Tree Fruit Diseases

Influence of Three Irrigation Practices on Phytophthora Crown and Root Rot of Apple Trees Under Field Conditions

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Phytophthora crown and root rot (PCRR), caused by Phytophthora cactorum, is one of the most serious soilborne diseases of apple trees in the Okanagan Valley of British Columbia. Information is lacking on the effect of different methods of irrigation on the incidence of PCRR.

The field test was conducted to examine the effect of three practices of irrigation on the development of PCRR of apple trees in a sandy loam soil at Kelowna Substation located in the Okanagan Valley of British Columbia. One-year-old disease-free trees of the crown rot susceptible rootstock MM.106 were bench-grafted with 'Macspur' in February 1985 and planted on 22 April 1985. Tree spacing was 3.5 m between rows and 1 m between trees. Four treatments were arranged in a randomized complete block design with 4 replications. There were 24 trees per treatment planted in 3 rows. The outside rows served as guard rows to avoid interplot interference. The drips and microjets were located 1 m and 2 m, respectively, apart within a row. The sprinklers were located at 4 corners of the plot. The treatments were: microjet irrigation, 2.3 hr daily; drip irrigation, 2.6 hr daily; sprinkler irrigation, 1.5 hr every 7 days; and sprinkler irrigation, 3.0 hr every 7 days. The automatic operation of the irrigation system was controlled by an Irri-Trol C.Q. Battery Operated Controller. The amount of water delivered to each tree per day was calculated for each treatment as follows: drip, 11 L; microjet, 29 L; sprinkler, 1.5 hr, 20 L; and sprinkler, 3.0 hr, 40 L. Soil around each tree was infested with P. cactorum annually in mid-June. The trees were irrigated with their respective irrigation methods immediately after the soil infestation with P. cactorum. During the growing season the experimental plot was irrigated as per treatments. Weeds, insects, and foliar diseases were controlled by standard orchard practices.

This eight-year study indicates that crown and root rot caused by Phytophthora cactorum was most severe where young MM.106 rootstock trees were watered by microjet irrigation for 2.3 hr each day. There was no difference in infection by P. cactorum when trees were irrigated either by drip or sprinkler irrigation systems. The MM.106 apple rootstock trees watered by drip irrigation for 2.6 hr each day were least affected by phytophthora crown and root rot.