

CRA-MAC

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The neonicotinoid insecticide seed coatings for protection of corn kernels, seedlings and for plant yield.

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Planted corn seeds and corn seedlings could be attacked by a variety of insect pests, as beetles (adults and/or larvae): billbugs, wireworms, corn rootworms, seed-corn beetle, white grubs and flea beetles. Other pests include: caterpillars, fly larva, aphids and thrips. When abundant, these pests could injury the emerging seed or attack the small emerging corn seedlings resulting in low-productive fields.

The yield and/or the vigor of an agronomic plant can be increased or improved in locations where the level of insect infestation indicates the need for the use of an insecticide for insect control purposes by treating a seed of the plant with a neonicotinoid compound. This new family of insecticides, including such agents as thiamethoxam, imidacloprid, clothianidin, fipronil, was found to be effective against targeted pests showing great potential for protecting seeds and plants of important agronomic crops from insect damage (Bai et al., *Pestic. Sci.*, 33: 197-204, 1998; Nauen et al., *Pestic. Sci.*, 51: 52-56, 1998). The use of these insecticides as seed treatments, rather than as field-applied formulations, is believed to reduce the exposure and odor of the pesticide, and to reduce the amount of post-planting cultivation and application (Elbert et al., *Insecticides with novel modes of action: mechanism and application*, 50-74, 1998).

However, in Italy and in other European countries, one of the risk factors for honeybee health and Colony Collapse Disorder (CCD), are supposed to be agrochemical treatments, by the loss of active seed coatings ingredients through the fan drain of pneumatic seed drills during corn sowing operations (Greatti et al., *Bulletin of Insectology*, a) 56: 69-72, 2003; b) 59: 99-103, 2006); so that a precautionary suspension of use of all the four neonicotinoid active ingredients registered for seed dressing, above mentioned, was established in Italy during 2008-2009. In order to give an explanation about the possible causes of colony losses and high bee mortalities reported in the recent years and to evaluate the efficacy of the cited suspension of active ingredients used for seed dressing, the Italian Ministry of Agriculture, financed a national research project, Apenet (Bortolotti et al., *APOidea*, 6:2-21, 2009).

The aims of our research in the frame of the Apenet project, are devoted: i) to compare, in 20 locations of the Northern-Central Italy, the yield and agronomic traits of a commercial hybrid when grown without any insecticide treatment (as untreated control) with the yield and agronomic traits when grown, in the same location, with the four neonicotinoid insecticide seed coatings, under study,(thiamethoxam, imidacloprid, clothianidin, fipronil); ii) to detect the presence of the four neonicotinoid active ingredients registered for seed dressing, in leaves and other corn plant tissues periodically collected from the emerging seedling to the flowering stage.

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