

Environmentally Friendly Crop Protectants – Listen To The Kookaburras*

Abstract

Rachel Carson's book "Silent Spring" created history in 1962 by highlighting the environmental impacts of pesticides. Dr Carson described how organochlorine pesticides were persisting in the food chain, debilitating entire ecosystems. She warned that if we continued with indiscriminate use of persistent chemicals, we would be eliminating many important species, and our planet would be a lifeless and silent place, with no birds to sing in Spring.

Four decades later, and awareness of pesticides influences the decisions of farmers growing potatoes, mums shopping at the supermarket, and corporate executives signing multi-billion dollar deals. Dr Carson's message has been heeded. Public perceptions about the perceived risks of pesticides mean that strict regulations will keep our birds forever singing.

Public awareness has been the driving force behind significant legislative and commercial changes in pesticide use and regulation in Australia. Legislation to establish the Australian Pesticides and Veterinary Medicines Authority (APVMA) came into effect in 1993. The APVMA is responsible for reviewing and approving all agricultural chemical registrations. The APVMA works closely with various government agencies to assess all aspects of registration from environmental risk to toxicology. The governmental environmental agency, Environment Australia, undertakes assessment of environmental impacts on behalf of the APVMA.

Globally, multi-national chemical companies are investing significant funds into new 'environmentally friendly' chemistries. The APVMA has approved a range of crop protection products based on chemistries derived from naturally occurring soil bacteria and fungi, and plant extracts. Trial work is currently being conducted in Australia to compile data for registration submissions for new synthetic chemicals, plant defence boosters and biofungicides.

Extensive data must be provided to the APVMA to support the registration of new products as crop protectants. Efficacy data from at least three Australian states, validated over a number of seasons, must be provided to substantiate product claims. APVMA registration provides industry with an assurance that all efficacy, crop tolerance, environmental, toxicological, occupational health and safety aspects of a product have been well researched and tested. However, APVMA approval is a long and expensive process, and typically only companies with significant resources undertake the process.

A number of products fitting in the category of 'environmentally friendly' crop protectants are exempt from full assessment by the APVMA. Semiochemicals or insect pheromones are a class of compounds exempt from poison scheduling. These chemicals act as mating disruptors and attractants, and have revolutionised production in a number of perennial horticulture crops prone to attack by insects such as light brown apple moth. Refinements in mass rearing of beneficial and biological control insects have also provided scope for a new approach to crop protection, with an insecticide spray being replaced by release of biocontrol insects.

Exciting developments are taking place in the development of bacteria and fungi for biological control of soil-borne and foliar pathogens. Biological control with micro-organisms has gone beyond laboratory trials, and there are now a number of commercial formulations available. Formulation chemistry is particularly important, in order to ensure viable organisms in a product that stores easily and disperses readily in water.

Compatibility with conventional practices is also important for growers to adopt biological control products or strategies. 'Biological' approaches that fit with commercial practice, and which also provide additional benefits, are being readily adopted by growers. An interesting development

in this area is use of biofumigant crops to reduce soil-borne disease pressure and to enrich soils through addition of organic matter and improvement in soil structure.

Unfortunately, a number of 'biological' products are being marketed to growers, without adequate data available to validate product claims. Manufacturers are deliberately elusive in their label claims, so that they can avoid the costs associated with submission of a full efficacy package to the APVMA. Distribution of these products is typically undertaken by small agri-business organisations, with any product development work undertaken being backed by venture capital funds.

These 'biological' products are often certified as being suitable inputs for organic agriculture, although often there is not enough data available to substantiate any claims regarding environmental fate and impact. Information about acute and chronic toxicities, half-lives, solubility and soil sorption coefficients is not readily available for many 'biological' inputs. In instances where data is available, the parameters used to estimate environmental risk indicate that potential impacts of some organic inputs are equivalent to those of conventional pesticides. For example, the International Federation of Organic Agriculture Movements currently allows inputs such as derris dust and pyrethrum, which are 1000 times more toxic to fish than some new generation synthetic chemicals. More quantitative data is required to validate the 'environmentally friendly' claims of some alternative inputs.

Quantitative data is also required to validate the claims of environmental benefits of biotechnology for crop protection. The Office of the Gene Technology Regulator currently oversees all developments with agricultural biotechnology under the Gene Technology Act 2000. Cotton and carnations are the only GM crops currently being grown in Australia.

This paper describes the issues surrounding use and perception of 'environmentally friendly crop protectants' in the context of sustainable agricultural practices in Australia, and specifically in the island state of Tasmania. Issues relating to agricultural chemicals will be put in context with other environmental concerns in Australia's agricultural regions. Salinity, water management, land clearing, soil degradation, fragmentation of ecosystems and loss of biodiversity are Australia's biggest environmental problems. Management of these issues is much harder to regulate than pesticide use.

The Australian continent is an ancient and arid land, and many parts of it are not suited to intensive farming. To continue farming sustainably, careful management of our agricultural resources is required. Extensive monitoring is needed to understand and quantify the changes we are making to the landscape. We are lucky that we can listen to the chorus of kookaburras cackling in the gumtrees, and watch kangaroos feeding on the plains, but we do need to be informed about the realities of how agriculture is altering their world.

** Kookaburras are birds native to Australia. They feed on snakes, large insects and lizards. They are quite territorial, and it is common to hear their call, which sounds like a loud raucous laugh.*