

Recent advances in weed management in cereals in Denmark

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Introduction

The aim of this presentation is to present some of the results from the research on management of annual weeds in cereals in organic farming in Denmark. Research has been conducted on crop and weed ecology, mechanical weed control and cultural factors affecting the crop weed competition and efficacy of mechanical methods. Strategies for the integrated use of these factors are being developed.

Results

Cultural methods

Crop competition against weeds can be improved by the choice of more competitive crop cultivars, which may reduce the need for weed control. The main characteristics of crop competitiveness are canopy height, growth rate and spatial distribution of the canopy foliage. The difference in weed biomass varies by $\pm 25\%$ among winter wheat as well as spring barley cultivars.

Delaying the sowing time in winter cereals by 3 weeks has been proven to decrease the density and biomass of weeds by 30 to 75%, depending on the weed species composition etc. Since the yield loss with this delay in sowing was about ten percent in weed free conditions, this method seems to be relevant only at high levels of weed infestation, where weed competition would otherwise cause a larger yield loss.

Placement of slurry in the soil close to the crop rows in spring cereals improves the competitiveness of the cereals against weeds. Without additional weed control, weed biomass was reduced by up to 50% in barley and crop yield increased by 15-35% in barley and oats by placement of the manure.

Crop rotation influences the weed infestation, i.e. the amount of weeds was lowest in cereals grown the first year after plowing a clover-grass field, and increased to twice the amount three years after clover-grass.

Mechanical weed control

Weed control in cereals can be achieved through a strategy combining pre-emergence and post-emergence harrowing, if necessary augmented by later selective harrowing. A good result can be achieved in spring cereals, where up to 80% efficacy has been reached. There is a positive relation between crop competition and efficacy of mechanical control, i.e. there seems to be a positive interaction so that placement of slurry close to the crop rows in some cases enhances the effect of mechanical weed control and reduces the harm to the crop.

If the weed pressure is very high, the cereals might be sown at larger than normal row distance to enable hoeing. This could be especially appropriate for winter cereals, where it is often difficult to achieve a good effect on weeds without harming the crop at post-emergence harrowing in the fall, and often the soil is also too wet for the control to be carried out.

Mechanical weed control cannot be carried out in broadcast cereals with undersown ley or catch crops. A new sowing technique has been developed, where the underseed is placed in the same row as the crop plants. It is then possible to carry out mechanical weed control with little loss of yield and good establishment of the ley or catch crop.

Discussion

While some of the above mentioned results are from field experiments under organic conditions, others are from conventional farming practices. As there is generally a larger weed problem on organic farms, it may prove difficult to achieve as good results as mentioned above. It is important for the organic farmer to take heed of the weed problems when planning the crop rotation, then utilise all possibilities for cultural methods of weed prevention, and finally use the necessary control in each field, not only to secure the yield in that crop, but also in order to prevent seed shedding which might give problems later. Work is continuing to develop management strategies suited for organic farming, but more research is needed, for example on the role of crop rotations.

Although the work mentioned covers many aspects, there are still others which are known to influence weeds, for example soil tillage, which must also be taken into consideration.

A list of references is available on request.