

OREGON AGRICULTURAL COLLEGE

EXPERIMENT STATION

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HOT WATER TREATMENT OF NARCISBUS BULBS

by

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Hot water treatment of narcissus bulbs affected with nematodes or flies is now a common practice wherever these bulbs are grown commercially. A standard treatment has been worked out after years of experience and experiments which effectively cures the bulbs of these parasites. This standard treatment consists of immersing the bulbs in hot water at 110 to 111.5° F. for 2 1/2 to 3 or up to 4 hours depending on the size of the bulbs, the larger ones requiring longer time than the smaller ones to get effective penetration of the heat completely through the bulb. When treated at the right time and under proper conditions no injury to foliage or root growth results. The flowers are more sensitive to injury from hot water and even at best generally show some damage. In most varieties treatment at the proper time will give a higher increase in weight of the bulbs than if left untreated. This is especially true if the stock is affected with any of the pests.

Best Time to Treat

The best time to treat is determined by the condition of the bulb and not by any given date on the calendar. Judging as best we can from the accumulated knowledge, the following is a brief outline of the desirable procedure:

Dig the bulbs when mature and before the new roots start growth, cure for from three to five weeks, treat with hot water, empty the crates immediately after treatment and cure out thoroughly before bulking again for storage or planting. Practically independent of the date when dug the bulbs require a period of curing to develop the flower bud before treatment. If the flower bud is not developed so as to be readily seen when the bulb is sectioned, or apparently if the flower bud is growing rapidly at the time of treatment, then the flower is more sensitive to injury from the treatment. Also, if treatment is delayed too long until the root cells have started growth, then the roots are injured. Treatment after root growth has started may merely cause reduced plant growth without being fatal by entirely preventing any growth of the bulbs. Treatment even after root growth has started is advisable under some circumstances as when the nematode disease is present and has escaped detection till late. Under such circumstances, it would be preferable to risk injury from late treatment than to risk the greater injury likely to occur from planting diseased bulbs untreated.

Injury to Flowers and Foliage from Treatment

The Experiment Station in cooperation with growers carried out a comprehensive series of treatment tests in 1926 to 1928 to determine under what conditions the least injury to the flowers and to growth would result from the treatment. In 1926 four hundred and seventy-five lots, including 23,500 bulbs of eight varieties, were used. These bulbs were dug at different dates from about July 15 to 20. Three sizes; namely, splits, round, and mother bulbs, were employed in some varieties. Two treatment temperatures; i.e., the standard of 110-111° F. and then 114-115° F. to secure a more striking injury were used. Different lots were treated for one, two and three hours. Four main treatment dates were used, starting July 22 and ending September 16, with tests of one variety conducted later in October. Some lots were treated with cold water to see if the water itself had any effect on growth. Also suitable untreated controls were maintained.

The earlier treatments conducted in July often gave split or deformed flowers but normal foliage; the treatment in August gave very good flowers and normal foliage, and the later treatments in September and October gave noticeably reduced growth and a large number of blasted flowers. Lots treated on September 16 gave quite appreciable injury and those treated October 7 were badly injured. At that time the outer scale of most of the bulbs had broken away from the basal plate exposing the ring of white tissue from which the new roots issue when planted. As judged from these tests, treatment of the bulbs any time previous to September will result in satisfactory growth of the foliage and increase in weight of the bulbs themselves.

The effect of the treatment, however, on the flowers produced by the bulbs is another matter. The flower tissues within the bulb apparently develop and become more resistant to injury from the heat quite early in the case of Golden Spur and King Alfred, but are late in doing so in Emperor. In most cases the early treatment of the former varieties gave a larger proportion of successful blooms than did the later treatments. For these two varieties under the conditions of this experiment, the best time for treatment was the last week in July and the first two weeks in August. Emperor, on the other hand, gave badly injured flowers in the two earlier treatments and a large percentage of good flowers in the later treatments of September 2 and 16. For Emperor, the best results in foliage and flower development were secured by the September 2 treatment.

In 1927 bulbs of eight varieties were dug at weekly intervals on July 19 and 26, and August 2, 9, and 16. Following these dates, different lots were treated at weekly intervals beginning one day after digging and extending to September 14. The results were more striking because the range of time of the treatments was greater. Regardless of when dug, the bulbs treated one day after digging did not do as well as those cured a while before treatment. This was expected. On the average the bulbs dug first; i.e., July 19, gave the best results in growth when treated from four to five weeks after digging. Those that were left in the ground longer did not require as long a curing period out of the ground before good results were secured from treatment. The bulbs dug July 26 gave the best results on the fourth and fifth weeks after digging; those dug August 2 gave the best results in one to three weeks; those dug August 9 gave the best results in the second week, and those dug August 16 averaged best when treated one week after digging. In almost all cases the poorest results were secured from the latest treatment; namely, that done on September 14.

Apparently then the bulbs dug in good season may be treated to best advantage after curing for a period of from four to five weeks, depending on conditions. The bulbs dug later can be treated to advantage after a shorter curing period and those dug as late as August 16 may be treated within a week after they are dug. Almost invariably the bulbs treated at the proper time after digging gave as good increase as the untreated ones dug at the same time, and they usually gave greater increase than the untreated.

These results are to be interpreted as applying only to the treatment of planting stocks. There are other factors involved in the hot water treatment of stocks for forcing that must be fully studied before such treatment can be recommended. From the work that has been done here on this to date, it appears to be a risky practice that can not be recommended at this time. Further detailed tests are necessary before a positive statement one way or another would be justified.

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