P U L S E S

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Downy mildew control in peas

Key Points

- Downy mildew can significantly reduce the yield of peas in some seasons. In severe cases almost entire stands can be destroyed and yield reductions of over 4 tonnes/ha have been reported.
- Downy mildew is favoured by cool wet conditions.
- Under high disease pressure Wakil XL and Aliette Super seed treatments have totally controlled the disease, resulted in increases in establishment of more than double the untreated plots and seed yield increases of 4 tonnes/ha.
- Under low disease pressure there were no yield increases in Wakil treated plots.
- Foliar fungicide treatments significantly reduced the incidence and severity of downy mildew but, although there were small increases in yield, these were not significant and the gross margins over the control were negative.

Background

Downy mildew, caused by *Peronospora viciae*, can either appear as a systemic infection causing stunting and sometimes death of the plant or as localised lesions on the leaflets which become necrotic. Many crops have a high incidence of infection and farmers consider the use of foliar applied fungicides. No foliar fungicides are registered for use for downy mildew but some fungicides are registered as seed treatments. The disease is favoured by cool conditions and high relative humidity.

There are some resistant cultivars and these can be used in conjunction with cultural control (tillage and crop rotation) to reduce the disease incidence. The overwintering phase of the fungus can survive in the soil for long periods of time. This Arable Update discusses the use of both seed treatments and foliar fungicides to reduce the incidence of disease.

Seed treatments

Three seed treatment products were evaluated and their influence on plant establishment, disease incidence and grain yield was determined in a trial with Bolero peas at Lincoln. The three seed treatments used, and the rates applied, are shown in Table 1. This trial had a high incidence of downy mildew.

The trial was assessed for seedling establishment and all seed treatments significantly increased establishment with the high and low Wakil and the Aliette treatments giving the highest establishment. The incidence and severity of disease was assessed 8, 9 and 10 weeks after sowing. At 8 weeks there was a high level of infection on the untreated and Apron treated seed but no disease in the other seed treatments. At 9 weeks only the Wakil treated plots were disease free. A week later many plants of untreated seed plots and the Apron treated plots had dead leaves. The Aliette treated plants had a lower incidence of disease and the Wakil treated plants were disease free (Table 2).

Table 1: Fungicide seed treatments applied to Bolero peas.

Trade name	Active ingredients	Rate (mg ai/kg seed)
Apron® XL	35% metalaxyl-M	350
Aliette Super®	53% fosetyl Al + 13% thiabendazole + 17% thiram	1530 + 370 + 500
Wakil® XL	10% cymoxanil + 18% metalaxyl-M + 5% fludioxonil	200 + 350 + 100 (low) 400 + 700 + 200 (high)

The yield from all fungicide seed treatments was significantly higher than the untreated seed. The grain yield increases were closely related to the increased establishment and the reductions in disease. The two Wakil rates and the Aliette were significantly higher yielding than the control but not significantly different from each other (Table 2).

In two other trials where the disease pressure was low there was little or no yield response to the use of Wakil fungicide seed treatments in any of the three cultivars in Canterbury or the cultivar used in Southland (Table 3).

Table 2: Downy mildew disease incidence, severity, seedling establishment and yield of Bolero peas treated with different fungicide seed treatments in a high disease pressure season.

Seed Treatment	Number of plants/m^2 established	%infection	Disease Severity Score#	Grain yield t/ha
Nil	42	95	5.0	1.8
Apron	76	59	1.8	3.9
Aliette	99	23	1.1	5.8
Wakil (low)	113	0	0	5.8
Wakil (high)	100	0	0	5.8
LSD(p>0.05)	18		0.9	0.7

0 = no disease, 2 = 10%, 5 = 33%.

Table 3: Yield of treated and untreated peas at low disease pressure sites.

Seed Treatment	Seed Yield (t/ha) Canterbury (mean 3 cultivars)	Southland (Eiffel)
Nil	4.0	7.6
Wakil	4.1	7.5
Aliette	-	7.4

Foliar fungicides

A number of foliar fungicide products were evaluated for control of downy mildew in a crop of field peas (Mara Red) which had been seed treated, yet had a disease incidence of 100% at the time of the first application. One or two applications were made. All treated plots received the first application in mid November when plants were at 7-10 nodes and some received the second application at the end of November when plants were at 9-13 nodes (Table 4). Assessments of the incidence (number of plants infected) and severity (percent leaf area affected) were made on the nodes that had grown since the application of the first fungicide.

Disease incidence was high for all treatments (40-60%) except for the Ridomil x 2 and the Foschek treatments. The disease severity was low on the new leaves and only a trace of disease was present on the two treatments with a low incidence of disease. The two fungicide treatments that significantly reduced the incidence and severity of disease were the highest yielding treatments. There was no significant difference in yield between any of the treatments but there was a significant linear increase in yield (r=0.86, p>0.01) as the incidence of downy mildew decreased.

As there was no significant yield increase with fungicide application, all treatments reduced the gross margin of the crop.

The yield of this crop was low and although some of the fungicide treatments controlled the foliar disease it may already have had a significant influence on yield through the systemic infection. In addition other diseases, Fusarium and Aphanomyces, which were isolated later in the season may also have suppressed any yield advantages from the fungicide treatments.

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Table 4: The influence of fungicide foliar applications on incidence and severity of downy mildew and the subsequent yield and MOCC.

Treatment & rate/ha	Active ingredient	Number Applications	Disease incidence [1]	Disease severity [2]	Yield (t/ha)
Nil	-	-	49	1.2	2.9
Water	-	2	60	2.6	2.8
Kocide 2kg	Copper hydroxide	2	48	1.3	2.9
Manzate 2kg	Mancozeb	2	40	1.1	2.7
Ridomil Gold 2.5kg	Metalaxyl-M	2	3	trace	3.1
Ridomil Gold 2.5kg	Metalaxyl-M	1	42	1.0	2.8
Amistar WG 0.38kg	Azoxystrobin	1	52	2.2	3.0
Foschek 0.5/	Phosphorous acid	1	2	trace	3.0
Shirlan 0.25/	Fluazinam	1	57	1.6	2.8
Chlorocarb 2kg	Chlorothalonil + carbendazim	1	51	1.5	2.9
(LSD P<0.05)			24	1.4	0.4

[1] % of plants with infection or new growth at the time of the 2nd application
[2] % of leaf area infected