Potato late blight – fatal threat in organic potato production

Improved potato late blight management is crucial for the continuity of organic potato production. Two major changes in cultural practises are necessary: more diverse crop rotation with at least 4 years between consecutive potato crops and optimising nitrogen fertilisation according to the needs of the crop. Compounds for direct control of blight in organic production will not be available in near future.

Potato late blight caused by an oomycete, *Phytophthora infestans*, (*P.i*) is the main factor determining the length of the growing season of organic potato by killing the canopy. As a polycyclic disease the control of the disease is most effective by protective chemical treatments. In organic production there are no compounds available for direct blight control. Copper products can be used with special permission of the authorities in exceptionally severe situations.

Management of the new sexually reproducing *P.i.* population characterised by early oospore-derived epidemics is a challenge for conventional production and can be crucial for the economy of organic potato producers. In organic production it is also necessary to eliminate any other primary inoculum sources if possible in practise.

Challenging project to improve late blight management

In 2003 a three-year research project funded by the Ministry of Agriculture and Forestry in Finland was initiated to improve disease management in organic seed potato production. All organic potato producers can implement the results. The aim of this study is to define factors of success and failure in disease management in organic potato production and test efficacy of cultural crop management practises including row spacing and mechanical defoliation to suppress the progress of potato late blight epidemics. Some preliminary results obtained in 2003–04 are presented and shortly discussed.

The project is conducted using two major approaches: surveys and interviews on farms and field experiments carried out by research institutes. The database maintained by The Information Centre of the Ministry of Agriculture and Forestry was utilised to find potential farmers in 2003 and 2004 for the survey. The database also provides valuable background information about cropping history of each field.

Durable resistance in varieties should be found. Blight resistance breaks down easily and also the healthy looking variety in the picture in 2003 vas totally destroyed in 2004. Picture: Aarne Kurppa.

Selected organic potato growers were further interviewed to get more detailed information on their specific crop and disease management practises by a questionnaire. Farms were also visited several times at July and August in 2003 and 2004 to inspect their potato crops and for recording the onset of blight epidemics. In 2004 much effort was paid on comparing onset and development of blight epidemics on fields with appropriate and narrow crop rotations.

During the visits also potential primary inoculum sources for the epidemic were traced to conclude whether the epidemic was tuber, soil or air borne. Farmers were naturally informed, if any factors increasing risk for severe blight epidemic were noticed.

The effect of row spacing on the onset and progress of the blight epidemic was studied in field experiments at different parts of Finland at 5 and 3 experimental sites in 2003 and 2004 respectively. In addition in 2004 the effect of mechanical defoliation at different levels of late blight infestation was studied at field experiments on organic farms.

The most severe concern among organic potato farmers

All farmers interviewed were very concerned about leaf blight, as it has become common that blight stops the growing season by the middle of August as happened in 2003. The season 2004 was even more severe. The weather in most potato growing regions was extremely conductive for potato late blight and many organic fields were totally defoliated by blight at the end of July when no marketable tuber yield had developed. There were many farmers who had totally lost

their ware potato in three consecutive years. Producers of early potato in general had succeeded rather well.

Too narrow crop rotations and too much nitrogen

In both years the epidemics started earlier and were more severe on fields where potato was grown for two consecutive years compared to good crop rotation. From the statistics in 2003 it was shown that potato was the most common precrop for potato in organic production. In 2004 many farmers were giving up the practise of growing potato for two consecutive years at the same field.

It was also obvious that many farmers using green manure did not actually realise the nitrogen requirements of potato. According to the statistics and interviews green manure was very often provided for the potato crop resulting in considerable uncontrolled overdose of nitrogen. The onset of tuber formation was delayed due to excessive release of nitrogen from green manure. In addition very thick and tall stand was extremely favourable for devastating blight epidemic before onset of tuber formation.

Widening of the row space in field experiments did not delay the blight epidemic, but in some sites slightly slowed defoliation in both years. Very preliminary data from 2004 indicate that mechanical defoliation after appearance of blight in crop considerably decreases yield but has very little effect on the prevalence of tuber blight.

Crop management practices should be changed

As a preliminary conclusion there are limited possibilities for effective enough blight management in organic potato production, when disease pressure is very high as in 2004. Changing towards more diverse crop rotations and better control of nitrogen release can delay the onset of blight epidemics considerably. Increasing row spacing and mechanical defoliation have very limited value in blight control. More resistant potato cultivars are urgently needed, but it takes time to change consumers' habits preferring current susceptible cultivars for their foodstuff. An ideal type of variety for organic production would be as blight resistant as possible, starting tuber formation as early as possible. ■

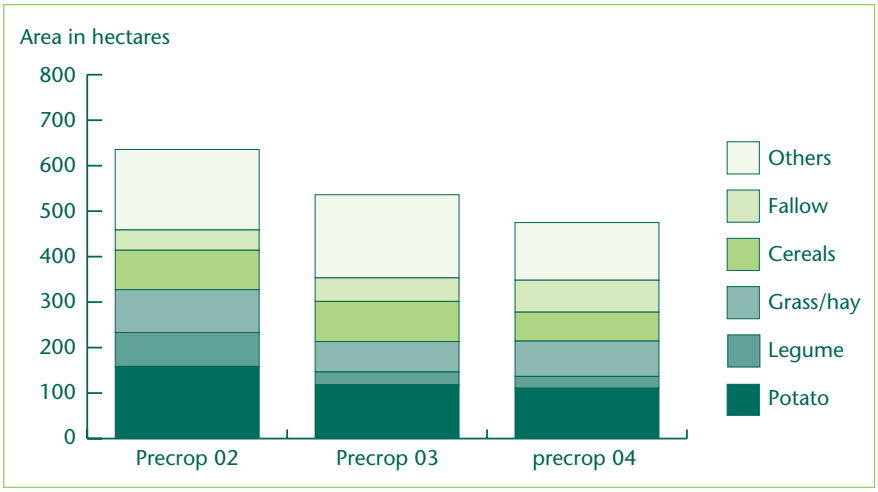

Figure 1. Preceding crops of organic potato grown in 2002–04.

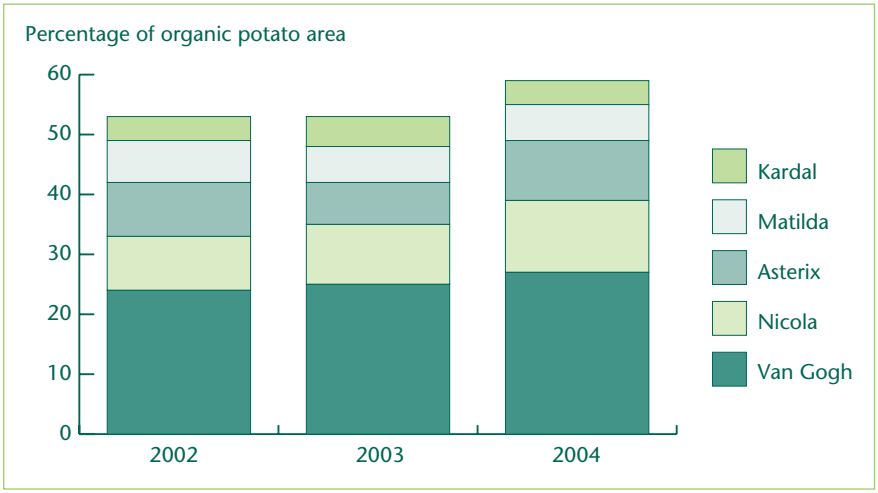

Figure 2. Five most common varieties covered over 50 % the organic potato area. At the remaining area numerous varieties whose share was less than 3 % were grown.

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