IPM strategies to reduce weed infestations in grass seed crops

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Introduction

Many annual grasses are difficult or impossible to control chemically in grass seed crops. At the same time seed characteristics make it difficult to separate the seeds from some of the cultivated grasses in the cleaning process. A main issue in an integrated strategy is therefore to reduce or eliminate the seedbank of weed species that possesses the above mentioned characteristics before the grass seed crop is established. This poster summarizes seedbank investigations of important annual grasses as weeds in grass seed production.

Preparing seed samples of a grass species for field studies of seed survival

It further gives the main conclusions concerning factors of importance in IPM strategies. These involve particular attention to the handling of volunteer seeds. In general seed survival is strongly reduced at the soil surface compared to incorporated seeds. Crop rotations and cropping systems that allows the volunteer seeds to be left as long as possible at the soil surface or in stubble favours a fast decrease of the soil seedbank of the investigated annual grasses.

Results

Seed survival of the most important annual grasses creating problems in grass seed production has been investigated. Soil tillage is the primary factor moving seeds between soil layers. The studies has examined seed survival following different relevant simulated soil tillage operations. At maturity seeds are shed and placed at the soil surface and soil tillage operations will incorporate these seeds to deeper layers depending on the tillage implement used. Seed survival has been investigated following placement of the seeds at the soil surface or incorporated at different depths in the soil. The studies has included different intervals where the seeds has been placed at a certain position in the field.

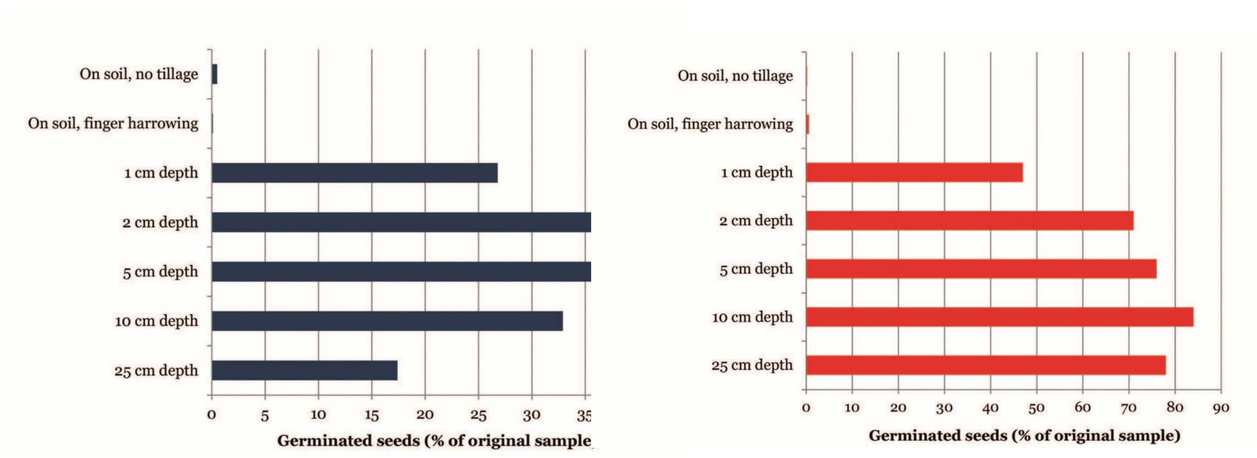

Figure 1. Germination of seeds of blackgrass from samples kept at different soil depths in the field from the beginning of August to the end of September. The figure shows the number of plants in the germination test as a percentage of the original seed sample. LSD = 7.5 in 2017 (left) and 3.6 in 2018 (right).

Figure 1 show an example of the type of studies with blackgrass (Alopecurus myosuroides). The seeds were harvested at maturity and immediately after seed samples with known numbers were placed in the field either at the soil surface or at different distinct soil depths. The placement simulates tillage varying from no tillage (placement at the soil surface) to ploughing (25 cm depth). By the end of September all samples were collected and the percentage of viable seeds in the sample was examined in a germination test. Almost all seeds placed at the soil surface had lost there viability or were disappeared during the period. Seeds that were incorporated even shallowly in the soil immediately after seed shedding on the other hand had a much higher percentage viable seeds.

Table 1 The influence of stubble treatment on the viability of newly shed seeds of important annual grasses are summarized in Table 1. Generally the largest reduction in viability is seen when the seeds are left undisturbed at the soil surface. Bromus species are the main exception.

Figure 2 show an example of the effect of false seedbed technique on viability of annual grasses at the soil surface. Seed samples of Vulpia myuros and Poa trivialis were prepared and buried at ploughing depth. The following autumn and spring traditional seedbed preparation and drilling at the same time were tested together with treatments including a false seedbed. It can be seen that a big reduction in viable seeds of the two species were found following the false seedbed treatments.

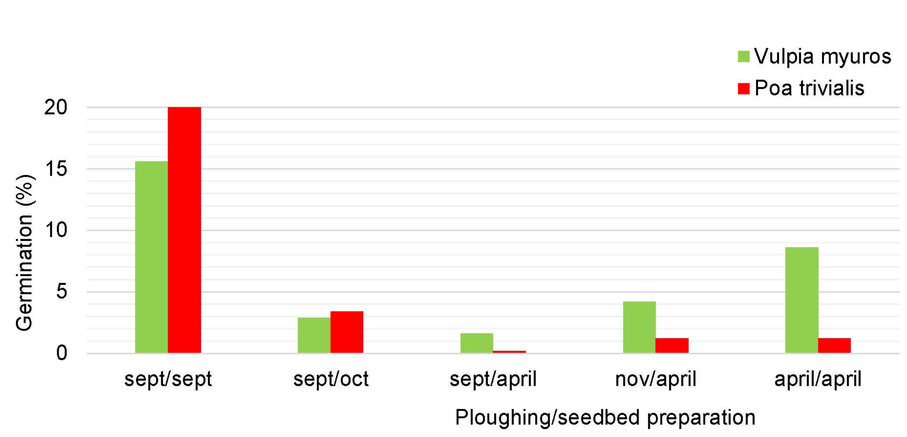

Figure 2. Effect of false seedbed treatment on seed viability of Vulpia myuros and Poa trivialis in seed samples. Seed samples were placed at 25 cm depth in the autumn before the test started. At the indicated month of ploughing and seedbed prep. the samples were moved to the soil surface. The seed samples were collected and seed viability was tested at the time of seeding.

Table 1. Recommended stubble treatment to reduce viability of newly shed seeds of some important annual grasses.

Species	Stubble treatment	No treatment
Cereals	√	
Avena fatua		√
Alopecurus myosuroides		√
Apera spica-venti		√
Lolium perenne		√
Poa trivialis		√
Vulpia myuros		√
B. sterilis	√ without straw	√ With straw
B. hordeaceus	√	

CONCLUSIONS

- Leaving seeds undisturbed at the soil surface as long as possible after seed shedding reduces viability of many important annual grass weeds and is an important tool in an IPM strategy
- Annual grasses in the seedbank has a limited dormancy and germinates when placed close to the soil surface under favourable conditions. Use of the false seedbed is therefore an effective tool to reduce the seedbank of annual grasses ahead of a grass seed crop.