

There's a FUNGUS Among Us!



Food Molds – An Important Health Concern

Food safety experts say we worry too much about chemicals used in food. We should be more concerned about the growing number of illnesses caused by microbiological contaminants, such as disease-producing bacteria, and by molds and natural toxins.

There are millions of cases of food-borne illness each year, with an economic toll of billions of dollars. Most of these illnesses are caused by pathogenic, or disease-producing, microorganisms that contaminate our food supply. The contamination usually stems from the mishandling of food – unsanitary food handling practices, inadequate refrigeration and storage or inadequate cooking.

We can prevent most of these illnesses.

Another source of potential illness, and to most of us an unsuspected source, is mold growth on food.

Molds—What They Do

Molds are true fungi. They are found almost everywhere in nature and have a profound influence on our environment.

Molds can be beneficial:

- They rot wood and leaves, enriching the soil.
- They release carbon dioxide for use by green plants.
- They are used in fermentation industries to produce organic acids, alcohol and other compounds.
- They are used in the manufacturing of many Oriental foods.
- Some of the *Penicillium* molds ripen cheeses, such as Roquefort, blue and Camembert.
- *Penicillium* molds also were the source of some of our most important antibiotics, namely penicillin.

But on the other hand...

These same fungi, if left uncontrolled, can cause enormous harm:

- They cause deterioration of wood, electrical insulation and other building materials.
- They cause textiles to rot.
- They damage a significant portion of the world's food supply and food crops.
- They often are responsible for the spoilage of fruits, vegetables, breads, cheese, grains and other food products.

Molds can grow under diverse conditions of moisture, pH and temperature. They are more adaptable to stress than most organisms. For example, they can grow with much less moisture than bacteria and yeasts need. When the environment is too dry, they produce spores and go into a resting state. Molds can live in higher concentrations of sugar, salt and acid but need oxygen to grow.

Thus, most food crops and food products are susceptible to contamination by molds during some stage of production, processing, transportation or storage.

Food Molds

Mold growth on food – with its fuzzy or cottony appearance – is familiar to all of us. Molds are easy to see because they are colored. They may be white, gray, black, brown, yellow, green, purple or red. Sometimes they are compact and dry or powdery.

We used to think mold was harmless. It was just unsightly and gave food a strange flavor. Usually the mold was just scraped off, or scooped off, and the food was eaten, unless it was completely molded.

In recent years, however, we've learned that some molds are dangerous because, under certain environmental conditions, they produce mycotoxins. Some mycotoxins are cancer-causing, and others cause mutations and birth defects.

Mycotoxins and Disease

Mycotoxins are poisonous substances that may be produced by molds. Many of the molds that can produce mycotoxins also are frequent contaminants of food and agricultural commodities.

If mold growth occurs, there is the possibility mycotoxins will be produced.

One-fourth of the world's food or animal feed crops is reported to be contaminated with mycotoxins each year.

A poisoning caused by eating a food or feed that contains a mycotoxin is called a mycotoxicosis.

Aflatoxins

There are many mycotoxins, but the aflatoxins are the best known and the greatest concern because they are among the most poisonous naturally occurring substances known. These toxins can affect the immune system, making the body more susceptible to disease. They also cause liver cancer.

Cooking and processing do not destroy the toxins.

Children and young animals generally are more susceptible to aflatoxins than adults and mature animals. Fish, young ducklings, chicken and turkey poults are extremely susceptible.

Aflatoxins are produced mainly by a strain of molds called *Aspergillus flavus*. Peanuts, tree nuts, corn and cotton seed are highly susceptible to this mold, both in the field and in storage. The mold grows best in warm, humid areas, including the southern United States. When drought occurs during pollination of corn, contamination is more likely to occur.

Testing for Aflatoxins

The U.S. Food and Drug Administration requires testing of susceptible food crops and animal feed for aflatoxins and rejects them if the toxins are present above acceptable limits. Finished products, such as peanut butter, also are monitored.

Although mycotoxins are of natural origin, the FDA considers them added, though unavoidable, contaminants. Aflatoxins are known carcinogens (cancer-causing substances), but they are not regulated under the Delaney Amendment since they are not food additives intentionally placed in foods.

Safe tolerance levels have not been determined for mycotoxins, and the FDA has set what it considers to

be practical limits only for aflatoxins in food and feeds. A level of 20 parts per billion was set for susceptible commodities.

The rule was relaxed for feed in 1984, however, and a level of 100 parts per billion for aflatoxins is allowed in feed for all animals except for dairy cows – where the level is still 20 parts per billion.

Milk can be contaminated with aflatoxins by feeding moldy grain to cows. The action level for aflatoxins in all milk is 0.5 parts per billion. Milk cooperatives screen tanker-truckloads of milk for aflatoxins. If they find a trace, they check all dairies that supplied milk for that load. The dairy producers involved then check their feed for aflatoxin contamination.

LSU AgCenter extension agents in the major dairy parishes of Louisiana have screening kits for checking dairy feeds.

Before grain elevators buy corn in Louisiana, it is screened with an ultraviolet light for possible contamination with aflatoxins. If the sample "fluoresces," this is an indication aflatoxin may be present. The corn is rejected, and the grower must get a more sophisticated test to confirm whether or not aflatoxin is present.

Testing is done at the Feed and Fertilizer Laboratory at Louisiana State University as a service by the Louisiana Department of Agriculture.

The FDA has proposed lowering the level of aflatoxins in peanut butter to 15 parts per billion because routine methods can measure aflatoxins below this amount. With good manufacturing practices, aflatoxin can be reduced to 1 or 2 parts per billion in peanut butter, according to Consumer Reports. In testing, that organization found detectable levels of aflatoxin in a number of brands, especially freshly ground natural peanut butters sold mainly in health food stores.

Patulin

Patulin is another potentially carcinogenic (cancer-causing) mycotoxin. It is produced by several species of molds, including one found in apple rot (*Penicillium expansum*).

Ergot

Ergot is a mycotoxin produced by a fungus (*Claviceps purpurea*) which grows on rye and other grains. It causes ergotism, a disease called St. Anthony's Fire in the Middle Ages.

Ergot probably was the cause of the colonial witch-hunt hysteria, because this toxin can cause hallucinations. It is a natural source of lysergic acid dimethylamine, also known as LSD.

Fumonisin B1

This mycotoxin is a potent toxin and carcinogen produced by the mold, *Fusarium moniliforme*. It was finally characterized in 1988 in South Africa after 18 years of research. Moldy corn has been the primary source of this toxin for animals and humans.

Fumonisin B1 has been shown to cause liver disease in animals, brain cancer in horses, liver damage and cancer in rats, heart failure in baboons, pulmonary edema in pigs and esophageal cancer in humans.

Esophageal cancer is a major health threat in southern Africa, northern China and the Caspian Coast of Iran. South Carolina has a high rate of esophageal cancer among black males. Undistilled moonshine is the suspected source.

In 1989, there were outbreaks of pulmonary edema in pigs in the United States, and hundreds of horses died from brain lesions. Fumonisin B1 from moldy corn was the cause. In Louisiana, more than 60 horses died in a single incident.

Trim It or Toss It???

We don't always have to throw away food if it has some mold growing on it. Food is too expensive to discard or waste if the potential hazard is minimal and if the hazard can be reduced even more or eliminated by trimming.

Do a risk versus benefit assessment before you throw it away. The Institute of Food Technologies Expert Panel on Food Safety offers some guidelines:

First, use adequate refrigeration or storage, and use food within a reasonable time. It takes a long time for mold to start, but then it grows quickly. Molds also must have air to grow, so proper packaging is important.

Regarding specific foods:

Bread

Most breads and baked goods have a preservative to prevent mold growth for several days. If preservatives are not used, however, breads and baked goods will mold. Throw away bread or baked goods if you see mold.

Apples

Trim away all signs of apple rot. This will remove Patulin if it is present.

Jellies, jams, syrups

We used to scoop off the visible mold. We still can if there is only a small amount and it hasn't been on the product very long. Lift mold out carefully; then use another clean spoon to remove and discard a larger portion from the surrounding area. If the mold is extensive, or has been there a long time, throw the food away. Byproducts of the mold might have spread into the semi-liquid product. Even if mycotoxins are not present, these metabolites might give undesirable flavors.

Hard cheeses

Studies show aflatoxins will not develop on hard cheese under refrigeration, and if other toxins are produced, it's only in small amounts. If the cheese has been properly refrigerated, trim off the mold if it is not too extensive. Trim off ½ inch of extra cheese around and underneath for a margin of safety. Keep the knife out of the mold itself. Rewrap in fresh packaging.

Soft and semi- soft cheeses and other dairy products

Throw away soft cheese, such as cream cheese or Brie, yogurt and sour cream if they have mold.

Peanuts and other nuts

Throw away; don't eat moldy nuts.

Meats

In the days of home-curing meat, dry, salt-cured hams and bacon often became covered with mold. The mold was scraped or cut off, and the meat was washed thoroughly and used. This was OK because these strains do not produce aflatoxins. Today, however, throw away visibly molded food such as hot dogs, lunch meats, cooked chicken and baked meats.

Fruits and vegetables

Trim mold from firm vegetables and fruits. Cut an extra ½ inch from around and beneath where the mold grew. Throw away molded small fruits, soft fruits, berries and soft vegetables.

Don't Let Spores Spread

Avoid spreading mold spores by gently wrapping moldy portions, or put them in a closed bag and discard. Thoroughly clean container that held the product.

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Pub. 2488 (online only) 3/10 Rev.

Issued in furtherance of cooperative Extension work, Acts of Congress of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. The Louisiana Cooperative Extension Service provides equal opportunities in programs and employment.