



Agriculture & Horticulture
DEVELOPMENT BOARD



Grower Summary

FV 341a

Asparagus: evaluation of spray treatments for control of purple spot (*Stemphylium vesicarium*) in a field crop

Final 2012

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HDC is a division of the Agriculture and Horticulture Development Board.

Project Number: FV 341a

Project Title: Asparagus: evaluation of spray treatments for control of purple spot (*Stemphylium vesicarium*) in a field crop

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Contractor: ADAS UK Ltd

Industry Representative: Mr Philip Langley, Sandfield Farms Ltd

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Previous report/(s): None

Start Date: 01 July 2012

Expected End Date (actual): 31 January 2013 (31 October 2012)

Project Cost (Total Project Cost): £7,890 (£13,060)

Headline

- Olympus (azoxystrobin + chlorothalonil) and Switch (cyprodinil + fludioxonil) gave the best control of purple spot out of five fungicides tested.

Background and expected deliverables

Stemphylium purple spot (*S. vesicarium*) on asparagus ferns often results in premature defoliation and can significantly reduce yield in subsequent seasons. In work on container-grown asparagus inoculated with spores of *S. vesicarium*, single sprays of Amistar Top (azoxystrobin + difenoconazole), Olympus (azoxystrobin + chlorothalonil), Plover (difenoconazole), Signum (boscalid + pyraclostrobin) and Switch (cyprodinil + fludioxonil) appeared to reduce the disease. Various programmes using these products in different sequences in field trials gave significant reductions of purple spot (FV 341). However, there is no sound information on the relative efficacy of individual products in the field, or their efficacy when used at different levels of disease pressure. The aim of this project was to compare the efficacy of five fungicide products each applied at two spray timings ('early' and 'late' first spray) in controlling Stemphylium purple spot on ferns. Additionally, the efficacy of a four-spray programme of Serenade ASO, and an alternating four-spray programme of Signum and Plover were examined; all the products listed for testing are approved for use on asparagus.

The expected deliverables from this project are increased knowledge on the relative efficacy of five fungicides and a biofungicide for control of Stemphylium purple spot, including their performance at two levels of disease pressure.

Summary of the project and main conclusions

A replicated large plot field experiment was established in late June 2012 in a two-year down field of asparagus, variety Gijnlim, in Warwickshire. Five fungicides approved for use on asparagus (Table 1) were each applied as two-spray programmes (a) from first appearance of the disease ('early' treatment), and (b) when the disease was obvious ('late' treatment), resulting in 10 treatment comparisons. Additionally, Serenade ASO was examined as a four-spray programme and Signum and Plover were applied alternately in a four-spray

programme. Sprays were applied as a fine mist at 300 l/ha. Wet weather throughout much of July and early August resulted in severe disease development.

At the start of the experiment *Stemphylium* purple spot was present only on the stem bases and at a low level (1.3% stem surface area). Early spray programmes of Olympus (azoxystrobin + chlorothalonil) and Switch (cyprodinil + fludioxonil), each applied on 27 June and 12 July, gave good control on the stem base and branches five days after the second spray. There was also a trend for reduced spotting on needles with these two products. Amistar Top (azoxystrobin + difenoconazole), Plover (difenoconazole), Signum (boscalid + pyraclostrobin), Serenade ASO (*Bacillus subtilis*) and the Signum/Plover programme had no effect at this stage (Table 2). On 25 July (2 weeks after the early sprays were completed), all of the early spray programmes and also the Signum/Plover alternating programme were giving control (between 35% and 75% reduction) of lower stem infection. There was a low level (1 - 3%) of needle spot in the fern canopy at the time with no difference between treatments.

At the start of the late treatment programmes on 20 July, *Stemphylium* spotting was obvious on lower stems (4.3% surface area), and was also now present on needles in the fern canopy (2.9%). One week after the end of these programmes (9 August) the disease affected 20% of needles in untreated plots. This was reduced to 10% or less by all of the late two-spray programmes. *Stemphylium* spotting increased greatly between 9-16 August to affect 59% of needles by 16 August. The disease was reduced by all of the late two-spray programmes and also the Signum/Plover four-spray programme; Olympus (18.8% needles affected) and Switch (12.9%) were again the most effective products. The Olympus early two-spray programme also remained effective (26%), now four weeks after the last spray application. The Serenade ASO four-spray programme did not reduce *Stemphylium* at any assessment.

Visual assessment of canopy greenness largely reflected control of *Stemphylium* on fern needles, with Olympus and Switch generally having the highest scores. At one month after the final spray application, the proportion of canopy still green was less than 30% in all treatments except for plots which had received two late sprays of Olympus (54% green). The proportion of stems dead at this time (18% in untreated plots), due to severe *Stemphylium* in the canopy, was reduced by Switch early sprays (7%), Olympus late sprays (3%) and the Signum/Plover four spray programme (7%).

Olympus and Signum gave the most persistent control (1 month) of severe foci when products were applied as early sprays; Olympus and Switch gave the more persistent control (2 weeks) when products were applied as late spray. The reduced persistence of disease control from the late spray programmes is likely due to the higher disease pressure and possibly also from reduced spray penetration. In a wet year such as 2012, where rainfall through the growing season (June, July and August) was significantly higher than the previous two years, it is likely that a programme of at least four spray applications will be required to maintain protection. The above results suggest that for the most effective disease control in a wet year programmes include early sprays of Olympus and/or Signum and later sprays of Olympus and/or Switch.

Table 1. Details of fungicides and a biofungicide examined for control of *Stemphylium* purple spot on asparagus - 2012

Product	Active ingredients (fungicide group)	Rate of use (l or kg/ha)	Maximum number sprays	Approval status (October 2012)
Amistar Top	azoxystrobin (11) + difenoconazole (3)	1.0	2	EAMU 0831/07
Olympus	azoxystrobin (11) + chlorothalonil (M5)	2.5	2	Label
Plover	difenoconazole (3)	0.5	2	EAMU 0158/05
Signum	boscalid (7) + pyraclostrobin (11)	1.5	2	EAMU 2105/10
Serenade ASO	<i>Bacillus subtilis</i> (44)	10.0	20	EAMU 0475/2012
Switch	cyprodinil (9) + fludioxonil (12)	1.0	3	EAMU 3173/10

EAMU – Extension of Authorisation for Minor Use. Treatments applied under an EAMU are used at grower's own risk.

Table 2. Effect of fungicide spray programmes on control of *Stemphylium* purple spot on asparagus, Warwickshire – 2012

Treatment	% area lower stem affected		% needle spot in upper canopy		% severe foci	% green canopy
	17 July	25 July	9 Aug	16 Aug	16 Aug	4 Sep
1. Untreated	4.3	5.1	20.0	59.4	69.3	20.2
<u>Early two-spray programmes</u> (applied 27 June and 12 July)						
2. Amistar Top	3.9	3.3	12.1	46.2	56.7	15.8
3. Olympus	1.5	1.3	0.9	25.8	43.3	19.6
4. Plover	4.0	3.1	15.0	56.7	70.0	19.6
5. Signum	3.3	2.1	11.2	49.6	45.0	22.1
6. Switch	1.8	1.7	3.9	50.4	58.3	15.8
<u>Late two-spray programmes</u> (applied 20 July and 3 August)						
7. Amistar Top	2.9	3.4	8.1	38.3	50.0	25.0
8. Olympus	4.8	4.3	8.2	18.8	33.3	54.2
9. Plover	2.8	2.9	10.1	29.2	55.0	22.9
10. Signum	3.8	3.0	9.2	37.1	53.3	25.4
11. Switch	4.3	3.9	5.7	12.9	30.0	26.7
<u>Four-spray programmes</u> (applied 27 June, 12 and 20 July, 3 August)						
12. Serenade ASO	4.7	3.9	10.8	49.2	63.3	23.9
13. Signum/Plover	3.0	2.5	13.3	29.6	51.7	21.7

Values significantly different ($p < 0.05$) from the untreated in the same column are shown in bold. Sprays were applied at 14 day intervals with final treatments on 12 July (early two-spray programme) and 3 August (late two-spray and four-spray programmes).

Financial benefits

Poor control of *Stemphylium* on asparagus fern in the summer and autumn can reduce transfer of carbohydrate to roots and reduce yield in subsequent seasons. In the USA it was demonstrated that untreated control plots yielded around 20% less than plots on which the disease was managed successfully the previous season using fungicides. Information on the effect of *Stemphylium* control on yield in the UK is not available. Assuming an average yield of 2.58 tonne/ha and a farm gate price of £3,920/tonne, a yield loss of 20% represents £2,022/ha (DEFRA Horticultural Statistics), considerably more than the cost of a four-spray fungicide programme. Implementation of the results of this project are therefore likely to result in significant savings in a season when the disease is damaging.

Action points for growers

- Start fungicide treatment for control of *Stemphylium* on ferns immediately the first symptoms occur (usually at the stem base) and preferably before it spreads to the needle canopy.
- Purple spot has a short disease cycle and fungicides should be applied regularly to maintain control, particularly when there is frequent rainfall in July – September.
- Suitable fungicides include Amistar Top, Olympus, Plover, Signum and Switch; in our work Olympus and Switch were the two most effective products overall.
- Where there is reduced opportunity for spray application, consider using Olympus or Signum if early season and Olympus or Switch if later in the season to provide more persistent protection against severe disease foci.
- An alternating spray programme of Olympus and Switch is at low risk of resistance development and, based on the results of this project, should give good control of *Stemphylium* purple spot. If the programme starts with Switch, there is the option to apply a total of five sprays to a crop, should weather conditions and disease levels indicate this is necessary.



Figure 1: Asparagus *Stemphylium* symptoms in fungicide experiment 2012. Purple spot on needles (top left), canopy browning and needle fall (top right), comparison of plots with different disease severity (bottom left) and stem base lesions (bottom right).