# "The Envirosol® Technology"

***[liquid $CO_2$ as a solvent/propellant of pesticides].***

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The BOC patent (Ryan et al 1978) of the solvent-propellant properties of liquid carbon dioxide is the basis of the Envirosol® product range. The unique Envirosol® system relies on liquid $CO_2$ at high-pressure (5,000 kPa) to act as a solvent and propellant for insecticides. The resultant aerosol droplet size range between 2 and 20 microns results in the insecticide being suspended in excess of two hours. A small quantity of insecticide applied as a liquid $CO_2$ aerosol can quickly fill a large space and no insect can escape the treatment. Envirosol® products with the exception of high pressure and high propellant content are similar to the domestic "aerosol" pressure-pack can. Envirosol® products include Pestigas® [0.4% natural pyrethrum] and Insectigas® [5% dichlorvos] and are supplied in 6kg and 31kg net content industrial gas cylinders.

Envirosol Technology is being applied to develop products that can be used as alternatives to methyl bromide fumigation. Quarantine treatment of commodities is being evaluated. For example, the elimination of external insect infestation on organically grown bananas using "organic" pedigree pesticides. Reformulated Pestigas without the synergist piperonyl butoxide and with the alternative solvent ethanol is such a candidate product.

The long time registered dried fruit pesticide ethyl formate is being formulated in liquid $CO_2$ and could have application in quarantine and stored product disinfestation. The added benefit of ethyl formate is its volatility, which minimises residue concerns where contact with foodstuff is an issue. The option of internal use in food processing equipment of a non-flammable liquid $CO_2$ and ethyl formate mixture together with external "fogging" using existing Envirosol products could be an alternative to the methyl bromide in food manufacturing plant.

The use of liquid $CO_2$ as a carrier for liquid soil fumigants is also being evaluated. The high pressure of liquid $CO_2$ mixture, the elimination of flammability hazards and optimising dosage offer significant benefits for effective soil fumigation.

This project is affiliated to the on-going extension of dispensing pesticides - fungicides and insecticides - in horticultural applications is actively developed by Crop & Food Research, New Zealand.

**References:**

R. F. Ryan, E.A Shervington and D. J. Catchpoole (1978) "Pesticide Distribution System" Australian Pat., 494,198 ( 26 June ).

H. Krishna, Stephens, C.; Carpenter, A.; Grant, N.; Galbraith, G.; Starr, M.; Lill, R.; Ryan, R.F. 1998. "Envirosol Technology – A New Approach to Fungicide Application in Greenhouses". Proceedings of the 51st New Zealand Plant Protection Conference pp 152-156.