

I Plant protection and ecological production

I1 Decline of stone fruit trees in Switzerland

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For some years now, decline of plum and cherry trees, especially in new plantations, was observed in Switzerland. This may be caused by different factors. Based on observations in affected plantations and on evaluation from field and laboratory trials it is concluded that new combinations of dwarfing rootstocks with high-yielding varieties may be more susceptible to stress. In addition they show particular needs regarding soil and climate conditions and agricultural techniques. Soil and climatic conditions (high rainfall and alkaline soil) in most of the stone fruit producing areas in Switzerland favour pathogens such as *Thielaviopsis basicola* (black root rot), *Phytophthora spp.* (root, collar and crown rot) and *Pseudomonas syringae* (bacterial canker). In 2002, several on farm-experiments were started. They are focused on remediation of soils in already existing plantations and on improvement of soil preparation for new plantations. The techniques applied are ridge culture, addition of ripe compost of different composition and addition of chitin-based fertilizers.

I2 Fungal pathogens causing fruit decay on plum (*Prunus domestica* L.) in Norway

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In order to reduce fruit decay at harvest and after storage, a standard spray programme in plum in Norway includes a sanitation spray at bud swell with a copper fungicide, one spray during flowering against brown rot and 1 to 3 sprays against brown rot and grey mould between flowering and harvest.

Since 1998 we have recorded the presence of fungal diseases on plum fruits in commercial and experimental orchards in Norway, both at harvest and after storage (ca. 14 days at 4°C and 2-4 days at 20°C, in order to simulate the marketing period). The overall dominating disease was brown rot, caused by either *Monilinia laxa* or *M. fructigena*. Other diseases found were blue mould (*Penicillium sp.*), grey mould (*Botrytis cinerea*), Mucor rot (*Mucor piriformis*), and bitter rot (*Colletotrichum gloeosporioides* or *C. acutatum*).

The amount of decay varied between years. In the late ripening cv. Victoria in 1998, 1999, 2001 and 2002 the total amount of decay after storage was in the range from 5 to 30%. From 63 to 100% of the decayed fruits were attacked by *Monilinia* sp. The second most common disease found was blue mould in 2002 (14%) and Mucor rot in 1998 (34%) and 2001 (10%).

The amount of fruit decay varied among varieties. As an example; five different late ripening varieties from the same field trial were stored in 2001, and the total amount of decay varied from 17 to 83%. Brown rot was present on 28 to 100% of the decayed fruits and blue mould on 0 to 56%. Grey mould and bitter rot were only detected on fruits of one variety each and was present on 5 and 13% of the decayed fruits, respectively. Mucor rot was found on 0 to 16% of the decayed fruits.

13 Pest management in organic plum production in Norway

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About 2,5 % of the total plum production area in Norway was organic in 2003. Challenges regarding pests in organic plum production are less than in organic apple and pear production. The main problems in organic plum production are plum rust mite (*Aculus fockeui*), European red mite (*Panonychus ulmi*), different species of aphids (*Brachycaudus helichrysi*, *Brachycaudus cardui*, *Phorodon humuli*), lepidopterous larvae, plum saw fly (*Hoplocampa flava*) in some regions and various fungi. In addition the marketing and sale of organic fruit has been a problem up till now.

Registrations in five different organic plum orchards with eight different varieties over two years will be presented to show the variation between varieties and orchards as well as the correlation between predaceous mites and harmful mites. Results show that both varieties, site and number of predaceous mites explain variation in population size of harmful mites. The population size of predaceous mites increased from 2001 to 2002 in all plum varieties.

Two trials with quassia against plum saw fly (*H. flava*) was conducted in 2004. The results showed that quassia had the same effect as pesticides used for commercial plum production.

The potential for growth of organic plum production in Norway will be discussed.

14 Organic farming of plums in Estonia

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Mainly due to environmental reasons the importance of organic farming in Estonia is growing. A new project with the aim to study plums in organic farming was started at the Polli Horticultural Institute in 1998. An experiment with five plum cultivars: 'Emma Leppermann', 'Liisu', 'Ave', 'Perdrigon' and 'Queen Victoria' was established in spring 1998. Trees of 'Emma Leppermann' served as controls. The trees came into bearing in the fourth year after planting. In 2002 and 2003 trunk circumference of five trees of each cultivar at 20 cm above ground level was measured and length of one-year-old shoots was determined. In both year the yield per tree was calculated. Also the resistance to leaf spot was evaluated. No pesticides and fertilizers was used in that experiment.

On the basis of these investigations it was noted that trees of cultivars Liisu and Perdrigon have significantly smaller trunk circumference compared to trees of control cultivar. In 2002 the greatest mean shoot length was noted in 'Ave' and in 2003 in 'Queen Victoria'. The best average yield per tree both in 2002 and 2003 was found in 'Perdrigon', 14.3 and 6.3 kg, respectively. The relatively resistant to leaf spot were cultivars Ave, Liisu and Queen Victoria. On the basis of the preliminary results of the experiment it can be concluded that plum is quite suitable for growing in organic farming.

15 Organic production of plum cultivars

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Two plum cultivar trial orchards planted 1991 were grown organically from 1998 on. This poster present results from the transition phase. 'Jubileum' gave higher yield than 'Souffriau', 'Victoria' and 'Reeves' (trial on rootstock 'St. Julien A') and 'Avalon' was more productive than 'Excalibur' (trial on rootstock 'Pixy'). Mean harvest date ranged from 10 September ('Souffriau') to 23 September ('Jubileum').

Degrading of fruits due to damages was on a low level in plums compared to results from organic apple and pear orchards. A fully acceptable level of first class plums was harvested. The highest figures for degraded fruits were found in 'Victoria', mainly due to internal gummosis. Skin cracks were observed mainly in 'Excalibur', 'Reeves' and 'Victoria'. 'Jubileum' was found to be susceptible to fruit rot.

16 Different strategies for foliar applications of calcium in plums (*Prunus domestica* L.)

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The consumers are asking for fruit grown with a low input of chemical fungicides and pesticides. To avoid fruit with a short shelf life being marketed, alternative methods to reduce the amount of fruit decay are needed. In the plum and prune symposium in Bulgaria we presented results of foliar application of calcium close to harvest on the incidence of fruit rot in plum. Further work has been done to find the optimum time and number of applications.

Experiments with plum cultivars 'Mallard' and 'Victoria' were conducted in the experimental orchards at Ullensvang Research Centre and in commercial plum orchards in the Hardanger region in Western Norway. Fruits from trees without foliar application of calcium were compared to fruits from trees given (i) three applications of calcium early in the growing season (every two weeks from two weeks after bloom until late June), (ii) three applications six, four and two weeks before harvest, (iii) six applications at the same dates as above and (iv) without calcium applications, but sprayed twice with a fungicide (two weeks after bloom and two weeks prior to harvest).

The effects of the applied treatments on fruit quality factors were registered. The foliar application of calcium had small effects on the fruit quality parameters. Foliar application of calcium in the first part of the season had a tendency to delay fruit development; firmer fruits, less cover colour, more green ground colour. However, the found differences were not statistically different. No effect on content of soluble solids or titratable acidity was registered.

Plums from each treatment were stored at 4°C or 20°C up to three weeks. Decayed fruits were registered and discarded once a week. Foliar applications of calcium reduced in three out of four experiments fruit decay during storage. No significant difference in amount of postharvest fruit decay was found between early season or late season calcium sprays.