



Agriculture

Canada

Food Production
and Inspection Branch

Plant Industry Directorate

Direction générale,
Production et inspection des aliments

Direction de l'industrie des produits végétaux

Canada

Decision Document

E92-03

Grape Berry Moth Pheromone

Decoy Grape Berry Moth Pheromone is a synthetic replica of the naturally occurring pheromone produced by the female grape berry moth. Data provided by the applicant indicate that the product is an effective alternative to traditional chemical insecticides for control of this important pest of grapes. The nature of the pheromone and method of application via the slow release dispenser are such that exposure to operators and the crop are minimal. The pheromone is expected to have minimal impact on non-target organisms and the environment when used as proposed. Based on this assessment, Agriculture Canada has granted registration of Decoy Grape Berry Moth Pheromone (Registration Number 22527 *Pest Control Product Acts*) for control of grape berry moth in vineyards through mating disruption.

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Decoy Grape Berry Moth Pheromone

Agriculture Canada has granted registration for 'Decoy Grape Berry Moth Pheromone' for control of grape berry moth, *Endopiza viteana* (Clemens), in vineyards through mating disruption. The registrant is Agrisense of Fresno, California (Canadian Agent: Cooper Mill Ltd., Madoc, Ontario). Decoy Grape Berry Moth Pheromone is the first pheromone product registered under the *Pest Control Products Act* for control of an insect pest through mating disruption.

The active ingredient (Z-9 dodecenyl acetate) contained in Decoy Grape Berry Moth Pheromone is a synthetic replica of a component of the naturally occurring pheromone produced by the grape berry moth. Natural pheromone is produced and released by the female moth. The adult male uses the pheromone as an olfactory cue for locating the female prior to mating in or around the vineyard. The synthetic pheromone controls the grape berry moth population by permeating the surrounding area, thus disrupting the olfactory cues used by the male moth to locate the female. As a result, the male does not find the female and the reproductive cycle is disrupted. This differs from a control strategy using conventional chemical insecticides which act by killing the target pest.

The end-use product consists of the active ingredient impregnated in an acrylate copolymer plug which is contained within a plastic dispenser clip. The dispensers are packaged in airtight foil wrappers and should be kept in these until ready to be applied. The dispensers are designed to be manually attached to the trellis wires in the vineyard. Each dispenser contains 160 mg of active ingredient which is released from the dispenser over a period of about 100-120 days depending on weather conditions.

Dispensers containing Z-9 dodecenyl acetate are registered for control of grape berry moth through mating disruption in the United States, and for control of European grape berry moth, *Eupoecilia ambiguella* Hb., in Germany, Switzerland and Austria.

Use Pattern

The rate of application is 1000 dispensers per hectare. A single application is required per season. To be effective, dispensers must be placed in the vineyard prior to mating of grape berry moth (usually mid-May in southern Ontario). Dispensers are to be attached manually to the trellis wires supporting the vines.

The efficacy of the pheromone treatment can be influenced by a number of factors such as the level of infestation, shape and size of the vineyard, and proximity of the vineyard to untreated vineyards and secondary hosts. Wooded areas adjacent to the vineyard can act as a reservoir for moths entering the vineyard, and therefore may also require treatment with pheromone. Careful monitoring of the adult population and larval damage is essential to assess the effectiveness of the treatment and to determine

whether further corrective measures (e.g., insecticide spray) are necessary at some point in the season. Because the mode of action of the pheromone drastically differs from that of a chemical insecticide, growers should consult with Integrated Pest Management (IPM) specialists and company representatives on an ongoing basis when implementing a control program using Decoy Grape Berry Moth Pheromone.

Human and Environmental Safety Considerations

Data provided by the applicant indicate that the pheromone is not acutely toxic by the oral, dermal or inhalation routes (acute oral LD⁵⁰ in rats at >15000 mg/kg; acute dermal LD⁵⁰ in rabbits at >3000 mg/kg; acute inhalation toxicity in rats elicited no observable effects at 31.8 mg/L). The data suggest that the pheromone is a slight-to-moderate eye irritant in rabbits, but is not a primary skin irritant.

Because the Decoy Grape Berry Moth Pheromone dispensers do not come in direct contact with the grape plants, the only exposure the developing grapes will have to the pheromone is through a slight increase in ambient concentration of the pheromone in air. As a result, the Food Directorate of Health and Welfare Canada feels that it is unlikely that the use of this product, as proposed, will result in residues of Z-9 dodecenyl acetate in grapes harvested from treated vineyards. Therefore, promulgation of a maximum residue limit for Z-9 dodecenyl acetate in grapes is not necessary.

The Environmental Health Directorate (EHD) of Health and Welfare Canada has reviewed the available toxicology data as it pertains to worker and bystander exposure. Because the formulation is packaged in a passive dispenser and is volatile at low concentration, the EHD feels that the potential for human exposure to the pheromone is minimal.

The Canadian Wildlife Service (CWS) of Environment Canada and the Department of Fisheries and Oceans (DFO) have reviewed the available data and concluded that Decoy Grape Berry Moth Pheromone poses very little risk to wildlife and fish habitat. CWS has recommended that the dispensers be securely attached to the trellis wires of the vineyards as they could be considered attractive nesting material for some birds. DFO has recommended labelling precautions to prevent contamination of water bodies and directions for disposal of the dispensers which will prevent entry of the active ingredient into aquatic ecosystems.

The Commercial Chemicals Branch (CCB) of Environment Canada has requested information on vapour pressure, water solubility, octanol-water partition coefficient and Henry's Law constant in order to determine the likelihood that the pheromone will partition into soil and water. CCB has also requested information on the fate of the pheromone in air in order to estimate the persistence of the pheromone and major transformation products in air. However, due to the slow release rate of the product and chemical nature of the pheromone, CCB feels that the impact on non-target organisms in and around vineyards is likely to be minimal. CCB has recommended that used dispensers and wrappers be disposed of in accordance with municipal, provincial and federal regulations.

Value of Decoy Grape Berry Moth Pheromone to Sustainable Agriculture

Grape berry moth is the primary insect pest of grapes in southern Ontario. The larvae cause physical injury to the grape flowers, clusters and berries. There are up to three generations of the insect per year depending on location and weather conditions. Population levels and berry damage can vary among regions, among vineyards within the same region, and even among areas within the same vineyard (i.e., border vs. centre of the vineyard).

Traditionally, grape berry moth is controlled by a series of carefully timed insecticide sprays (e.g., permethrin, azinphos methyl) to control successive generations of the insect. In southern Ontario, between two and six insecticide sprays may be required for seasonal control. The number of sprays depends on factors such as location of the vineyard, level of infestation and correct timing of application. Results from field trials conducted in southern Ontario by Cooper Mill Ltd. have shown that a single application of Decoy Grape Berry Moth Pheromone dispensers can be as effective as a traditional series of insecticide sprays [e.g., spray regime of permethrin (June 4), azinphos methyl (July 7), azinphos methyl (July 22), parathion (August 19)¹] in reducing grape berry moth damage to grapes.

Registration of Decoy Grape Berry Moth Pheromone provides growers with an alternative to chemical insecticides for control of grape berry moth. Reduced reliance on chemical insecticides for control of this pest results in 1) decreased exposure of growers to chemical insecticides during mixing/loading/application, 2) reduced residues on grapes, and 3) reduced environmental loading of pesticides. Because a single application of Decoy Grape Berry Moth Pheromone is required for season-long control of grape berry moth, grower contact with the dispensers is limited to attachment of the dispensers to the trellis wires in the spring. Grower contact with the pheromone is further minimized because the active ingredient is impregnated in an acrylate copolymer plug which is contained within the plastic dispenser. Due to the nature of the product, it is unlikely that any residues would occur in grapes harvested from vineyards treated with pheromone.

Unlike chemical insecticides, Decoy Grape Berry Moth Pheromone does not kill the target pest. The product disrupts mating by interfering with the ability of the male to locate the female. Because of its specific mode of action, it is expected that Decoy Grape Berry Moth Pheromone will have minimal impact on non-target organisms. Although the potential for impact on non-target Lepidoptera having similar dodecenyl acetate components in their pheromones is not known, use of the product in commercial grape orchards is likely to result in minimal impact on non-target organisms. This characteristic makes Decoy Grape Berry Moth Pheromone an ideal Integrated Pest Management tool for use in grapes because impact on beneficial arthropods is expected to be minimal. It should be noted that Decoy Grape Berry Moth Pheromone is not intended to be an exclusive replacement for chemical insecticides but, if used properly, can be an effective tool in a pest management program for control of grape berry moth.

¹ Timing of insecticide sprays was determined by on-site monitoring of the adult population.

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