

Investing in strawberry resilience

Less nitrogen and phosphate boost yields and resilience



An extensive field trial got under way in spring 2018 with a container crop grown on gutters in an open plastic greenhouse.

Extensive trials of biostimulants in strawberry cultivation in North America have produced increases in yields averaging between 10 and 15 percent. But figures like these haven't yet been achieved in the Dutch crop, where the setup is different. In a new, wide-ranging series of trials, a supplier hopes to uncover the right cultivation recipe.

"We firmly believe that the Natugro programme adds value to almost every soil and container crop. This sustainable system, which is based on microorganisms and biostimulants, has been trialled for four years in North America. We consistently saw yields rise by between 10 and 15 per cent there and it is now being used on a large scale in the commercial setting.

"Some pioneering Dutch strawberry growers have been gaining experience with this system in greenhouse crops over the past two years but the results haven't lived up to

expectations. So adding microorganisms and biostimulants to the soil or substrate is not the whole story. You also have to take a close look at the nutrient supply."

Explaining this is Mark van der Werf, soft fruit consultant at Koppert Biological Systems. Although he doesn't yet have a ready answer to the question as to how Dutch strawberry cultivation can fully benefit from the programme with its biostimulants, microorganisms (including Trianum) and additional nutritional components, he thinks he can explain the marked difference between the Dutch experiences and those in North America.

Reverse effect

"First off, there are substantial differences in cultivation methods," he says. "Most of the strawberries grown in North America are everbearers that are grown in open fields. Dutch strawberries are grown both outdoors and indoors, with a strong emphasis on early

summer fruiting varieties. We have also noticed that in modern cultivation practice it is not unusual to oversupply immediately absorbable nutrients, particularly nitrate. But adding biostimulants and microorganisms to such a rich system can sometimes have the reverse effect because it boosts the plant's uptake of nitrogen."

Microorganisms (fungi – mycorrhizae and trichoderma – and bacteria) and biostimulants (amino acids, seaweed extract and plant extracts) are the cornerstones of the Natugro programme. Depending on the crop and the feeding regimens the grower uses, these components can be supplemented with organic fertilisers to optimise the overall picture.

More sensitive

"We know that an oversupply of directly absorbable nitrogen makes plants more susceptible to fungal diseases such as mildew and also to some insects such as thrips and aphids," adds Sjoerd Smits of the Dutch company Nova-

CropControl. “That has been scientifically established time and again.”

This effect, which has also been observed by the Dutch strawberry growers who have trialled the Koppert system in recent years, runs counter to the intended aim of producing a more resilient, more vital and more productive crop by improving the health of the soil and achieving more efficient uptake of nutrients in the right proportions.

Trial setup

In order to get to the bottom of this, the research centre was asked to carry out a series of trials. Smits: “Koppert has opted for a pragmatic system approach, in which we compare different fertilisation levels with and without Natugro on the basis of yield figures, plant sap analyses and pest and pathogen monitoring. Of course, a healthy and varied soil life does much more for a plant, but to keep our research practical and affordable, we don’t zero in on this.”

On 7 May, an extensive field trial got under way with a container crop growing on gutters in an open plastic greenhouse, consisting of six treatments and five repetitions. Two feeding regimens, one standard and one reduced (with an EC of 1.6 and 1.3 respectively), were compared with a regimen involving Natugro and one with alternative biostimulants. In the reduced feeding regimen, 20 percent less nitrate and phosphate and slightly higher concentrations of some trace elements were given. The nutritional solutions in these linked treatments could be adapted during the trial if the data indicated a need to do so.

Minerals and plant vitality

Van der Werf explains the choice of treatments: “Twenty percent less nitrogen and phosphate sounds quite drastic, but the latest insights have revealed that these elements are offered in excess in the standard regimen used for strawberries. We know that some



Mark van der Werf (left) and Sjoerd Smits pass through the trials, inspecting as they go. Up to now the plants have developed extremely well under the reduced feeding regimen.

trace elements make a positive contribution to both yields and plant vitality. So we want to feed these at a slightly higher level.”

Smits: “We have been taking plant sap measurements for years, and that’s helping us get a better understanding of the phenomenon of plant vitality. Big advances have already been made in pest and disease prevention in various crops based on adapted fertilisation regimens. We are not only looking at the quantities and proportions of minerals in the root environment, but also at the form in which they manifest themselves in the plant.”

Complex molecules

The researcher cites nitrogen as an example. This element can occur in the plant as nitrate and as a building block of proteins. “Many pathogens can process nitrate but not complex proteins,” he explains. “Something similar also applies to carbon. The plant can store this in the form of monosaccharides, disaccharides or polysaccharides. In general, the more complex the molecules, the more difficult they are for pathogens to process.”

“In terms of our system, the hypothesis is that the complex of microorganisms and biostimulants in the root environment promotes the formation of complex proteins in the plant, making them less susceptible or less attractive to pests and diseases,” Van der Werf adds. “Quite apart from that, the fact is that a richer soil life is better able to keep soil pathogens at bay, simply because of the increased competition for space and nutrients.”

Initial observations

Although it is too early to draw firm conclusions as yet, researcher and client speak positively about the development of the crop in the trials with the lower feeding regimen. “On the face of it, the lower doses are producing much the same results as treatments with standard nutrient solutions,” Smits says.

“It remains to be seen to what extent the microorganisms and biostimulants will impact positively on yields and resilience. Our expectation is that increased plant vitality and reduced susceptibility to pests and diseases will make a positive difference which will gradually increase. Our employees will have their hands full in the next few weeks with harvesting and weighing, scouting and plant sap analyses. The trial comes to an end at the end of October and we will know more in the following months.”



A battery of storage tanks supplies the various nutrient treatments.

Summary

Adding microorganisms and biostimulants to the substrate can boost nitrate uptake. This can make strawberry plants more susceptible to pests and diseases and produce less instead of more. Research is looking at whether investing in resilience by reducing nutrient levels will produce better results. Initial impressions are encouraging.