

◀ and their mode of action (Crop Life Australia, 2011)", describes the mode of action and spectrum of activity of the currently available insecticides.

Carbamates: Carbamate insecticides include bendiocarb and carbaryl and are synaptic poisons (ie they work in the gap between nerve cells). Carbamate insecticides bind to an enzyme which breaks down a neurotransmitter in the gap between nerve cells.

The binding of carbamate insecticides to the enzyme prevents the breakdown of a chemical called acetylcholine. This leads to continued stimulation of the nervous system and causing death of the insect. Symptoms of carbamate poisoning of insects include tremors and uncontrolled movement. Carbamates are fast acting insecticides with a relatively short residual life and control a wide range of insects. The use of carbamate insecticides in amenity turfgrass has become limited due to the introduction of newer generation insecticides.

Organophosphates: Organophosphate insecticides include some of the most toxic of insecticides, hence why many have been withdrawn from registration. Organophosphate insecticides include chlorpyrifos, diazinon, malidison, methidathion and trichlorfon, some of which have miticidal efficacy. The mode of action of organophosphates is similar to carbamates. Organophosphates have a relatively short residual life and control a wide range of insects and mites.

Pyrethroids: Pyrethroid insecticides mimic the chemical structure of natural pyrethrum and are axonic poisons (ie they work in the nerve cell). They

include bifenthrin and beta-cyfluthrin. Pyrethroids result in continual nerve stimulation with rapidly developing symptoms of tremors and unco-ordinated movement. Pyrethroids are used for rapid control (or knockdown) of a wide range of insects and some mites but have limited residual life.

Phenyl pyrazoles: Phenyl pyrazoles are a relatively new chemical group represented by fipronil and are synaptic nerve poisons. Their mode action is different to other synaptic poisons like the carbamates and organophosphates. These chemicals prevent the inhibition of nerve impulses resulting in over stimulation of the nervous system. Insects controlled include weevils, mole crickets and ants.

Neonicotinoids: Neonicotinoids are a relatively new generation of insecticides which includes imidacloprid and thiamethoxam and act on the insect's nervous system similarly to that of nicotine. Again they are synaptic poisons, but have a different mode of action to the other groups already described. Like the others these chemicals result in over stimulation of the nervous system. One of the beneficial features of neonicotinoids is their upward systemic movement in plants. Neonicotinoids are used for residual control against scarab and weevil larvae.

Avermectins: Abamectin is the only chemical available from this group and is registered as a miticide and nematocide. Avermectins like the pyrethroids are axonic poisons but have a different mode of action. Their effect is that the nervous system becomes overexcited resulting in tremors, unco-ordinated movement and eventually death.

Diamides: Chlorantraniliprole is a new chemical and the only one available from this group. Chlorantraniliprole causes depletion of calcium ions in insect muscles which cause muscle contraction and paralysis and eventually insect death. Chlorantraniliprole controls the larvae of moths, scarabs and weevils.

Hydramethylnon: The mode of action of hydramethylnon unlike many of the other turfgrass registered insecticides is not on the nervous system of insects. Hydramethylnon disrupts energy metabolism in insects. Hydramethylnon is the only chemical in this group and is registered as a bait for the control of ants.

Microbial insecticides: Microbial insecticides include *Bacillus thuringiensis* (Bt) and *Metarhizium anisopliae* are registered to control moth and scarab larvae respectively. In Australia two strains of Bt are registered for use in turfgrass.

Entomopathogenic nematodes: Entomopathogenic nematodes of the genus *Heterorhabditis* have been developed by CSIRO for application on many crops including turfgrass and are used for control of the larvae of scarabs, billbug and weevils.

Eucalyptus and Melaleuca oil: Some products containing Eucalyptus and Melaleuca oil may also contain fertiliser and wetting agents. The exact mode of action of these oils is not known. Products containing Eucalyptus and Melaleuca are registered in Australia on turfgrass for the control of African black beetle and armyworm but are not categorised under a chemical group. ●

Mobile app to aid industry

THE Australian Pesticides and Veterinary Medicines Authority (APVMA) has released an iPhone application that makes information about agricultural and veterinary chemicals registered in Australia instantly accessible to people on the move.

"The tool, thought to be a world first, will give a farmer in a paddock the ability to access a searchable database of the 10,500 agricultural and veterinary chemicals approved for use in Australia," APVMA spokesperson Dr Simon Cubit said.

"The farmer, for example, will be able to search for a registered chemical prod-

uct available to treat a specific insect pest.

"That search will also provide information about active constituents, withholding periods, product labels, and pack sizes at the touch of a button.

"Once a search has been completed the farmer will be able to save the search for later reference or share the results with others, perhaps in the form of an email to a rural supply store."

The application (called 'APVMA') also provides information on products that have been suspended, cancelled, stopped or archived. This ability, which provides a time depth to chemical registrations in

Australia, is not currently available on any other system including the 'parent' PUBCRIS database available on the APVMA website.

"The app is expected to be widely used not just by farmers but also by environmental managers needing chemical tools to tackle environmental weeds and pests. Versions of the app suitable for Android devices will also be developed," Dr Cubit said.

"The development of the application reflects a commitment by the APVMA to deliver the benefits of more efficient regulation to business and the community," Dr Cubit said