



NBS CASE

Plant-based fertilizer and natural crop protection



Cover crops (grass clover and/or grass) in rotation with seed potato. The nitrogen effect of the cover crops and the effect of the cover crops on aphid abundance in seed potato is investigated. This work will include monitoring aphid populations since there is evidence to suggest that different cover crops and other soil ameliorations can reduce aphid numbers and thereby enhance the efficiency of soil nutrient use.

Viruses are an important threat in the cultivation of seed potatoes and cause deviations and loss of yield in deviated plants. These deviations can express in leaf roll, or as mosaic leaves. During the entire growing season seed potato farmers carry out field inspections to identify deviations in the crop and remove diseased plants. The presence of too much diseased plants can lead to rejection from inspection authority NAK.

These viruses are mostly transferred by aphids. The aphids prick in the plants for the transformation of the virus. To prevent aphids from being able to prick the plants farmers spray insecticides and mineral oil over the plants.

The last years more and more pesticides are banned and the challenge of keeping the plants becomes bigger. Therefore the last years experiments have been done with spreading straw over the potatoes to decrease of aphids pressure.

In this research not only straw has been spread but also fresh grass and grass-clover. This choice has been made because straw needs more nitrogen to decompose. In this research we try to find out if grass and grass-clover have the same working on aphids.



Challenges addressed by the NBS

Reducing the use of artificial fertilizers is high on the agenda of seed potato growers. The use of extra mineral nitrogen in seed potato cultivation to decompose the straw is a point of attention where profit can be made. When using straw to reduce the presence of aphids in the field, the potato plant has less nitrogen at its disposal, because the decomposition of straw requires nitrogen. The research is based on the possibility that grass clover and/or fresh grass could be an alternative to the use of straw. This will be evaluated in relation to the traditional method of adding mineral oil.



trans4num's main research questions and ambitions

- Investigate why certain operations are carried out in the cultivation system of seed potato cultivation in the Netherlands and why growers make this choice.
- Investigate whether the same goal can be achieved with replacement products, while at the same time achieving a reduction in mineral input.
- Create awareness among growers about the necessity of limiting mineral input in favour of water quality.
- Map the n uptake by the crop at several moments during the season so that the application of grass / lucerne can be optimised.

Which biophysical, agronomic, and farm management implications does the NBS have at field and farm level?

- A large reduction of pesticides to almost zero use of aphicides and oils to prevent the spread of viral infections by aphids.
- Healthier crops by reducing stress in the crops due to reduced use of chemicals.
- Reduced use of fertilizers.
- Restore lost productivity and improve farm resilience and efficiency.
- Increased biodiversity, due to reduced use of chemicals, biodiversity is less affected during cultivation.
- Improved water quality at area level due to less leaching of chemicals and fertilizers.

Which indicators/criteria are used to assess the success of the NBS in addressing the challenge?

The success of the NBS in addressing its challenges is assessed using the following indicators/criteria:

- **The nutritional value** of the different products is known and it's also known if they give the same effects of straw on reducing aphids available in the field.
- This will be a comparison between an industry standard practice and a possible novel substitute for the industry standard practice. The amount of aphids and virus infection between all the treatments will be measured. The aphids will be count by using sticky traps, the virus infection will be determined by using PCR.
- **The yield** of the potatoes will be determined by harvesting the plots and the potatoes will be sorted by size with the use of a GeJo smartgrader.
- During the season the crops will be observed and reviewed if there are any virus infections visible.

These indicators provide a comprehensive assessment of the NBS's success in addressing its challenges.

What methods/tools are used for the NBS assessment?

- **Nitrogen soil** samples: at the start and after the season, sample each field.
- **Nitrogen fertilizer** samples: for application a sample of the ingredients of the grass silage and straw.
- **Assessment of crop** position, 3 separate aspects: growth, color and crop health for which one score is given each moment (scale 1-10), moments are after emergence, around tuber formation and halfway through flowering (in combination with tuber number determination), a final time just before foliage death.
- **Assessment of percentage flowering**: if visible differences during the position observation, flowering expressed as a percentage
- **Number of plants and stems** in the different fields
- **Yield determination** and size sorting (number of tubers and weight per size) of each field.
- **Moisture measurements** during the season: 2x, once before and once after tuber formation. By taking a gouge sample which is dried in the drying oven for the percentage moisture loss.
- **Virus observation**: during the season 2x 20 samples and 1x 60 samples per field.

Contact NBS team

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NBS site and scale

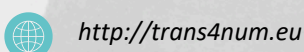
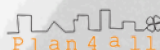
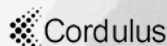
NETHERLANDS

- 1. Kollumerwaard
- 2. Ebelsheerd



trans4num is a four-year project funded under the Zero Pollution call as an EU-China international cooperation action on nature-based solutions (NBS) for nutrient management in agriculture.

trans4num ambition is to broadly enhance the NBS implementation in Europe with an integrative and tested multi-level approach, in dialogue with academic partners, practice partners and societal stakeholders.



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