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The effect of pollinating insects on the structure of seeds yield of *Helianthus annuus* L.

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The study of beekeeping value of sunflower plantation was conducted in Pulawy in the years 2005-2007. Time and the abundance of blooming, abundance of nectar secretion and intensity of foraging flowers by bees were analysed. The pollinating insect effect on seed setting was also estimated. It was carried on in comparison to the main components of the crop from plants freely accessible for pollinating insects during blooming phase and from plants isolated against the insects. It was stated, that sunflower blooms in the second half of July throughout 2 to 3 weeks in Polish conditions. Depending on cultivar, it produces from 1.5 to 2.3 thousand of blossoms per one inflorescence on average. Ten tubiform flowers secrete ca. 4.9 mg of sugars in nectar. The sugar efficiency of evaluated plantations varied from 48 to 62 kg of sugars per 1 hectare. The blossoms of the sunflower were foraged by insects very willingly, mainly by the honeybee workers. The density of insects on sunflower blossoms was equal to values between 2 to 6 individuals per 1 m² in each year of researches carried on. These insects improved the seed setting very effectively. After cross-pollination the percentage value grew-up to 21-39 points in comparison to self-fertilization. Moreover, in comparison to isolated plants, the ones freely accessible for pollinating insects, during the blooming phase, produced more seeds. Additional effect recorded was that the mass of 1000 seeds was bigger and as a consequence – the higher calculated commercial yield.

Effects of nosemosis on homing abilities and learning

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We report changes in flight behavior of foragers infested by *Nosema* sp. and demonstrate that diseased bees have lower returning rate than healthy ones when released from the cage in a distance of 30 m from the colony. The inoculated bees failed to return 2.7 times more frequently than uninoculated bees. Effects of *Nosema* sp. on learning of 17-19 days old foragers were examined using a proboscis extension conditioning procedure (PER). Although there were no differences in responsiveness to increasing sugar concentration, we found significant differences in learning. The results correspond to an impact of the parasitic mite *Varroa destructor* on homing and learning abilities of forager honey bees which was demonstrated recently. This similarity supports that the behavioral modifications effected by *Nosema* and *Varroa* could be a general response to pathogens. The increased loss of infested workers could be interpreted as a mechanism to remove the parasite from the colony and thus enhance its survival.