DARCOFenews

Newsletter from Danish Research Centre for Organic Farming • December 2004 • No. 4

Articles in this issue

Common Couch-grass control with less tillage

By **Bo Melander**, **Ilse A. Rasmussen**, Dept. of Crop Protection, Danish Institute of Agricultural Sciences and **Inger Bertelsen**, the Danish Agricultural Advisory Service, National Centre, Crop Production

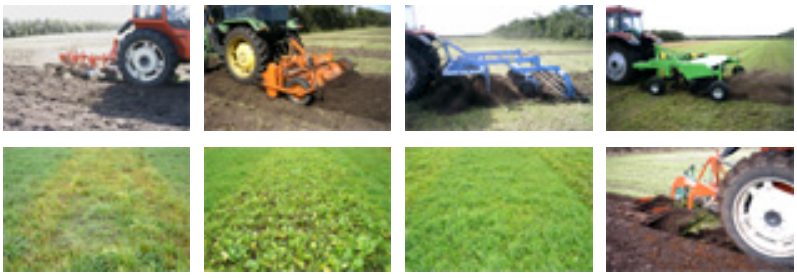
Common Couch-grass (*Elymus repens* (L.) Gould) constitutes a major perennial weed problem in organic cropping systems in many parts of Denmark with great negative impact on crop yield and quality. Couch infestations are traditionally controlled by repeated stubble cultivation in the post-harvest period from harvest to ploughing, either early autumn before sowing a winter-sown crop or in late autumn.

However, in organic farming, post-harvest tillage is undesirable due to the need for retaining nutrients, particularly nitrogen, in the cropping systems. The soil is often cropped with catch crops, autumn sown crops or perennial crops in that period, thus limiting opportunities for post-harvest tillage.

Two integrated strategies

In this article, a new control strategy (Strategy I) against couch is presented that merges the objectives of achieving a significant reduction of couch while having the soil covered with plants during most of the post-harvest period. Strategy I represents an integration of rhizome fragmentation by soil cultivation within one or two days after harvest in early August with subsequent catch crop growing in late summer and autumn to suppress shoot growth from the weakened rhizome fragments.

Strategy I is discussed in relation to another strategy (Strategy II) that also includes catch crop growing in late summer and autumn, but is preceded by a mid-summer fallow period lasting 4-6 weeks, where repeated soil cultivations are conducted to fragment, weaken and desiccate the rhizomes.



Photos No. 1-8. Click for enlargement

Field experiments

Strategy I has been evaluated in two field experiments on a coarse sandy soil heavily infested with couch. The experiments, a and b, respectively, were established just after harvest of spring barley in August 2002 and August 2003. **Table 1** shows the factors that were studied including photos of the different implements and catch crops that were used.

Mechanical disintegration was conducted within two days after harvest and

not Couch-grass or annual weeds

News briefs

Front

straw removal, and the catch crops were sown subsequently so that both rhizome disintegration and catch crop establishment were accomplished no later than one week after harvest. Spring barley was sown in the following spring and the overall effects on couch including barley yield were assessed at harvest.

Strategy II was undertaken by the **Danish Agricultural Advisory Service, National Centre, Crop Production**. The mid-summer fallow period was started around first of July by shallow mouldboard ploughing to 10 cm soil depth and then followed by tine cultivation once a week till early August where the fallow period was ended by mouldboard ploughing to 20 cm soil depth.

A competitive catch crop (mixture of red clover, fodder radish, winter rye (*Secale cereale* L.) and winter vetch) was established to suppress couch shoot growth and to take up nutrients during autumn. The effect was assessed the following year in spring barley. Results from totally 5 experiments on fine or coarse sandy soils, one started in 2001 and four in 2002 and then assessed in 2002 and 2003, respectively, are presented.

Effects of strategies

Results from the two years experiments with strategy I varied considerably. None of the three factors affected couch in expt b) because of wet and cold weather conditions during most of the summer 2004, presumably promoting couch growth to an extent where the effects of previous year's treatments were eliminated. However, effects were evident in expt a) where p.t.o.-driven rotary cultivation gave the highest growth reduction compared to untreated **(Figure 1A)**, but compared to the infestation level prior to starting the strategy, the reduction was only roughly 40 percent.

Catch crop growth during the autumn 2002 and 2003 suffered from very dry weather conditions resulting in poor establishment and canopy development. In spite of that, the radish/ryegrass mixture significantly suppressed weed growth in expt a). The mixture also affected the crop's ability to compete with couch in the subsequent year as shown in **Figure 1B** where barley grain yield is related to the amount of couch biomass that followed the treatments (1-5) under factor 1.

The radish/ryegrass mixture had strengthened crop growth more than no catch crop and the clover/vetch mixture, probably by providing the crop with more nutrients as a result of better nutrient uptake during the post-harvest period and a subsequent better release of nutrients after incorporation into the soil. Timing of ploughing had no effect in expt a).

Strategy II gave very high and consistent reductions of couch infestations, leading to 91-99 percent efficacy compared to the infestation level prior to starting the strategy. A stronger weakening and desiccation of rhizomes took place during the mid-summer fallow period in strategy II than in the short-term mechanical treatment in strategy I.

Probably strategy I would have shown more marked effects, if catch crop establishment and growth had been more successful. Strategy II was also more effective than common couch control with repeated stubble cultivations in the post-harvest period.

Concerns and perspectives

Strategy II has disadvantages as well. It has been tested in long-term organic crop rotation experiments where high effects the first year tended to decline rapidly within a few years. Also, the rather long mid-summer period with fallow may lead to undesirable nutrient loss through leaching, which subsequently may give rise to crops that are less competitive against couch. In addition, the grower will have to desist from growing a full-season cash

crop. These aspects should be counterbalanced against the urgency for couch control and other possible control options.

Strategy I appears to be most relevant for low infestation levels of couch, and mainly aims at maintaining infestations at controllable levels. Strategy II would be more appropriate where infestations have become large and need to be reduced considerably and quickly in order to preserve yield of future crops.

About DARCOFenews | **Archives** | **DARCOF** | **Front**