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SEED-PROPAGATED PELARGONIUM PELTATUM: UNIFORMITY

Document presented by experts from the Netherlands

SEED PROPAGATED PELARGONIUM PELTATUM: UNIFORMITY

This document has to be read in addition to TC 34/8 (for convenience reproduced in the Annex to this document) and gives an answer to some questions arising during the 1997 Technical Committee meeting.

Breeding Aims

- SEED propagated variety in a crop that is propagated vegetatively by tradition.
- Flower color as PURE-WHITE as possible.

Some Facts

- Pollination system in *P. peltatum*: cross pollination.
- Ploidy level: diploid in THIS breeding program, normally tetraploid.
- Male sterility: NOT involved in this breeding program: HAND POLLINATION.
- Nature of variation of blotch: NO heterogeneity WITHIN one plant.

Breeding Program of the Z Parent Populations

- F1 – Variety x wild parent (interspecific cross).
- F2 – Self pollination
- F3 – Full sib (mother plants harvested separately).
- F4 – Full sib
- F5 – Half sib (mother plants harvested together as a lot).
- F6 – Half sib
- F7 – Free cross pollination of isolated population. (Parent seed, maintenance of parent populations).

As no male sterility is involved in the seed production and all the pollination is made by hand resulting in 5 or less seeds per flower the seed production is very expensive. All further inbreeding is at the expense of fertility and that makes the exploitation of the variety non-economic.

Being familiar with the above mentioned facts one could give the following answers to the 4 questions mentioned in the summary of TC/34/8:

- Q 1: Is the number of off-types fixed in this case, or is some tolerance possible depending on the breeding formula?
- A 1: As it is clear that we are not dealing with a pure F1 (as meant in TG 1/1), it is not justifiable to apply here the rule of fixed number of off-types.
- Q 2: When some tolerance is allowed, is it logical to handle the application as for a cross pollinated variety?
- A 2: Viewed in the light of the answer to the previous question it could be considered as reasonable to handle the application as for a cross-pollinated variety (even

without some tolerance). This means that a continuous variation in the blotch characteristic, within certain limits, is acceptable.

Q 3: Is it logical to examine whether or not further segregation of the blotch characteristic should be possible?

A 3: With respect for the preceding answers and the fact that the breeder in spite of many attempts did not succeed in selecting blotch-less flowers, further examination of the segregation of this characteristic does not seem to yield more useful information.

Q 4: Is it justifiable and logical, in the absence of any white reference variety, for violet varieties to be used?

A 4: It is beyond doubt that the uniformity requirement must be related to the way of propagation of a particular variety, although there is a certain relativity necessary in respect to hybrid varieties, as the uniformity of the F1 hybrid variety is dependent on the degree of inbreeding of the parent lines. In principle there should be one and the same uniformity standard within a crop with the same way of propagation.

The problem with the uniformity of this particular white flowered variety is the observation of the expression of the blotch characteristic. This aspect has already been discussed in the TC last year as recorded in TC/34/3 par. 27 (...)” where small markings are easily overshadowed and difficult to be detected”. In other words, the violet flowered variety may show the same uniformity or heterogeneity pattern in the blotch characteristic as the white colored variety, but this cannot be properly observed as the weakest expression of this blotch characteristic is overshadowed by the dominant presence of the main color “violet”. The consequence is that no direct comparison can be made between violet and white-colored varieties in respect to the question whether the uniformity of the blotch characteristic in the white and the violet-colored varieties meets the same standard.

Therefore the problem to be discussed is whether the violet variety can be used as *the* standard, like a “yardstick”, for the white colored variety in respect to the uniformity requirement, having regard to the problem of the overshadowing of the expression of the blotch characteristic by the violet background color.

In order to discuss this problem the following questions could be considered:

- What are the observable states of expression of the blotch characteristic in the group of violet colored varieties and what is the applicable uniformity standard for these varieties?
- Is it possible and advisable to leave out this blotch characteristic on the ground that its expression is not equally observable in the different groups within this species.

[Annex follows]

ANNEX

SEED-PROPAGATED PELARGONIUM PELTATUM: UNIFORMITY

The Technical Committee is asked to give advice in an actual test case.

Report by the Testing Authority

One F1 hybrid of *Pelargonium peltatum* (single-cross variety) does not reach the uniformity standard for hybrid varieties according to TG/1/2.

Four groups of plants, raised from the same seed sample, were found in 1995 and 1997 to be clearly distinct in two characteristics (upper petal: conspicuousness of markings, and upper petal: color of middle of upper side). The number of plants in each group is shown in the table below.

Difference in upper petals	Number of Plants	
	1995	1997
1. light pink with clear blotch	19	18
2. light pink with unclear blotch	29	26
3. light pink without blotch	10	14
4. white without blotch	2	2

The maximum number of off-types allowed is four out of 60 plants. The testing authority therefore decided that the variety was not uniform.

There is no other white variety of this species on the market that is propagated by seed. The only two other seed-propagated reference varieties had violet flowers. They both had markings on their upper petals that were uniform in their conspicuousness.

According to the breeder, it would not be possible to make the variety more uniform, because after five or six generations of inbreeding the plants were no longer fertile. Some members of the TWO were therefore of the opinion that the variety was sufficiently uniform.

Because the number of applications for seed-propagated ornamentals is increasing, it is important to reach a decision on the uniformity standard to be used in this case.

Some Additional Facts and Interpretation

- Seed propagated *P.peltatum* F1 hybrids were introduced quite recently in this crop, which is traditionally propagated by cuttings.
- Consequently a few applications for breeders' rights have been made (for violet varieties and one white-flowering—actually pale-pink flowering—variety).
- The varieties are the result of the cross-pollination of two inbred (five to six-generation) populations (not clones).
- As no other white-flowering seed-propagated varieties are known in the trade, two violet varieties were used as a reference.
- The trial results from the German Plant Varieties Office reveal two types of heterogeneity:
 1. The expression of the ground color ranging from light pink to white
 2. The expression of the blotch at the end of the two stripes on the claw ranging from clear to absent.
- The violet-flowering varieties show hardly any or no difference in ground color, whereas the expression of the blotch varies slightly but within acceptable limits (from the breeders' rights point of view).
- The number of off-types allowed in a sample of 60 plants is four for pure F1 hybrids in *Pelargonium*.

Questions Raised

- On what basis was the number of four off-types set for all F1 hybrids within the genus *Pelargonium* ? Is the number of off-types in the genus *Pelargonium* fixed irrespective of the method of breeding within the F1 concept? What is the position regarding F1 hybrids of other species?
- As no comparison with other white varieties was possible, violet varieties were used for reference. The violet ground color does not show much variation, or in any case less than in the pale-pink-flowering test case. Could one imagine the two pure-white-flowering plants being considered off-types? As far as the expression of the blotch is concerned, it is quite clear that it is less variable in the violet varieties than in the white variety under test. One could wonder whether the same genetic system was not responsible for the variation in the above expression in both varieties, and at the same time whether the nearly-white ground color of the candidate variety did not have something to do with the observed difference in expression.
- The breeder states that the inbred seed populations resulting in the F1 of the white test variety were more homogeneous than with the violet references. Any attempt to get rid of the blotch failed. The truth of the statement could be tested by taking two sub-

populations out of the F1 test population: light pink with a blotch and light pink without a blotch. Cross pollination should be made within each of the two groups (not between them of course). When the result, the segregation, is the same from both sub-populations, it is clear that the final stage of breeding has been achieved, whereas in the opposite case further selection for uniformity is possible. A similar trial was conducted in the Netherlands on a seed-propagated *Pentas* variety.

Apart from all these considerations, one should contemplate accepting the candidate variety, as no other comparable variety is known in this color group. Therefore the “state of the art” for the uniformity requirement could be set at the result reached at this stage. It has been a general practice in the history of DUS testing to accept the level of uniformity reached at a certain stage of breeding development, even where the course of time varieties have improved in that respect. The development is new and therefore needs some support.

Summary

- Is the number of off-types fixed in this case, or is some tolerance possible depending on the breeding formula?
- When some tolerance is allowed, is it logical to handle the application as for a cross-pollinated variety?
- Is it logical to examine whether or not further segregation of the blotch characteristic should be possible (irrespective of the costs involved)?
- Is it justifiable and logical, in the absence of any white reference variety, for violet varieties to be used instead?

[End of document]