Grower Summary

BOF 072

Narcissus: evaluation of fungicides for improved control of smoulder and white mould

Final 2012

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Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

Further information

If you would like a copy of the full report, please email the HDC office (hdc@hdc.ahdb.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

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Project Number:	BOF 072
Project Title:	Narcissus: evaluation of fungicides for improved control of smoulder and white mould
Project Leader:	Dr Tim O'Neill
Contractor:	ADAS UK Ltd
Industry Representative:	Mr Mark Clark, Grampian Growers Ltd Mr Dick Evenden, H L Hutchinson Ltd
Report:	Final Report 2012
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Previous report/(s):	Annual report 2011
Start Date:	01 December 2010
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Project Cost:	£32,829

Headline

- New fungicides identified for improved white mould control.

Background and expected deliverables

Smoulder (*Botrytis narcissicola*) and white mould (*Ramularia vallisumbrosae*) of narcissus attack flower buds and leaves resulting in a loss of marketable flowers and reduced bulb yield. The diseases are most common in commercial crops left down for two years or more, as widely practiced in the UK for economic reasons. Both diseases are favoured by wet weather and are likely to increase in importance with the forecast warmer, wetter winters due to climate change. The use of effective fungicides for control of these diseases is critical as the crop generally only justifies a limited number of sprays. Ground conditions in the spring can restrict the opportunity to spray, further increasing the need to select effective products. Choice of the most appropriate fungicides is currently unclear due to loss of some proven effective materials (e.g. carbendazim as Cleancrop Curve, vinclozolin as Ronilan) and the phased cessation of the Long Term Arrangements for Extension of Use (LTAEU) which allowed extrapolation from other crops. There is concern that repeated use of a restricted number of fungicides (e.g. azoxystrobin, iprodione) will inevitably lead to selection of resistant strains of the causal fungi. Novel fungicides recently introduced on arable crops may offer improved control of foliar diseases. The overall aim of the project is to identify new fungicide treatments for control of narcissus smoulder and white mould so that an armoury of effective products is maintained as older products are withdrawn. At the end of Year 1 the project was amended to introduce work on the effect of different spray timings.

The expected deliverables from this project are increased knowledge on:

- The efficacy of some new fungicides against smoulder and white mould;
- The safety of these fungicides to narcissus and whether they affect two disorders (‘rust’ and ‘chocolate spot’) of unknown cause;
- The effect of some different spray timings on disease control.

Summary of the project and main conclusions

Aberdeenshire trials

A replicated experiment was established in Aberdeenshire in autumn 2010 in a first-year-down commercial crop of the variety Carlton. In 2011, 11 fungicides were each applied three times from immediately after flowering (Figure 1a). White mould increased greatly during wet weather in June and affected 17% leaf area by the end of the month. All treatments

significantly reduced the disease and eight products reduced it to 2% leaf area affected or less: Amistar (azoxystrobin), Brutus (epoxiconazole + metconazole), Comet (pyraclostrobin), Escolta (cyproconazole + trifloxystrobin), Nativo 75WG (tebuconazole + trifloxystrobin), Prosaro (prothioconazole + tebuconazole), Shirlan (fluazinam) and Tracker (boscalid + epoxiconazole). Plots treated with Tracker remained free of the disease. All of the fungicides greatly increased green leaf retention compared with untreated plants, probably due mainly to foliar disease control.

In 2012 the experiment was continued. Each main plot was divided into three sub-plots comprising: a) no further (2012) fungicide sprays; b) 3 sprays post-flowering; c) 2 sprays pre-flowering and 3 sprays post-flowering. The aims were to determine the effect of year 1 fungicide treatment on disease levels at the start of year 2, and the benefit of adding pre-flowering sprays to a programme of post-flowering sprays, for each of the fungicides tested.

White mould appeared in late April 2012 and increased to affect 25% leaf area of untreated plants by 12 June. Disease severity was significantly reduced by all fungicides except for Amistar. Five fungicides reduced the disease by 50% or more (Brutus, Comet, Prosaro, Shirlan and Tracker). In this crop, where white mould did not appear until near the end of flowering, disease control from three post-flowering sprays was not significantly improved by the addition of two pre-flowering sprays. Tracker again gave the best control of white mould and also resulted in the greatest retention of green leaf area (Figure 1d).

The level of smoulder was low throughout the season (2% severity or less) and none of the treatments reduced the disease.

There was no evidence that fungicides applied in 2011 affected initial levels of white mould in 2012.

Cornwall trials

A replicated experiment identical to that in Aberdeenshire was established in Cornwall in autumn 2010 in a first-year-down crop of the variety Golden Ducat. Smoulder and white mould were observed at low levels in April 2011. Smoulder increased to affect up to 3.6% of leaf area but none of the fungicides reduced the disease. As the smoulder symptoms were largely primary infections (i.e. ones that arose from the bulb or soil), this lack of effect of fungicides on early season smoulder was expected. White mould did not develop early season due to dry weather. Unbeknown to the host farmer, the stock of bulbs was badly affected by Fusarium basal rot resulting in gappy crop growth and early die-back. The effect of treatments on smoulder and white mould later in the season could not be determined because of early senescence due to Fusarium basal rot.

The original site in Cornwall was therefore abandoned due to the poor crop growth. In 2012 a new trial was established on a second-year-down crop of variety Early Flame (Figure 1b). Each main plot was divided into two sub-plots comprising: a) 3 sprays post-flowering, b) 2 sprays pre-flowering and 3 sprays post-flowering. The aim was to determine the effect of adding pre-flowering sprays to a programme of post-flowering sprays for each fungicide tested. The fungicides examined comprised eight that performed well against white mould in 2011 and four products not tested previously in this project with a nil or short harvest interval. These were Karamate Dry Flo Neotec (mancozeb), Scala (pyrimethanil), Signum (boscalid + pyraclostrobin) and Switch (cyprodinil + fludioxonil).

White mould was present at low levels from mid-February. By late April 2012 white mould had increased to affect 9% leaf area on untreated plants (Figure 1c). All 12 fungicides significantly reduced severity of the disease, with six treatments (Brutus, Folicur, Prosaro, Signum, Tracker and Vivid) reducing it to 1% leaf area affected or less. In this crop where white mould was not observed before the start of flower picking, disease control from three post-flowering sprays was only slightly improved by the addition of two pre-flowering sprays.

Smoulder was present from emergence and increased slightly to affect 2% leaf area on untreated plants. All fungicides except Karamate Dry Flo Neotec (mancozeb) reduced the disease. Prosaro and Tracker gave the best control. At 7 weeks after the final spray, these two treatments, which also gave best control of white mould, had the greatest green leaf area.

A low level of the disorder ‘chocolate spot’ (unknown cause) occurred at the Aberdeenshire site in 2011; levels were not reduced by any of the fungicide treatments. No phytotoxic symptoms were observed following fungicide treatment at either site in either year.

Figure 1: Narcissus fungicide experiments 2012. a) View of Aberdeenshire site (top left), b) Cornwall site (top right), c) severe white mould (bottom left) and d) prolonged green leaf area in plots treated with Tracker (bottom right).

Table 1: Details of fungicides evaluated for control of smoulder and white mould

Product	Active ingredients (fungicide group)	Rate used (kg or L/ha)	Approval status (August 2012)	Max. no sprays*	Harvest interval (days)
Amistar	azoxystrobin (11)	1.0	SOLA 0443/09	Not stated[a]	Not stated
Brutus	epoxiconazole (3) + metconazole (3)	3.0	LTAEU	3	Not stated
Cercobin WG	thiophanate-methyl (1)	1.0	SOLA 1384/08 (expired 28/2/11)	2	Not stated
Comet 200	pyraclostrobin (11)	1.0	LTAEU	2	Not stated
Escolta	cyproconazole (3) + trifloxystrobin (11)	0.35	LTAEU	2	35
Folicur	tebuconazole (3)	1.0	LTAEU[b]	2	28
Karamate Dry Flo Neotec	mancozeb (M3)	2.0	Label	4	Not stated
Nativo 75WG	tebuconazole (3) + trifloxystrobin (11)	0.4	LTAEU	2	21
Priori Xtra	azoxystrobin (3) + cyproconazole (11)	1.0	LTAEU	2	30
Prosaro	prothioconazole (3) + tebuconazole (3)	1.2	LTAEU	2	56
Scala	pyrimethanil	2.0	SOLA 1315/11	3	3
Shirlan	fluazinam (29)	0.4	LTAEU	10	0
Signum	boscalid (7) + pyraclostrobin (11)	1.35	SOLA 1852/09	2	Not stated
Switch	cyprodinil (9) + fludioxonil (12)	1.0	Label	3	Not stated
Tracker	boscalid (7) + epoxiconazole (3)	1.5	LTAEU	2	Not stated
Vivid	pyraclostrobin (11)	1.0	LTAEU	2	Not stated

*Treatments in this project were applied under an Experimental Permit to permit up to five sprays of each product. [a]Maximum total dose of 4 L/ha. [b]Extrapolation under the Long Term Arrangements for Extension of Use (LTAEU) from SOLA 1516/04 which permits Folicur on narcissus grown for galanthamine production.

Where a product is used under a SOLA or the LTAEU, growers should read and observe all the restrictions; treatment is at a grower's own risk.

Table 2: Summary of fungicide efficacy on narcissus white mould determined in field trials in 2011 and 2012[a]

Product	Aberdeenshire			Cornwall	
	2011 (3 sprays)	2012 (3 sprays)	2012 (4 sprays)	2012 (3 sprays)	2012 (5 sprays)
Untreated	17.4	25.3	25.3	8.6	8.6
Amistar*	1.9	19.0	17.0	2.1	2.4
Brutus*	0.3	4.8	3.8	1.2	0.5
Escolta	0.3	11.3	8.5	2.0	1.0
Folicur	2.4	7.3	6.0	1.2	0.4
Karamate*	-	-	-	4.9	4.8
Nativo 75WG	0.2	13.3	11.0	1.1	0.8
Priori Xtra	3.7	18.5	15.0	-	-
Prosaro	0.2	7.0	5.3	0.5	0.1
Scala*	-	-	-	2.4	0.9
Shirlan*	0.4	6.5	4.3	-	-
Signum*	-	-	-	0.9	0.4
Switch*	-	-	-	3.5	1.4
Tracker*	0	2.8	1.5	0.8	0.1
Vivid*	0.6	7.3	5.0	1.6	1.4

[a] Products where use is no longer permitted on narcissus (August 2012) have been excluded.

* Product has a harvest interval of 7 days or less. Comet 200 was used instead of Vivid at the Aberdeenshire site; the two products have the same active ingredient.

Financial benefits

Annual losses of narcissus bulb and flower production due to foliar diseases vary greatly between crops and years. The effect of foliar diseases on bulb yield is probably underestimated as foliar die-back due to disease is not easily distinguished from that of early senescence due to other causes (e.g. moisture deficit). Assuming that foliar diseases on average reduce marketable bulb yield by 10%, and flower production by 5%, and with an estimated farmgate value of £11 million and £15 million for narcissus bulb and flower production respectively in 2011, it is estimated that losses each year are in excess of £1.85 million.

Action points for growers

- For crops susceptible to white mould, consider applying up to three fungicide sprays from immediately after flower picking using two or more of the following products: Brutus, Escolta, Folicur, Nativo 75WG, Priori Extra, Prosaro, Shirlan, Signum, Tracker or Vivid (or Comet 200). Karamate Dry Flo Neotec, Scala and Switch also give some control but were generally slightly less effective.
- If Amistar is used for white mould control, monitor crops carefully and consider using a fungicide from a different group if disease control is below expectations.
- Use products with active ingredients from different fungicide groups (see Table 1) for sequential sprays against white mould in order to reduce the risk of selecting fungicide resistant strains. Example programmes which fit this criterion are:
    - Signum, Prosaro, Signum.
    - Tracker, Switch, Tracker
- In crops where no white mould is observed before flower picking starts, there appears to be little benefit in applying pre-flowering sprays for this disease providing a programme of three effective treatments is applied starting from immediately post-flowering.
- Where the risk of white mould is assessed as high (consider site, variety and crop history, for example), and weather restricts the number of spray days, it would be prudent to apply at least one spray pre-flowering.
- Note that any harvest interval specified on a label applies to both flower and bulb harvest. Where there is no specified harvest interval, it is permissible to treat this as a zero harvest interval.
- In crops where flowers will be picked and a pre-flowering fungicide spray is considered necessary, select a product with a nil or no stated harvest interval for this treatment. Do not use Shirlan or equivalent product at this time due to risk of allergic contact dermatitis.