

GREEN FERTILIZERS: LUCERNE AND CLOVER PELLETS FOR WINTER WHEAT



Summary

Plant-based fertilizers offer promising opportunities to make grain cultivation more sustainable. Grains have a high nitrogen demand, making this crop particularly suitable for reducing CO₂ emissions. Research into the potential of plant-based fertilizers increases the likelihood of a shift toward more sustainable grain farming.

The need

There is a growing need for research into alternative fertilization methods in grain cultivation. Conventional farming typically uses a combination of synthetic fertilizer and a second application of slurry. In organic farming, fully animal-based fertilizers are more commonly used.

The challenges differ between the two systems. Organic farming already relies largely on circular fertilizers, but the availability of animal manure is limited, creating a demand for alternative sources.

In conventional farming, linear (non-renewable) fertilizers are still widely used, accounting for about 50% of total fertilizer input. The key challenge here is reducing dependence on these inputs. Fertilizer prices have risen sharply in recent years, and concerns about nutrient leaching into surface water are becoming increasingly urgent.

A potential solution for both systems could be increased use of plant-based fertilizers, such as alfalfa or grass pellets.



The benefits

The use of plant-based fertilizers offers a major opportunity to reduce chemical fertilizer use in conventional farming. Additionally, it can help lower the use of animal manure in both conventional and organic grain cultivation.

By introducing this third fertilization option, farmers become less dependent on synthetic and/or animal-based fertilizers.

The use of more natural products is also expected to improve soil biodiversity, which in turn supports better soil health.

Grain farming often operates on tight margins, so rising fertilizer costs can have a significant impact on profitability.

At the same time, the Netherlands faces a pressing challenge to improve water quality – an issue in which the agricultural sector plays a key role. Regulations on fertilizer use are becoming increasingly strict. The need to maintain yields while also improving water quality is urgent. Using plant-based fertilizers to help prevent nutrient leaching is a practical and forward-looking solution that fits well within the operations of many farms in the coming years.



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trans4num solution

We are testing whether the standard fertilization in both organic and conventional winter wheat cultivation can be fully or partially replaced by alfalfa and/or grass pellets. We are examining different application rates and timings.

Soil samples are taken from the fields before and after the growing season to measure how much nitrogen and other nutrients remain in the soil.

Throughout the season, crop development is monitored, focusing on plant growth, common diseases, ripening, and lodging. At the end of the season, yield and grain quality are assessed, including moisture content, protein level, Zeleny index, hectoliter weight, and starch content.


The pellets used in the trials have been analyzed beforehand for their nutrient composition, which determines the appropriate application rate.

Each year, the different treatments are compared. After four years of research, we aim to provide a well-founded recommendation on the advantages and disadvantages of using plant-based pellets compared to current standard fertilization practices in both organic and conventional winter wheat farming.



What were the challenges / limitations in the implementation process?

- How do Lucerne and grass pellets compare to my standard fertilizer?
- Can Lucerne or grass pellets reduce my dependency on conventional fertilizers?
- What specific benefits do Lucerne and grass pellets provide in my fields?
- Do Lucerne or grass pellets have any impact on the next crop, such as cover crops or the following main crop?
- Is the use of plant based fertilizer increasing the risk of weed pressure?
- Does soil life improve when using plant-based fertilizers like grass-clover?



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

- Sufficient availability of plant-based alfalfa and/or grass pellets.
- Possibility to apply the pellets early in the season onto the crop.
- Knowledge of soil nutrient levels through soil sampling, in order to determine the correct fertilization dosage.
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More information

- [SPNA article on Plant-based fertilization](#)
- [Caring farmers - 100% vegetable fertilizer - is it possible?](#)
- [trans4num Dutch NBS site](#)

