

## Toxic Effects of Selected Insecticides on Honey Bees and Earthworms

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Application of pesticides is an integral part of crop production in protecting crops from various pest damages. Pesticide usage and safety are monitored by means of setting Pre Harvest Intervals (PHI) and Minimum Residue Levels etc. but attention given to ill-effects of pesticides on non-target organisms is inadequate. In tea, majority of international markets require guarantees on conservation and safety of biodiversity components. Through adherence to such requisites, growers can fetch higher premiums for the produce.

A study was carried out to evaluate the non-target effects of pesticides on honey bees (*Apis cerana*) and earthworms (*Eudrilus* sp.) in aerial and soil environments using five pesticides Fipronil (Class II), Fenthion (Class II), Carbofuran (Class I and II), Carbosulfan (Class I and II), Imidacloprid (Class II and III) which are used in tea plantations under standard protocols. While toxicity of pesticides on honeybees in aerial environment was determined by exposing honeybees to pesticide fumes emanating from pesticide soaked cotton wool kept in insectaries, toxicity on earthworms was determined by placing earthworms in soil treated with pesticides in bags.

The pesticidal effects were shown to be significant with respect to risks on important non-target organisms. The mean mortality of honey bees and earthworms varied significantly ( $P < 0.0001$ ) with different treatments. Results were ranked according to the ranking method adopted for toxicity by Selvasundaran and Muraleedharan (1995). Fipronil, ranked as very toxic, showed 87.5% mortality of honey bees. Carbosulfan, ranked as toxic, Imidacloprid, ranked as tolerable and Fenthion, ranked as harmless, showed honeybee mortalities of 57.5%, 20% and 15% respectively. No dead honey bees were found in the untreated control. Out of five pesticides assessed in this study, Imidacloprid, Carbosulfan and Carbofuran resulted in very low survival of earthworms while Fipronil (Regent) and Fipronil (3GR) resulted in high survival rate. Hence, pesticide recommendations need to be perfected not only with bio-efficacy on the targeted pest but also concerning valuable biodiversity components which govern natural balances in agro-ecosystems. Therefore, it is increasingly important that pesticides are used with safety to minimise non-target effects.

