

Onion black mould (187)

Common Name

Black mould, collar rot, neck rot

Scientific Name

Aspergillus niger

Distribution

Asia, Africa, North and South America, the Caribbean, Europe, Oceania. In soils, and on decaying vegetable matter. On onions, it is recorded from Australia, Fiji and New Zealand; *Aspergillus niger* is also recorded from New Caledonia (garlic), Papua New Guinea (cassava, citrus, peanut, rice soil), Solomon Islands, (*Piper* leaves, rice), and Vanuatu (peanut).

Hosts

Coconut, garlic, maize, onion, peanuts, rice, and sorghum, and many other hosts. Globally, seeds, bulbs, tubers, fruits and flowers are hosts.

Symptoms & Life Cycle

The fungus is common in soil as a saprophyte, meaning it lives on dead or decaying organic matter, but it is also an 'opportunistic pathogen', that is, it will begin by living on dead or dying tissues and then extend to tissues that are still alive. This is particularly so in the case of stored fruits, seeds, roots and tubers.

On onions, the fungus occurs on or between the outer scale leaves of the bulbs, especially along the veins (Photos 1&2). It can be severe with the surface covered in black spore masses, and rots developing at the neck and sides. On garlic, a dry rot develops, associated with dark brown to black spores masses (Photo 3).

The fungus survives in the soil living on crop remains and any other decayed plant material. Spread occurs as spores blown in the wind. These may land on the dying leaves of plants in the field, especially during periods of rain, and infect them. Infections from the leaves spread to the bulbs. Bulb infection in the field is usually associated with injury. For infection of the onion surface, water and high humidity is required for 6-12 hours. Spread may also occur on seed, and on seedlings. Spores of *Aspergillus niger* are common on seed grown in hot dry climates.

Impact

The damage caused by *Aspergillus niger* is mostly cosmetic affecting the quality of onion or garlic bulbs. However, it is also a wound pathogen. When bulbs are "topped" to seal the necks before storage, *Aspergillus niger* gains entry to wounded tissue, and rots develop, especially during warm to hot humid weather.

Black mould has been reported causing major rots of stored onions in the US and in Japan when kept at high temperatures (27°C) and more than 70% relative humidity. Heavy losses have also been reported from the Sudan.

Detection & inspection

Look for the dark powdery masses of spores on garlic, or on the outer scale leaves of onion, especially along the veins or on the neck.



Photo 1. Black mould, *Aspergillus niger*, along the veins of an onion bulb.



Photo 2. Black mould, *Aspergillus niger*, on onion. The bulb on the left is showing large spore masses, whereas the mild infection on the right is mostly along the veins.



Photo 3. Black mould, *Aspergillus niger*, on garlic clove.

Management

CULTURAL CONTROL

Before planting:

- Use a 2-3-year rotation between successive crops of onion and its relatives on the same land. Rotate with crops that do not belong to the onion family.
- Choose land with good drainage.
- Ensure that seed is 'clean', i.e., free from spores, and that transplants are healthy. If you are not sure about the quality of the seed, treat it with hot water at 60°C for 15 minutes.

During growth:

- Do not harvest crops during wet weather.

After harvest:

- Collect and burn all the debris from the harvest.
- Carefully dry bulbs after harvest and before storage and marketing. In hot climates, make sure that the humidity is below 80%.

RESISTANT VARIETIES

Varieties of onions with red scale leaves tend to be more resistant to *Aspergillus niger* due to the presence of phenolic compounds that have antifungal properties.

CHEMICAL CONTROL

First priority should be to control the disease using cultural methods. If fungicides are needed for seed treatment, use mancozeb or thiram.

When using a pesticide, always wear protective clothing and follow the instructions on the product label, such as dosage, timing of application, and pre-harvest interval. Recommendations will vary with the crop and system of cultivation. Expert advice on the most appropriate pesticide to use should always be sought from local agricultural authorities.

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Information (and Photo 2) *Diseases of vegetable crops in Australia* (2010). Editors, Denis Persley, et al. CSIRO Publishing; and from CABI (undated) Black mould of onion *Aspergillus niger*. Plantwise Knowledge Bank. (<https://www.plantwise.org/knowledgebank/datasheet/7444#SymptomsSection>). Photo 1 Kohler F, et al. (1997) *Diseases of cultivated crops in Pacific Island countries*. South Pacific Commission. Pirie Printers Pty Limited, Canberra, Australia. Photo 3 Black mould, *Aspergillus niger* Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org.

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