

## **XIII Results from crop protection trials in minor crops in 2017**

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In 2017 the minor crops group at AU Flakkebjerg carried out 76 field and greenhouse trials. These trials were distributed over 20 trials in vegetables, 18 trials in fruit and berries, 11 trials in garden seeds and 9 trials in nurseries and Christmas trees and on uncultivated areas. In addition, there were 16 greenhouse trials (mainly ornamentals) and 2 insecticide trials in agricultural crops, which also belong to the group's activities.

The group's activities are especially characterised by comprising many different crops but also all the common subjects within crop protection, that is to say control of weeds, diseases and pests as well as growth regulation. It is also against this background that there are many different stakeholders behind the trials, which are broadly financed by various agricultural tax funds, GUDP, agrochemical companies and various private trial partners. The Swedish minor use project under LRF has also been a major client and collaborator in the past few years.

The range of traditional chemical crop protection products has for several years become smaller and smaller, and this development seems especially evident in the minor crops. Although Denmark is located in the North Zone together with areawise large countries like Sweden and Finland (and the Baltic States), agricultural production is small, and the market for crop protection products for minor crops is not of that much interest for the agrochemical companies. Therefore, we often see that if a product does not also have an agricultural use/authorisation that ensures a certain sale, then there is a major risk that it will disappear from the market. In other cases, it is also often seen that products on re-registration only keep the agricultural authorisation for products previously used in both agricultural and minor crops.

Because of this development, the group's activities have become increasingly characterised by the growing interest in products with a microbiological or another alternative effect – an interest shared by the industry and certain companies. There is also a great interest in products which have an effect on pests but which are not registered as crop protection products. This includes products on the Basic substances list but also for instance fertilisers or so-called plant enhancers. Within weed control there is an awareness that the times when chemistry could handle everything are over and that it is necessary to supplement with other forms of weed control.

However, the testing of chemical solutions is still the major activity in the trial unit, and a summary of the most important activities is presented below.

### **Weed control in vegetables in 2017**

The majority of the weed control trials was carried out for the Swedish minor use project. Especially the Swedish onion and carrot growers have been badly affected by the changes in the range of herbicides. As some within the industry will know, the loss of Stomp and Totril has been a theme in the trials for some years. But whereas we in Denmark still have access to Stomp and whereas Totril has been replaced by Xince (bromoxynil), the situation in Sweden is different as Stomp probably will not get an authorisation again, and at the same time it is very uncertain whether there will be any bromoxynil products in Sweden at all. Furthermore, the dose rate of Fenix has been severely reduced so that a maximum of 0.9 litre per

hectare is permitted, which is considerably less than the dose rate previously permitted for use to especially the carrot and parsnip growers.

The Danish activities concerning weed control in vegetables have mainly been concentrated in the GUDP project HORTPROTECT including work with direct sowing and strip tillage in onion, beetroot and cabbage. Another element in the project is testing of row-differentiated weed control, that is to say different weed control within the row (intra-row) and in the space between the rows (inter-row). The testing includes a dual band sprayer allowing intra-row spraying with a selective herbicide and at the same making a shielded inter-row spraying.

#### **Weed control in garden seeds in 2017**

Denmark's status as the world's largest producer and exporter of spinach seeds is a contributing factor for the industry to be continuously on the lookout for new herbicides or ways of controlling weeds. Another contributing factor is that there is still an ongoing search for a replacement for Asulox, which is a key herbicide in spinach growing. Besides a number of trials in spinach, weed trials in 2017 were also carried out in pak choi and cress for seed production.

#### **Control of fungal diseases in vegetables in 2017**

A number of fungicide trials were carried out for agrochemical companies, while the industry's own main priority has been to find an alternative to Acrobat for control of onion mildew. This product has for a number of years been the leading fungicide for control of this disease, which – when untreated – can develop at epidemic speed, but the company has withdrawn the product from the Danish market. The attempts at finding alternatives have been going on for some years, but since 2016 the trials have been carried out at Flakkebjerg with artificial inoculation. This trial method has so far proved a good way of ensuring the presence of the wanted pest in the trials, which cannot always be guaranteed.

#### **Control of fungal diseases in spinach in 2017**

As mentioned above, Denmark is the world's largest producer and exporter of spinach seeds, and the area will in the coming season exceed 10,000 hectares. Weeds are a major challenge in spinach growing, but the humid Danish climate may also cause problems with fungal diseases in some years. To be able to export seeds to the whole world, seeds must be of the absolutely best quality, and therefore the fungal diseases must be kept in check in order to protect the seeds against infection, but of course also to ensure yield. So far, many have used a control strategy with a relatively high input of pyraclostrobin and boscalid; this is unfortunate because this practice increases the risk that the fungi develop resistance to these substances. Therefore, there is a major need to develop strategies with other active substances, and this trial work, which is expected to last some years, began in 2016 with a single trial and was continued in 2017 with 3 trials.

#### **Plant protection trials in greenhouse cultures**

The trial unit's major activity in greenhouse cultures in 2017 was a number of growth regulation trials in ornamentals. Besides a number of registration trials, a number of trials were carried out in the Swedish minor use project. Cycocel has for many years been extensively used for growth inhibition of ornamentals in many countries. However, there is uncertainty concerning the future of the product, and in Sweden there is much to suggest that it will not be re-registered for agricultural use, and that it will therefore no longer be a possibility for use in ornamentals either. In 2016 trials were carried out in 5 different vigorously growing ornamentals, and these trials were repeated in 2017. Various growth regulation products were tested with rather different results. Some substances work well in one culture but result in damage or have no growth regulatory effect in other cultures. There is also a difference as to whether the products are being drenched at the beginning of the culture period or whether they are being applied by spraying.