

BULB HOT WATER TREATMENT

Frank Ward – Hennock Industries Ltd.

AIMS HOT WATER TREATMENT OF BULBS

The aim of bulb sterilising in hot water is to provide an effective method of killing and controlling stem nematode. This is enabled by dipping the bulbs for a prolonged period in a hot water/formaldehyde solution. It is critical that strict control is maintained over the process. Especially the following items:

- Time of year for treatment – (Bulbs must be dormant)
- Liquid temperature. The bulbs must be maintained at 44.4°C (min 44.3°C max 44.5°C) *
- Time of treatment. This should be 3.0 hrs after warm-up. *

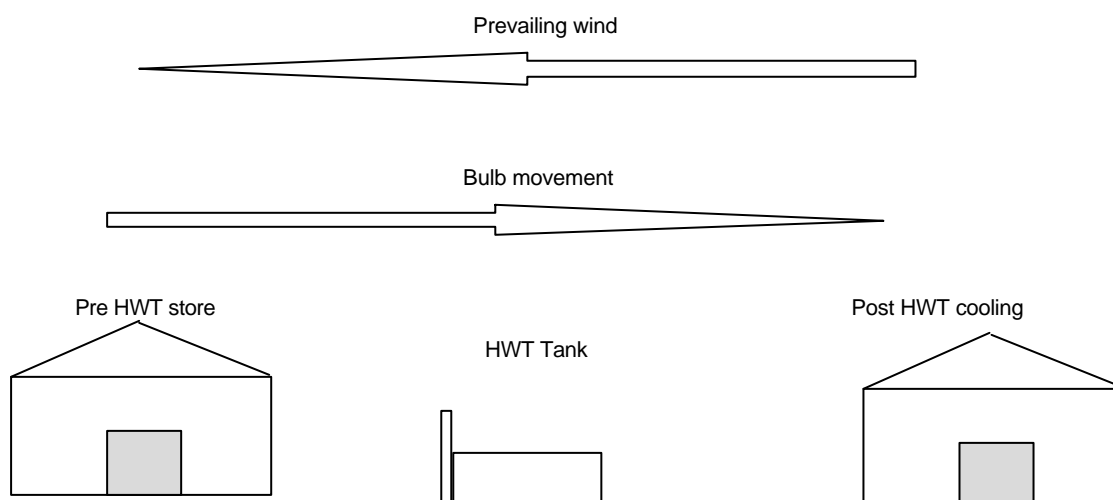
* Temperature and treatment time may vary for pre-warmed stocks.

In addition, the following should also be controlled:

- Cool down rapidly after treatment to near ambient (30 mins max)
- Avoid cross contamination with un-treated stock or areas/machinery/containers used with untreated stock

HWT SYSTEM DESIGN

The sketch below shows the ideal layout for a HWT system. The untreated stocks being kept separate and downwind of the HWT Tank and the treated stocks. This is the very best way of ensuring that the stocks remain clean once the treatment is completed. Nematode spores can be easily carried on the wind or on shale from untreated stocks.



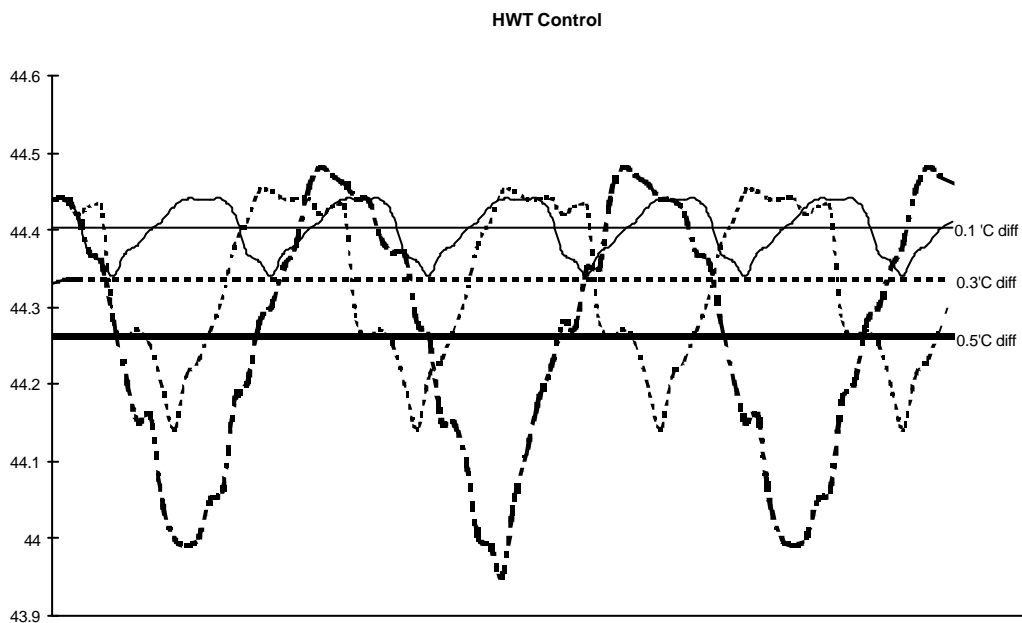
TANK & EQUIPMENT SPEC

To ensure your system is suitable for the purpose, check if it meets the following:

- Tank capacity suitable to treat bulbs within season
- Tank insulated and covered
- Heater capable of 5°C lift in 30 mins
- Pump capacity capable of 10 tank volumes per hour
- Positive water circulation
- **Controller sensitivity at least 0.1°C**
- Differential 0.1°C

Of these, the controller differential is critical. With a wide differential, your bulbs are being exposed to temperatures that can be very harmful to them, and could result in foliar damage. For example, if your controller has a 0.5°C differential, the bulbs will be experiencing temperatures up to 44.7°C, even though the average may be 44.44 °C.

This could be remedied by limiting the upper temperature to 44.44 °C, but this in turn would result in the system running too cold on average, as shown below.



PRE-SEASON CHECK

To ensure accurate and adequate control of the nematode, your system should be checked each season, looking at the following:

- Heater operation
Is the heater operating correctly, and will it achieve the rate of temperature rise required?
- Pump condition
Are there any signs of wear on the pump impeller, bearings etc. Cavitation caused by the pump working at pressures beyond it's capability will damage the impeller and reduce the pump's throughput.
- Sparge pipes
Sparge pipes easily become blocked with bulb shale and soil. These need to be clear throughout their length to ensure adequate temperature distribution.
- Controller operation and calibration
The controller can easily go out of calibration. Both mechanical type thermostats or electronic controllers are susceptible to vibration and require calibration every year. This should be done with a reference thermometer and accurate sensors placed throughout the tank whilst the system operates over a full cycle.
- Extraction system in operating condition.
If you are working on an enclosed HWT system, you should have fume extraction to reduce the risk to health from Formaldehyde fumes. Check this is working before the season starts. Remember the upper limit for Formaldehyde is 5 ppm.
- PPE in date
Check that all Personal Protective Equipment used (masks, gloves, boots etc) are in date. If not replace them.

HEALTH AND SAFETY MATTERS

Remember that operating the HWT system does pose risks to your health. Have you got:

- COSHH assessment for chemical use?
- Formaldehyde monitoring?
- Fume extraction?
- Personal Protective Equipment?

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