Theo Sanders December 2017

The inheritance of the red and pink colour, the fertility of triploids, and the self-incompatibility of daffodils – remarks to (1)

Ad 1: Many years ago, I crossed Edna Earl (3W-OOR) with Rashee (1W-W) and Empress of Ireland (1W-W) with Professor Einstein (2W-R) and got in both cases some plants with orange in the crown. Furthermore, I combined Mrs. R.O. Backhouse (2W-P) with Rashee (1W-W) and Kingscourt (1Y-Y) and some plants had pink in the crown. In the family tree of Rashee, Empress of Ireland and Kingscourt neither red nor pink can be found. The colours white and yellow are not dominant over red and pink. Therefore a simple inheritance of recessive pink or red genes combined with dominant white or yellow genes correspondent to Mendel cannot be concluded.

It may be of interest that I got a good seedling from (Empress of Ireland x Professor Einstein) x Pink Silk (see picture).

It is well known that tetraploid standard daffodils with red or pink crowns crossed with N. cyclamineus often show flowers with pink or red cups. Nobody would think that N. cyclamineus has recessive genes for pink or red.

When tetraploid varieties are interbred with genetically, very different diploid species like for example N. jonquilla, N. triandrus or N. assoanus often plants with good red or pink crowns develop.

(Empress of Ireland x Professor Einstein) x Pink Silk

Ad 2: Many triploid plants have a fertility of about 10 %. To this group belong most cyclamineus hybrids. The same is valid for allotriploids, which occur when tetraploid standard daffodils are crossed with diploid species. These facts are known, also for many other genera (2).

Ad 3: Lloyd and Schoen (3) have defined a self-compatibility index as average seed set after self- pollination divided by average seed set after cross-pollination. If this value is lower than 0.75 (75%) they define a species as self-incompatible. This definition is not very useful for hybridizers. They are often fond of few seeds only and these they can get probably from all narcissus species after self- pollination. Here are some data of the literature: Following the definition above N. longispathus (4), N. dubius (5), N. rupicola (6), and N. watieri (6) are self-compatible. The species (6) N. albimarginatus, N. calcicola, N. scaberulus, and N. marvieri of the Apodanthi section are self-incompatible but they all show some seed set after self-pollination which ranges from 0.008 (0.8 %) in N. scaberulus to 0.077 (7.7 %) in N. albimarginatus. For N. triandrus the value is 0.16 (16%) (7), for N. assoanus 0.08 (8%) (8), and for N. cyclamineus 0.17 (17 %) (9). For N. tazetta L (10) and N. papyraceus (11) the seed set for self-pollination is very low.

The fertility of these species following self-pollination does not imply that all diploid and tetraploid daffodil varieties are self-fertile. Especially few tetraploid cultivars are sterile or only seed or pollen fertile, but most of them are seed and pollen fertile and should be also self-fertile. I crossed for example in 2014 Savoire Faire with itself and got 400 seeds with 15 seeds per seed capsule. This result cannot be achieved by open pollination. This year I harvested seeds from self-pollinated N. x litigiatus, Gold Step and a viridiflorus hybrid.

The question of self-fertility is very important for hybridizers:

- Self- pollination is the most suitable method to give an attractive property to the progeny in one-step.
- Diploid interspecies crosses for example between N. tazetta and N. cyclamineus generate sometimes unreduced gametes. In this case, self-pollination can originate allotetraploid fertile descendants effectively.
- Triploid cyclamineus hybrids with low fertility can be transformed by self-pollination to tetraploids, which have normal fertility.
- For allotriploid crosses of the type NNX (N is the chromosome set of a standard daffodil and X of a species) with low fertility self- pollination can generate allotetraploid fertile progeny. Two well-known examples are Lapwing and Mission Bells, which arose from Silver Bells by self-pollination.

- If a diploid species or a diploid species hybrid has been transformed with oryzalin, you get often mixoploids, which have to be converted to tetraploids by self-pollination.
- Crosses with species as the seed parents are often complicated because the stigma resides between or under the anthers. Here self-pollination must be prohibited by special methods.

Literature

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