

RIZOLEX[®] FUNGICIDE

IN FURROW



**Affordable In-Furrow control of
Rhizoctonia in Potatoes**



SUMITOMO CHEMICAL

Rhizoctonia disease of potatoes

Rhizoctonia solani is a fungus that attacks potatoes and many other crops it is rotated with. It attacks the tubers, underground stems and stolons of potato plants. *R. solani* occurs wherever potatoes are grown, but is most severe and causes significant economic damage in wet, cool soils.

The disease is most visible as black scurf, which are black or brown masses of sclerotia on the surface of tubers. While these do not cause damage, even in storage, they are responsible for perpetuating the disease and inhibiting plant establishment if the tuber is used as seed.

The most damaging phase of the disease often goes unnoticed and occurs underground when the potato plant is at its most susceptible. *R. solani* can survive on organic matter in the soil, from where it attacks the tender sprouts before they emerge from the soil. Symptoms of such attack appear in the form of lesions (also referred to as stem canker) which can become sunken and necrotic – causing the new growth to be girdled and/or stunted.

Determine whether the main source of infection is seed or soil borne, because effective control of *Rhizoctonia* requires targeted application of a fungicide to contain the infection at its source.

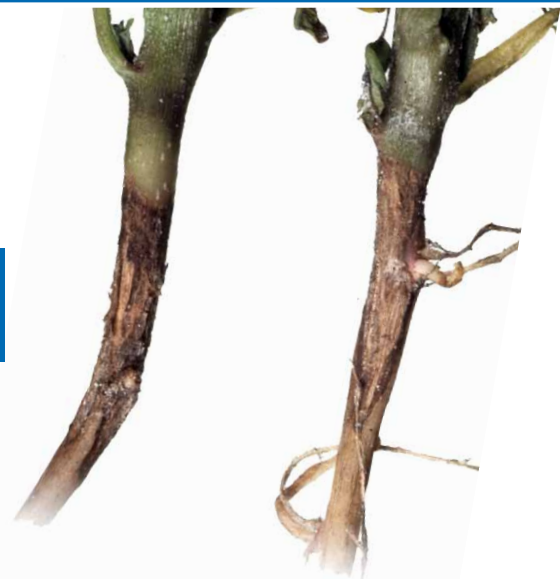


The seed-borne form (sclerotia) of *R. solani*

The combined effect of *R. solani* is poor stands, stunted plants and depressed yield. A reduction in yield relates to problems with starch translocation from the leaves to the tubers. Affected stolons and underground stems – acting as a conduit for starch produced in the leaves, cannot translocate starch to the developing tubers. As a result of this condition, small green tubers (aerial tubers) may form on the stem above the ground.

It is important to protect the tender emerging shoots when they are most susceptible to the disease by concentrating the fungicide in the germination zone directly above and around the seed piece. This is accomplished by a combination of seed treatment and in-furrow spray.

Lesions known as stem canker caused by *R. solani*



Seed treatment, in-furrow spray, or both?

The decision which method of fungicide application is the most appropriate is influenced by a number of considerations:

COST

Common perception is that fungicide seed treatment, followed by in-furrow application is too expensive. This may not be the correct approach, since this decision should be based on the main source and severity of infection. **Rizolex In Furrow was developed as a flexible product that can be applied in a program, or as a stand-alone treatment – depending on the infection scenario.** Use the Table below as a rough guide.

Infection scenario		Seed dressing required	Appropriate rate of Rizolex In Furrow
Seed borne	Soil borne		
Seed certified or confirmed to be disease-free	Unknown	NO	12 mL / 100 m row
Seed infected / from an unknown or suspect source	Unknown	YES	12 mL / 100 m row
Seed certified or confirmed to be disease-free	No history of <i>R.solani</i> / potatoes grown in rotation with non-solanaceous crops	NO	6 mL / 100 m row
Seed certified or confirmed to be disease-free	Potato monoculture / soil known to be infected / history of <i>R.solani</i>	YES	12 mL / 100 m row
Seed infected / from an unknown or suspect source	No history of <i>R.solani</i> / potatoes grown in rotation with non-solanaceous crops	YES	12 mL / 100 m row
Seed infected / from an unknown or suspect source	Potato monoculture / soil known to be infected / history of <i>R.solani</i>	YES	12 mL / 100 m row

CONVENIENCE

Because of the convenience associated with in-furrow application, this practice gained popularity in recent years. **Rizolex In Furrow can be applied with existing in-furrow applicators, using similar spray nozzles and water volumes as existing in-furrow products.** Convenience however, should not take priority over determination of the infection scenario; on which the appropriate treatment approach should be based.

RESISTANCE

The popularity of azoxystrobin as an in-furrow spray, and also as a foliar spray for control of Early blight and Late blight, increases the risk and probability for the development of resistance against this valuable Group 11 product. **Rizolex In Furrow belongs to a different chemical grouping (Group 14), and can be positioned as an in-furrow alternative to azoxystrobin, thereby reserving azoxystrobin for foliar sprays later in the season.** Rizolex In Furrow was developed and has been demonstrated to give effective control when preceded by Maxim[®], Monceren[®] or Rizolex 100D. When applying an in-furrow spray after seed treatment, use products from different chemical groups.

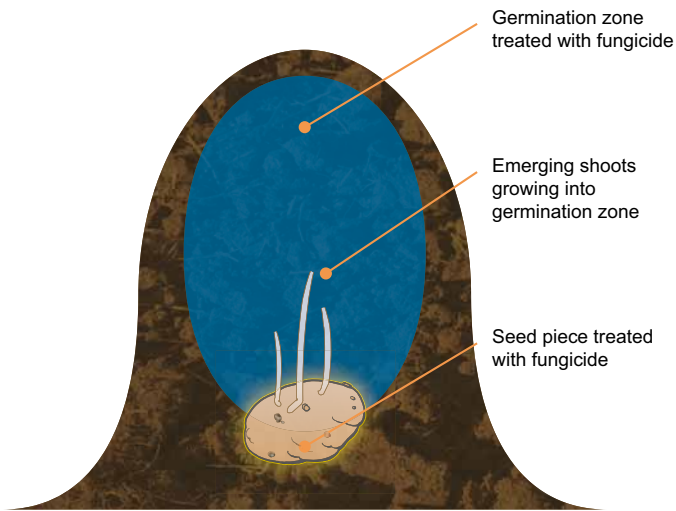
ECONOMICS

An extensive development program over a period of four years in all the major production areas has shown that a program approach consisting of seed treatment (if required), followed by the appropriate rate of Rizolex In Furrow gave a greater economic return than single applications.

Application

Effective chemical control of *R.solani* depends on the ability of the fungicide to protect the emerging shoots and growing stems while they are soft and tender, and therefore most susceptible to the disease. Placement of the fungicide in the germination zone – that area directly above and around the seed piece into which the emerging shoots will grow, is therefore critical.

Apply Rizolex In Furrow as an in-furrow spray at planting. More than one spray nozzle is preferred to direct the spray in a 15-20 cm band to the top of the seed pieces as they fall into the planting furrow, so that the surrounding soil is also treated when the furrow is closed and the seed is covered. Apply in no less than 1.5 L water per 100 m row, but be careful not to wash previously applied seed treatments from the seed.



A typical in-furrow applicator mounted on a potato seed planter. Note that there are two nozzles per row, mounted at converging angles.



More about Rizolex In Furrow

Tolclofos-methyl, the active ingredient in Rizolex In Furrow, has been the benchmark fungicide for control of *R.solani* for decades. In Australia, it is best known as Rizolex 100D – the dust formulation used as a seed dressing in potatoes and other crops.

- Now available in a 500 g/L suspension concentrate formulation, for targeted application to control *Rhizoctonia* at its source
- Strong preventive and curative activity
- Reasonable persistency in soil, but does not accumulate
- High degree of crop safety to all varieties of potatoes
- Very few cases of documented resistance – none in Australia
- Controls all strains (anastomosis groups) of *R.solani*

Different strains of *R.solani* are divided into subgroups called anastomosis groups (AG's), according to the ability of their hyphae to fuse with one another. Different AG's tend to attack different hosts or host plant families. AG 3 is the most damaging to potatoes.

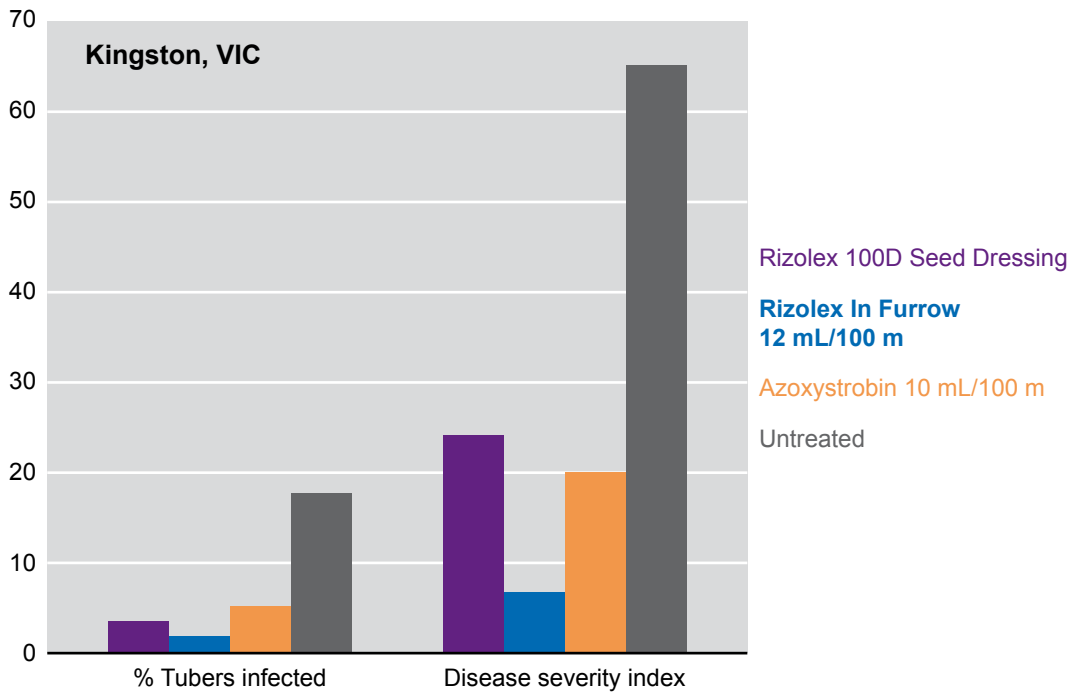
Anastomosis group	Host range
AG 1 (1A, 1B and 1C)	Rice , maize, sorghum, beans, turf, vegetables and others
AG 2-1, AG 2-2	Crucifers, vegetables, clover, turf, ornamentals and others
AG 3	Potatoes , tobacco, tomatoes, eggplant
AG 4	Potatoes , cotton, peas, soybean, onions, beans, tomatoes
AG 5	Potatoes , turf, bean crops
AG 8	Cereals
AG 9 (weak pathogen)	Potatoes , crucifers
AG 11	Wheat
AG 6, AG 7, AG 10, AG B1	Non-pathogenetic strains of <i>R.solani</i>

Trial results

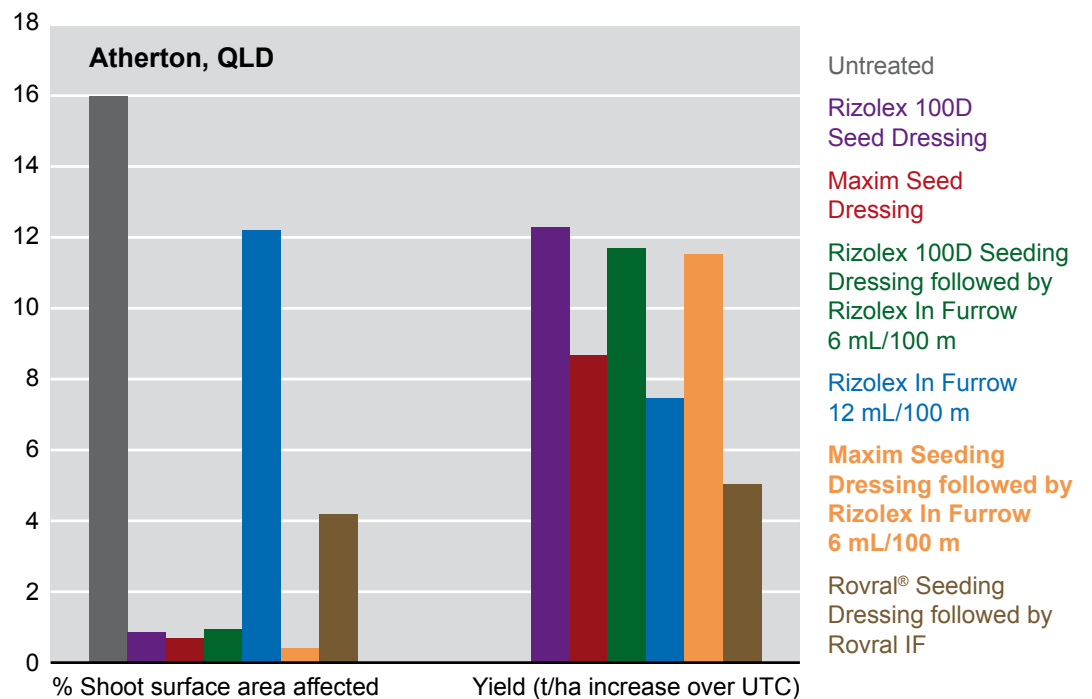
Registration of Rizolex In Furrow was preceded by four years of intensive experimentation in all major Australian production areas – according to local practices, using popular products as comparative standards, using cut or whole seed, and including a range of processing and fresh market varieties. Some of the results are shown below:

Location	Kingston, VIC
Variety	Atlantic
Planting date	December 2007
Infection scenario	Seed – low infection Soil – unknown with previous history of <i>R.solani</i> when last planted to potatoes four years prior
Conducted by	Peracto Pty Ltd
Conclusion	Seed treatment alone was not sufficient to prevent the disease from spreading to the tubers at harvest because the soil borne disease pressure was obviously higher than anticipated. Rizolex In Furrow at the 12 mL/100 m rate significantly reduced the amount of sclerotia on the tubers at harvest.

Trial results (continued)



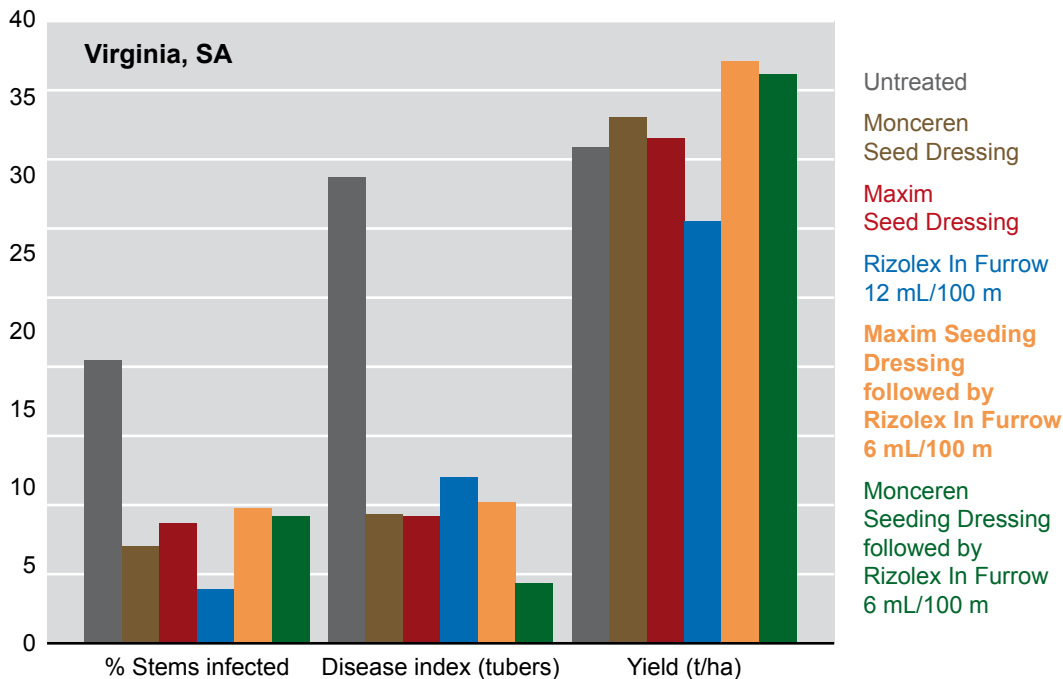
Location	Atherton, QLD
Variety	Sebago
Planting date	July 2005
Infection scenario	Seed – moderately infected Soil – previously planted to potatoes, conditions optimal for disease development
Conducted by	Peracto Pty Ltd
Conclusion	Since the main source of disease was from infected seed, all treatments that included a seed dressing were more effective. In this scenario, stand-alone in-furrow application could give only partial control. Maxim Seeding Dressing followed by Rizolex In Furrow 6 mL/100 m was the most cost-effective treatment.



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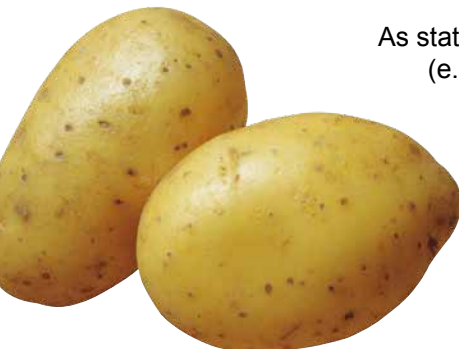
IN FURROW

Location	Virginia, SA
Variety	Red Pontiac
Planting date	June 2005
Infection scenario	Seed – low level infection Soil – paddock had a history of <i>R.solani</i> but was planted to carrots the previous year, followed by a three month fallow period
Conducted by	Serve-Ag Research
Conclusion	This is a typical example of the benefits of the program approach in a scenario where the disease originated from two sources: seed and soil. The Rizolex In Furrow in-furrow treatment contributed by reducing infection to the stems, but was inferior to the seed treatments for limiting tuber infection. The combination of seed treatment followed by Rizolex In Furrow at 6 mL/100 m row gave the best disease control as well as a significant yield increase.



Compatibility with other in-furrow products

As stated in the Directions for use, tank mixtures with other in-furrow products (e.g. insecticides) is not recommended. This restriction does not relate to the concern that such mixtures may be chemically incompatible and result in inferior disease control, but to concerns about potential crop effects. Experience has shown that application of chemicals in-furrow can affect germination, shoot formation and crop emergence, particularly when using cut seed. While Rizolex In Furrow has been proven to be safe to all potato varieties tested, it is impossible to predict how product mixtures may affect shooting and crop emergence in different varieties under different conditions.



Directions for use

Always consult the most recent label for comprehensive directions.

Crop	Disease	State	Rate	Critical comment
Cotton and Beetroot	<i>Rhizoctonia solani</i>	QLD and NSW only	120 mL/ha OR 120 mL/10,000 m row	Apply as an in-furrow spray or by water injection at time of planting.
Potatoes	Soil borne <i>Rhizoctonia solani</i>	All states	6 or 12 mL per 100 m row	<p>IN-FURROW APPLICATION</p> <p>Apply as an in-furrow spray at planting. More than one spray nozzle is preferred to direct the spray in a 15 to 20 cm band at the top of the seed pieces as they fall into the planting furrow, so that the surrounding soil is also treated when the furrow is closed and the seed is covered. Apply in no less than 1.5 L water/100 m row, but be careful not to wash previously applied seed treatments from the seed. Use the high rate when the planting seed is confirmed to be free of <i>Rhizoctonia</i> infection, or when higher levels of disease can occur. Use the low rate ONLY when the planting seed has been treated with a registered seed treatment product prior to planting.</p> <p>DO NOT apply if conditions (e.g. high soil temperature and moisture in sandy soils) or seed quality favor seed piece breakdown, as the addition of any moisture to the seed may enhance the problem. Under these circumstances the use of Rizolex 100D is recommended.</p> <p>DO NOT mix Rizolex In Furrow with other products when applied as an in-furrow spray.</p>



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