HOT WATER TREATMENT: Effective eradication of root-knot nematodes?

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Nematodes are microscopic worm-like organisms that mostly occur in the soil. There are both “good” (free-living) and “bad” (root-feeding) nematodes. Balanced soil systems will contain both, with the root-feeding nematodes only present in small numbers.

One of the root-feeding species present in vineyard soil is the root-knot nematode (RKN) (Meloidogyne spp.), which penetrates the roots causing their characteristic root galls. The formation of these galls damages the roots and restricts their ability to absorb water and nutrients, leading to reduced vigour and yield. Additionally, this makes control of these nematodes particularly difficult. Nurseries are not exempt from RKNs but use soil fumigation and chemical control throughout the year to control RKNs, in addition to other endoparasites. Despite these intensive control practices, RKNs are not completely eradicated. Research has shown that an additional control measure is the possibility of using hot water treatment (HWT).

Hot water treatment has proven to be effective for the control of several grapevine pests and diseases and can routinely be implemented in grapevine nurseries. In the past, HWT at 50°C for 30 minutes was the official recommendation for plant pathogens in grapevine nurseries, but has been changed to accommodate the control of aster yellows to 50°C for 45 minutes.

Research was conducted at the ARC Infruitec-Nietvoorbij to establish if treating nursery material at 50°C for 45 minutes was sufficient to ensure that no viable adults or eggs remain after treatment. The research has shown that HWT at 50°C for 45 minutes significantly reduces RKN in grapevine planting material, but it could not be demonstrated that the treatment completely eliminates RKN from rooted material. A second HWT regime (55°C for 20 minutes) also reduced the level of infestation of RKN in grapevine planting material, but resulted in a significant reduction in growth and is considered phytotoxic, while applying a treatment of 50°C for 45 minutes is not. Additionally, the results of this work demonstrated that hot water treatment is most effective when root-knot nematode numbers are low. It is recommended that hot water treatment should not be applied on its own, but in combination with other practices. This includes filtering of irrigation water sterilisation of growing medium and general sanitation practices.