Theo Sanders February, 2017

Crosses of tetraploid species with each other or with tetraploid standard daffodils

Most species are diploid. When they are crossed with each other, the seedlings are diploid too with two different chromosome sets and therefore usually infertile. The situation concerning the fertility is much better for crossing tetraploids: You obtain fertile tetraploid plants.

The following species are tetraploid:

- N. viridiflorus
- N. cavanillesii
- N. cantabricus foliosus
- N. romieuxii
- N. bulbocodium graellsii
- N. bulbocodium obesus
- N. bulbocodium (Orihuela del Tremedal, Spain)
- N. bulbocodium (Odeceixe, Potugal)
- N. bulbocodium (Santiago, Spain)
- N. bulbocodium (Mazagón, Spain)
- N. bulbocodium citrinus (Saucats, France)
- N. bulbocodium (Grazalema, Spain)
- N. bulbocodium (Puebla de Don Rodrigo, Spain)

Some diploid species have been transformed to tetraploid by a special chemical treatment. As far as I know, are these:

- N. tazetta papyraceus (transformed by William R.P.Welch)
- N. jonquilla (transformed by Lawrence Trevanion)
- N. jonquilla henriquesii (transformed by the author)

The combination of species from the same section yields seedlings, which in most cases react as autotetraploids during meiosis. That means the chromosomes behave as if they are all from one species. This can be expected from crosses between different bulbocodium and cantabricus types. The situation may be the same for combinations of N. viridiflorus and the tetraploid jonquillas.

For crosses with species which are not so densely related, for example combinations of N. viridiflorus and N. cavanillesii the descendants are allotetraploid: They have all over four chromosome sets. Two sets are very similar to each other but different from the other two very similar sets. Each similar set react during meiosis separately like in a diploid plants.

The real situation may often reside between these two extreme cases. The 28 more or less similar chromosomes can decide if they react in groups of four or of two with each other.

N. viridiflorus frequently has been crossed with tetraploid standard daffodils. An example is the well- known Emerald Sea from John Hunter. In my climate, it is rather easy to get seeds if the temperatures during pollinating are higher than normally, perhaps about 18 centigrade. There are already many second-generation plants, often backcrosses with standard daffodils - some of them are also fertile- and crosses with jonquilla hybrids, which are in most cases fertile. Combinations with diploid species like N. cyclamineus, N. hedraeanthus, N. triandrus, diploid yellow bulbocodiums, and N. cantabricus are successful.

I have used N. viridiflorus pollen on N. cavanillesii. The seedlings are called N. x xanthochlorus. The parents flower together during autumn in Spain, but nobody found the cross until now. N. xanthochlorus was successfully used as seed parent with pollen of Maria Pia, Solar System and N. assoanus in 2016.

Seedlings of N. romieuxii x N. cavanillesii are one year old. Utilizing N. cavanillesii as a seed parent is a little complicated for me, because I get from about hundred bulbs two or three flowers only. Therefore, I pollinated in 2016 many plants in Spain. I harvested seeds with the pollen of Solar System and N. serotinus and the little seedlings are already growing. In autumn 2017, I shall do the same with the pollen of a Y-R split corona and some other standard daffodils. The resulting progeny should have some very special characteristics. With these allotetraploid seedlings, similar crosses can be made as with the viridiflorus hybrids like Emerald Sea, for example back crosses with standard daffodils. Some interesting traits as early flowering time, blossoms looking up to the observer, long styles and anthers, rapid bulb increase can perhaps be integrated into the standard daffodils.

In DaffSeek there are listed in Division 10 ⊎Bulbocodium Hybrids Ω173 varieties. Most of them are crosses of different bulbocodiums and cantabricus and many of them should be autotetraploid and fertile. Crosses of standard daffodils with tetraploid bulbocodiums are very rare. This combination was tried at first, as