LfL Pflanzenschutz

Bavarian State Research Center for Agriculture

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Strategies to reduce copper amounts in organic potato production

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Introduction

Potato late blight (*Phytophthora infestans*) is still an unsolved problem in organic farming. Currently the disease can only be controlled by copper fungicides. The project is aiming to reduce the application of copper by introduction of the new blight forecasting system ÖKO-SIMPHYT. To control secondary leaf infections, strategies should be elaborated to achieve best efficacy with reduced copper amounts. Therefore copper amounts and application intervals should be adjusted to the infection pressure. Primary stem infections should be reduced by copper seed treatment in order to postpone the beginning of the blight epidemic as well as the start of spraying.

Above: Primary stem infection
Left: Infected tuber

Materials und Methods

Secondary leaf infections with late blight were controlled by several copper strategies. In field trials different copper amounts were sprayed with variable application intervals adjusted to infection pressure. Bit-parallel copper amounts and spraying intervals were adjusted variable on the infection pressure. The potato varieties Ditta and Nicola were used. Infection pressure was calculated with the new blight forecasting system ÖKO-SIMPHYT.

To ensure the appearance of primary stem infections, artificially infected tubers (varieties Agria and Quarta inoculated with zoospores) were planted in field trials. Subsequently seed tubers were treated with different application methods and copper fungicides. After emergence every week visible primary stem infections were measured and also PCR detection of latent stem infections was conducted. Finally the daughter tubers were analysed for tuber blight by PCR.

Results

In 2005 and 2006 late blight infection pressure was very low and disease appearance was late. Under these conditions the new blight forecasting system ÖKO-SIMPHYT reliably predicted the start of spraying and disease progression. In field trials all copper strategies achieved reduced secondary leaf infections with late blight, whereas between different copper amounts no significant differences were assessed. An efficient control of late blight with reduced copper amounts without yield losses was possible (Fig. 1).

A copper seed treatment significantly reduced primary stem infections of potato plants (Fig. 2). In 2005 seed treatment resulted in reduced secondary leaf infections. Thus, a delay of the blight epidemic as well as start of spraying were possible. Furthermore a copper seed treatment reduced tuber blight infections of daughter tubers (Fig. 3). The PCR detection of daughter tubers showed a decreased latent tuber infection with *Phytophthora infestans*.

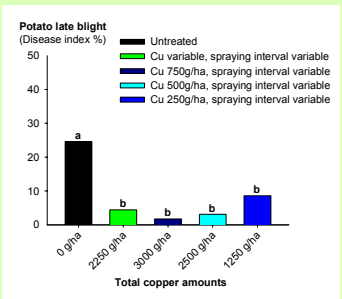

Fig. 1: Effect of different copper application strategies on potato late blight

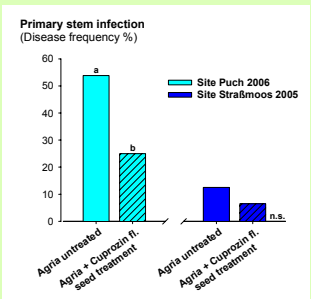

Fig. 2: Effect of copper seed treatment on primary stem infection (48g/t Cu)

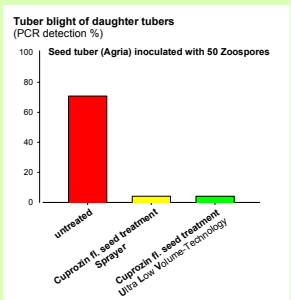

Fig. 3: Effect of copper seed treatment on tuber blight of daughter tubers

Summary

- **In 2005 and 2006 the new blight forecasting system ÖKO-SIMPHYT reliably predicted the start of spraying and disease progression**
- **By introduction of the new blight forecasting system ÖKO-SIMPHYT an efficient control of late blight with reduced copper amounts was possible**
- **Copper seed treatment decreased primary stem infection and resulted in reduced secondary leaf infections in 2005**
- **Copper seed treatment effected a reduction of *Phytophthora infestans* infections of daughter tubers**

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