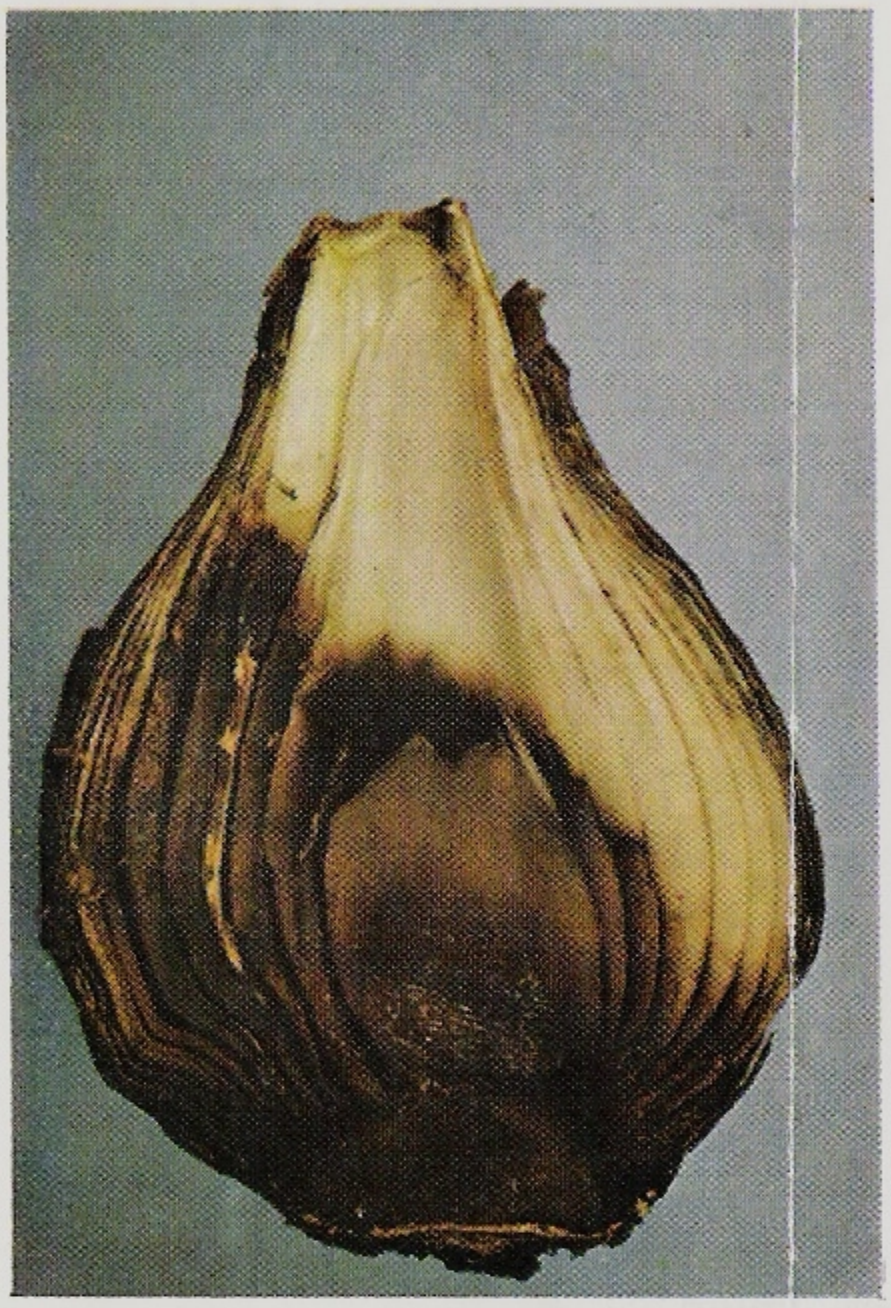
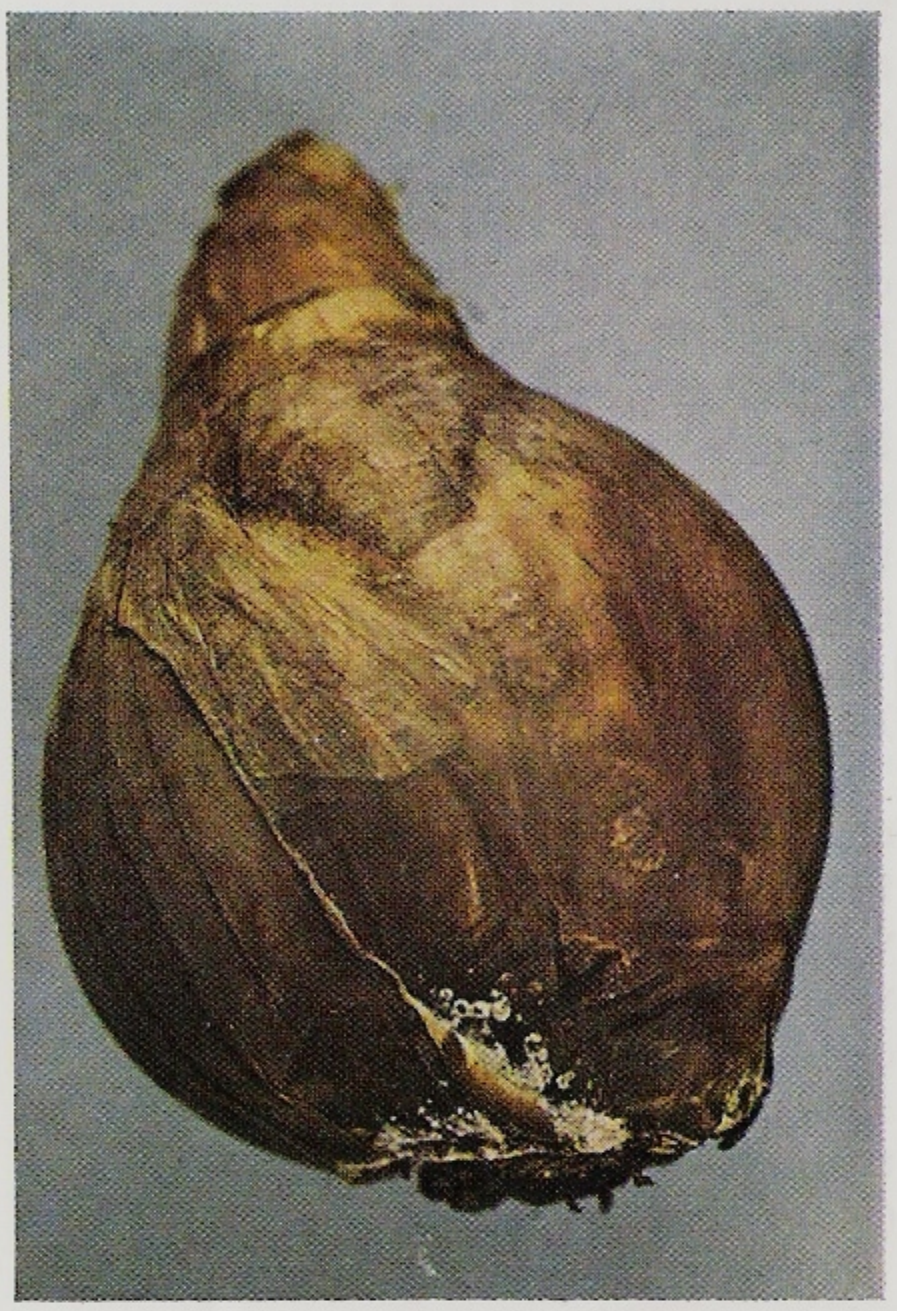
Ministry of Agriculture, Fisheries and Food

HPD 53
Published 1978

Basal rot of narcissus





Photos: D. R. Humphreys-Jones

1 Infected bulb cut open

2 Infected bulb with spore masses

Basal rot is a disease of narcissus roots and bulbs caused by the fungus *Fusarium oxysporum* f. sp. *narcissi* a special strain of *F. oxysporum* which includes many other pathogens with world wide distribution mainly in tropical and subtropical countries. The different strains which make up *F. oxysporum* are very similar in appearance and while many attack a wide range of plants, others are limited to a single host.

Fusarium oxysporum f. sp. *narciss*' has only been known to attack narcissus, some cultivars being more susceptible than others. Golden Harvest is one of the most susceptible of the major narcissus cultivars, although many other trumpet daffodils, especially those with white perianths, are very prone to attack. It is believed that susceptibility is inherited from parents including Mme de Graaff or White Emperor.

Certain divisions of narcissus, including the jonquils, triandrus and tazettas such as Grand Soleil d'Or are

highly resistant. Poeticus types, for example Actaea, are seldom attacked.

Symptoms

Basal rot is not usually seen until the bulbs are lifted and stored. Bulbs lacking roots when lifted are likely to be diseased. Infected bulbs feel soft, especially in the basal region, and if cut through lengthwise a reddish brown area of rotting tissue extending from the root plate, is revealed (Fig. 1). A transverse cut will show uniformly rotted tissue which distinguishes basal rot from eelworm damage, in which the rot forms concentric rings (Advisory leaflet No. 460). A pink or whitish web of fungus may be found between scales long before the bulb rots, from about August onwards. Eventually the whole bulb rots and clusters of white, cream or pink-coloured spores form around the base of the bulb (Fig. 2). Finally the bulb shrinks and mummifies.

Life history

The rotting of bulbs caused much concern at the turn of the century but the effects of basal rot and eelworm were confused and for many years there were no control measures. By 1917 both conditions had been defined and after 1919 control of eelworm by hot water treatment became standard practice (Short Term Leaflet 21).

The pathogen occurs in most soils where narcissi have been grown and although it is believed to be limited to this host it has been found in soils which have never been cropped with narcissus. Several types of spores are produced by the fungus and one, the chlamydospore, enables it to survive in the soil for a long time, even in the absence of narcissus. Other pathogenic fusaria have been shown to exist, either in association with other plants without causing damage or as dormant chlamydospores in soil; such sources of infection may occur in the case of basal rot. Spores of both pathogenic and non-pathogenic *F. oxysporum* have been found on healthy narcissus bulbs and it may be assumed that the reservoir of the pathogen is both in the soil and on the bulb.

Several of the factors involved in bulb infection have been investigated in considerable detail, particularly the effect of soil and storage temperatures. It has been shown that root infection and disease development are closely related to soil and storage temperatures above 10°C with the most severe attacks occurring at 30°C. Bulbs are penetrated by the fungus via the dying roots in summer, providing the soil is not too dry. Root senescence commences in late May and lasts until September although new roots are formed from August onwards. This senescence coincides with soil temperatures suitable for active growth of *F. oxysporum*. Besides entering the bulbs through the roots, the fungus can invade through the small wounds made by emerging roots. Although the fungus scarcely grows in the soil it can grow along the roots for considerable distances, eventually to infect the bulbs. Distances of up to 30 cm have been recorded.

Control

There is no certain cure for basal rot and because of the ability of the fungus to survive in most soils it is not possible to avoid the disease. Despite this, careful crop husbandry supported by chemical treatment will keep attacks to a minimum.

Cultural control

There are several husbandry practices that are important if full benefit from chemical control measures are to be achieved.

1. Lift and treat bulbs annually only when control of basal rot is of paramount importance (See under chemical control).
2. Lift early and dry quickly. Do not leave bulbs lying on the soil.
3. Lift carefully to minimise mechanical damage.

4. Sort bulbs, both before and after hot water treatment and remove diseased bulbs.

5. Store at correct temperatures. Bulbs for replanting should be held at 17°C.

6. Avoid very early planting in warm seasons and, if necessary, delay planting until September. Avoid warm, e.g. south sloping sites.

7. Plant at 12 cm depth. Shallower planting places bulbs in warmer soil.

8. The excellent weed control which can be achieved with modern herbicides allows the bare soil to attain high temperatures in summer and could be detrimental where fusarium is a problem. This fact should be considered where basal rot control is of over-riding importance, as a covering of weeds would help reduce temperatures.

9. Where possible ridges should be drawn north/south to minimise undue warming up from the sun. Ridges drawn east/west expose a south facing slope to the sun which also encourages the soil temperature to rise.

Chemical control

There are two main methods depending on whether or not the stocks are to be hot water treated.

1. With hot water treatment:
   Where the bulbs are to be hot water treated this can be carried out within two weeks of lifting. The addition of formalin (40 per cent formaldehyde) diluted to 1 in 200, which should always be added to the hot water treatment tank to prevent spread of eelworms and diseases, will also give a good control of basal rot. Other fungicides may be added to the formaldehyde but are more costly because of the need for more frequent renewal of the solution.

2. Without hot water treatment:
   Bulbs should be dipped within 48 hours of lifting in a solution of formalin (1 in 200) for one minute, or in benomyl, carbendazim or thiabenzadole according to the manufacturers' instructions. Because of the presence of soil the solution will require frequent renewal.

Precautions

Whenever pesticides are used, *read and follow carefully the instructions on the label.* Users should consult the 'Recommendations for Safe Use of Chemical Compounds Used in Agriculture and Food Storage', published by and obtainable free from the Ministry of Agriculture, Fisheries and Food, Environmental Pollution, Pesticides and Infestation Control Division, Great Westminster House, Horseferry Road, London SW1P 2AE.

Use the pesticides mentioned in the leaflet with care, especially formaldehyde, and wash off any concentrate that falls on the skin.

Store new and part-used containers in a safe place under lock and key. Wash out empty containers thoroughly and dispose of them safely. Do not contaminate ponds or waterways with pesticide concentrate, spray or washing.

Proprietary products based on chemicals used for pest. disease and weed control can be officially approved under the Agricultural Chemicals Approval Scheme. It is strongly recommended that approved products should be used. Approval is indicated on the containers by the mark shown here. The booklet *Approved Products for Farmers and Growers* is available as a priced publication from HMSO, PO Box 569, London SE1 9NH or through booksellers.

AGRICULTURAL CHEMICALS APPROVAL SCHEME

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Single copies of Advisory Leaflets may be obtained free from the Ministry at the address below

Ministry of Agriculture, Fisheries and Food
(Publications), Tolcarne Drive, Pinner, Middlesex HA5 2DT

HPD 53
Published December 1978

635.93425 : 635.924

Printed in Scotland by Her Majesty's Stationery Office at HMSO Press, Edinburgh
Dd 581395 7,500 5/79 (16229)