Fusarium rot of garlic bulbs

Cause

Fusarium oxysporum Schlechtend: Fr. f.sp *cepae* (H.N. Hans) W.C. Synder & H.N.Hans
F. oxysporum Schl. f.sp. *garlic* Matuo, Miyagawa & Saito
F. culmorum (Wm.G.Sm.) Sacc.(syns. *F. roseum* Lk.emend. Snyd. & Hans. "Culmorum" and *F. roseum* Lk.emend. Snyd & Hans.var. *culmorum* (Schwabe) [sic] Snyd. & Hans)
F. solani (Mart.) Sacc.
F. proliferatum (Matsushima) Nirenberg *syn. F. moniliforme* Sheldon
F. camptocerus Wollen, Weber & Reinking
F. verticillioides (Sacc.) Nirenberg

Occurrence

F. oxysporum, *F. culmorum* and *F. proliferatum* occur in North America. These and the species noted above have been reported around the world, including India, Thailand, China, Japan, Iran, Israel, Australia and Europe.

Symptoms

Plants may or may not show symptoms in the field or at harvest, but bulbs may subsequently rot in storage. In the field affected plants may show reduced emergence, yellowing and/or browning (necrosis) of leaves beginning at tips. The discoloration will move toward the base of the leaf, which will eventually wither and die. Other symptoms include reduced bulb size, bulb decay, and brown, poorly developed root systems. This is a result of decay of the stem plates and storage leaves. The stem plate and dry outer scales may crack open. There may be reddish or reddish purple discoloration on stems and bulbs.

Fusarium sp. in garlic head
Photo by Melodie Putnam

In storage, bulbs show spongy, sunken, yellow-brown rotting lesions. In the early stages, infected bulbs are softened, brown and watery when cut open. There may be a white, light pink or reddish fungal growth (mycelium) covering the cloves, or in the rot cavities. Deep cracks form in the cloves, followed by breakdown of the tissue, which will eventually dry down to a portion of its original size, the cloves becoming crinkled and small.

Fusarium sp. on garlic basal plate
Photo by Melodie Putnam

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11/6/2013

Small *Fusarium* sp. lesions on garlic clove
Photo by Melodie Putnam

Disease Cycle.

Fusarium is a soil borne fungus and can persist for long periods in the soil. Transmission may occur via infested soil on tools or equipment, infected debris, infected seed, or run-off water. The pathogen enters the plant through stem plate or wounded tissue. The disease develops from the base of the bulb and progresses towards the tips of the cloves. Infection may occur at any time in the field, or in storage. The disease is favored by higher temperatures, 68º – 86º F (20-30 C), and high humidity. Late season rains may favor the pathogen.

Management

● Avoid rotations with *Allium* spp.(e.g. onions, shallots, bunching onions, chives, and leeks), and cereals, on which this fungus can also cause disease (*F. culmorum*).
● Store bulbs at cool temperatures and low humidity with good ventilation.
● Avoid storing damaged bulbs.

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Fusarium infection of garlic clove. Note the watersoaked appearance of the clove, and presence of the fungus.
Photo by Melodie Putnam

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11/6/2013

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