

PLANT-BASED FERTILIZER AND NATURAL CROP PROTECTION IN SEED POTATOES



Summary

This research focuses on the use of green manures (such as grass-clover and/or grass) in rotation with seed potatoes. It examines the nitrogen effect of these green manures as well as their impact on aphid abundance in potato crops. A key part of the study involves monitoring aphid populations, as there is evidence suggesting that certain green manures and other soil improvement practices may reduce aphid numbers, potentially leading to more efficient use of soil nutrients.

The need

Viruses are a serious threat to seed potato cultivation, often causing deformities and yield loss in affected plants. Symptoms include leafroll and mosaic patterns on the leaves. To identify and remove infected plants, seed potato growers carry out field inspections throughout the growing season. If too many infected plants are found, the crop may be rejected by the certification authority (Dutch: NAK).

These viruses are primarily spread by aphids, which transmit the virus by piercing the plant. To prevent this, farmers spray insecticides and mineral oil onto the crops. However, an increasing number of these products have been banned in recent years, making it more difficult to protect the plants effectively.

As a result, alternative methods are being explored—such as covering the potato crop with straw to reduce aphid pressure. In this study, not only straw but also fresh grass and grass-clover were used. This choice was made because straw requires nitrogen to decompose. The aim of the study is to find out whether grass and grass-clover have the same effect on aphid populations as straw.



The benefits

Reducing the use of synthetic fertilizers is a key priority for seed potato growers. One specific area for improvement is the additional application of mineral nitrogen used to help break down straw.

When straw is applied to reduce aphid pressure in the field, it competes with the potato plant for nitrogen, as straw decomposition consumes nitrogen from the soil.

This study explores whether grass-clover and/or fresh grass could serve as effective alternatives to straw. These options are evaluated alongside the traditional method of using mineral oil.

The research also investigates whether intercropping different types of green manures between the potato ridges can offer a natural solution to virus problems. Because the green manure begins growing earlier than the potato plant, aphids may settle on the green manure instead—potentially reducing the risk of virus transmission to the crop.



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trans4num solutions

The research begins by exploring why certain practices are used in Dutch seed potato cultivation, and what drives growers to make these choices. These decisions are discussed with both farmers and advisors.

The next challenge is to determine whether the same goals can be achieved using alternative methods—while also reducing the input of minerals. This involves raising awareness among growers about the importance of limiting mineral use to protect water quality.

By monitoring nitrogen uptake by the crop at multiple points during the growing season, we gain a clearer understanding of the process and of the impact of inter-row green manures or straw/grass covers on the potato crop. With these insights, growers can adjust their management throughout the season, helping to minimize potential yield losses due to reduced mineral input.



What were the challenges / limitations in the implementation process?

- Significant reduction in pesticide use — nearly eliminating aphid control agents and oils used to prevent virus transmission.
- Reduced use of fertilizers.
- Recovery of lost productivity and improved farm resilience and efficiency.
- Increased biodiversity: less chemical use leads to lower impact on ecosystems during cultivation.
- Improved water quality at the regional level, due to reduced leaching of chemicals and fertilizers.



What kind of resources do you need to implement the proposed solution?

- Nitrogen sampling at the beginning and end of the growing season.
- Crop development assessments at several points during the season.
- Evaluation of plant differences and stem counts to determine the impact of each treatment.
- Yield measurement and size grading per plot.
- Virus monitoring during the season and through post-harvest tuber inspections.

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More information

- [Dutch paper on Integral control of PVY 9 in seed potatoes](#)
- [Dutch article on applying straw to reduce aphid pressure on seed potatoes](#)
- [Video: Cover crops in a potato based crop rotation](#)
- [trans4num Dutch NBS site](#)

