



Pesticide Detectives

FUNGICIDES

Tebuconazole

What is tebuconazole?

Tebuconazole is a broad-spectrum fungicide used to control a wide range of diseases such as rusts, smuts, bunt, powdery mildew, leaf spots, and blights, it can be applied as a seed dressing or foliar spray (Dutra). In Victoria, it is registered to be used in cereals, wheat, barley, and oats

How does tebuconazole work?

Tebuconazole works on contact with fungal pathogens and prevents their germination (Brennen and Murphy, 1991)



What happens to tebuconazole when it enters the environment?

Tebuconazole has a tendency to bind to soil due to low solubility, and will enter waterways via direct application, drift and sediment/soil runoff (USEPA,, 2000). Tebuconazole is persistent, with a half life of 796 days

Sediment quality guideline values for tebuconazole

There are currently no sediment quality guidelines for tebuconazole; however sublethal effects on reproduction have been found in *Daphnia* after 14 days at 0.52mg/L (Sancho et. Al)

References

- Brenneman TB, Murphy AP. Activity of tebuconazole on *Cercosporidium personatum*, a foliar pathogen of peanut. *Plant Disease*. 1991 Jul;75(7):699-703.
- E. Dutra, Tebuconazole (189) first draft, Food and Agriculture Organisation of the United Nations, Caldas University of Brasilia, Brasilia, Brazil.
- E, Sancho, MJ Villarroel, MD Ferrando. Assessment of chronic effects of tebuconazole on survival, reproduction and growth of *Daphnia magna* after different exposure times. *Ecotoxicology and Environmental Safety* , v.124, p.10-17, 2016. Available from: <http://www.sciencedirect.com/science/article/pii/S0147651315301081>.
- USEPA (2000), Ecological Risk Assessments for Section 3 Registration of Tebuconazole on wheat, cucurbits, bananas, turnips, tree nuts, hops and sunflowers.



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Propiconazole

What is propiconazole?

Propiconazole is a triazole based fungicide used to control fungal diseases in a wide range of crops such as banana, peanuts, sugarcane, wheat and stone fruit. They are usually applied before infections occur. It is also used on turf and wood.

How does propiconazole work?

Propiconazole is a demethylation inhibitor. It inhibits the formation of critical fungal cell membrane ergosterols by blocking the action of 14- α -sterol demethylase enzyme from demethylating a precursor to ergosterol. Ergosterol is a sterol found in cell membranes of fungi and protozoa.



<https://specialistsales.com.au/shop/turf-domestic/fungicides-turf-domestic>



What happens to propiconazole when it enters the environment?

Propiconazole can enter the aquatic environment through runoff and spray drift. The fungicide partitions from water to sediment rapidly and is persistent in soil and the aquatic environment. It has been reported to be very toxic to aquatic invertebrates and toxic to algae and fish.

Sediment quality guideline values for tebuconazole

There are currently no ANZECC sediment quality guidelines for propiconazole. It's predicted no effect concentration (PNEC) for sediment is 0.054 mg a.i./kg wet sediment based on the no observed effect concentration (NOEC) from *Chironomus plumosus*.

References

ECHA Europe 2015, Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products – Propiconazole. Finland.

Gad, S.C and Pham, T. 2014. Propiconazole. Encyclopedia of Toxicology, 1101-1104.



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Imidacloprid



<https://www.amazon.com.au/Richgro-CRI9400-Bug-Killer-Insecticide>

What is imidacloprid?

Imidacloprid is a neonicotinoid insecticide which are synthetic derivatives of nicotine and made to mimic nicotine.



Uses of Imidacloprid

Imidacloprid is used to control sucking and chewing insects on crops, in soil and as seed treatments. It is also used in flea treatments for pets.

How does imidacloprid work?

Imidacloprid is effective by contact or ingestion. It targets receptors in the central nervous system of insects. It is less effective in vertebrates due to different receptors in the CNS and are therefore less toxic to vertebrates





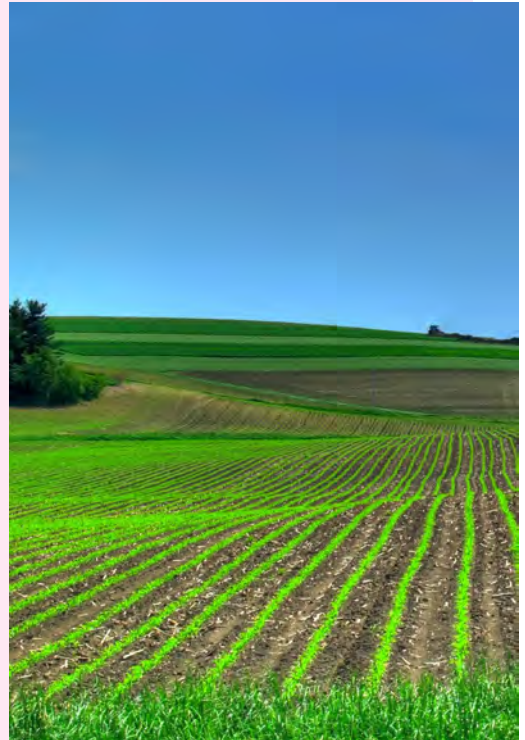
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Imidacloprid

What happens to imidacloprid when it enters the environment?

Imidacloprid binds to soil upon application, its estimated half life in soil ranged from 40-124 days depending on the type of soil, this time was increased by amendment with fertilizers. Imidacloprid can be introduced to aquatic systems by runoff, and spray drift. Once in the water imidacloprid can be broken down quickly via photolysis (half life 57mins). In water-sediment systems imidacloprid can be broken down by microbial activity, with a half life of between 30-162 days.



Sediment quality guideline values for imidacloprid

No sediment quality guidelines exist for imidacloprid, however LC50 data for daphnia is 85mg/L over 48hrs.

In 2018, imidacloprid was banned for outdoor use in the EU over links to collapse in the bee industry



References

Gervais, J. A.; Luukinen, B.; Buhl, K.; Stone, D. 2010. *Imidacloprid Technical Fact Sheet*; National Pesticide Information Center, Oregon State University Extension Services. <http://npic.orst.edu/factsheets/archive/imidacloprid.html>.

https://ec.europa.eu/food/plant/pesticides/approval_active_substances/approval_renewal/neonicotinoids_en



Pesticide Detectives

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Iprodione



What is iprodione?

Iprodione is a fungicide used to control root and stem rots, mould or mildews of a variety of fruit and vegetable crops (Pohanish, 2015). Iprodione may also be effective in treating root knot nematodes (worms) (d'Errico et. al 2017).

In Australia, iprodione is used on many types of crops and on almonds in all states to control Blossom Blight and Brown Rot. It is used to manage storage rot diseases in apples and pears and has been detected during pesticide residue testing in those fruits.

How does iprodione work?

Iprodione inhibits DNA, RNA and enzyme synthesis, thus preventing the fungus from growing (Pappas & Fisher, 1979).





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Iprodione

What happens to iprodione when it enters the environment?

Iprodione has low to moderate persistence in the environment, it breaks down quite quickly by hydrolysis in basic environments, but is more persistent in acidic environments, with a half life between 27mins (at pH9) and 130 days (at pH 5). It is moderately mobile and can be introduced to aquatic environments through runoff and leaching



www.ebay.com.au

Sediment quality guideline values for iprodione

There are no Australian sediment quality guidelines for iprodione. Use of iprodione was banned in the EU in 2018 and is not permitted in produce exports to the EU.

References

Australian Government, Department of Agriculture, Water and the Environment, Plant product monitoring datasets 2018-2019. Retrieved from <https://www.agriculture.gov.au/ag-farm-food/food/nrs/nrs-results-publications/plant-product-monitoring-2018-19#horticulture-datasets>

d'Errico, G., Giacometti, R., Roversi, P.F., d'Errico, F.P. and Woo, S.L. (2017), Mode of action and efficacy of iprodione against the root-knot nematode *Meloidogyne incognita*. *Ann Appl Biol*, 171: 506-510. doi:[10.1111/aab.12397](https://doi.org/10.1111/aab.12397)

Pappas, Athanasios C. and Fisher, David J. (1979), A Comparison of the mechanisms of Action of Vinclozolin, Procymidone, Iprodione and Prochloraza against *Botrytis cinerea*., *Pestic. Sci.* 10, 239-246

Pohanish, Richard P. (2015). *Sittig's Handbook of Pesticides and Agricultural Chemicals (2nd Edition)*. (pp. 495, 496). Elsevier. Retrieved from <https://app.knovel.com/hotlink/toc/id:kpSHPACE01/sittigs-handbook-pesticides/sittigs-handbook-pesticides>

USEPA, (2007) Review of Iprodione (PC Code 109801) Revised Application Rates and New IR4 Use (DP Barcodes D3 15437 and D3 13332)