Relevance of neonicotinoids in sugar beet

Seed treatments with neonicotinoids are highly effective in controlling many pests and associated diseases and thus maintaining yield stability. So far, neonicotinoids are used as seed treatment only. Mostly, an additional insecticide application in sugar beet during the growing period is unnecessary[1] (please refer to the figures).

Insecticides in seed treatments are currently the only option to control **damaging seedling pests.** If the pests occur during the first weeks after drilling, they **can cause total plant losses** in areas of the fields.

Neonicotinoids cannot be replaced adequately for controlling the most damaging pest *Myzus persicae* (Green peach aphid). Effective alternatives are missing especially because many European aphid populations **are resistant** against organophosphates, carbamates and pyrethroids.

Exposure of pollinators to neonicotinoids used in seed treatments is unlikely:

1) **Abrasion and dust emissions during drilling are minimal:** Sugar beet seeds are pelleted with the insecticide in a film inside of the seed pellet[2]. The outside layer has **a high seed coating quality** with a **very high resistance of treated seeds to abrasion** and thus, a **low risk for dust emission**[3]. Dust drift during mechanical drilling is lower compared to pneumatic drilling[4]. The **sowing machinery in sugar beet is predominantly mechanical** in Germany (90 %), as it is in most European countries. Thus, mechanical seeders minimize dust emissions and ground deposition during drilling.
2) **Guttation drops of sugar beet are unlikely to serve as a water source for pollinators:** Guttation in sugar beet **occurs rarely**[5]. Guttation drops of sugar beet are very small and **occur only under very high humidity and early in the morning** for a short time period. These circumstances reduce the risks for pollinators to a minimum.
3) An exposure of pollinators through bolters (= flowering shoots) is purely theoretical. The probability for bolters in sugar beet cultivated for sugar production is less than 0.05%[6] and **bolters are usually consequently removed from the field.**
4) There is a hypothetical exposure risk of pollinators through flowering weeds, because weeds in sugar beet may take up neonicotinoids (no studies exist). Usually **weeds are controlled by the farmer in the cotyledon stage**[7], i.e. before flowering.
5) In **soil**, the **degradation of residual active substances of neonicotinoids** from sugar beet seeds continues after beet harvest. In addition, the following field operations and the subsequent incomplete uptake of residues plus the increasing biomass of the succeeding crop bring about additional **diluting effects**. All these processes help to r**educe possible risks to pollinators in succeeding crops**.
6) Concentrations of neonicotinoids and their residues in **pollen** or **nectar** or even in **guttation fluid of succeeding crops** were found to be at least one order of magnitude below the concentrations in guttation fluids of sugar beet plants.

The specific application of neonicotinoids to the sugar beet seed is performed in closed containments. The risk for the farmer during drilling is therefore minimal especially compared to the former broad and frequent insecticide sprays.

Alternative active ingredients for seed treatment in order to control foliar pests are less effective or missing. Therefore spray application with e.g. pyrethroids will gain more importance. This might increase the exposition of operators as well as pollinators and could be critical in terms of biodiversity. An in depth impact assessment is lacking so far. Intensive research is needed to develop ecologically and economically feasible alternatives.

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Footnotes (References)

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