

4. Hopping, M. E. 1976. Effect of exogenous auxins, gibberellins, and cytokinins on fruit development in Chinese gooseberry (*Actinidia chinensis* Planch.). *N.Z. Journal of Botany* 14:69–75.
5. Hopping, M. E. 1981. Kiwifruit pollination: influence of male clones. In: Proceedings of Kiwifruit Seminar held at Tauranga, MAF, New Zealand, pp. 21–25.
6. Hopping, M. E. 1982. Spray pollination of kiwifruit. *N.Z. Agri. Sci.* 16:46–48.
7. Hopping, M. E., J. A. K. Marytn, and N. J. A. Hacking. 1985. Selection of superior males for kiwifruit. *Suppl. to N.Z. Kiwifruit*, July 1985.
8. Lionakis, S. M. and W. W. Schwabe. 1984. Bud dormancy in the kiwifruit, *Actinidia chinensis* Planch. *Ann. bot.* 54:467–484.
9. Lyttleton, S. 1985. More superior males on sale next winter. *N.Z. Kiwifruit*, September, 1985.
10. Martyn, J. A. K. and M. E. Hopping. 1988. How to identify superior males. *N.Z. Kiwifruit*, February 1988, p. 29.
11. Sim, B. L. and G. S. Lawes. 1981. Propagation of kiwifruit from stem cuttings. *Gartenbauw.* 42:65–68.
12. Testolin, R. and C. Vitagliano. 1987. Influence of temperature and applied auxins during winter propagation of kiwifruit. *HortScience* 22:573–574.

CHEMICAL USE IN NEW ZEALAND—THE UNDOCUMENTED SIDE EFFECTS

MICHAEL CROOKS

*27 Hamilton Road
Herne Bay, Auckland*

Standards governing the use and sale of chemical pesticides in New Zealand are based on international guidelines. A Pesticides board administers Government regulations intended to safeguard end users, the public, and the environment. Representatives from grower groups, manufacturers and resellers, and Government departments make up a Board of twelve. Its their task, with guidance from independent counsultants and referees, to make judgements and set parameters by which pesticides may be pruchased and applied. These decisions are invariably made on “hard facts” presented as documented evidence by the intending marketer of the product.

History has demonstrated that while this process of regulating pesticide availability to the market place has mostly met the aims of the legislators, exceptions have and will likely always occur. Knowledge is not finite and documented evidence will not necessarily always present all of the hard facts on which such judgements can be made. It is the prupose of this paper to trace some of the recent documented and undocumented history of pesticide use in New Zealand which has resulted in some of the causes of general

concern and anxieties expressed by many end users including plant propagators and the general public.

Over the past twenty years or so since the time of Rachel Carson's "Silent Spring" and the resulting demise of the chlorinated hydrocarbon chemical compounds, DDT and the like, public awareness and mistrust of manufacturers and chemicals in general has grown.

In those days New Zealand was a big user of these DDT type chemicals. We imported technical DDT's by the shipload and processed it into a variety of agricultural and horticultural pesticides. Since its introduction in the late 1940's, it was enthusiastically aerial top-dressed onto farmlands regularly for a period of twenty years or more. "Silent Spring" put a stop to all that. Eventually by the late 1960s there was monumental documented and undocumented evidence available from around the world which convinced our then Agricultural Chemicals Board and the forerunner to the Pesticides Board to put a blanket ban on all DDT type products for agricultural use and a restricted use for horticulture. This was because nobody wanted to buy New Zealand foodstuffs contaminated with a potentially health harmful pesticide residue.

At that time also NZ Health Department studies in certain rural communities had detected levels of DDT contamination in human mothers' milk as high as 100 ppm when tolerances in export foodstuffs was less than 2 ppm.

Then we had our long running 2,4,5-T controversy with manufacturers, farmer interests, and the Agricultural Chemicals Board on the one hand, and concerned environmentalists and a suspicious public on the other. The build up in this debate coincided with the demise of DDT and related products. Open debate was encouraged and fueled by the news media.

With the chemical under close scrutiny from the early 1970s until the mid 1980s various professional studies and surveys were made into its contribution to spina bifida which environmentalists were claiming. The case was never proven to the general satisfaction of the scientific community; however the point was made and accepted that the dioxin impurity associated with 2,4,5-T manufacture was extremely hazardous.

To the bitter end, throughout this period of claims and counter claims the compound was defended stoutly by the Pesticides Board as it had no hard factual documented evidence to support the claims for its deregistration which was the position the anti-lobbyists were endeavouring to establish. Eventually various factors contributed to the exit of 2,4,5-T, including poor public image and PR for the manufacturer, Agent Orange, and eventually the development of alternative products.

We have been one of the last countries to cease manufacture.

The chemical has been widely used for a period of over 40 years in this country and one would have to conjecture what undocumented evidence went undetected in the earlier years of use when formulations then were relatively crude and use and application was haphazard compared to the restrictions placed on it in more recent times.

At the present time the general public and commercial end users of pesticide chemicals have a growing sensitivity and aversion to the use of chemicals. Currently glyphosate has captured public attention. Two local bodies here in Auckland have banned its use along with other herbicides until further notice. These are the Devonport and Waiheke island councils.

Councillors have voted to ban the use of chemicals in favour of alternative controls, mainly mechanical. These decisions are based on undocumented assumptions that most pesticide chemical sprays are best regarded as health hazardous and the public should be protected from them. Dr. Matt Tizard, Auckland, has specialised in the treatment and cure of people with pesticide and chemical spray poisoning.

Similar beliefs are shared by many end users, including plant propagators. Undocumented and documented data has led many to the view that pesticide chemicals are unclean, health hazardous, and environmentally polluting. They can lead to, or be the cause of, biological imbalances, resulting in aggravating rather than solving pesticide problems.

We have plant propagators philosophically opposed to the use of chemicals. Grahame Platt of Platts Nurseries, Albany, states "That if a NZ native plant is going to be affected by pests or diseases then the sooner it dies the happier he will be. He only wants to grow survivors and if an ornamental species requires an artificial life support system then he doesn't want to know about it."

Others like Richard Ware of Plant Propagator's, Napier, is an avid user of a fish emulsion to prevent pest damage. His experience has demonstrated the product provides an oily film and odor on treated plant surfaces which appears to deter insect attacks.

Because of the documented and undocumented case against the use of chemicals there is an increasing interest towards the sophisticated use of organics. Recent research has demonstrated the efficacy of host specific pathogens. These include virus, bacteria, and fungi which may demonstrate antagonism towards specific diseases or pests to give effective commercial control.

Genetic engineering is believed to offer limitless potential as an alternative to chemical protection. Parasite and predators against pest damage have gained respect and acceptance in commercial horticulture. In particular predator mites now have an established track record as positive deterrents to spider mite invasions.

It takes a brave knowledgeable grower who can step out against

the status quo of chemical application and supplement undocumented alternatives as crop protectants. The bottom line in all commercial production is profit; without it we fail. At the commencement I made mention that knowledge is not finite. Do any of us know all the answers on crop protection? Can we afford not to use chemicals which will maximise quality and quantity? If we do, how certain can we be that they are safe to ourselves, our environment and our customers? Recent history has many examples of judgements and knowledge which in hindsight has proven to be false.

The evidence would seem to suggest, take note and accept documented hard evidence as a starting point in any management decision when chemical pesticide applications are contemplated. But beware also that the biology and environment in which we grow our plants is full of complexities and endless inter-reactions. Chemicals are only a useful convenient management tool. They have a place for immediate short-term use, yet always have the potential to generate biological imbalances.

In the end it is us who must live by the results of our decisions. We have a choice. Take note of experiences and observations. For these will be your undocumented evidences as to whether the side effects from the chemicals used are positive or negative for plant propagation.

Documented evidence gives us part of the picture dependent upon the views and aims of the presenter. The chemical manufacturer has profit as an aim. The research scientist has status cudos to achieve. The end user, the plant propagator, has a viable business venture to successfully manage. Somewhere between documented knowledge, undocumented experiences, and observations, judgements and opinions must be formed. Both have a place. Documented knowledge is a useful starting point but as history has shown us, decisions based on documented knowledge alone can sometimes be misleading.