

Moulds and Mycotoxins

Moulds are microscopic fungi that live on plant or animal matter. Mycotoxins are toxins produced by moulds under specific environmental conditions.

Most moulds are filamentous (threadlike) organisms and produce spores.

Spores can be transported by air, water, or insects.

Spores are easily disturbed. When airborne, the spores spread the mould from place to place.

Mould filaments are like very thin threads and may be difficult to see when the mould grows deep into the food.

Mouldy foods may also have invisible bacteria growing along with the mould making them unsafe to eat.

Where are moulds found?

- Moulds can be found everywhere, year-round, both indoors and outdoors
- Moulds grow on the surface of foods, with filamentous roots penetrating food for nutrition. Mycotoxins can spread throughout the food.
- High moisture content, high relative humidity, and warm temperatures promote mould growth and mycotoxin production. Insect infestation causes physical damage to food, predisposing it to mould invasion, which leads to mycotoxin production. Moulds can penetrate porous foods like bread and baked goods.
- Moulds can also grow at refrigerator temperatures. They also tolerate salt and sugar better than bacteria. Therefore, moulds can grow in refrigerated jams and jelly and on cured, salty meats such as ham, bacon, salami and bologna.
- Foods without preservatives are at high risk for mould

Are moulds on food safe or dangerous?

Some moulds are safe and beneficial, such as those used to make certain kinds of cheese. For example, blue-veined cheeses include Roquefort, Blue, Gorgonzola, and Stilton. Brie and Camembert have white surfaces.

Some moulds are dangerous; they produce very harmful mycotoxins such as Aflatoxins, Patulin, Fumonisin and Ochratoxin. Mycotoxins cannot be detected visually and have no specific taste or smell, making it difficult to identify affected food/crops.

Mycotoxins can be found in corn, peanuts, rice, wheat, barley, alfalfa, oilseeds, coffee, cocoa, and tree nuts (pecan, almond, pistachio, hazelnut, walnut and Brazil nut), beer and wine.

Health implications of moulds and mycotoxins

- Some moulds cause allergic reactions and respiratory problems
- Mycotoxins cause acute illness or death at high doses or chronic toxicity at low doses
- Toxins may affect the body's nervous system, heart, lungs and digestive tract. Aflatoxin is associated with acute hepatitis and liver cancer.

Prevention and control of moulds/mycotoxins

Most moulds are naturally found in soil and air making it difficult to prevent food contamination.

Mycotoxins are difficult and sometimes impossible to eliminate. Aflatoxin and Patulin are heat stable and cannot be destroyed by cooking.

The best control is prevention.

- Reducing moisture and oxygen content of food products and controlling storage conditions such as temperature and relative humidity
- Modified atmospheric packaging with nitrogen/carbon dioxide gas mixtures is used to prevent mould growth and extend the shelf life of cheese, pasta, bread, jerky meats, etc
- Don't buy mouldy food unless it is part of the product, like blue cheese
- Keep food covered during storage and serving to prevent exposure to mould spores in the air
- Use leftovers within 3 to 4 days, so mould doesn't have a chance to grow

Mouldy Food – To Use or Discard

Food	Handling	Food	Handling
Luncheon meats, bacon, hot dogs	Discard	Bread and baked goods	Discard
Hard* salami, dry-cured country ham	Use. First, scrub mould off the surface	Yogurt and sour cream	Discard
Cooked leftover meat and poultry	Discard	Jams and jellies	Discard
Cooked casseroles	Discard	Firm* fruits and vegetables (cabbage, bell peppers, carrots)	Use. Cut off at least 2.5 cm (1" inch) around and below the mould spot
Cooked grain and pasta	Discard	Soft fruits and vegetables (cucumbers, peaches, tomatoes)	Discard
Hard cheese, where mould is not part of the product: Parmesan, Romano, Vintage Gouda	Use. Cut off at least 2.5 cm (1" inch) around and below the mould spot	Other semi-soft and soft cheeses: Feta, Havarti, Mozzarella, cottage, cream cheese, Chevre, crumbled, shredded, sliced cheeses	Discard
Cheeses like Roquefort, Blue, Gorgonzola, Stilton Brie or Camembert contaminated by other moulds	Discard	Peanut butter, legumes and nuts	Discard



Note: *Mould cannot generally penetrate deep into hard/firm foods with low moisture.

When cutting out mouldy parts of the food, keep the knife out of the mould itself so it will not cross-contaminate other parts of the food.