



NJF Seminar 389

**Pest, disease and weed
management in strawberry –
progress and challenges for the
Nordic production**

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Screening strawberry plant resistance to *Phytophthora cactorum* with two techniques

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Phytophthora cactorum was first detected as causing crown rot and plant death on strawberry in Finland in 1990. Resistance of strawberry cultivars has been tested at MTT Agrifood Research Finland, Plant Protection since 1993 with the crown test. By 2003, about 60 cultivars had been tested in a greenhouse. The NFT system has been used for screening for resistance since 1998. The two screening methods have been compared with the same strawberry cultivars in similar greenhouse conditions.

For tests, runners with one small leaf were taken for rooting in small rockwool cubes and the cubes with rooted plants were placed in the NFT system. The inoculum, sporangia of *P. cactorum*, was added to the water tank of the NFT system. Crown tests with *P. cactorum* mycelium were carried out on runner plants with three to four leaves. The test time for the two techniques was four weeks and the temperature in the greenhouse was kept at 24°C (day) and 18°C (night) with a 16-hour day.

P. cactorum infects runner plants in the NFT system fairly quickly, the first symptoms becoming visible in three to five days in susceptible cultivars. 'Jonsok', the standard cultivar used in the tests, shows the same level of susceptibility with both methods, the crown test and the NFT system. The resistant control used was 'Sara', which shows resistance both in the crown test and in the NFT system. When the test methods were compared, a fairly resistant cultivar 'Senga Sengana' showed no crown rot symptoms in NFT. Most of the tested cultivars showed the same level of resistance in both tests.

The cultivars which showed high resistance in the crown test showed no wilt symptoms in NFT. Internal browning was, however, observed also in the crown tissues of those cultivars which showed less wilting. This indicates that they were infected, but that the disease had not spread from the vascular tissues to cause wilt. The variation in the test results during different seasons is comparable to that found in crown tests, and the level of resistance of most cultivars was similar with both methods when the tests were performed in the same season. However, in some cultivars the variation in test results could be fairly great. 'Symphony', for instance, was classified as susceptible in the crown test but quite resistant in NFT. Other similar cultivars were 'Arking' which is considered very susceptible and is used as a control cultivar in France.

The NFT system makes it possible to use small, unwounded strawberry runner plants in screening for resistance. Rooting the runners in rockwool cubes and adding the *P. cactorum* inoculum as sporangia to circulating irrigation water makes it possible to spread the inoculum rapidly and evenly throughout the plant material tested without any need for extra humidity in the greenhouse to produce infection. Unlike normal zoospore tests, the NFT system gives the results within the same time as the crown test when small fresh runner plants are used. However, this method, too, requires several replications to get reliable results. There is still work to be done to improve the reliability of the NFT system, but once it has been established and calibrated with the control cultivars, it is easy to use for screening plant material.