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## Information

### Hot Water Treatment of Bulbs and Herbaceous Perennials

One method used to successfully control nematode infections in Chrysanthemums over the years has been the heat treatment of the stools. Principally the system involves washing all the soil or compost away from dormant plant material, which is then immersed in hot water at a strictly controlled temperature, for a strictly controlled time, then tray or potted up, and cutting material rooted from these treated stools. Experience has shown that considerable reduction in the level of nematode activity in the young cutting material is achieved by this method along with Narcissus fly maggots. Individual plant varieties have shown varying degrees of response to higher temperatures and these notes are given purely as guidelines rather than definitive temperatures and times.

Instances of the system being unsuccessful are usually traced to bad circulation of the water through the plant material, relating to variable temperature achieved through the plant material.

The following points highlight the most important requirements of a system:

1. Efficient forced circulation of the water, but avoiding foaming. Where foaming occurs an anti-foam agent should be used.
2. Good heat insulation, including a lid, over the whole tank.
3. Accurate temperature control (preferably by an automatic electronic thermostat regulator).
4. An accurate thermometer of the mercury-in-glass type (*not* one encased in metal or other material) or an accurate electronic thermometer.
5. A clean, draught-free building to house the equipment.
6. A good, non-ionic wetting agent added to the water.
7. A fungicide added to the water to prevent rots and other fungus troubles e.g. Storit Clear Liquid (EAMU 2007-0924) or Bravo 500 (EAMU 2011-1130), hard copies of which must be in your possession before you start work. Copies can be forwarded if required. These products will only control fungi.

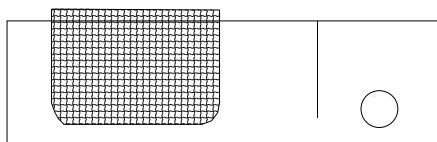
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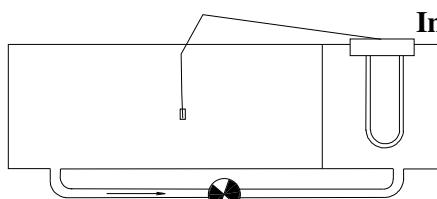
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8. Where bulk-handling systems are not used, rigid open-mesh containers, trays or nets for the bulbs are satisfactory alternatives, but close-woven sacks are *not*. Plastic nets or wire baskets are widely used. Nets stacked on pallets should be filled tightly and cross-stacked to ensure adequate circulation of water between the nets. However, where nets are loaded into bins through which water is pumped, they should be loosely filled to ensure a more uniform distribution of heat.
9. With bulk-handling systems - using for example 500 kg wooden boxes having slatted floors - water circulation, temperature control and post-treatment drying all require special attention.
10. Tanks must not be overloaded: too many bulbs or plants impede circulation and make temperature control more difficult. A ratio of plants to water of 1:2 should never be exceeded; a ratio of 1:3 or more is ideal.
11. Strict attention to hygiene. Frequent hosing down of the building, a 'one-way-traffic' system and new or sterilized containers for treated plants or bulbs are recommended. However, with front-loading (and some bulk-bin treatment tanks) a one-way system is not possible. With bulk handling, treated plants or bulbs remain in the same containers throughout, so the containers are treated along with the plants.
12. Some small units have been built very successfully treating 10 or 20 plants at a time. These can be made in a cattle drinking trough and using a small circulating pump. Plants are lowered into the water in wire baskets. The whole tank should be clad in 50mm polystyrene sheeting for insulation and a lid fitted.
13. Herbaceous subjects should be tested before large commercial quantities are treated. Treatment times should be started at 44.4°C for 15 minutes. Longer times can be carried out on some species. In the case of bulbs treatment times are much longer at 3 hours again at 44.4° C. Pre-treating bulbs by storing them at 30°C for three weeks prior to treatment will reduce the risk of flower damage.

**Plants in basket**



**Immersion heater and electronic thermostat**



**Bronze central heating circulator**

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