

Project Title: Narcissus: overcoming the problem of soil sickness with particular reference to the Isles of Scilly

Project number: BOF 50

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Report: Annual Report 2003

Previous reports: Brief interim report, September 2001. annual report 2002

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Project commencing: 1/4/01

Project completion: 31/3/06

Key words: Narcissus, Root Lesion Nematode (*Pratylenchus*), *Cylindrocarpon*, *Tagetes patula*, Telone (dichloropropene)

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The results and conclusions in this report are based on an investigation conducted over one year. The conditions under which the experiment was carried out and the results obtained have been reported with detail and accuracy. However because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results especially if they are used as the basis for commercial product recommendations.

Contents

Grower summary	1
Science section	2
Interim conclusions	3
Acknowledgement and key to appendices	3

Grower Summary

Headline

The project seeks to establish, by survey, some of the causes of soil sickness. Also, since there have been good reports from Holland on the effectiveness of *Tagetes patula* (French Marigolds) in controlling certain soil-borne pests and diseases of bulbs, this technique needs to be compared with the standard soil fumigation treatment employed by growers.

Data on the first objective has been presented. Work on the use of *tagetes* has not yet yielded results and is continuing.

The costs of producing a weed free stand of *Tagetes* is expected to be similar to that of soil injection with Telone. However, the 100-day duration of the *tagetes* plants from June to September does deny the grower any crop returns for one season.

The production of large volumes of fibrous organic matter from the *tagetes* crop could be an additional benefit.

Background

- The project is located in the Isles of Scilly where intensive narcissus production has been followed for over 100 years resulting in cases of soil sickness
- The project could deliver an alternative to frequent routine soil fumigation by the use of a bio-active break crop.
- The findings could be immediately applicable on farms,
- Little further work required beyond this project.

Summary of main conclusions

The majority (60%) of sites showing symptoms of soil sickness confirmed *Pratylenchus* and many of these also had the fungus *Cylindrocarpon* confirmed on the roots. These are the two agents generally regarded as causing soil sickness.

Two sites where the bulbs were lifted in 2002 have been chosen and strips of *tagetes* grown in 2003. These strips will be cross-injected with Telone in spring 2004 and the whole site planted with bulbs in 2004.

Financial benefits

It is too early to quantify these.

Action points for growers

Although there are, as yet, no positive results, the use of this break crop on un-cropped land is being tentatively suggested and there is some uptake locally.

Science Section

i) Introduction

Information based on work at Dutch centres at Lisse, Lelystad, Boskoop and Wilhelminadorp has been summarised in the paper "Tagetes als grondontsmetter ter bestrijding van wortelstelselaaltjes" ("Tagetes as a soil steriliser for nematodes")

ii) Materials and methods

Survey sites: 21 sites on the Isles of Scilly and analysed by CSL

Trial sites: 2 sites on St. Mary's on sandy loam

Trial design: 4.5 m wide strips of *tagetes* which will be crossed by 4.5 m wide strips of Telone injection

Materials: *Tagetes* ' Ground Control' PVP-EU5577 drilled at 5kg / ha.
Telone at 225 litres / ha.
Narcissus bulbs to be planted overall July 2004 at 15 tonnes / ha.

The treatments are:

1. Telone fumigation
2. *Tagetes*
3. *Tagetes* followed by Telone
4. Untreated control

iii) Results and Discussion

Survey results -See former report

Trial site results –

Soil analyses

Date	Site	Name	PH	P Index	K Index	Mg Index
1 July 2003	07	Pine Tree	6.1	4	2-	2
1 July 2003	10	Old Town	5.3	5	3	3

Nematode analyses

Dates of sampling:

26 February and 22 May 2002 in growing narcissus crop in which symptoms of soil sickness were present. Site 7 showed overall poor growth whilst site 10 had several areas of depressed growth within the trial area

2 July 2003 in fallow ground following bulb lifting in 2002 immediately prior to sowing tagetes.

The attached table summarises the nematode counts.

Key to species and their importance:

Prat. *Pratylenchus* sp. Root lesion Nematode. A well-known root damaging nematode in many crops. Root damage aggravated by fungal entry.

Helio. *Heliocotylenchus* sp. Spiral Nematode. Not usually considered an important plant parasite but its feeding may contribute to overall root damage.

Tricho. *Trichodorus* sp. Stubby Root nematode. Damaging to roots and a vector for several viruses including Tobacco Rattle Virus.

Roty. *Rotylenchus* sp. Spiral Nematode. As for Spiral Nematode *Heliocotylenchus*.

Para. *Paratylenchus* sp. Pin Nematode. As for the spiral nematodes.

Merl. *Merlinius* sp. (& *Scutylenechus* sp.) Stunt nematodes. As for the spiral nematodes.

Cylin. Fungus *Clindrocarpon radicum* (= *Nectria radicum*). A root rotting fungus regularly associated with nematode damage.

Trial plans

These are attached as appendices.

Interim Conclusions

The growth of tagetes on the plots has been satisfactory and further nematode sampling will take place before further treatment and bulb planting takes place.

Subsequent crop performance and further nematode sampling will indicate the level of success achieved in 2005 and 2006 on the sites.

Acknowledgement

Trenoweth Horticultural Centre acknowledges the helpful reports and guidance provided by the scientific staff of the Central Science Laboratory. The co-operation of the project co-ordinator, K. Hale, on whose land the trials are sited is also gratefully acknowledged.

Appendices

1. Annual report September 2002
2. Statement of May 2003
3. Appraisal of results so far by Central Science Laboratory March 2003
4. Plans of current trials
5. HDC Project Self Assessment and report Form

Table: HDC. BOF 50. Results of nematode analysis of soils, (Dec 2003)

Trial site	Date	Area	Prat.	Helio.	Tricho.	Roty.	Para.	Merl.	Cylin.
07	26 Feb 2002	Bad growth	42	8	0	0	2	0	Yes
07	2 July 2003	Plot 1	19	3	15	0	12	0	No test
		Plot 2	30	14	11	0	17	0	No test
		Plot 3	23	0	11	0	0	0	No test
10	22 May 2002	Bad growth 1	65	0	3	79	13	1	Yes
		Bad growth 2	13	0	3	32	0	4	Yes
10	2 July 2003	Plot 1	12	63	0	35	5	0	No test
		Plot 2	25	93	1	80	120	0	No test
		Plot 3	2	30	0	32	29	10	No test

In 2002 Site 7 showed bad growth overall whilst Site 10 was variable and figures are presented for two samples. Plots 1, 2 and 3 refer to the areas subsequently sown with tagetes and are numbered from 1, nearest the field headland. There was no *Cylindrocarpon* examination in 2003 because the bulbs had been lifted from the site in 2002. The nematode counts by CSL are per 200 grammes sub-sample of soil extracted by corer 0-15cm deep.