74th IIRB Congress, 1-3/07/2014, Dresden (D)

Methodology of testing efficacy of ALS-inhibiting herbicides on weed species in sugar beet

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Introduction

Testing the efficacy of ALS-inhibiting herbicides on weeds in sugar beet cropping in farming practice is impossible due to the susceptibility of currently registered varieties. Alternatively, a detailed analysis of the efficacy properties of the ALS-inhibiting herbicide can be conducted in a model trial. In cooperation with Bayer CropScience, the Institute of Sugar Beet Research (IfZ) executed field trials on three locations in Germany to evaluate the new ALS-inhibiting herbicide by testing its durability of soil action and to identify the weed development stage limiting its efficacy.

The **limiting weed development stage** for a sufficient efficacy was determined by treating weeds at different growth stages (Fig.1). Timing of application was defined by the growth stage of *Chenopodium album* as a fast growing and difficult to control weed.

Implementation steps:

1. Five weeds species were sown per site.
2. The ALS-inhibiting herbicide was applied across to the seeding direction.
3. Applications were done at three dosages at five growth stages (EC 12, 14, 16, 18, 20) of *Chenopodium album*.
4. Efficacy was separately evaluated by the phytotoxical damage of each weed species.

   Used weed species: *Chenopodium album, Brassica napus, Matricaria chamomilla* and *Galium aparine* on all sites. *Polygonum convolvulus, Polygonum aviculare and Aethusa cynapium* on one site.

Limiting weed development stage

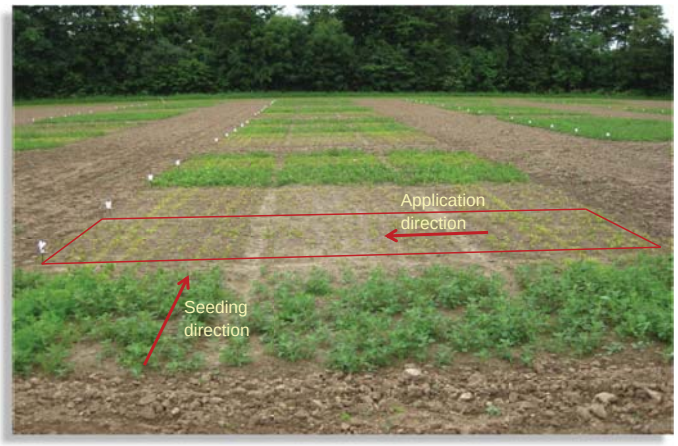

Fig.1: **Field trial design to investigate „limiting weed development stage“**
(The red frame shows one treated plot with five different weeds)

Durability of soil action

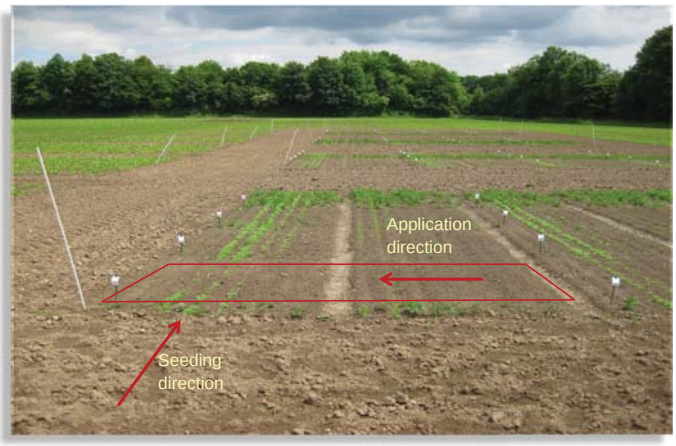

Fig.2: **Field trial design to investigate „durability of soil action“**
(The red frame shows one plot with six different weeds)

The **durability of soil action** of the ALS-inhibiting herbicide was determined by a special field trial design, which was developed by the European Weed Research Society (Fig.2).

Implementation steps:

1. The ALS-inhibiting herbicide was applied at three dosages on the bare soil.
2. Six weeds were sown in five-day intervals (5, 10, 15 and 20 days after application) across to the application direction.
3. Durability was separately evaluated by the relative weed coverage rate of every weed species.
4. Assessments were conducted on two predefined dates.

   Used weed species: *Chenopodium album, Brassica napus, Matricaria chamomilla, Amaranthus retroflexus, Alopecurus myosuroides and Echinochloa crus-galli.*

Conclusions

In 2013, effects due to the efficacy and durability of the ALS-inhibiting herbicide could be determined by the described methodology. Further results from 2014 trials are necessary to confirm these effects.