Product Safety Assessment

Spinetoram


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Names
- CAS No. 187166-40-1
- 3’-O-ethyl-5,6-dihydro Spinosyn J
- (2R,3aR,5aR,5bS,9S,13S,14R,16aS,16bR)-2-[(6-deoxy-3-O-ethyl-2,4-di-O-methyl-α-L-mannopyranosyl)oxy]-13-[[2R,5S,6R]-5-(dimethylamino)tetrahydro-6-methyl-2H-pyran-2-yl]oxy]-9-ethyl-2,3,3a,4,5,5a,5b,6,9,10,11,12,13,14,16a,16b-hexadecahydro-14-methyl-1H-as-indaceno[3,2-d]oxacyclododecin-7,15-dione (IUPAC)
- Spinetoram (a mixture of 3’-O-ethyl-5,6-dihydro Spinosyn J and 3’-O-ethyl Spinosyn L)
- CAS No. 187166-15-0
- 3’-O-ethyl Spinosyn L
- (2R,3aR,5aS,5bS,9S,13S,14R,16aS,16bS)-2-[(6-deoxy-3-O-ethyl-2,4-di-O-methyl-α-L-mannopyranosyl)oxy]-13-[[2R,5S,6R]-5-(dimethylamino)tetrahydro-6-methyl-2H-pyran-2-yl]oxy]-9-ethyl-2,3,3a,5a,5b,6,9,10,11,12,13,14,16a,16b-tetradecahydro-4,14-dimethyl-1H-as-indaceno[3,2-d]oxacyclododecin-7,15-dione (IUPAC)

Trade Names
- Delegate® WG insecticide
- Radiant® SC insecticide
- Exalt™ SC insecticide

Product Overview
Spinetoram is the active ingredient in a series of insecticides formulated by Dow AgroSciences, a subsidiary of The Dow Chemical Company (“Dow”). Spinetoram is a mixture of chemically modified spinosyns J and L. It is a white to off-white powder, and is formulated as a solid water dispersible granule or liquid suspension concentrate. Formulations are sold under various trade names Delegate™ insecticide, Exalt™ insecticide, and Radiant™ insecticide. Spinetoram was accepted for review and registration under the Reduced Risk Pesticide Program by the U.S. Environmental Protection Agency (EPA) and was

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designated by the EPA as the 2008 Presidential Green Chemistry Challenge winner for Designing Greener Chemicals Award (http://www2.epa.gov/green-chemistry/presidential-green-chemistry-challenge-winners).1,2,3

- Spinetoram is a broad-spectrum insecticide used to control crop-damaging insects. It shows high-efficacy against target insects at a very low use rate, with a margin of safety toward beneficial insects.1 See Product Uses.
- Eye contact with spinetoram products may cause slight irritation. Corneal injury is unlikely.
- Brief skin contact with spinetoram products is essentially nonirritating and unlikely to result in absorption of harmful amounts. Spinetoram granular formulations contain silica, which may irritate the nose and throat.2,3 See Health Information.
- Occupational exposure to spinetoram could occur in manufacturing or formulating operations during maintenance, sampling, testing, or other procedures. Agricultural workers could be exposed during field application. Workers using spinetoram must wear proper protective equipment, and follow label instructions.4,5 Consumers could be exposed to spinetoram from dietary sources (food and drinking water). Spinetoram is chemically similar to spinosad, a pesticide approved for use in organic agriculture with an established safety record.6 See Exposure Potential.

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Manufacture of Product

- Process – Spinosyns J and L, the starting materials for spinetoram, are produced at facilities using a fermentation process in which Saccharopolyspora spinosa colonies are grown using natural materials such as soybean and cottonseed meal as feedstocks. The synthetic steps to produce spinetoram are done at a contract manufacturing facility. Delegate™ WG and Radiant™ SC products are prepared by multiple contract formulators. The chemical structures of 3’-O-ethyl-5,6-dihydro spinosyn J and 3’-O-ethyl spinosyn L are shown below.

![Chemical structures of 3’-O-ethyl-5,6-dihydro spinosyn J and 3’-O-ethyl spinosyn L](image)

3’-O-ethyl-5,6-dihydro spinosyn J

3’-O-ethyl spinosyn L

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Product Description1,2,3

Spinetoram is the second active ingredient in the spinosyn series of insecticides manufactured and formulated by Dow AgroSciences. Spinetoram is a mixture of 3’-O-ethyl-5,6-dihydro spinosyn J and 3’-O-ethyl spinosyn L. Spinetoram is formulated as a water dispersible (WG) granule or as a suspension concentrate (SC). Formulations are marketed under the trade names Delegate™ WG insecticide, Exalt™ SC insecticide, and Radiant™ SC insecticide. Spinetoram formulations are typically mixed with water and applied to foliage as a spray. The dry residue on plant foliage appears to be harmless to foraging honeybees and other beneficial insects.

Due to its low effective use rate (15 to 50 grams active ingredient per hectare) safety toward the environment and safety toward mammals and beneficial insects, spinetoram was accepted for review and registration under the Reduced Risk Pesticide Program of the U.S. Environmental Protection Agency (EPA).
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Product Uses
Applications for spinetoram products include control of crop-damaging pests such as codling moth, leafminers, apple maggot, pear psylla, oriental fruit moth, navel orangeworm, diamondback moth, armyworm, thrips, tomato fruit worm, loopers, bollworm, cutworm, grape berry moth, and others. Crops likely to be treated with spinetoram include apples and pears, stone fruit, tree nuts, crucifers, leafy vegetables, fruiting vegetables, citrus, grapes, honeydew and cantaloupe melons, corn, cotton, soybeans, caneberries, and bushberries.

Exposure Potential
Based on the uses for spinetoram, the public could be exposed through:

- **Workplace exposure** – Exposure can occur in a spinetoram manufacturing or formulating facility. Workers could be exposed during maintenance, sampling, testing, or other procedures. Each manufacturing and formulating facility should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit unnecessary exposure. Agricultural workers could be exposed during field application. Wearing proper protective equipment and following label instructions will reduce exposure risk. See Health Information.

- **Consumer exposure to products containing spinetoram** – Consumers could be exposed to spinetoram from dietary sources (food and water). Spinetoram is approved for organic wide range of agriculture with an established safety record.

- **Environmental releases** – For small spills of spinetoram granules, sweep the material up and place it in a container suitable for disposal. For a small spills of spinetoram liquid formulations, use a nonreactive absorbent such as sand, sawdust, or dirt. Collect the material in a container suitable for disposal. Wash exposed body areas thoroughly after handling. See Environmental and Physical Hazard Information.

- **Large release** – In the event of a large spill of spinetoram liquid formulations, dike the spill area to prevent material from reaching sewers, drains, streams, or waterways. Personnel engaged in clean up of spills should wear appropriate protective equipment. Apply nonreactive absorbent material such as soil or sand. Collect material and contain in appropriate containers for disposal. Report large spills to Dow AgroSciences immediately at 800-992-5994 or visit http://www.dowagro.com/company/contact/ to access Dow AgroSciences in a specific geographic area. In case of fire, self-contained breathing apparatus (SCBA) and full protective clothing must be worn. Isolate area and deny unnecessary entry. Fight fire with foam, carbon-dioxide, dry-chemical, or water-fog fire extinguishers. Do not allow water from fire-fighting to enter water supplies or drainage systems. See Environmental, Health and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

Health Information

**Eye and Skin Contact**—Eye contact with spinetoram formulations may cause slight irritation. Corneal injury is unlikely. Brief skin contact with spinetoram formulations is essentially nonirritating and unlikely to result in absorption of harmful amounts.

**Ingestion**—Spinetoram formulations have very low toxicity if swallowed.

**Inhalation**—Inhalation of spinetoram formulations is not likely to cause adverse effects. Spinetoram granular formulations contain silica, which is an irritant to the nose and throat. Repeated, excessive exposure to crystalline silica may cause silicosis, a progressive and disabling disease of the lungs. Include Human Toxicology information here – pull almost verbatim from SDS.

**Cancer and Birth Defect Information**—Spinetoram did not cause cancer in laboratory animals. In laboratory studies, Spinetoram did not cause birth defects, although dystocia was observed at high (not environmentally relevant) dose rates.
For more information, see the relevant Safety Data Sheet.

Environmental Information\textsuperscript{1,2,3}

The acute and chronic toxicity of spinetoram to mammals, birds, fish, earthworms and aquatic plants is low. Spinetoram is toxic to aquatic invertebrates from chronic exposure. However, because of its rapid degradation in aquatic systems, spinetoram is not expected to negatively impact these species. In field trials, the components of spinetoram rapidly biodegrade in soil. Spinetoram poses little threat to groundwater because it binds strongly to soil, it has a short lifetime in the environment, and its water solubility is low.

For more information, see the relevant Safety Data Sheet.

Physical Hazard Information\textsuperscript{2,3}

Spinetoram is stable under normal storage and use conditions.

For more information, see the relevant Safety Data Sheet.

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of spinetoram. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet.

Additional Information

- Dow AgroSciences website: http://www.dowagro.com/

For more business information about spinetoram, visit the web site of Dow AgroSciences. (www.dowagro.com)
References

1 Spinetoram Technical Bulletin, Dow AgroSciences LLC, Form No. Y47-343-001
2 Delegate™ WG Insecticide Material Safety Data Sheet, Dow AgroSciences LLC
3 Radiant™ SC Insecticide Material Safety Data Sheet, Dow AgroSciences LLC
4 Delegate WG Insecticide Specimen Label, Dow AgroSciences LLC., Label Code: D02-359-001, EPA Reg. No. 62719-545
5 Radiant SC Insecticide Specimen Label, Dow AgroSciences LLC., Label Code: D02-358-001, EPA Reg. No. 62719-541
6 Spinetoram Pesticide Tolerance, U.S. Environmental Protection Agency (http://www.ecfr.gov/cgi-bin/text-idx?SID=e5b7eacd89ec4b281fd9ee4f505f014f&node=se40.24.180_1635&rgn=div8)

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