Stone Fruit Dieback – Retrospective View and Outlook in January 2004

The work group Steinobststerben (SOS – stone fruit dieback) looks back on a busy year in which much has been achieved, but new problems have arisen.

What has been Achieved?

An SOS database has been created that contains all current data, photos and lab reports of 116 enterprises. Many visits were made to stone fruit farms with advisory service, and about sixty submissions of stone fruit samples were processed and tests were carried out.

At the stone fruit centre of Breitenhof, four trials were designed for the control of black root rot (*Thielaviopsis basicola*) and two more are at the planning stage. In five nurseries, young plants and samples of sawdust from cutting and from stool beds were examined for pathogens.

An SOS website was created, and six publications regarding stone fruit dieback were published.

Based on the collected data, observations and test results, a preliminary list of possible causes of SOS was compiled:

- The new combinations of poorly growing rootstocks with high-yield varieties make increased demands on the site and cultivation measures
- Waterlogging, long periods of drought, light frosts
- Unbalanced nitrogen fertilization
- Yield expectations that are too early and too high
- Infestation with:
  the soil fungi *Phytophthora spp.* and *Thielaviopsis basicola*,
  wood-destroying fungi such as *Valsa,*
  the bacterium *Pseudomonas syringae*.

Table 1 lists the cases of damage of the last two years according to pathogens.

The sudden and frequent occurrence of the soil fungi listed above can be best explained by the extreme weather conditions (very wet autumn of 2002, very dry spring of 2003). These conditions created a stress situation that affected in particular trees that were already weakened.

Tab. 1: Pathogens detected in ailing stone fruit plantations between July 2002 and October 2003.

Type of pathogen	Number of infested plants	Crop	Steps taken
*Phytophthora spp.**	10	cherries	Soil activation with compost, ridge cultivation – method Neuweiler/Heller
*Pseudomonas syringae***	8	plums	Whitewashing trees before planting – method Hinrichs-Berger, Stuttgart/Germany
*Thielaviopsis basiola****	25	apricots 1 cherries 20 plums 4	Soil sanitation with suppressive cover crops, chitin fertilization to activate the chitin-degrading microorganisms – improved degradation of the resting spores of *T. basiola* – method Heller/Bosshard

* Fungi, isolated only in a few cases
** Bacterium, isolated and identified in four cases
*** Fungi, detected on all sites

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Table 1 also lists possible measures for checking the spread of soil-borne diseases. Some of these measures have been successfully used in other cultures, some are still being tested in laboratory and greenhouse experiments or at the stone fruit centre of Breitenhof (field tests). Recommendations for controlling stone fruit dieback can be made only after the tests have been completed and conclusive results are available.

According to the relevant literature and our own observations, not all rootstocks are equally susceptible to the different soil-borne pathogens (Tab. 2). These susceptibilities should be taken into account when replanting.

In the summer of 2003, experiments with “Halswelke” (fruit withering near the stem) were carried out on two sites. The known symptoms did not occur in the extremely hot summer of 2003, which leads to the conclusion that the disease is not triggered by heat.

Replanting on Ridges in Field-scale Tests

Conferences are being held in different Swiss cantons to discuss stone fruit dieback with demonstrations for establishing ridge cultures with compost. Growers plan field-scale tests in collaboration with the heads of sections and employees of Agroscope FAW Wädenswil.

Chitin Fertilizer to Control Black Root Rot

The use of chitin fertilizer to control black root rot is currently a promising approach. When adding chitin to the soil, chitin-degrading fungi are activated which can degrade the thick-walled chitin-containing chlamydospores of *T. basicola*.

Preliminary tests were carried out in the laboratory using chitin from mushrooms (dried and pulverized kitchen waste) and crab shells (Fluka preparation). The zygomycete *Cunninghamella elegans*, a known chitin-degrader, was isolated from three treated soils of different origin.

During our search for chitin sources we came across registered fertilizer preparations based on mycelium (*Penicillium chrysogenum*, by-product of penicillin production). Currently laboratory tests are carried out with the preparation Agro Biosol. It is granulated and therefore also applicable in field tests without problems. The effect and the plant compatibility of the preparation shall be examined in field tests in the stone fruit centre of Breitenhof and in selected IP (integrated production) enterprises.

Control of Fruit Deformations

Accompanied tests are carried out in 2004 in two enterprises using mancozeb and manganese treatments against fruit deformations. If possible, they should be accompanied by determining the populations of bacteria, fungi, viruses, phytoplasms and pests on the fruits. Information leaflets on Agro Biosol are available at the canton sections.

Collaboration with Nurserymen

As healthy young stands are the most important precondition for successful cultivation, we aim at intensifying the collaboration with nurserymen. Root samples of stone fruit young stands should be examined for *T. basicola* before planting. As is already being

done in some enterprises, sawdust and soil samples from cutting, stool beds and nursery plots should be examined for pathogens of the black root rot, and sanitation measures should be recommended if necessary.

Tab. 2: Susceptibility of different rootstocks to *Thielaviopsis basicola* (black root rot).

Culture	Rootstocks	Susceptibility
Cherries	Cob	tolerant
	Colt	tolerant
	F12/1	highly susceptible
	Gisela 5	susceptible
	Hüttners Hochzucht	highly susceptible
	Maxma	tolerant
	Weiroot 13,53,158	susceptible
Apricots	Waxwa	susceptible
Plums	GF 655-2	susceptible
	Jaspi	susceptible
	St. Julien	susceptible
Gooseberries	Roter Triumph	susceptible
	Achilles	susceptible

Literature of «SOS»

Widmer A. and Stadler W.: Halswelke bei Zwetschgen. SZOW 2003, no. 10, p. 6–8 ("Halswelke" (fruit withering near the stem) of plums).

Bosshard E.: Bericht zum Steinobststerben. SZOW 2003, no. 10, p. 13–14 (report on stone fruit dieback).

Bosshard E., Rüegg J. and Heller W.E.: Mögliche Ursachen des Steinobststerbens: Kragenfäule, Wurzelhals- und Wurzelfäule. SZOW 2003, no. 13, p. 14–16 (possible causes of stone fruit dieback: crown rot, collar rot, root rot).

Bosshard E. and Heller W.E.: Vorläufige Massnahmen zur Eindämmung des Schwarzfäulepilzes Thielaviopsis basicola. SZOW 2003, no. 14, p. 12–13 (provisional measures for controlling the black rot fungus *Thielaviopsis basicola*).

Grünig K.: Kirschen und Zwetschgen senden SOS. Die Grüne no. 15, 22- 25, 2003 (cherries and plums are sending an SOS).

FAW, Fachbereich Pflanzenschutz und Extensionteam Obstbau (Rüegg, Neuweiler, Heller, Ladner, Bosshard); September 2003: Steinobststerben – lassen sich Probleme mit pathogenen Bodenpilzen durch Dammpflanzungen und eingearbeiteten, biologisch aktiven Kompost entschärfen?
(FAW – Swiss Federal Research Station for Fruit-Growing, Viticulture and Horticulture, section plant protection and extension team fruit growing (Rüegg, Neuweiler, Heller, Ladner, Bosshard); September 2003: stone fruit dieback – can ridge planting and biologically active compost that is worked in help to solve the problems with pathogenic soil fungi?)

ELISABETH BOSSHARD, FAW (Swiss Federal Research Station for Fruit-Growing, Viticulture and Horticulture)