



R.E.D. FACTS

Ryanodine

Pesticide Reregistration

All pesticides sold or distributed in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides which were first registered before November 1, 1984, be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers describing the human health and environmental effects of each pesticide. To implement provisions of the Food Quality Protection Act of 1996, EPA considers the special sensitivity of infants and children, as well as aggregate exposure of the public to residues of the pesticide from all sources, and the cumulative effects of the pesticide and other compounds with common mechanisms of toxicity. The Agency develops any mitigation measures or regulatory controls needed to reduce each pesticide's risks. EPA reregisters pesticides that meet the safety standard of FQPA and can be used without posing unreasonable risks to human health or the environment.

When EPA reaches a decision regarding a pesticide's eligibility for reregistration, the Agency announces this in a Reregistration Eligibility Decision (RED) document and provides opportunity for public comment. Alternatively, some pesticides are withdrawn from the reregistration process prior to the completion of a formal RED document. This fact sheet serves as and explains the Agency's Reregistration Eligibility Decision for Ryanodine (reregistration case 2595), which consists of a voluntary cancellation of this pesticide.

Description of Chemical

Common Name:	Ryanodine
Trade Names:	Ryanodine, Ryanocide, RYANIA
Empirical Formula:	C ₂₅ H ₃₅ NO ₉ or C ₂₆ H ₃₇ NO ₉
Chemical Abstracts Service (CAS) No.	15662-33-6
EPA Shaughnessy Code:	071502
Year of Initial Registration:	1968
Year of Patent:	1945 Patent No. 2,400,295
Pesticide Type:	Insecticide

Chemical Family:	Plant Alkaloid
U.S. and Foreign Producers	None

Use Profile and Formulations

Ryanodine was a botanical or non-synthetic insecticide used in integrated pest management and organic farming. This pesticide was registered for the control of citrus thrips on citrus, codling moth on apples, pears and walnuts, and European corn borer on corn. In fact, it has only been used on apples and citrus. On these crops it was used primarily by growers interested in avoiding use of longer lived residual products, controlling pesticide resistant insects (primarily phosphate resistant populations), and practicing “organic” insect control. Historically it has also had broad spectrum uses by homeowners on food and feed crops and in residences to control roaches.

Formulations were based on an active ingredient isolated from the wood of *Ryania speciosa*. End-use products were powder or wettable powders containing 5.5% to 22% active ingredient, and formulation intermediates containing 45% active ingredient.

Science Background

Ryania has been used commercially as a pesticide spray since the early 1940's. Several LD₅₀ studies conducted in 1948 helped establish the safety of use of powdered ryania stems as an insecticide. However, these studies lacked accurate quantization of the alkaloid active ingredient. They established the acute oral toxicity of powdered stems of *Ryania speciosa* to be: 1200 mg/kg in rats; 150 mg/kg in dogs; more than 400 mg/kg in monkeys; 650 mg/kg in rabbits; 650 mg/kg in mice; 2500mg/kg in guinea pigs; and more than 3000mg/kg in chickens. These and other studies on the effects of ryanodine on vertebrates and invertebrates revealed powerful effects on striate muscle contraction.

Because of the lack of persistence of ryania or ryanodine in the environment, residues did not result in the food chain or the human diet. Bobwhite quail and mallard duck have been shown not to be acutely sensitive to low doses of ryania. The NOEL in dietary LC₅₀ testing was 3160 ppm and 5620 ppm for bobwhite quail and mallard duck respectively. Ryania is acutely toxic to *Daphnia magna* neonates, with an LC₅₀ 48 hour value of 44 ppm. This toxicity would require application methods that prevent spray drift from reaching ponds and other water sources. Primary eye irritation testing has shown moderate to temporary irritation in the non-rinsed eye, but no irritation in the rinsed eye. Primary dermal irritation testing showed no irritation, and no skin sensitization was shown in either dermal or guinea pig skin sensitization.

Use History and Regulatory Status

Ryania was available for many years and was used commercially as a pesticide spray since the early 1940's. As synthetic insecticides became more available and less expensive, use of ryania declined. In the early 1950's, at its maximum use, approximately one million pounds of 40% ryania (400,000 pounds of active ingredient) were used each year. By contrast, by 1990, only about 200

pounds of ryania were used per year. Prior to its voluntary cancellation, ryania's partial resurgence in the market place was due to its use in integrated pest management programs. Both apples and citrus have singular insect pests that are not routinely controlled by predators. Ryania's mode of action, which differed from that of the widely used phosphate-carbamates (acetylcholine esterase inhibitors), enabled it to control phosphate resistant insects on these crops. Nevertheless, in recent years, use of ryania has been small and insignificant except among those few growers deriving value from its use.

In 1989, the Agency considered requests by registrants for waivers of required toxicity tests based on their products' low volume/minor use. Registrants were advised that certain minimal toxicity data were needed before EPA could consider waiving additional, more complex studies. A data call-in (DCI) was issued in June 1991. As of September 1996, five reregistration data requirements remained outstanding: 81-3; 82-1a; 83-3a; 84-2a; and 84-2b. These requirements constituted part of the minimal toxicity data that the Agency needed to consider ryania's reregistration eligibility. Rather than submitting the required data, the registrants requested voluntary cancellation.

In accordance with section 6(f)(1) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), on January 22, 1997, the Agency issued a notice in the Federal Register (vol. 62, No. 14, pp. 3284-3287) of receipt of a request by the registrant to voluntarily cancel all remaining ryanodine containing products and the start of a 180 day public comment period. After the comment period expired with no comments received, voluntary cancellation of all remaining registered ryanodine containing products and the active ingredient became final on July 23, 1997.

**For More
Information**

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Electronic copies this fact sheet are available on the Internet. Please see <http://www.epa.gov/REDS>.

For information about the health effects of pesticides, or for assistance in recognizing and managing pesticide poisoning symptoms, please contact the National Pesticide Telecommunications Network (NPTN). Call toll-free 1-800-858-7378, between 6:30 am and 4:30 pm Pacific Time, Monday through Sunday. The NPTN website is: <http://www.ace.orst.edu/info/nptn/>.