

Herbicide resistant weeds and herbicide tolerant crops

Jan Petersen

Current herbicide tolerant crops based on non GMO-techniques showed resistance to ALS or ACCase inhibitors respectively. To both MoA many weeds (13 species for ACCase and 34 species for ALS-inhibitors) are resistant in European countries. Consequently, introduction of HT varieties increase the selection pressure in general. However, detailed knowledge of resistance mechanism in weeds and efficacy of used herbicide(s) in HT varieties can help to support the performance to HT systems in the short term, because there are many interactions between weed species, resistance mechanism, kind of mutation, weed species and used active ingredient. However, resistance management can only be successful if diversification in herbicide rotation and agricultural methods reduce the selection pressure and selection likelihood.

Herbicide tolerant varieties for improvement of cropping systems

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Today implementation of HT varieties focused on substitution of current used herbicides in a crop with the aims of more easy weed control systems, reduced crop damage (selectivity) or higher efficacy (incl. control of resistant or parasitic weeds). This can provide advantages for the farmers. However, systems may become more productive but the cropping systems in general are the same than before growing of HT varieties. In some cases the HT varieties can provide the possibility to improve the total cropping system towards more sustainability. Crop mixtures (full or relay intercropping) can be managed more easily compared to current systems because of lack of herbicides that can be used in crop mixtures. Furthermore also mulch systems (incl. living mulches) can be managed in a better way with HT varieties. These options may help to address some of the main problems in conventional farming systems like reduction of climate relevant gases, increasing biodiversity, reduction of crop damage to extreme weather situations, ... Future work with HT varieties should pick up some of these points to clarify if and how what potential HT varieties may have for improvement of cropping systems.

Response of ALS-resistant *Alopecurus myosuroides* to different herbicide strategies in a crop rotation including imidazolinone-tolerant oilseed rape

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In a crop and herbicide rotation experiment including imidazolinone tolerant winter oilseed rape it was investigated if and how herbicide resistant ALOMY can be kept under control without further development of resistance. Results showed that use of imidazolinone tolerant winter oilseed rape and corresponding imazamox had no significant influence on resistance evolution, because of weak performance of imazamox to ALOMY. However, resistance development increased with increasing frequency of ALS-inhibitors in the rotation. ALOMY density did not (or only slightly) increase in rotations with use of flufenacet in winter wheat and propazamide in oilseed rape. Use of ALS tolerant

oilseed rape varieties without increasing risk of evolution in weed resistance is possible if herbicide program in the total crop rotation is adapted.