

Frost resistance of narcissus

From my own experience, I know that standard daffodils of class one to three are normally resistant to frost. I live in Essen (Germany) in climate zone 8 with mean and minimum temperatures in January of 4,5 and 0,2 degrees C. For forty years, I lost no bulb because of frost, even if the bulbs were not planted and laid open on the ground without snow. There was one exception of this behaviour in the winter 2011/2012. I lost more than 50% of my standard daffodils and seedlings from standard daffodils crossed with species. I described the situation in two e-mails to Daffnet from April 9, 2012 and August 5, 2012. We had very high temperatures in winter during December and January without frost. *N. cyclamineus* was short before flowering. The ground was extremely wet from rain during January. I have a heavy soil, which takes a maximum of 540 g water by one kg soil. The draining is not optimal. From January 28 to February 14, a period of frost followed; the temperatures went down to -14 degrees C. The ground was frozen during this time up to about 40 cm and without snow. The damage was variable for different places in the same field. In places with some shade which were a little colder and where the leafs were not so big the daffodils were not so hardly affected as in spots with full sun. In little sunken spots in which water could collect, the bulbs were especially harmed. Daffodils, which were freshly planted, were more damaged than the same varieties, which stood there for some years. In fields of the neighbours with sandy and/or sloping grounds, the damage was much less.

In detail the process of destruction for standard daffodils, crosses of standard daffodils with species and species followed a special schema: The bulbs, roots and leafs were killed or the leafs were much or more affected and the roots were damaged or destroyed. With no roots, the big leafs got no water after the frost period and died down. In some cases, the bulbs survived without roots and leaf and became smaller. They needed about two years to flower again. In many cases, the rotted roots infected the basal plate of the bulb and afterwards the whole bulb decayed in the wet soil.

Those are the facts. The deeper cause of the distraction is not so easy to explain. Some factors may have influence:

- The resistance of different species or varieties is variable. Most tazetta bulbs for example are sensible to frost.
- The daffodils had no time to accustom slowly to the falling temperatures. There was an extremely warm period and then they were 'shock-frosted'.
- In the wet soil, shifting of soil plates developed by frost broke the already very long roots. Here roots with higher diameter are more affected.
- The wet soil after the frost period promoted the rotting of the damaged roots and bulbs.
- It is possible that plants, which exhibit fungus diseases, under other circumstances are more often killed by frost.

Completely resistant to frost under the described circumstances are *N. pseudonarcissus* from the Eifel and the Ardennes as well as *N. poeticus*. Destroyed were the bulbs of *bulbocodium conspicuum*, *N. fernandesii/cordubensis*, *N. henriquesii*, *N. cyclamineus* and most *N. tazetta* from Figueres (Spain). One clone of this tazetta survived. The same did one clone of the cross '*N. bulbocodium* x *N. romieuxii*'. Sun Disc and Smarple were robust. Emerald Sea, Hawera and Gipsy Queen were killed. Most crosses of standard daffodils with *N. dubius* were ruined. At first, I thought that they were tough because the slightly damaged leaves looked quite good during a long time after the frost, but at least most bulbs rotted. A little better behaved different seedlings of standard daffodils crossed with *N. fernandesii/cordubensis*, *N. tazetta* (Figueres) and *N. assoanus*.

Many standard daffodils like Menehey, Bantam, Meldrum, Loch Loyal, Falstaff, Impeccable, Gold Convention, Matador, Tête à Tête, Truculent, Symptom and Bravoure were totally destroyed or badly damaged: Especially daffodils with red crowns and yellow trumpets. Compton Court and Triple Crown, Laurin, Pooka, Altruist and Solar System in contrast stood the frost well as did the white daffodils Broomhill, Class Act, Misty Glen and Hanley Swan, the yellow-white daffodils Reference Point and Clouded Yellow and the class 6 daffodils Maria, Foundling, Bilbo and Georgie Girl. Nearly all white-red and white-pink daffodils are resistant to frost. Here the poeticus genes have a positive effect. All fertile jonquilla hybrids which are early with their leaves, for example Regeneration and Limequilla, are also frost-proof.

In the literature, which is listed in the internet, you find some general information about the frost resistance of daffodils and more specific notices about *N. tazetta*. I detected one article where the lethal dose temperature for *Narcissus tazetta* is determined as -3 degrees C (K. Inamoto, K. Matsubara, M.

Doi, H. Imanshi. Evaluation of freezing hardiness of ornamental geophytes. Acta Hort. 2011). This seems to be the only scientific text concerning the problem. It should be reasonable to get more information, because many daffodils grow in regions where they freeze every year or at least in some years.

A special short test for determining the frost resistance could be developed: Grown up daffodils within a pot could be placed within a freezer at a specific temperature for a certain time. To design a short test for the rotting of the bulbs because of frost- damaged roots is perhaps too complicated.

I think for hybridizers it is possible to create frost resistant bulbocodiums for heavy soils and a pH amount about 7 and frost resistant clones of *N. tazetta* from Figueres.