Grower Summary

Narcissus: the use of FAM 30 disinfectant as a cold dip treatment for Fusarium basal rot

BOF 71 & 71a

Final 2010

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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.

HDC
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

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

Project Number:	BOF 71 & 71a
Project Title:	Narcissus: the use of FAM 30 disinfectant as a cold dip treatment for Fusarium basal rot
Project Leader:	Erika F. Wedgwood
Contractor:	ADAS UK Ltd
Industry Representative:	Julian Perowne, Jack Buck (Farms) Ltd
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Headline

FAM 30 (an iodophor disinfectant) diluted at 1:125 kills *Fusarium oxysporum* f.sp. *narcissi* and when recently-lifted narcissus bulbs are dipped in treated water at ambient temperature for 25 minutes the incidence and severity of Fusarium basal rot during subsequent storage can be significantly lower than in bulbs left undipped.

Background and expected deliverables

Basal rot of narcissus remains a major disease problem; any infection within a bulb basal plate potentially leads to a rotten bulb. Retail stock with an incidence of 5% of bulbs affected is usually unsaleable, 2% is the accepted limit. For planting stock, anything over 10% leads to a potential problem at lifting after two years.

Previous work (BOF 61a) showed that the disinfectant FAM 30 (an iodophor disinfectant) was effective against *Fusarium oxysporum* f. sp. *narcissi* and can be used to replace formaldehyde in hot water treatment tanks. The emergence and flowering of bulbs was unaffected by treatment with FAM 30 in hot water.

However, the efficacy of FAM 30 at ambient temperature against *Fusarium* is unknown, there is therefore a need to determine whether or not a cold FAM 30 dip can control *F. oxysporum* f. sp. *narcissi* after 15-25 minutes immersion so that it could be used by growers immediately after the lifting of narcissus bulbs to prevent fungal invasion of wounds.

Summary of the project and main conclusions

The initial stage of this project (BOF 71) showed that FAM 30, used at the label dilution rate of 1:125 *in vitro* at ambient temperature for 15-25 minutes was effective against resting spores of *Fusarium oxysporum* f. sp. *narcissi*. Half this rate of FAM 30 (1:250) was also effective in preventing the growth of *Fusarium*. However, no control was achieved when the disinfectant was unable to penetrate inert material to reach resting spores inside.

In the second part of the project (BOF 71a) a 25 minute ambient temperature dip of cv. Carlton narcissus bulbs in FAM 30 at the 1:125 dilution was carried out. To ensure disease presence the bulbs came from a field with a history of basal rot. Eight replications of 25 recently harvested bulbs without any external basal root rot symptoms were dipped in FAM

30 under laboratory conditions, or left undipped, and then stored for 9 weeks. Dipping in FAM 30 treated water significantly reduced the incidence and severity of Fusarium basal rot in the lifted naturally infected narcissus bulbs.

After 7 weeks storage, 19% of undipped bulbs felt soft, compared with 4.5% of bulbs in FAM 30 treated water. The dipping reduced the incidence of dark brown rotting, which covered over 15% of the internal surface, from 47% to 5.5% of the bulbs (see table on following page).

After a further 2 weeks, following storage in warm humid conditions to encourage the visible growth of *Fusarium oxysporum,* 84% of undipped bulbs were rotting, compared with 60% of bulbs from treated water. FAM 30 significantly reduced the incidence of *Fusarium* infection.

Much greater incidences of *Fusarium* browning than at the earlier assessment indicate that dipping in FAM 30 had only delayed symptom development and expression in many bulbs. Treatment success may have been through FAM 30 preventing the entry of infection to harvest wounds. It is likely that some of the apparently healthy bulbs selected for storage were already infected, but not visibly, and the FAM 30 was not be expected to kill Fusarium already in the tissue.

The majority of dipped bulbs affected by Fusarium had rotted after 9 weeks. A white *Fusarium* growth predominantly affected bulbs which had been dipped in FAM 30 treated water, whereas salmon pink Fusarium growth, which usually covered a more extensive area than the white, was more common in undipped bulbs. Commercially any rotting would cause rejection and it is likely that the level of internal rotting would have increased during further storage.

Effect of FAM 30 at 1:125 dilution on growth of F. oxysporum f.sp. narcissi from resting spores, and development of Fusarium rot in narcissus bulbs

Assessment	FAM 30 at 1:125	FAM 30 not used
Growth of Fusarium from resting spores (% agar plate cover)	0.0	100.0
Bulb rot after 7 weeks storage (% bulbs soft)	4.5	19.0
Internal browning by probable Fusarium after 7 weeks storage (% of bulbs affected)	5.5	47.0
Fusarium sporulation confirmed on cut bulbs, after 2 weeks warm, humid incubation post-storage (% of bulbs affected)	60.0	84.5
Extent of bulb scales and basal plate area affected by Fusarium after post-storage incubation (mean % internal surface area affected)	15.1	49.5

Financial benefits

The principal benefit of using FAM 30 would be the acceptance of bulbs from a crop which without the dipping could otherwise be totally rejected for retail sale. Commercially, a 5% disease incidence would risk retail rejection, if bulbs with this potential level of disease incidence were treated with FAM 30 in the dip water then infection could be reduced, permitting retail industry and PHSI limits for export to third countries of 2% Fusarium to be attained. Similarly, bulbs with a potential incidence above the 10% limit advisable for bulbs to be planted for lifting could be saved from rejection.

In terms of the approximate treatment cost, FAM 30 costs around £43 per 1,000 litres of treated water when used at a dilution rate of 8 litres per 1000 litres of water. If it takes 1,900

litres of water to treat 1 tonne of bulbs then the chemical cost of treatment is £82 per tonne of bulbs (not allowing for re-use of the dip treatment).

Action points for growers

- The incidence of narcissus bulb infection by Fusarium basal rot can be reduced when freshly lifted bulbs are placed in cold water with FAM 30 at a 1:125 dilution. This was seen after bulb immersion for 25 minutes.
- Bulbs should be thoroughly mechanically cleaned to remove spore-contaminated soil before dipping because FAM 30 can have difficulty disinfecting when chlamydospores are held within suspended inert material.