveliness'

F. 'Lye's Own'

What are the immediate lessons we can draw from all this information?

1. Sometimes a *Fuchsia* produces no pollen. This could be because of the segregation of sexes, as found in Section Encliandra. It could be that the natural flowering time is at a completely different time of the year. Perhaps, pests (such as wasps) are removing anthers and pollen. The greater the genetic differences between parents the less likelihood there is of viable seed or pollen being produced in their offspring. **Parentage depends on fertile pollen.**

2. **Just because pollen appears to be fertile this does not guarantee success.** Some degree of trial and error is always necessary in the advancement of plant breeding.

3. **Growing conditions greatly affect the production of pollen and its fertility.** Wind, aridity and extremes of temperature inhibit viability whilst being grown out-of-doors, in reasonably long grass, in ideal conditions is helpful. Sometimes, only one anther produces viable grains on a single day in the whole year. Keen observation of stock increases success rates.

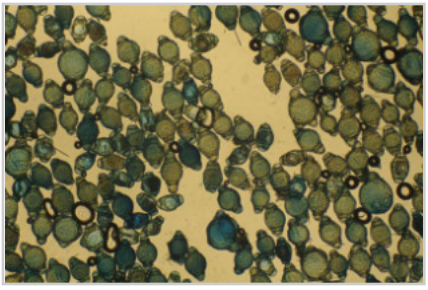
4. **Hybridising can be seen as a percentage game.** We have already discussed this aspect in the part called Pollen Charting. Pollen studies help to stack the odds of success in your favour.

5. The most general of our lessons is, **The greater the fertility and variability in a pollen sample the greater will be the chance of its success.** Ignorance might be bliss, but in my experience it hugely increases the hybridist's workload. At the same time it diminishes the percentage of successes. These things matter to plant breeders who have clear aims for their own *Fuchsia* hybridising programme.

Notes:

1. *F.* 'Obcylin' was one of several seedlings produced by Martin Beije from the cross *F. obconica* x *F. cylindracea* ♂.

It might have been expected to carry two aperturate pollen grains. The photograph and chart results show some unexpected results that could not have been determined in any other way except by pollen testing. The other seedlings were not released and we do not know what their pollen or progeny might have been like.



F. 'Obcylin' pollen

2. The articles written by Gerard Rosema and mentioned here can be found in *Fuchsiana*, the publication of Nederlandse Kring van Fuchsiavrienden as follows:

Fuchsia Breeding - 1 June 2008: pp.91-93

Fuchsia Breeding - 2 August 2008: pp.116-120

Fuchsia Breeding - 3 October 2008: pp.148-151

Fuchsia Breeding - 4 Dec. 2008: pp.91-93

Fuchsia Breeding - 5 February 2009: pp.47-49

Fuchsia Breeding - 6 April 2010: pp.47-49

Fuchsia Breeding - 7 June 2010: pp.82-83

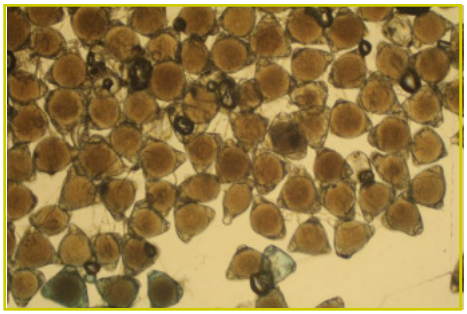
Pollen chart

Fuchsia (♀ ♂)	Date	Grn.	Vis.	Stn.	2 ap.	3 ap.	4 ap.	>=5 ap.	Size	Loc.	Tem.	Hum.	Comments
Belize	14.08.12	200	Y	85%	0%	85%	0%	0%	L	G	34°C	30	Bright day
Blush of Dawn	12.09.10	30	Y	40%	2%	15%	23%	0%	V	G	30°C	25	Bright day
Daryn John Woods	16.12.10	500	Y	40%	40%	0%	0%	0%	M/L	G	U/K	U/K	Dark, cold & wet
F.cestroides	06.05.11	300	Y	99%	94%	4%	1%	0%	M/L	G	34°C	30	Bright day
F.cestroides	20.05.12	200	Y	50%	50%	0%	0%	0%	M/L	G	13°C	55	Bright & cloudy evening
F.cylindracea ♂	03.07.11	120	Y	97%	97%	0%	0%	0%	M	G	26°C	25	Bright & cloudy
F.cylindracea ♂	21.05.12	200	Y	50%	50%	0%	0%	0%	M	G	22°C	30	Bright & cloudy
F.decidua	08.03.11	20	Y	100%	100%	0%	0%	0%	M/L	G	34°C	30	Bright day after frosty night
F.encl. ssp. *tetra.* ♂	30.08.11	50	Y	80%	79%	1%	0%	0%	S/M	G	30°C	30	Bright & cloudy
F.fulgens	12.09.10	20	Y	40%	1%	36%	3%	0%	L/VL	G	30°C	25	Bright day
F.fulgens	18.09.10	60	Y	90%	70%	20%	0%	0%	M	G	35°C	15	Bright day
F.lycioides	11.11.10	200	Y	100%	0%	100%	0%	0%	M	G	13°C	35	Dark & cold
F.obconica	11.11.10	30	Y	98%	96%	2%	0%	0%	S	G	22°C	30	Dark & cold
F.obconica	21.05.12	50	Y	10%	10%	0%	0%	0%	M/V	G	22°C	30	Bright & cloudy
F.paniculata	12.09.10	30	N	30%	28%	2%	0%	0%	M/L	G	30°C	25	Bright day
F.paniculata	21.05.12	250	Y	30%	30%	0%	0%	0%	M/V	G	22°C	30	Bright & cloudy
F.ravenii	18.10.10	200	Y	99%	99%	0%	0%	0%	S	G	18°C	55	Dark & cold
F.ravenii	21.05.12	50	Y	60%	59%	1%	0%	0%	S/M	G	22°C	30	Bright & cloudy
F.splendens	27.12.11	300	Y	90%	2%	88%	0%	0%	L	G	16°C	60	Dark & cold
F.triphylla	17.09.11	50	Y	50%	10%	15%	15%	10%	S/M/L/VL	G	24°C	40	Bright & cloudy, thrips
Globosa	15.10.10	100	Y	65%	2%	59%	2%	2%	M/L/V	OD	U/K	U/K	Posted sample
Hof Popkensburg	14.08.12	200	Y	95%	0%	95%	0%	0%	L	G	34°C	30	Bright day
* Koralle	12.10.10	100	Y	90%	85%	5%	0%	0%	VL	G	24°C	50	Dark & cold
Loveliness	24.06.11	250	Y	40%	0%	40%	0%	0%	S/M/L/VL	G	20°C	20	Dull & cloudy
Lye's Elegance	04.09.11	35	Y	90%	0%	90%	0%	0%	L	G	24°C	45	Dull & cloudy
Lye's Own	24.06.11	100	Y	99%	0%	79%	30%	0%	M	G	20°C	20	Bright & cloudy
Lye's Unique	12.09.10	40	N	98%	0%	50%	48%	0%	L/V	G	30°C	25	Bright day
Maik Luijten	14.08.12	200	Y	80%	0%	40%	40%	0%	L	G	34°C	30	Bright day
Obcylin	21.09.10	40	Y	30%	28%	2%	0%	0%	S/V	G	40°C	25	Bright & hot
Our Ted	18.10.10	80	Y	90%	80%	8%	2%	0%	M/V	G	15°C	40	Dark & cold
12.EEX.875.A.	08.09.13	100	Y	60%	58%	2%	0%	0%	M	OD	20°C	30	Bright & cloudy

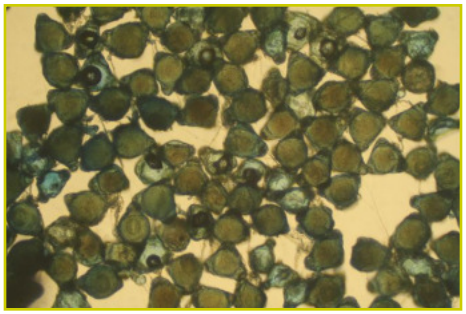
Notes on the chart

1. *F. encl.* ssp. *tetra.* = *F. encliandra* ssp. *tetradactylla.*
2. *F. fulgens*, *F. paniculata* and *F. splendens* charted here are tetraploids.
3. Koralle (Bonstedt) is the same plant that I used for many years as Thalia, to avoid confusion in recording.
4. ♀ This symbol has not been used in the chart. Where such plants are grown, this is also shown on my own records. (Sometimes single sex *Fuchsias* carry flowers that are heterosexual or even the opposite sex.)
5. The seedling shown last is a cross between *F. splendens* and *F. decidua.*
6. Where more than one entry is shown the same plant was re-tested.
7. Pollen grains have been estimated to the nearest 10.
8. Size of grain is given as follows:

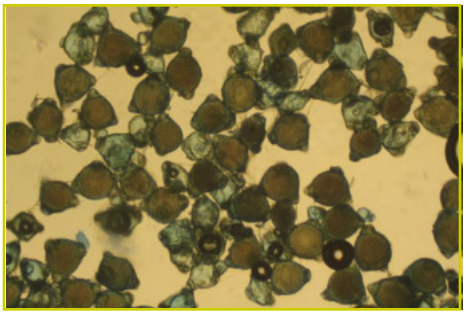
   S = Small; M = Medium; L = Large; V/L = Very Large; V = Variable
9. G = Greenhouse; OD = Out of doors; U/K = Unknown. Greenhouse minimum temperatures are maintained around 4°C. Maximum summer greenhouse temperatures sometimes rise as high as 50°C.



F. 'Belize' pollen



F. 'Hof Popkensburg' pollen



F. 'Maik Luijten' pollen

Young Fuchsia seedlings can be strong survivors

By Mario de Cooker

Could young Fuchsia seedlings, frozen like ice cubicles, survive winter cold?

Are fuchsias able to survive more winter cold than you would think in first instance they can? In fact, putting such question is already more or less providing the answer. So the answer is definitely a clear YES. Of course, it depends on the weather history and growing conditions, and not for the least on the properties of the specific fuchsia cultivar itself. In particular from which parents the cultivars have originated plays an important role.

Many fuchsia cultivars, especially the magellanica and regia types, having many 'hardiness genes' in their parentage, have excellent hardiness properties. If applying some protection during winter, even most of such fuchsias are probably reasonably winter hardy. For an extensive list of winter hardy Fuchsias, see for example http://www.nwfuchsiasociety.com

General experiences with overwintering fuchsia seedlings above ground

Since I have been hybridizing fuchsias, which encompasses now some 25 years, I have always left some young, 1 year of age Fuchsia seedlings (left over from the summer seedlings) outside the glasshouse in the winter season for exploring their winter hardiness properties. These young seedlings were mostly grown in 9 x 9 cm pots and left in the garden during the winter, above ground and without any special protection.

I know that several of my Fuchsia friends probably find it a mess, and even almost a mortal sin, not cleaning up the garden before the start of the winter season. And indeed, it could cause some pest and diseases to be transferred to the next garden season. On the other hand, however, such experiments are highly enjoyable and provide great pleasure during the gloomy winter months.

Various young Fuchsia seedlings can survive severe winter cold.

One of the striking points is that, over the years, in most winters always some of the seedlings have survived. These surviving seedlings always had at least in part some magellanica genes in their parentage! Another observation is, that contrary to general belief, I have never experienced that young hardy seedlings, often having fresh shoots, suffered more from cold winter conditions and frost than older plants[1].

Example of set-up of frost hardiness experiment. Dummies (uninteresting or dead seedlings) have been placed at the periphery to assure uniform exposure to frost of the others.

Fuchsia 'N 05-23'

Fuchsia '189-04-02'

Fuchsia 'N 96-17'

Survival experiment performed

In the winter of the years 2010 -2011 an extensive survival experiment has been carried out.

Some 200 young seedlings in 9 x 9 cm pots (of which many had been pruned mid October) were, in the same way as was done also in previous years, left above ground outside the glass house during the winter, without any special protection against wind, rain, snow or frost. The winter was characterized by some extensive frost periods; see the time-temperature graph of weather station "Ell" (Figure 1). In some periods, a thin layer of snow was present for 1 or 2 days. However, this provided some extra protection against frost only for a short period of time. During these frost periods, which sometimes continued for several weeks with temperatures as low as -10 to -15°C , all small pots became completely frozen after some days. They felt and looked like ice cubicles, or as to the color: like small basalt blocks.

All survivors in the winter 2010-2011 originated from the same parentage.

On 1 March 2011, 10 seedlings out of 200 that seemed to have survived the winter were visually selected and stored in the glasshouse. All of these 10 seedlings originated from the same crossing: ***F.* 'N 05-23' x 'N 96-17'**. Both 'N 05-23' and 'N 96-17' have a lot of potential winter hardiness in their parentage [2]. Regrowth started fast and easily, and after 9 weeks most of the seedlings had grown to nice young plants (see the photos above).

The experiment has shown that young seedlings originating from the specific crossing 'N 05-23' x 'N 96-17' are able to survive several weeks of severe frost, above ground in small pots even if they become completely frozen, including the root system.

None of the seedlings has been kept for further use in the breeding program, because they did not have any specific interesting properties except their hardiness. If desired, such crossings could however easily be repeated [3].

Alternative methods for winter hardiness testing, less dependant upon unpredictable field conditions, could also be considered, e.g. making use of climate chambers (or less sophisticated: even a freezer?). Various testing methods are described in [4].

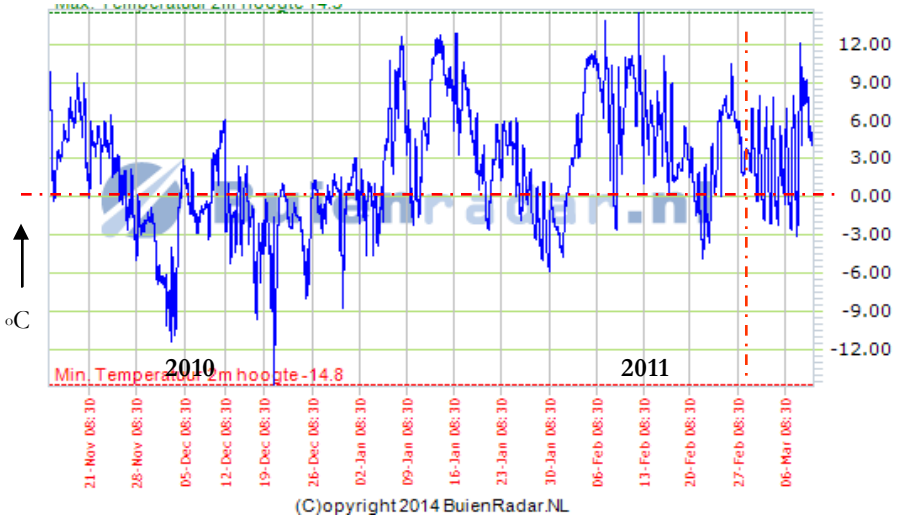


Figure 1: Temperature history of Dutch weather station 'Ell', **winter 2010-2011.**
The date is shown on the horizontal axis.
On the vertical axis the temperature is shown (degree Celsius at 2 m).
The temperatures of weather station 'Ell' are representative for the temperature in the garden; see also Issue #3 of The Fuchsia Breeders Initiative.

Experiences in the winter 2011 - 2012

Seedling *F.* 'N 96-17' appears to be one of the best winter hardy seedlings tested in my garden over the years. It has small, magellanica-type flowers. It plays a crucial role in incorporating

hardiness properties in several other seedlings. Its parentage is not known for 100% sure, but it has originated most probably from a *F.* magellanica 'Rosea' (100% sure) x *F. magellanica* 'Riccartonii' crossing.

F. magellanica 'Rosea' is a winter hardy Fuchsia, and *F. magellanica* 'Riccartonii' is even one of the best winter hardy fuchsias known. The excellent winter hardiness of seedling 'N 96-17' is therefore not a real surprise.

In the winter of 2011-2012, seedling 'N 96-17' in a pot survived a fortnight frost period with temperatures as low as -16°C (at 1.5 m; -19 °C at 10 cm level),

Photo 5: 'N 05-23' x 'N 96-17' seedling, 20 January 2012. Especially seedlings with 'leathery' foliage seem to tolerate heavy frost.

the upper edge of the pot being in the ground at surface level. It survived this severe frost period, but produced its first shoots, starting well above surface level, only around mid May 2012. Normally, in less severe winters, it starts shooting and flowering much earlier.

None of the young seedlings left aboveground, in small pots, did survive the winter 2011-2012. The seedlings originating from the crossing 'N 05-23' x 'N 96-17' performed well for several days at about -10°C. Then the foliage and branches became brittle, and the seedlings died back. It is not clear, as was also the case with *F. hatschbachii* (see issue nr.3 of TFBI), if this is caused primarily by the very low temperatures, or at least partly by desiccation (dehydration) of the seedlings.

In this year's- the year 2014- very mild winter, 'N 96-17' did not experience any trouble or damage at all. It fully kept its foliage during the whole winter, producing its first flowers on 21 April.

F. 'N 96-17' has been judged by the NKvF New Fuchsia Committee a few years ago, but is still in its testing period at Van der Velde Fuchsia Nursery. It has not been decided yet when it will be released in the coming years [5].

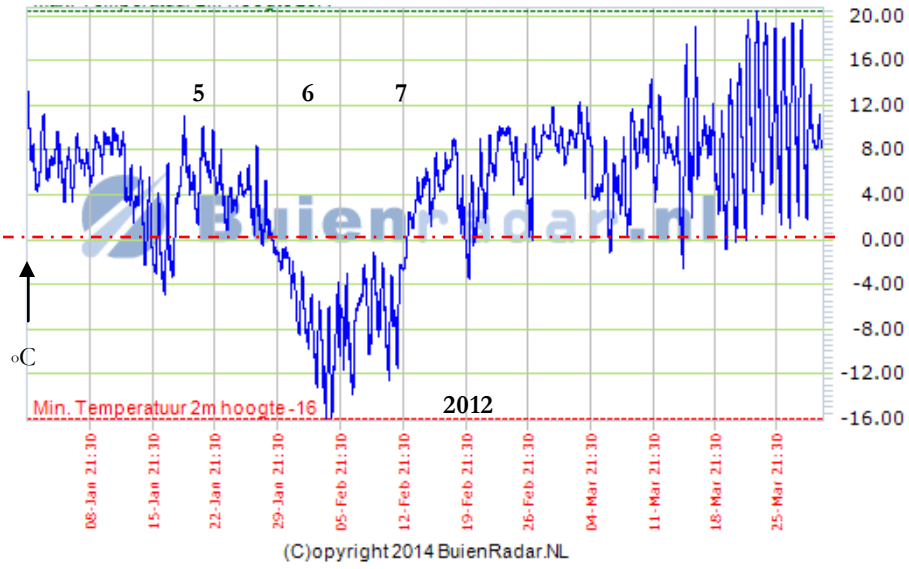


Figure 2: Temperature history of Dutch weather station 'Ell', **winter 2011-2012.**
The date is shown on the horizontal axis.
On the vertical axis the temperature is shown (degree Celsius at 2 m).
The numbers refer to the photos on page 9.

Notes and references

[1] This is a general observation. I have however never tested young seedlings and older plants of the same variety together at similar conditions.

[2] *F.* 'N 05-23' originates from the crossing I 89-04-02 (=*F. x colensoi* x *F. magdalenae*) x 'Delicate White'. *F. x colensoi* is a natural hybrid between *F. excorticata* and *F. perscandens*, which have both proven to be winter hardy species. Hardy *F.* 'Delicate White' originates, a.o., from *F. magellanica* 'Alba', which is on of the best winter hardy Fuchsias. The parentage of seedling 'N 96-17' is described on page 8.

[3] Further investigation of the winter hardiness of various I 89-04-02 crossings could be very interesting. Maybe 'the best of two worlds' is brought together by combinations with magellanica- or regia-type fuchsias. It could bring new shapes and colors in the winter hardy assortment.

[4] Dr. Leena Lindén: Measuring cold hardiness in woody plants; Academic Dissertation, University of Helsinki (2002).

[5] *F.* 'N 96-17' is a very vigorous and floriferous Fuchsia. It can be grown as a (large) standard or a bush. Also as a bonsai it has an excellent performance.

Photo 6 : 'N 05-23' x 'N 96-17' seedling, 1 February 2012 at -10°C

Photo 7: seedlings on 12 February 2012. The long frost period and low temperatures have been a too big challenge for the pots left aboveground.

New hardy Fuchsias from Hans van Aspert (NL)

Photos: Hans van Aspert

Fuchsia **'Jaspers Hardy Redpipes'** (Van Aspert, 2014)

Triphylla, originating from *F.* 'Göttingen' x *F. regia* (*)

Bush, 50 (height) x 40 cm; full sun.

Fuchsia **'Jaspers Hardy Dream'** (Van Aspert, 2014)

Originating from *F.* 'Gerharda's Panache' x *F. regia* (*)

Bush, 30 (height) x 20 cm; full sun. Horizontal pedicels.

Fuchsia **'Jaspers Hardy Queen'** (Van Aspert, 2014)

Originating from *F. regia ssp. serrae* x *F.* 'Kolding Perle'

Bush, 50 (height) x 40 cm; full sun.

Fuchsia **'Jaspers Hardy King'** (Van Aspert, 2014)

Originating from *F. regia* (*) x *F.* 'Annabel'

Large vigorous bush, 120 (height) x 140 cm; full sun.

(*) This *Fuchsia* species is a *F. regia* in the hybridizer's garden, known as *F. regia (Gerrit).*

Winter hardiness rating of these new *Fuchsias* is at least zone H5 (-15 to -10◦C).

Hardiness rating is according to revised RHS hardiness rating system (Ref.: The Garden, February 2013, p. 68-69).

In search of the white F. triphylla

By Mario de Cooker

Photos: Mario de Cooker

Part 3: Results of the first two growing seasons

In 2010 Mr. Hans van der Post, a Dutch fuchsia hybridizer, succeeded in creating a soft pink *F. triphylla* as a selfing from *F. triphylla* 'Herrenhausen'. A couple of years earlier, new seedlings of *F. triphylla*, the *F. triphyllas* "PB# xx", raised from seed provided by Dr. Paul Berry, became available for hybridization purposes. Together they provide the basis for creating a new series of (near) white *F. triphyllas*.

Introduction

In the December 2013 and July 2014 issues of The Fuchsia Breeders Initiative the experimental set-up and first results of the programme for creating a white *F. triphylla* have been described. In this issue, information will be provided on the overall results of the first two growing seasons of the F2 generation. Also the first results of the F3 generation will be presented.

Experimental results of the first two growing seasons of the F2 generation

From the 284 F2 *F. triphylla* seedlings, potted up in May 2013, a relatively large number of 46 seedlings has not survived the first months because of bad weather conditions. During the remainder of the season and subsequent overwintering, some more seedlings died, partly because of botrytis and partly because of suffering from vine weevil [1].

In September 2013 the first flowering seedlings with soft pink flowers were obtained. Until December 2013, a total of 65 seedlings had flowered, of which 13 with pale pink flowers. For a proper finalization of the F2-trial, the remaining seedlings have all been overwintered in the glasshouse at a temperature of 5°C.

From the overwintered seedlings, another 45 have flowered in the second season (2014). Overall, in two seasons, 110 seedlings (i.e. 47% of the remaining 238 seedlings that had survived the first months) have produced flowers. The others have died during overwintering or afterwards, have been disposed of because of poor growth (e.g., dwarfism) or have also not flowered in the second season.

In the second growing season, no new types of flowers have appeared in the F2 generation. According to expectations, all flowering F2 seedlings with light green colored foliage have produced pale pink flowers in various shades of pink.

Three types of flowers have been obtained in the F2 generation: orange, mixed orange/pink and pale pink.

The F2 seedlings with darker foliage have produced two types of flowers:

- tube, sepals and corolla all orange; various shapes,
- outside tube and sepals orange, inside tube and sepals pink; pink corolla in various shades of pink.

A large variety of F. triphylla flower sizes and shapes is obtained in the F2 and F3 generations.

All in all, the F2 generation has provided a lot of valuable information as to the shape and color of the flowers and the foliage.

The flower's tube length will be analyzed in more detail in this article. In the July 2015 issue of The Fuchsia Breeders Initiative an analysis of the flower color genotype will be presented.

F. triphylla F3 seedlings, 13 June 2014. Unfortunately, only some 15% of these have flowered.

First results of the *F. triphylla* F3 generation

The crossings made in the first season were mainly directed at fact finding. As the first pale pink flowers were produced only from early September 2013 onwards, not many opportunities were available for making crossings other than some F2 selfings or sib crossings.

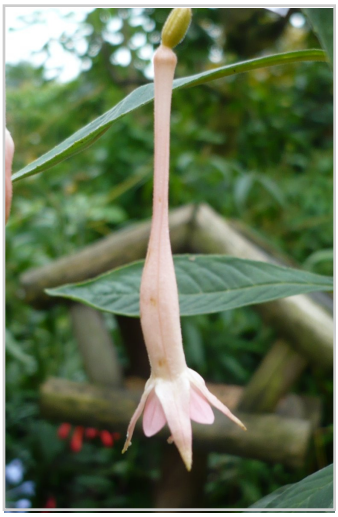
Most *F. triphylla* F2 seedlings have proved to be reasonably to very fertile, at least within their own species environment. Berries containing 50 seeds or more are no exception. Germination of fresh seeds is fast, and occurs often within 3-5 days.

Not all seedlings are equally fertile. This has however not systematically been investigated. The original female parent *F. triphylla* 'HvdP' does not produce any pollen. From a few observations, indications exist that look-alike seedlings of this species are less fertile than the majority of the others.

A large number of F3 seedlings, some 1300, has been produced this year of which some 800 have been potted on. Growth of the seedlings was very satisfactory (see the photo above). Spring 2014 has been very mild, and hardly any losses have occurred. Flowering of the seedlings, however, has been rather disappointing. Experience shows that some 40 -70% of the seedlings, originating from various *Fuchsia* cultivar crossings, normally sets flower in the first year. For the *F. triphylla* F3 seedlings this has been very different: only some 15% has flowered this year, whereas almost the double amount had been expected based on the results of the F2 generation. The reason why is not clear. Inbreeding could of course play a role, although most seedlings seemed to be healthy growers. Also the stand in the garden or the weather conditions may of course have had their influence.

The rather poor flowering has undoubtedly influenced the chance for finding a real white *F. triphylla*. This has indeed not occurred this year. Progress has however been made, as several F3 pale pinks were more nearing white than the F2 pinks (see the photo below of TriMC-F3-10A as an example). Making a real white *F. triphylla* in the near future therefore still seems a feasible option.

Furthermore, also some interesting variations have shown up. See, as an example, TriMC-F3-12A with the sepals having real green tips, which provides a special shining brightness to the flower. A large variation in flower shapes was obtained. See the photo with two extremes on page 13: one resembling the original female parent: *F. triphylla* 'HvdP', the other resembling



Pale pink, near white F. triphylla 'TRiMC-F3-10A'. Tube length is 47 mm.

F. triphylla 'TriMC-F3-12A' with sepals having real green tips.

Extremes of flower shapes in the F. triphylla F3 generation.

the original male parent: *F. triphylla* 'PB#7'.

The way ahead with the F3 generation

The *F. triphylla* F3 seedlings which have flowered this year, have originated from about 20 different crossings. A clear difference shows up as to the size and color of the flower, the branching properties, the root system and the foliage. Based upon this year's results, about 200 F3 seedlings that have not yet flowered have been selected and pruned, and will be overwintered in the glasshouse. The remaining of the seedlings will be overwintered aboveground in their small pots (see also page 7-9) to explore their winter hardiness properties. The chance for survival is, of course, almost nil, but the seedlings are there, so the experiment is 'for free'.

Deliberate choices can now be made as to which traits to combine or emphasize, e.g. long or short tubes, pink or near white flowers. Major goals are making a white Triphylla in combination with dark foliage, and creating a couple of healthy, homozygous inbred *F. triphylla* lines, preferably white, which could then be used for further experimentation and hybridization. Such lines could also be used for propagating pink or white *F. triphyllas* by seed, rather then vegetatively, which could offer great advantages.

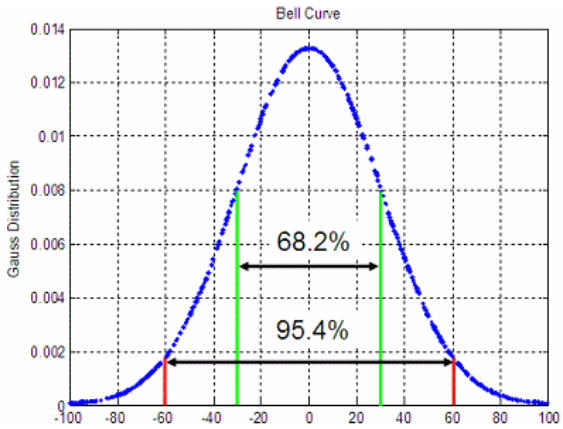
Analysis of the F1 and F2 results: the variation of *F. triphylla* flower shape and size.

Mendel worked with traits that were all discrete, either/or traits: yellow or green, round or wrinkled, etc. Different alleles gave clearly distinguishable phenotypes.

However, many traits don't fall into discrete categories. A measure can be attributed to such traits: height, for example, or yield of corn per acre, or size of the leaves. As an example of the latter, see e.g. [2]. These are "**quantitative traits**". They differ considerably in the number of loci involved [3]. This can range from truly polygenic (many genes involved) to olygogenic (a limited number of genes involved), but also monogenic quantitative traits exist. Often a mixture of a few major effects, each explaining a considerable proportion of the genetic variance exist, along with a large number of minor effects. There is a thin line between the distinction of qualitative and quantitative traits.

In general, the distribution of quantitative traits values in a population follows the normal distribution (also known as Gaussian distribution or bell curve; see Figure 1). These curves are characterized by the mean (mid-point) and by the variance (width). Often standard deviation, the square root of variance, is used as a measure of the curve's width.

Figure 1: Gaussian Distribution or Bell Curve



An important property of the bell-shaped curve is, that the value less than one standard deviation from the mean (between the green lines) represents approximately 68.2% of the observations, while 2 standard deviations from the mean (between the red lines) take about 95.4%, and 3 standard deviations account for about 99.7% of the observations.

Variation in traits is not only due to a combination of many genes, each contributing to the phenotype. Part of the variation is also caused by environmental factors:

Phenotype = Genotype + Environment

Flower size and shape of *F. triphylla* are quantitative traits

The flower size and shape of the *F. triphylla* seedlings vary appreciably. Both are quantitatively inherited traits.

Large variation is found as to the

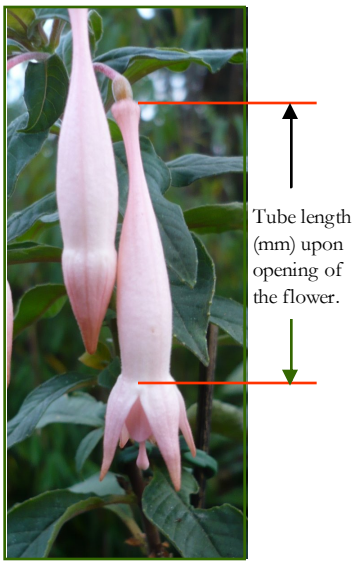
- size and shape of the upper part of the tube (the connection to the ovary),
- length and diameter of the bulbous part of the tube,
- diameter and length of the straight part of the tube
- shape and size of the petals
- shape and size of the sepals

See also the photo on page 11.

The flower shape of the seedlings has not been recorded systematically.

Tube length measurements

The size of the tube upon opening of the flower (see the picture below) has been measured and recorded.



It varies within a range of about 20 -50 mm. The environmental influence is rather high. Variations in addition to genetic effects can be attributed to:

- stand in the garden; e.g., more or less hours of sun; some measurements were made in the glasshouse,
- time of the year: early or late in the season; light intensity,
- weather conditions: e.g., temperature and rain,
- amount of fertilizer,
- pests, if any.

It has also been observed that the tube length may increase substantially (several millimeters) after opening of the flower. As all measurements were performed upon opening of the flowers, this effect has not to be taken into account.

From each seedling at least 2 flower tubes have been measured and averaged if necessary. As a rough figure, the standard deviation of a specific seedling's tube length is estimated at about 3%, which means a maximum spread in tube length as caused by environmental effects of about 4 mm at the lower side of the curve to about 9 mm at the upper side.

F. triphylla original parents

The tube length of the original parents amounts to:

F. triphylla 'HvdP': 23 mm

F. triphylla 'PB#7': 32 mm

F. triphylla F1 generation

From the crossing *F. triphylla* 'HvdP' x *F. triphylla* 'PB#7', 12 F1 seedlings have been obtained. All seedlings were completely orange. The average tube length amounted to 26.8 mm in a relatively narrow distribution (see Fig. 2), which is close to the expected average tube length of 27.5 mm of the two parents in case of additive gene action.

F. triphylla F2 generation

At the end of the second growing season (November 2014), the F2 generation has produced 110 seedlings that have delivered flowers. The F2 generation seedlings have been generated from random F1 crossings, although also some selfings may have occurred. The average F2 tube length amounts to 31.6 mm, which equals the tube length of *F. triphylla* 'PB#7'.

As could be expected, the F2 displays a large variation, both as to color: orange, mixed orange/pink and pale pink flowers, as well as to flower shape and tube length.

The average tube length of the orange flowers in the F2 generation amounts to 31.7 mm. For the mixed orange/pink seedlings, the average tube length amounts to 30.8 mm and for the pale pinks it amounts to 31.8 mm.

F. triphylla F3 generation

The F3 generation has not been taken into account, as segregation in the Gaussian curve occurs because of non random, selective crossings.

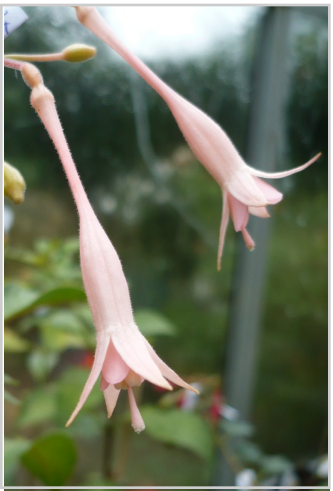
Gaussian distribution of tube lengths

In Figures 2 and 3 (page 15) the Gaussian distribution of the *F. triphylla* F1 and F2 seedlings is shown, as well as the distribution of the F2 oranges, pale pinks and mixed orange/pinks separately.

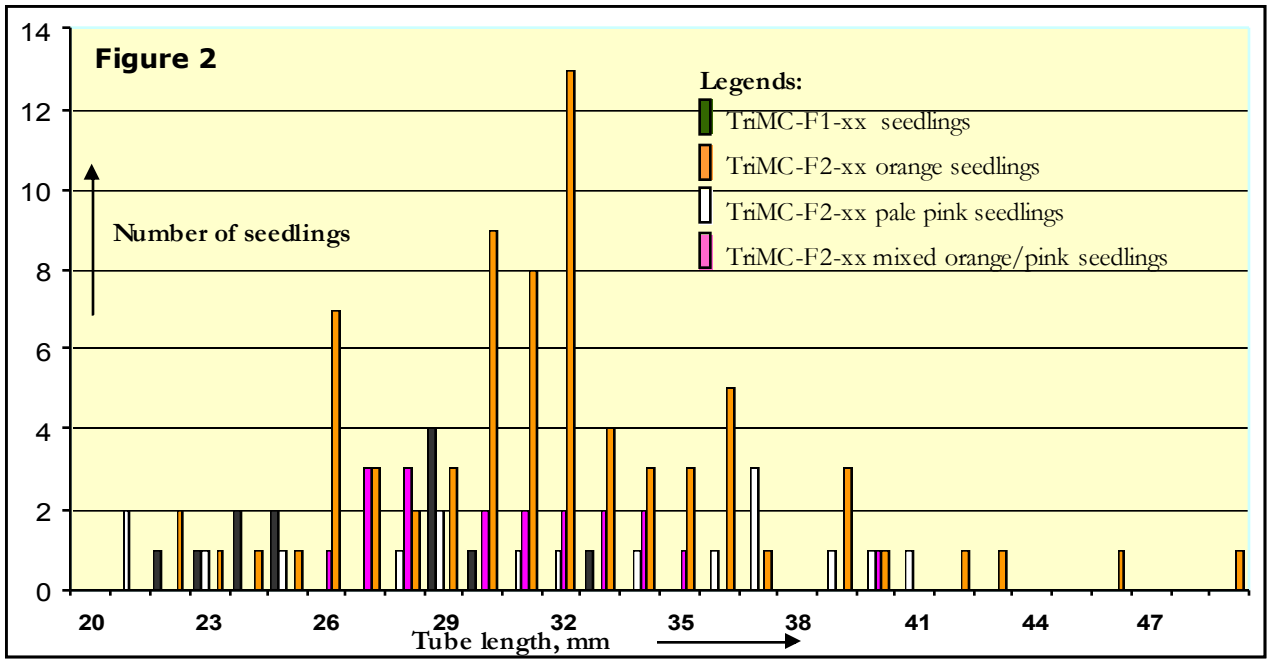
The tube length of the total of the 110 *F. triphylla* F2 seedlings is represented by a nice Gaussian distribution. A bias seems to exist at the left side of the curve, which could be caused by, e.g., the influence of the original parent *F. triphylla* 'HvdP' or some F1 selfings.

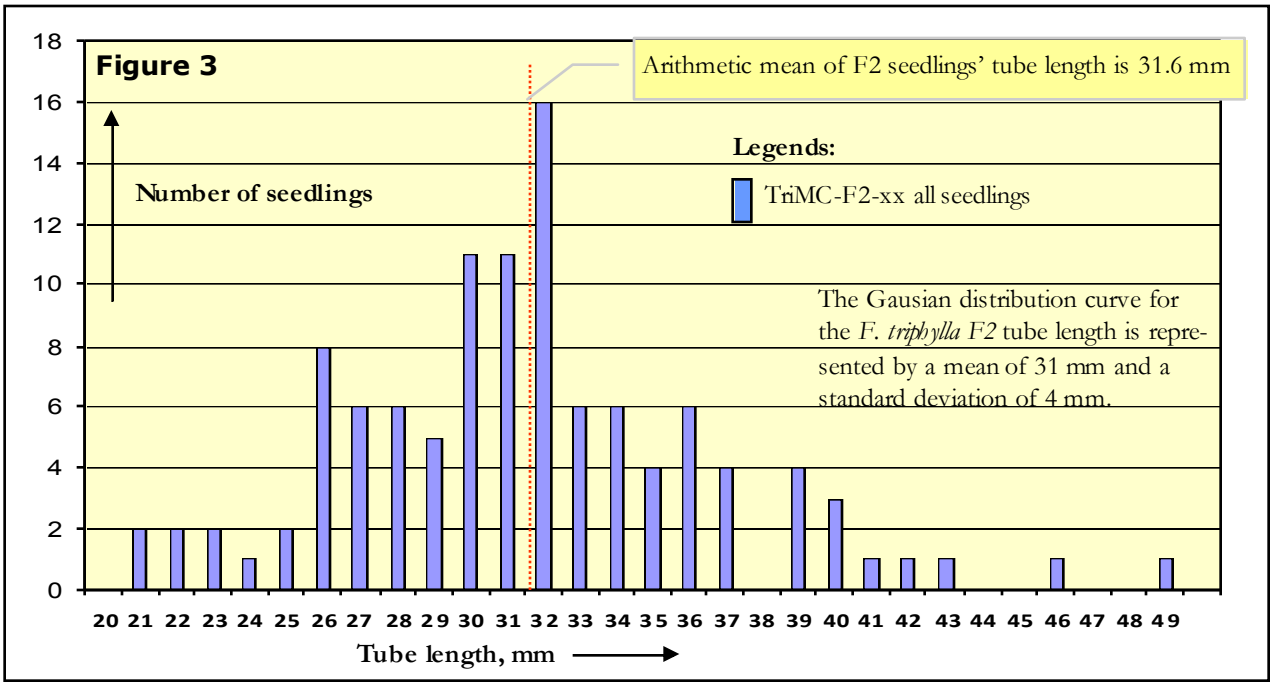
As can be seen, all flower types are, within the accuracy of the observations, evenly distributed. Furthermore, no relation seems to exist between tube length and color/shape of the flower.

It might take years of additional hybridization work for bringing the best of the various *F. triphylla* seedlings together in one variety: color, branching, rooting, flowering period etc. And waiting for years, searching for better varieties, before releasing one of the currently available pinks makes only little sense. It has therefore been decided to make available one of the pale pink *F. triphyllas* of the F2 generation: **TriMC-F2-33** to a broader public in 2015. Its name has still to be decided upon. From September 2015 onwards it will be available from the Fuchsia Nurseries Gommer (NL), Van der Velde (NL), Zeelenberg (NL), Michiels (B) and Other Fellow Fuchsias (UK).



F. triphylla 'TriMC-F2-33'





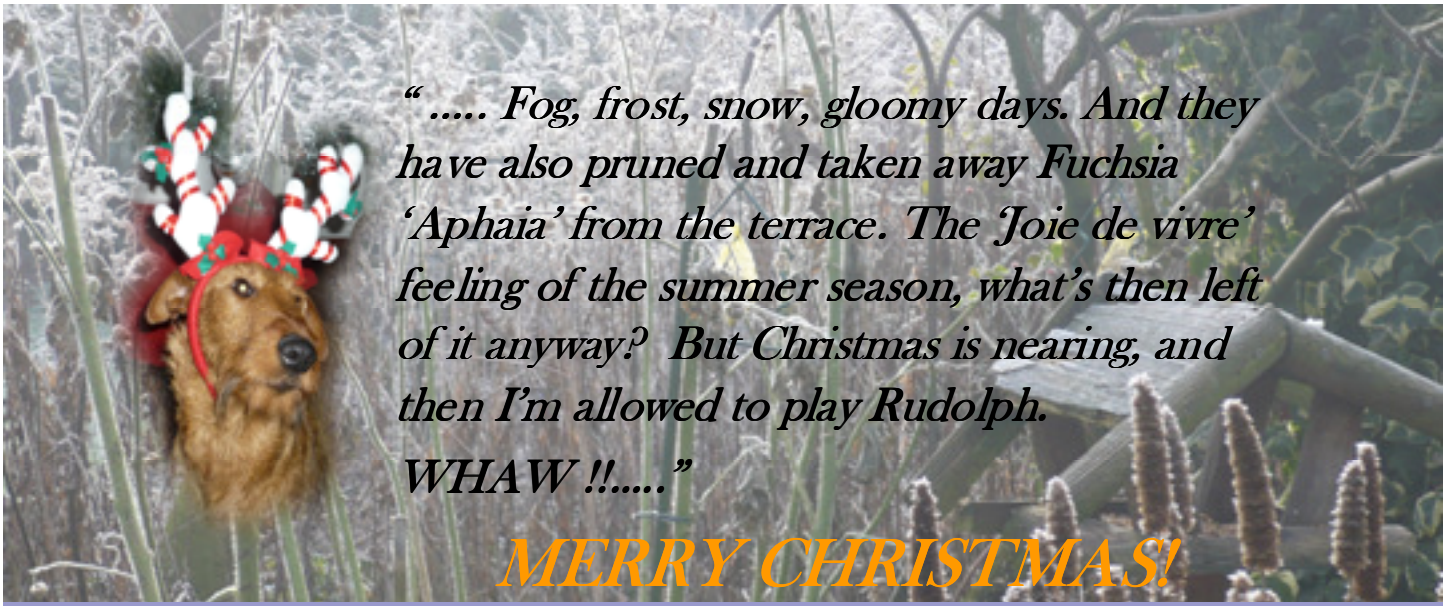
References and notes.

[1] This year I have, as a trial, applied Bio1020 for getting rid of the vine weevil larvae. Bio 1020 is a mycelial granule formulation of the fungus *Metarhizium anisopliae*, an entomopathogenic product for soil insect control. It is a product from the Bayer Crop Science company and has to be mixed with the potting soil. A competitive product: Met52, will erelong be introduced into the German market by the Everris company.
I should be careful as to the conclusion of this year's trial, because it is only a first time observation, but the performance was great!

[2] Dr. Stephanie Schie: Genomstruktur, Vererbung und Züchtung von *Dahlia variabilis*. Published in The DDFGG and ÖGGF Jahrbuch 2013 (ISBN 0724-2719), p. 83 - 93. It has been found that the hybrid *D. variabilis* has octoploid genome with polysome inheritance.

[3] Dr. George Acquaah, Principles of Plant Genetics and Breeding; Wiley-Blackwell, 2nd edition (2013). Provides extensive information on quantitative inheritance.

Irish Terrier Aphaia reflects on the winter season



Contents of the next issue

The next issue is scheduled for the end of July 2015.

First steps in making Triphyllas with brown foliage (Mario de Cooker)

Brown foliage is an attractive feature of many plant varieties. First steps have been made in making Triphyllas with real brown-purple foliage. But a lot of work has still to be done.

Encliandras - geographical perspectives (Edwin Goulding)

The article considers which Sections and Species of *Fuchsia* are closest geographically in the wild to Section Encliandra. It also asks whether they can be used to develop a range of *Endiandra* hybrids to create new international markets. It describes the options available and shows some of the work carried out so far.

In search of the white *F. triphylla* (Mario de Cooker)

The translation from phenotype to genotype as to the flower color will be elaborated. The diversity of the color phenotype suggests a quantitative inheritance pattern also for this trait, dominated by a few genes of major importance.

So 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 1 July 2015.

The Fuchsia Breeders Initiative

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