

Prosjektnummer: 200034

Prosjektnavn: Utvikling av bærekraftig krydderurtproduksjon

Prosjektleder: Kenny Brown

Formål og målsetninger med prosjektet:

"Make organic herbs with the same quality, the same growth time, lower fertiliser costs and the same durability as today"

The project aims to create an organic fertiliser suitable for use in a hydroponic/automated watering system, tailored for the greenhouse environment. The project looks to achieve this by adapting technology, created by N2 Applied, to process nutrients from several environmentally friendly, reclaimed, or recycled sources. The N2 Applied treatment will create a reactive nitrogen solution, which will be used to provide the fertiliser with the necessary nitrogen compounds while also facilitate the nutrient extraction from the selected nutrient sources.

Snarum Gartneri AS will be assessing this fertiliser on several criteria on a range of herbs. The plants that are watered with this solution must perform equally to plants fertilised with the current inorganic solution. The new fertiliser must be price competitive with the current fertiliser solution. The plasma process to produce the reactive nitrogen also produces a considerable amount of heat. Heat will be reclaimed and used to heat the greenhouse during winter months. It is important to have the appropriate bodies certify the product økologisk appropriate.

The project had several goals and sub goals, of which some have been achieved and some have not. The project achieved in producing a high quality fertiliser using only organic/recycled organic sources and the N2 process. This has been tested in the greenhouse and we are happy to have product that we produced. Unfortunately, this fertiliser was not able to be certified as organic. As such the business case for Snarum to adopt this technology was not there. However, as it is just certifying the product that is the problem, the ground work has been set so that in the future the remaining goals can be met once the official project has finished. This mean that although the gaols haven't been met in the time frame we initially intended, Snarum and N2 Applied will continue to collaborate with each other and hope to complete the conversion to organic herb growing in the future. This would not have been possible without the funding provided by Grofondet.

De viktigste resultatene fra prosjektet:

The N2 plasma unit was designed to treat organic slurries, i.e. manure or digestates. We have developed a system that can handle mineral-based solutions. This modified system has been utilised to treat materials with nutrient that are otherwise inaccessible, an example of this is struvite. Knowledge of how the individual components of the fertiliser work together have been very important. Snarum detected issues with some of the fertiliser that was developed, one of the nitrogen components produced caused issues with the growth of root. In the last year both parties work to identify this and we now understand herbs are sensitive to having nitrite in the fertiliser. This has lead to changes in how the fertiliser was produced. This was unforeseeable with out extensive test on the herbs. This is one example of how we have developed the fertiliser but they have been several, including the concentrations of essential nutrients in the solution.

Plant growth

In the first year of the project, we tested N2 Applied's nitrogen on the plants, this year we tested a full fertiliser solution. There were better and worse solutions, what this year has achieved is to extensively test components as a whole and develop a very good solution for growing herbs. This was achieved while using only organic certified, or organic recycle products alongside N2 Applied's

nitrogen. We are now confident that we can produce a fertiliser that is suitable for this type of automated watering system.

Machine developments

Initial steps have been taken to prototype a machine for greenhouse placement, although this was put on hold after this stage due to the potential of not achieving an organic certification for the product.

Knowledge of Organics in Norway

Intensive work has been undertaken to fully understand the criteria and process behind organic certification in Norway, this was due to the initial application being rejected based on more information and knowledge needed. Acquiring the research will take time, however, N2 Applied is committed to continuing the research into the future.

Viktigste aktiviteter:

(1) Rigorous and extensive phenotyping of plant grown with the N2 fertiliser. (2) A continuation of raw material selection/processing and testing.

To be successful with fertiliser design many factors must be considered. However, the most important aspect is how plants react and grow. We believe we have achieved in producing a fertiliser that is as simple to use/dose and as effective as traditional chemical fertiliser. The current make up and materials used produce a fertiliser that has a semi-tailorable nutrient ration that only uses organic inputs, as well as the N2 nitrogen. There were some issues at the beginning of the year, and as such modifications and changes were made to the fertiliser. Due to the time frame involved in each plant phenotyping test, this was completed throughout the entire year and even so more tests with different species will need to be completed. However, it has been a success, a suitable fertiliser with tailorable nutrients was designed and produced.

(3) Designing appropriate modifications to the N2 machine to enable tailorable fertiliser production. The standard N2 Applied machine was used to produce the nitrogen. From here prototype mixing/dissolving units were built to replicate a potential design that could be used at Snarum.

(4) Work behind Organic/økologisk certification.

Organic certification is a key criterion for the business case of the project. Without this certification it no longer makes financial sense for Snarum to invest in the machine. As such many hours from multiple people have been invested into trying to achieve this. N2 Applied had an application for organic certification turned down, we however believe there was a misunderstanding due to lack of evidence. As such a lot of work is invested into designing reports and culminating the science behind the technology to reapproach the topic. N2 Applied also believes this is of total importance and as such will continue to invest time and resources into this once the project has finished.

(5) Machine interface/business case with Snarum As previously stated, the business case for Snarum hinged on the organic certification. As such we postponed the machine integration and design until the organic question has been answered. This is unfortunate but is necessary for the success of the project. The ground work for implementing the machine has been completed and in the future, when certified Snarum and N2 Applied will revisit the topic.

Ekstra tilegnet kunnskap:

We have learned a lot about how nitrite works within a hydroponic/automated watering system. This includes refining the balance between being detrimental to plant growth and providing a method of sterilising the watering system, to inhibit microbial growth.