## 3.9 Distance a useful risk mitigation measure for honeybees exposed to frequently guttating seed-treated fields?

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### Abstract

Findings of high concentrations of bee-toxic compounds in guttation drops from crop plants treated with a neonicotinoid seed dressing gave rise to concerns about a potential risk to honeybee colonies. As bee colonies seem to prefer water sources in the near surroundings, several field trials were set up, aimed to investigate if setting minimal distances of bee colonies to a frequently guttating seed-treated field could be a method to minimize the potential risk of water collecting bees ingesting contaminated guttation drops.

The experiments were conducted in 2011 and 2012 on conventional managed maize, wheat and oilseed rape fields near Braunschweig (Lower Saxony, Germany). Every experimental field consisted of two plots; one planted with a neonicotinoid treated seed batch and one adjacent plot with an untreated seed batch. The bee hives were placed in the untreated plot before or immediately after emergence with a 0 m to maximal 85 m distance to the adjacent treated plot. The entrance of every hive pointed toward the treated plot. At each distance a minimum of three bee colonies containing approximately 11.000 - 20.000 bees were set up. During the whole experiment climatic conditions, growth stage of the crop plants and presence of guttation, rain and dew drops were recorded. If guttation occurred, droplets were sampled. Furthermore, colony development (Liebefelder method) and mortality (Gary-dead bee traps) were assessed. After completion of the field experiment residue analyses of guttation drops and dead bees were conducted.

Guttation occurred frequently during the experimental phase. Residues in guttation droplets were detected during the entire experiment from BBCH 10 up to a maximum of BBCH 59, depending on the investigated crop. However in most cases the number of dead bees per colony was at a normal level, regardless of the tested crop and the distance between the bee colony and the treated field. The only exception was a slightly increased number of dead bees in tests with oilseed rape which was occasionally observed at 0 m distance to the treated crop. Furthermore, in some dead bees residues of the seed treatment were detected but without link between mortality and residues. However, no long term effects on bee brood and honey bee colony strength and development were observed independently from the distance and tested crop.

Taking into account the results of all experiments there were no indications of an unacceptable risk for bee colonies from contaminated guttation drops in our trials. However, results of individual samples from the dead traps suggest that individual honeybees occasionally use guttation droplets as water source. Therefore, to maintain a certain distance between beehives and insecticide-treated fields of 60 m could be a potentially useful measure to further reduce the potential risk although the applicability and practicability of such a mitigation measure may be questioned. In many cases, it is neither for beekeepers nor growers possible to move the apiary or the field. It is possible that such a mitigation measure could further complicate the discussions between beekeepers and farmers in real life.