

Potential impact of neonicotinoid insecticides on honey bees (*Apis mellifera*) in muskmelon production
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Honey bees (*Apis mellifera*) provide pollination services to many agricultural crops, including cucurbits. Neonicotinoids are commonly applied to cucurbits where honey bee colonies are often rented for sufficient pollination and proper fruit set. The goals of this study were to determine the potential impact of neonicotinoid residues on honey bees in muskmelon production and to determine the extent and duration of striped cucumber beetle control among treatments. The neonicotinoids evaluated were imidacloprid and its metabolites imidacloprid olefin and 5-hydroxyimidacloprid, thiamethoxam and its metabolite clothianidin, and acetamiprid. Thiamethoxam applied as a FarMore[®] seed treatment resulted in a highest mean pollen concentration of clothianidin at 6.48 ng/g. The highest mean pollen concentrations of thiamethoxam when applied as a Platinum[®] transplant water drench reached 64 ng/g, and the Actara[®] foliar spray reached 133 ng/g. Imidacloprid applied as an Admire Pro[™] transplant water drench reached a mean pollen concentration of 96 ng/g. All of the resulting pollen residue concentrations following these treatments reached levels that have been shown to cause adverse effects on honey bees. The application of the acetamiprid Assail[®] foliar spray reached a mean pollen concentration of 150 ng/g which is well below the levels that have been shown to cause negative effects on honey bees.

The high and low label rates of Admire Pro[™] and Platinum[®] provided control for striped cucumber beetles for 20 days based on one year's data. Therefore, if these products are applied, the low label rate is recommended as to minimize risks posed to honey bees. These products however, demonstrated the potential to negatively impact honey bees in two field seasons. Admire Pro[™] resulted in imidacloprid concentrations that have been shown to cause decreased olfactory learning and memory, reflex response, mobility, and increased mortality (Decourtye et al., 2003, 2004b; Guez et al., 2001; Lambin et al., 2001; Teeters et al., 2012). Platinum[®] resulted in thiamethoxam concentrations that may hinder honey bees from being able to return to their hive (Henry et al., 2012). In addition, one research season demonstrated that Actara[®] and Assail[®] both controlled striped cucumber beetles for 7 days following application. In two field seasons only Actara[®] reached concentration levels in this study that have been shown to reduce the ability of foragers to return to the hive as well as increase mortality when fed to honey bees (Henry et al., 2012; Laurino et al., 2011). Therefore, Assail[®] foliar sprays instead of Actara[®] are recommended. The FarMore[®] seed treatment did not provide control for striped cucumber beetles throughout the season investigated and reached concentration levels that have been shown to decrease adult worker populations as well as reduce honey production, pollen collection, and colony growth (Sandrock et al., 2014). Therefore, the FarMore[®] seed treatment is not recommended for use when transplanting.