

Potato crop management: a third way between conventional and biological agriculture ?

Definition: integrated crop management aims to limit pesticide treatment as much as possible, by use of alternative methods for crop management and pest control (e.g. the pests' natural enemies, agronomic techniques, plus environmental measures).

In the Picardie region of Northern France, potato crops require intensive treatment with pesticides in general and fungicides in particular. The annual mean number of pesticide treatments is around 20 (1 herbicide, 1 or 2 insecticide, 15 or 16 fungicide and 1 or 2 defoliant treatments). Hence, the crop's environmental impact is very significant.

Objectives:

Obtain acceptable (conventional) economic results by using integrated crop management
 Improve environmental indicator(s) linked to crop management

Testing integrated crop management on potatoes:

Mechanical weeding by hilling:

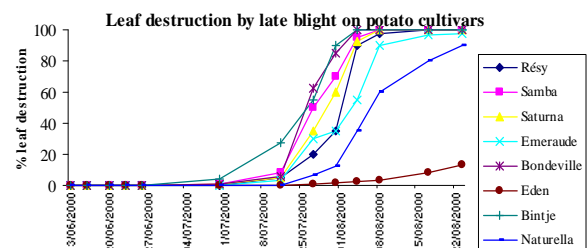
- 1 or 2 passes with a mechanical weeding tool



Results: efficiency was between 50% and 100%, depending on weather conditions following the tool's use. If the subsequent 2 days remain dry, mechanical weeding is as efficient as chemical weeding. Otherwise, it is insufficient.

The fight against late blight :

- choose late blight tolerant cultivars
- drive treatment with an epidemiological model (MILSOL, in collaboration with SRPV Picardie).



Result: crops need between 1.5 and 2 treatments less.

Mechanical defoliation by crushing : Nitrogen nutrition management to optimise the senescence entry date.

Result: potato haulm killing is satisfactory .

Nitrogen management: from 1997 to 2001, integrated crop management was tested, with lower nitrogen supplies than in conventional crop management.

Result: an average 9% decrease in yield was observed, compared to conventional crop management.

PROPOSAL for the integrated crop management of potato crops:

- Use late blight tolerant varieties as much as possible.
- Conventional date and sowing density.
- Novel evaluation of nitrogen requirements using the CRITIC model, in order to control maturity and optimise the senescence entry date. (Novel evaluation of N fertilizer rates applied to potato crops; C. Chambenoit 2002)
- Mechanical weeding, completed by chemical weeding, if necessary.
- Blight treatment driven by an epidemiological model
- Mechanical defoliation by crushing. It can be completed with a small amount of herbicide if the potatoes re-grow.

Remaining Questions & Issues:

- How can we manage the decrease in tolerance level over time shown by some varieties?
- It is necessary to introduce the novel calculation of nitrogen requirements into integrated crop management.
- Mechanical weeding is not sufficient: how should a combination of mechanical and chemical weeding be managed? (currently under test).

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Since 1997, in collaboration with agricultural research (INRA) and development institutes, Agro-Transfert has been testing integrated crop management on two crops: winter wheat and potato. Integrated crop management has been validated for wheat, experiments on potato are underway.

