# Bacterial Blotch Disease

**Bacterial blotch may be endemic on mushroom farms, damaging mushroom quality and posing a potential yield loss. Presence of the disease is probable if the surfaces of the mushrooms do not dry following watering, irrespective of the season.**

Figure 1

## Common Names

Bacterial blotch, Brown blotch, Bacterial spot

## The Pathogen

*P. fluorescens* biotype G

## Outdated Names

*Pseudomonas tolaasii, Phytomonas tolassi, Bacterium tolaasi*

*Pseudomonas fluorescens* biotype G, the pathogen, causes the formation of lesions on mushroom tissue that are pale yellow initially, but which later become a golden yellow or rich chocolate brown. This discoloration is superficial, no more than 2 to 3 mm deep, and the underlying mushroom tissue may appear to be water soaked and grey or yellow-grey. Blotches usually appear when the mushrooms are in the early button stage, but can appear on mushrooms of any age - even on harvested refrigerated mushrooms or mushrooms over-wrapped with a watertight film.

If moisture conditions favor the disease, the spots enlarge and coalesce, sometimes covering the entire mushroom cap (Figure 1). Mushroom stems can also be blemished similarly.

Typically, spotting is observed at or near the edge of mushroom caps - at the contact points between two mushroom caps, at crevices in clusters of mushrooms, or wherever mushroom caps remain wet for a period of 4 to 6 hours or longer after water has been applied. If very dry conditions occur after blotch has developed, infected caps may crack radially as the mushroom expands.

Casing and air-borne dust are the primary means of introducing the blotch pathogen into a mushroom house. The bacterial pathogen is probably present in most casing material, even after pasteurization. Occurrence of disease is associated with the size of the bacterial population on the mushroom cap (pileus), rather than on the population in the casing, which explains why a prolonged wet period on the cap precedes disease occurrence. Once the disease occurs, blotch-causing bacteria are spread by splash-dispersal during watering, upon tools used by pickers and trashers, and by mushroom flies and nematodes. Recent observations suggest compost with a moisture content of less than 62 percent at spawning preconditions mushrooms to blotch infection.

Bacterial blotch can develop on the outer surface of a mushroom - on cap or stem or both - at any stage of mushroom growth or development. Bacteria splashed onto a mushroom surface will reproduce in moist conditions, such as occur when water condenses or remains on the mushroom surface for a number of hours. Condensation forms when saturated (with water vapor) air is present and warmer than the cap surface. The cap surface is cooler than the surrounding air when water transpires from the mushroom due to active mushroom growth; transpiration produces a cool surface. Slight fluctuations - a few degrees - in air temperature during cropping can cause the air to vascillate between the saturation point and not being saturated, even though the absolute water vapor content remains constant. Warm air holds more water vapor than cool air, so as the air temperature increases the air becomes less saturated with water vapor; the inverse is also true. With Bacterial blotch disease being so strongly influenced by environmental and surface-moisture conditions, disease control requires inhibiting the pathogens' reproduction on the mushroom surface. Air will dry the mushroom surfaces if it can hold the additional moisture coming from transpiration. If air is cooled to a temperature lower than desired and then reheated a few degrees, it can hold more

moisture and mushroom surfaces will dry. This heating operation is accomplished by circulating hot water (110' to 120°F) through perimeter heating pipes found in many growing rooms. In a forced-air ventilation system, the air must pass through a heating coil after it has been cooled, so the cooling coils may need a bit more capacity than might be expected. This system of drying is energy intensive, but essential when drying is needed. Adding sodium hypochlorite at 150 ppm chlorine to water used in irrigating the crop will control blotch, providing the mushrooms can be kept dry. But if the mushroom stays wet, chlorine has little effect since the bacterial population reproduces at a rate that neutralizes the effect of the oxidizing agent. This helps explain why sodium hypochlorite seems to be very effective at times, while at other times it appears to have no effect at all.

## Contact Information

**David Meigs Beyer**
Professor Plant Pathology
dmb8@psu.edu
814-863-7059

**extension.psu.edu**

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