Control of *Ambrosia artemisiifolia*: disrupting lifecycle to exhaust seedbank in infested areas

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Infestation with common ragweed (*Ambrosia artemisiifolia*) has been increasing in the western part of Switzerland in several agricultural fields and along road sides for some years. It arrived in the Geneva region with the exchange of agricultural machines from France. Ragweed seeds reach private house gardens and public greens as contamination in bird seed grain. Single plants were mostly found during 2006, throughout the entire settlement area of Switzerland.

Up to 12% of the human population suffers from allergies (hay fever, asthma) to Ambrosia pollen in infested areas. A very low concentration such as 5-10 pollen spores m^{-3} of air are sufficient to trigger allergic reactions in sensitive patients. The bloom from July to October, initiated by day length, elongates the allergic season for patients. Ragweed propagates by seeds only.

Federal authorities have recently declared *A. artemisiifolia* as an undesirable plant. All types of feedstuff put into circulation must be free from ragweed seeds. Ragweed control should aim to disrupt the life cycle of the plant, in order to gradually exhaust the seed bank in the infested sites. According to first experiences, ragweed quickly develops sprouts from the base of the stem if it is cut or treated with a non-systemic herbicide. These sprouts develop a smaller number of viable seeds, while an untouched mature plant produces several thousands of seeds. Agroscope Changins-Wädenswil ACW has developed strategies to control ragweed. In arable fields as well as along traffic lines, chemical, mechanical and combined methods have been tested.

The efficacy of herbicides was tested in field trials. Some soil-applied herbicides showed the best activity when applied in spring; but when applied in autumn no efficacy was observed. Contact herbicides such as glufosinate killed all green parts of the plant, but could not prevent sprouting of side stems. Efficacy seems to depend on growth stage of ragweed; clopyralid applied in the 2-6 leaf stage killed ragweed totally, but applied in bloom, it allowed ragweed to produce seeds. Results of a growth stage herbicide efficacy trial in the glasshouse are presented. It was observed that certain herbicides did not prevent the production of seeds if they are applied late, but the viability of these seeds was reduced.

To test the viability of seeds having survived an herbicide treatment or being produced after mechanical or chemical control, we developed a method to break seed dormancy. We kept seeds mixed with humid sand at 4°C for 5 weeks. Germination rate was about 80-90 %.

In a 3 years trial with different mowing dates, we could show that one mowing early in September could prevent the production of viable seeds and therefore interrupt the life cycle of the species. Before the end of August ragweed seeds were not yet mature in the Geneva region but sprouts developed male flowers and pollen after cutting while female flowers remained empty. Mowing after the middle of September did not prevent ragweed producing viable seeds, and these were released during mowing.

Combination of treatments, including mowing in spring and herbicide application later on could be more effective than a single control method. An early cut could reduce pollen production and a late herbicide treatment could control the sprouts, preventing seed production. This combination could be important for road services, giving them a method for disrupting the plant's life cycle. Trials on optimization of the two methods are on-going and we present the first results of combined trials of mowing and herbicide application.