



# Fungal plant pathogens in Portugal: *Alternaria dauci*

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**Summary** A leaf blight of carrot (*Daucus carota*) caused by *Alternaria dauci* was found in Alentejo (Ourique, Portugal). Morphological characteristics of the fungus are described.

**Key words** Carrot leaf blight, *Alternaria dauci*, Portugal, Alentejo

## Hongos patógenos de plantas en Portugal: *Alternaria dauci*

**Resumen** Se describe el hallazgo de una enfermedad en hojas de zanahoria (*Daucus carota*) de la zona del Alentejo (Ourique, Portugal), causada por un hongo identificado como *Alternaria dauci*, así como las características morfológicas del hongo aislado.

**Palabras clave** Alternariosis de la zanahoria, *Alternaria dauci*, Portugal, Alentejo

*Daucus carota* L. subsp. *sativus* (Hoffm.) Arcang. (carrots) is an important member of the *Apiaceae* being cultivated in most European countries. In Portugal the main production of carrot takes place in Ribatejo e Oeste, Aveiro and Póvoa do Varzim (Figure 1), but carrots are farmed in vegetable plots all over the country [1].

Fungi are the most common pathogens of *D. carota*. Species of the genus *Alternaria* such as *Alternaria carotiincultae* E. G. Simmons, *Alternaria dauci* (J. G. Kuhn) J. W. Groves & Skolko, *Alternaria petroselini* (Neerg.) E. G. Simmons, and *Alternaria radicina* Meir, Drechsler & E. D. Eddy, have been reported on *D. carota* for several countries [3].

The genus *Alternaria* Nees includes nearly 100 species which occur all over the world in different habitats and its species are among the most common fungi on the phyllosphere [4-6]. This genus includes an important group of phytopathogenic species, such as *A. dauci* [2,9]. Pryor has performed a Random amplified polymorphic DNA (RAPD) analysis of the *Alternaria* species pathogens of umbeliferous crops [8].

In October 2006, symptoms of *Alternaria* leaf blight were observed on carrots in a small vegetable plot (Figure 2). The fungus isolated from *D. carota*, grown in Baixo Alentejo, Portugal, was identified *A. dauci*. Its morphological characteristics are similar to those of the descriptions by various authors [2,3].



Figure 1. The main production areas of carrot in Portugal.

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Alternariose symptoms may develop on foliage, stems, umbels and seeds of infected carrots. *Alternaria* leaf spots first appear at the margin of the older leaflets and are irregularly shaped, and dark brown to black (Figure 2). Lesions produced on the petioles and stems are dark brown and, as the disease progresses, the entire leaflets may dry up and die. On the infected old leaves *A. dauci* produced many conidia which can eventually infect young leaves or even roots when dispersed by water [10].

**Isolation, culturing and identification:** Carrot leaves with symptoms of leaf blight were observed and collected in October 2006 in Garvao (Baixo Alentejo). The preliminary identification of the fungus was by microscope examination of the crushed material mounted in water. Single conidia cultures on potato dextrose agar (PDA, Scharlau, Barcelona) were obtained from infected leaves. Thirty conidiophores and conidia were measured in fresh preparations of field material. For identification purposes, isolates were grown at 25° C in the dark on PDA, MEA and YMA (Scharlau).

A representative isolate was placed in the Fungi culture collection of the National Agronomic Research Station (MEAN N° 859).

**The fungus:**

*Alternaria dauci* (Kuhn) Groves & Skolko, Canadian Journal of Research Sect C, 1944; 22: 222.

**Synonyms**

*Polydesmus exitiosus* var. *dauci* J. G. Kuhn, Hedwigia 1855; 1: 91.

*Macrosporium carotae* Ellis & Langlois, Journal of Mycology 1890; 6: 36.

*Alternaria brassicae* var. *dauci* (J. G. Kuhn) P. C. Bolle, Meded Phytopath Labor Willie Comm Scholten 1924; VII: 27.

*Alternaria brassicae* var. *dauci* (J. G. Kuhn) J. Lindau, Fungi imperfecti: Hyphomycetes Zweite Halfte Dematiaceae, Rabenhorst's Kryptogamenflora. Pilze Leipzig, 1910.

*Alternaria carotae* (Ellis & Langlois) Stevenson & Wellman, Journal of the Washington Academy of Science 1944; 34: 263.

*Alternaria porri* f. sp. *dauci* Neerg. Danish species of *Alternaria* & *Stemphylium*. London, Oxford University Press, 1945: 252.

The conidiophores arise in single or in small groups (Figure 3). They are usually straight, 3-7 septate, with one apical conidial pore, variable in size 40-94 x 6-9 µm (Figures 4a and 4e). Conidia solitary, straight or curved, obclavate, rostrate (beak up to three times the length of

the conidial main body), brown, overall 100-350 µm long, 16-25 µm thick in the broadest part, septa 7-11 transverse and one to several longitudinal or oblique, beaks flexuous, hyaline and tapering to the apex, sometimes branched (Figures 4 b-d).



Figure 2. *Alternaria dauci*, symptoms on carrot leaves.



Figure 3. Colony morphology of *Alternaria dauci* at 25 °C after two weeks: on PDA, MEA, YMA.

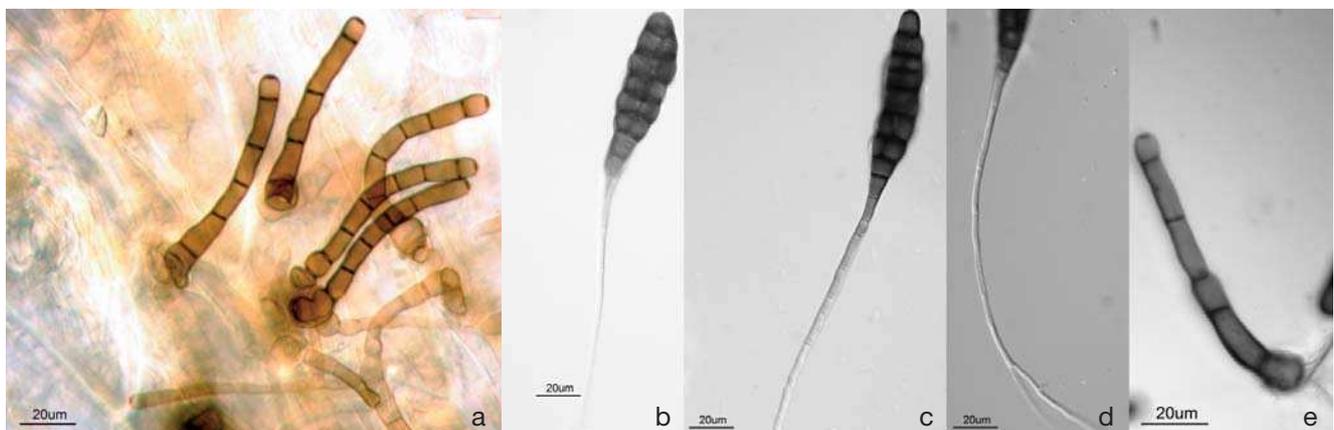


Figure 4. Conidiophores (a, e) and conidia of *A. dauci* (b-d).

On PDA colonies attain 46 mm, on MEA 30 mm and on YMA 40 mm in diameter after seven days at 25 °C. Mycelium immersed or semi-immersed, hyphae branched, septate and subhyaline to brown. Seven-day-old colonies dark olivaceous-brown in colour, aerial mycelium are felty, and the reverse dark olivaceous-brown. A reddish brown coloration (particularly on MEA) was produced (Figure 3).

Considerable information is available on the epidemiology of carrot leaf blights [2]. *A. dauci* can be spread through infected or contaminated seed and survives on crop residues [2]. The rate of spread of this fungus depends on the initial amount of inoculum, air temperature, leaf wetness duration and host susceptibility [2]. Methods exist for detecting pathogenic *Alternaria* species on carrot seeds [7], since *Alternaria* spp. seedborne and occur in most areas where carrots grow.

Despite the abundance and worldwide occurrence of the specie *A. dauci*, studies in Portugal are still limited. Data referring to this species in Portugal and its importance in Portuguese crops are scarce. Because cool weather is favourable for the development of *A. dauci*, in Portugal the fungus (or the symptoms) may be observed in late September and October, at the harvest time of *D. carota* [1].

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