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IPRODIONE (26019 RP) – A NEW BROAD-SPECTRUM FUNGICIDE

C. SURMAN

May & Baker New Zealand Limited, Lower Hutt

Summary

Iprodione (26019 RP), a member of a new group of hydantoin compounds, is a persistent contact fungicide of low mammalian toxicity. It exhibits good protectant activity against *Botrytis*, *Sclerotinia*, *Alternaria* and *Helminthosporium* species and is also effective against strains of *Botrytis* spp that have developed tolerance to some systemic fungicides. Overseas it has found application in a wide range of crop situations. Trials conducted in New Zealand over the past 3 years have confirmed its activity against *Sclerotinia* spp in stone fruit and *Botrytis* spp in grapes and berryfruit.

INTRODUCTION

Iprodione is a member of a new group of hydantoin compounds discovered in 1970 by Societe Usines Chimique Rhone-Poulenc. It is a contact fungicide exhibiting very effective protectant and some curative properties against a range of diseases including *Botrytis* spp, *Sclerotinia* (*Monilia*) spp, *Alternaria* spp, *Helminthosporium* spp and others. It has also been shown to be active against strains of *Botrytis* which have developed tolerance to benzimidazole fungicides.

Iprodione has previously been referred to as 26019 RP or glycophen.

Chemical structure

Toxicology

Toxicological studies have demonstrated that iprodione has a very low mammalian toxicity, regardless of the method of administration. The acute oral LD₅₀ in the rat is of the order of 3.5 g/kg and long-term feeding studies have not shown any adverse effects on the animals tested. It is also of low toxicity to wildlife and bees.

Residues

Iprodione is degraded in plants and the soil into metabolites of low toxicity which do not accumulate. In animals the product is rapidly excreted. Residues found in food crops at harvest are very variable depending on cultural practices but do not present any hazard to consumers. Tolerance limits have been established in New Zealand for grapes, stone fruit, berry fruit and glasshouse tomatoes.

Environment

Iprodione presents practically no environmental hazard since it has a low vapour pressure and breakdown products in the soil are practically insoluble, non-accumulative and of low toxicity.

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Biological properties

Iprodione is a persistent contact fungicide with both protectant and some eradicant properties and is active on both spores and mycelium.

Spectrum of activity

Since being introduced for the control of grey mould (*Botrytis cinerea*) of grapes in France in 1975 the product has been developed overseas for a variety of uses including control of the following diseases:

Brown rot (*Sclerotinia* spp) in stone fruit.

Grey mould (*Botrytis cinerea*) in glasshouse tomatoes, ornamentals, berry fruit and lettuce.

Sclerotinia spp in tomatoes, lettuce and peppers.

White rot (*Sclerotium cepivorum*) in onions and garlic.

Alternaria spp in brassica and flower seeds.

Rhizoctonia solani in potatoes.

METHODS

Field trials have been conducted with iprodione in a range of situations in New Zealand since 1975 and further developmental trials are currently under way. Experimental design has varied depending on crops and disease; some are summarised below.

Grapes: Control of grey mould

Both small plot replicated and grower trials have been carried out in commercial crops of wine grapes and in each case iprodione has been compared with standard commercial materials.

Small plot trials normally consisted of 6-8 vines per treatment and were replicated three times. Application was made with a motorised knapsack sprayer applying approximately 800 litres/ha (conforming to triple concentrate spraying). A range of commercial machinery was used in the grower trials. Iprodione at 0.75 kg/ha was applied at four times throughout the season:

- late flowering
- before bunch closure
- at the beginning of ripening
- to ripe fruit

At harvest representative samples of bunches were assessed for percentage infection with grey mould.

Stone fruit: Control of brown rot

Small plot replicated and grower trials have been conducted in crops of peaches, nectarines and apricots. Small plot trials consisted of single tree plots replicated four times. Applications were made with a hand-gun to the point of run-off. Conventional commercial equipment was used in the grower trials. Iprodione was used at doses of 25-50 g/100 litres in high volume sprays applied at 10-14 day intervals over the flowering period and then again just prior to harvest. Fruit was assessed for brown rot infection at harvest and after storage for one week at room temperature.

Berry fruit: Control of grey mould

Small plot replicated trials were conducted in crops of strawberries, boysenberries and smooth-stemmed blackberries. Iprodione at doses of 25 and 37.5 g/100 litres were applied in high volume sprays at intervals of 10-14 days over the flowering period and harvested fruit was assessed for percentage infection with grey mould.

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RESULTS AND DISCUSSION

Grapes: Control of grey mould

Table 1 summarises results obtained with iprodione over a 3 year trial period.

TABLE 1: Effects of treatments on grey mould infection at harvest.

<u>Small plot trials</u>		Mean % of total bunches showing < 5% infection							
Site No.		1	2	3	4	5	6		
Grape Variety**		SR	SI	SR	SR	SI	SR		
<i>Treatment:</i>									
untreated		10.0	37.3	50.6	34.9	14.2	29.2		
iprodione 0.75 kg/ha		29.2	44.5	74.3	50.2	59.7	69.1		
dichlofluanid 1.5 kg/ha		17.4	44.7	77.2	60.3	44.9	46.3†		
<u>User trials</u>									
Site No.		1	2	3	4	5	6	7	8
Grape Variety		SR	SI	SR	SR	SI	SI	GR	SR
iprodione 0.75 kg/ha		89.7	48.1	52.1	85.5	62.5	96.0	73.0	80.6
commercial standard*		65.3	26.0	52.0	70.1	50.0	84.5	30.0	81.4

* Commercial standards: varying combinations of benzimidazoles, dichlofluanid and thiram at recommended rates.

** Grape Varieties: SR – Sylvaner Riesling

SI – Siebel 5455

GR – Grey Riesling

† dichlofluanid 1.5 kg/ha at flowering, followed by thiram 3.2 kg/ha

These show that iprodione has consistently given control of grey mould at least equivalent to and usually superior to normally used commercial standards. Figures on yields are not presented but no adverse effects on growth or development of the crop have been noted in either these or overseas trials. Iprodione has no effect on fermentation and therefore may be used close to harvest – an advantage over presently available materials.

Stone fruit: Control of brown rot

Tables 2 and 3 summarise results obtained with iprodione over a 3 year trial period.

TABLE 2: Effect of treatment on incidence of brown rot. Small plot trials.

		Mean % fruit (by number) infected with brown rot at harvest (and after seven days storage)					
Site		1	2	3	4	5	6
Crop		Nectarine	Peach	Peach	Nectarine	Nectarine	Peach
<i>Treatment</i> (g/100 litres)							
iprodione 25	-	-	-	-	4.2 (0)	0 (0)	2.0 (14)
iprodione 37.5	-	-	-	-	0 (0)	0 (6)	0.3 (2)
iprodione 50	4.2 (18)	19.7 (80)	16.7 (92)	0 (20)	0 (2)	1.0 (2)	
benomyl 18.75	10.6 (34)	24.2 (96)	31.9 (98)	0 (2)	0 (0)	1.3 (14)	
untreated	11.9 (46)	26.1 (96)	65.4 (100)	4.8 (12)	0.7 (10)	2.2 (20)	

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TABLE 3: Effect of treatment on incidence of brown rot. Grower trials.

		Mean % fruit (by number) infected with brown rot at harvest (and after seven days storage)					
Treatment		iprodione g/100 litres			Standard*		
		25	37.5	50			
Location	Crop						
Alexandra	apricot	-	0 (0)	0 (0)	0.1	(7)	
Alexandra	apricot	-	0.3 (1)	-	0.3	(0)	
Alexandra	apricot	-	0.15 (2)	-	0.25	(2)	
Roxburgh	apricot	-	0 (2)	0 (2)	0.15	(19)	
Roxburgh	apricot	-	0 (7)	0.15 (5)	2.05	(17)	
Roxburgh	apricot	-	0.45 (6)	0.1 (3)	0	(11)	
Roxburgh	apricot	-	0 (4)	-	0.6	(19)	
Napier	peach	-	<1 (2)	<1 (5)	-	(29)	
Christchurch	nectarine	-	2.2 (6)	0.5 (2)	4.2	(4)	
Napier	apricot	0.1 (1)	0.05 (2)	-	-	(-)	
Hastings	peach	0 (16)	0 (8)	-	0	(12)	
Hastings	peach	0 (4)	0 (0)	-	0	(6)	
Alexandra	apricot	0 (0)	0 (0)	-	0	(8)	
Alexandra	apricot	0 (0)	0 (2)	-	0	(0)	
Christchurch	nectarine	0.15 (18)	0.25 (8)	-	0.7	(-)	
Hastings	peach	-	-	0.65 (14)	1.2	(-)	
Hastings	peach	-	0.9 (10)	0.3 (18)	-	(-)	

* Standard: benzimidazoles or triforine at recommended rates.

Brown rot infection levels were generally low on trial sites but the control afforded by iprodione at 25 g/100 litres was normally as good as that achieved with standard materials. Infections occurring in stored fruit were usually adequately controlled.

Berry fruit

Table 4 summarises results obtained with iprodione in berry fruit crops. Data refers to mean infection levels over a number of picks.

TABLE 4: Effects of treatment on grey mould infection and yield

Mean % grey mould infection (a) and yields tonnes/ha (b)						
Crop Treatment (g/100 litres)	Strawberry		Blackberry		Boysenberry	
	a	b	a	b	a	b
iprodione 25	4.8	15.3	21.3	3.2	19.3	13.3
iprodione 37.5	5.2	15.4	20.9	4.5	17.2	11.4
dichlofluanid 125	5.8	15.6	25.8	4.7	30.0	11.2
untreated	10.0	14.0	33.7	4.8	37.5	11.5
No. of picks	9		3		6	

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It was considered that the spray penetration achieved in the blackberry and boysenberry trials was inadequate and that the level of control could probably be improved by using commercial air blast sprayers. Despite this, iprodione gave control that compared very favourably with the commercial standard.

OTHER USES

Iprodione has shown promise in a number of other situations in New Zealand and has given good results in trials against:

Botrytis in glasshouse tomatoes (Hartill 1976)

Sclerotinia in field tomatoes (Mackintosh pers comm)

Botrytis in glasshouse ornamentals.

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REFERENCES

Hartill, W. F. T., 1976. New fungicides for the control of *Botrytis* in glasshouse tomatoes. *N.Z. Commercial Grower*, 31: No. 5, 20-21.