

IRAC International statement on the resistance management considerations of utilizing soil & seed applied insecticides¹

The application of an insecticide to the soil², either as a seed treatment or as a direct application (in-furrow, drip, drench, granule, etc.), is designed to either control soil borne insect pests or provide systemic control of pests above the ground. The general principles of resistance management apply to seed and soil treatments, as with foliar applied insecticides, however there are some additional factors that should be considered.

- There are limited insecticide modes of action available for use either as soil or seed treatments. Therefore the judicious use of the available modes of action is essential for sustainable control of the insect pests targeted by these applications.
- Soil and seed treatments to control insect pests are usually applied at the time of sowing or seedling transplant. Despite only one application per growing season in such use patterns, the risk of resistance development remains due to the potential for repeated use of the same mode of action in sequential crop plantings either in the same or following crop cycle. In order to reduce the risk of resistance development it is recommended that, wherever possible, insecticides with different modes of action be used in sequentially planted crops. In addition, rotation to other crops that are not hosts to the same insect species will reduce both pest pressure and the risk of insecticide resistance development.
- Soil borne insect pests that have an adult stage that lives above ground (e.g. *Diabrotica spp.*) may also be controlled through targeting the adult stages. Scouting for insects and application of a foliar insecticide with a different mode of action and at economic thresholds may help to reduce the risk of resistance.
- The control of above ground insects through seed or soil-applied insecticides with systemic activity is a common and convenient way of managing pests either during the early stages of plant growth or throughout the growing season³. In order to supplement insect control during the crop cycle, foliar applied insecticides may be used. Wherever possible the alternation of insecticides with different modes of action for soil and foliar applications is recommended to reduce the risk of resistance development.
- For some crops the soil treatment of transplant seedlings in nursery systems is a common practice to control pests in the nursery and to provide plant protection in the early stages of growth. Where possible growers should determine if their purchased seedlings have been pre-treated with insecticides and try to avoid using insecticides with the same mode of action in subsequent insecticide treatments to reduce the risk of resistance development.

1. Including seed treatments, soil drench, in-furrow soil, chemigation, drip irrigation, hydroponic, seedling dip and seedling tray dip methods of application.

2. Soil or other growing medium.

3. Drip irrigation, chemigation, hydroponics, etc