The language of pyrethrum flowers has permitted today's chemists to combine insecticide efficacy with safety for man and other mammals.

Pyrethrin derivation

Pyrethrum is the most important botanical insecticide. The flowers of this daisy, at the base of the petals, contain a mixture of pleasant-smelling esters called the pyrethrins with highly unusual insecticide properties. Many countries are involved in the production and use of pyrethrum.

Pyrethrum has been used for more than 160 years establishing the longest' safety record of any major pest control agent. However, the criteria of safety and effectiveness are constantly changing with social and political perceptions and this botanical insecticide is continually being reevaluated. Despite its chemical complexity, it must be thoroughly studied in the same manner as structurally-simpler pesticides. **Knowledge from these new investigations further verifies the unique built-in safety features of the pyrethrins. They are knockdown and killing agents for pest insects yet are of very low toxicity when ingested by mammals.** They are nonpolluting since they break down quickly on exposure to light and air and they are quickly metabolized. Pyrethrum is therefore a natural insecticide, which does its job effectively and is then rapidly degraded.

STORED PRODUCTS INSECT CONTROL

Pyrethrum is one of the most widely-used insecticides for stored products insect control because its low mammalian toxicity and short residual life allow application in numerous situations, its broad spectrum of activity is suitable for control of a wide variety of pests, and established tolerances for raw agricultural commodities and processed foods are acceptable for both direct grain treatments and in food handling establishments. There are literally hundreds of pyrethrum products with label claims for stored products insect control. These range from consumer liquid and aerosol products for control of these insects in private homes to a wide variety of professional products for use by commercial pesticide applicators either to protect commodities through direct applications to grain, as repellent treatments to packaging material, or for space, contact, surface, crack-and-crevice, and spot treatments within food handling establishments. These establishments are defined by the PMRA (Canadian Ministry of Health) and EPA (United States monitoring agency) as ***"an area or place other than a private residence in which food is held, processed, prepared, and/or served."*** They include, but are not limited to, bakeries, cafeterias, canneries, commercial airplanes, hospitals, mobile caterers, restaurants, schools, supermarkets, and taverns.

Use in Food Processing Plants

Ministry of health, Pest Management Regulatory Agency in Canada and a number of federal agencies including the EPA, the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) regulate the use of insecticides in food processing plants.

All insecticide products in Canada must be registered with PMRA. All insecticide products in the United States must be registered with the EPA. In addition, those used in food areas of FDA-inspected facilities (for receiving, serving, storage, packaging, preparing, edible-waste, and enclosed food processing equipment) must have established food additive *tolerances and* be applied in a manner that ensures the *tolerance will* not be exceeded. *The use of insecticides in meat and poultry plants is more complicated than in other types of food processing plants because some insecticides that are approved by the PMRA and EPA for use in general food handling establishments may not be used in facilities operating under the FDI (Canadian Food Inspection Agency) and USDA meat and poultry inspection program.*

PRECAUTION

The primary use of pyrethrum in food processing plants is as a space spray. These applications are an integral part of insect control programs in these facilities (Corrigan and Klotz, 1992. **Pyrethrum has been especially notable for its lack of persistence. *From its long history of use, its impact on the environment has been considered to be minimal in contrast to that of many other chemical pesticides.*** There has been no evidence of pyrethrins entering into the food chain through environmental residues, runoff, or leaching. In case of automatic dispensers the technology involves far lesser dispersing of the mixture in the atmosphere.

BUGCON HARVEST METERED SPRAY FOR FOOD ESTABLISHMENTS.

IMPORTANT DATA

1. The composition in the can consist of 60% to 70% of propellant. Balance is made of active and solvent.
2. Harvest insecticide for automatic aerosol dispenser (Cam Spring Action type), releases 55 mg of insecticide every 15 minutes (recommended).
3. Dispenser must be located 2-3 meters above the floor at a point where air circulation will carry particles throughout the area.
4. Use area must have at least 170 cubic meters of free flow air space.
5. Canadian PMRA approved label; allows following use areas**:**
   Restaurants, Food Plants, Hospitals, Food Service Establishments, Lodges, Resorts, Dairies, Horse Stables, Cow Barns and Poultry Houses ***while in operation.***
6. Also for use in Meat processing Plants ***while not in operation.***

CONCLUSIONS

Available information on the toxicity of pyrethrum extract to mammals was reviewed by Barthel (1973) and included studies reported through 1972. Substantial variations existed in the oral LD_{50}, of pyrethrins for rats, ranging from 100 to >2,600 mg/kg. However, the test materials used in these various studies differed in type, purity, and concentration and, in some studies, certain assumptions were necessary to calculate the $LD_{50.}$

The findings of the eco toxicological and environmental fate studies completed to date are totally consistent with previously-reported data. The potential hazard of pyrethrins for warm-blooded species is low. The oral LD_{50}, of >2,000 mg pyrethrins/kg and the dietary LD_{50}, of >5,620 ppm pyrethrin for both the bobwhite quail and the mallard duck indicates that pyrethrum spraying is very unlikely to produce any toxic effects on avian wildlife or humans. ***The impact of terrestrial spraying of pyrethrum extract on no target organisms other than sensitive insects is also minimized by extremely rapid dissipation.*** Although data acquisition continues for toxicological and fate investigations, which require (14C) pyrethrins, ***the available database from current and past studies indicates that pyrethrum extract, applied at insecticide dosages, has only a minimal direct impact on wildlife and humans and no long-term effects on various ecosystems***. As for impact on human beings working in the area where Bugcon Harvest is in operation the chemical release is extremely minimal.