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TREATMENT OF IRRIGAITON WATER FOR AVOCADO NURSERIES

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INTRODUCTION

The presence of plant parasitic fungi and nematodes in river water has been established. Irrigation of nursery plant material with untreated water from such sources must, therefore, be avoided.

Borehole water has been proved free of harmful fungi, and spring water is usually fairly clean. When these sources of water are not available, then river water must be treated by flocculation and/or filtration to remove plant parasitic nematodes, large size fungal spores and colloidal matter. Pretreated water has a low chlorine demand which facilitates effective chlorination for final elimination of fungal pathogens.

APPROACH TO WATER TREATMENT

The approach adopted at H.L. Hall & Sons to obtain treated water has been to remove the colloidal material by treatment with a flocculating agent followed by filtration; the clean water obtained is then treated in a reservoir with chlorine. The entire system between the canal and the reservoir is gravity fed. A more detailed description of each phase follows below.

1. *Flocculation*

Canal water, just prior to being fed into the conical settler, is treated with aluminium sulphate and, if necessary, soda ash to obtain the correct pH. The bulk of the flocculated material is retained in the settler as a "sludge blanket". The treated water with a certain amount of floe passes out through the top of the settler.

The flocculating agents floccotan (extract of wattle bark) and aluminium sulphate were compared as flocculating agents. Efficiency of water cleansing was measured by the amount of water passing through a 3 p disc before it became blocked. Aluminium sulphate was the more efficient as 11 litres of water passed through the disc wheras with floccotan only 7 litres passed through.

2. *Filtration*

After passing through the settler the water must be filtered to eliminate any floes and other filterable material. Two approaches to filtering were tried.

Firstly, it was thought that with a really efficient filtration system it would be possible to do away with chemical control. A nucleopore cartridge filter obtained from Atomic Export Corporation was tested against a zoospore suspension of *Phytophthora parasitica* and 100% retention of zoospores was obtained with 3*μ*m pore size filter. In order to prevent early blockage of this filter, a very clean source of water was required. It was found that a well designed sand filter supplied by Prentec gave a superior quality of water compared to that from a hydro-anthracite filter. In the former case 11,0 litres of water could be passed through a 3*μ* disc before blockage occurred whereas in the latter case only 3,8 litres of water could be passed through. In spite of the use of this sand filter only 23 m^3 of water could be passed through this nucleopore filter before blockage occurred. This proved to be too expensive an operation. The second approach was to produce sufficiently clean water which would have a low chlorine demand to facilitate effective chlorination for the final elimination of fungal pathogens. This is the approach which has shown most promise.

3. *Chlorination*

After flocculation and filtration the water is ready to be chlorinated. In-line chlorination was tried but this method proved to be unreliable. Calcium hypo-chlorite is now put directly into a reservoir while the water is circulating. In spite of adding sufficient calcium hypochlorite to give a calculated amount of 5 ppm. chlorine in the water, only 3 ppm. has been measured after treatment. Further, the free available chlorine concentration declines rapidly with time due to exposure to ultra-violet light. Within 7 hours on a sunny day the concentration was found to drop from 3,0 ppm. to 0,0 ppm. In spite of this, there was a drop from 350 *Phytophthora* and *Pythium* spores per litre to 1,5 over the 7 hour exposure period to chlorine. Microscopical examination indicated that most of the surviving propagules were associated with organic debris which has passed through the filter system.

It might be added that none of the fungi sampled after treatment with the existing method were either *P. cinnamoni* or *P. parasitica.* Furthermore, the lack of any positive tests or symptoms of *Phytophthora* in the nursery would tend to confirm that this method of water treatment is effective.

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