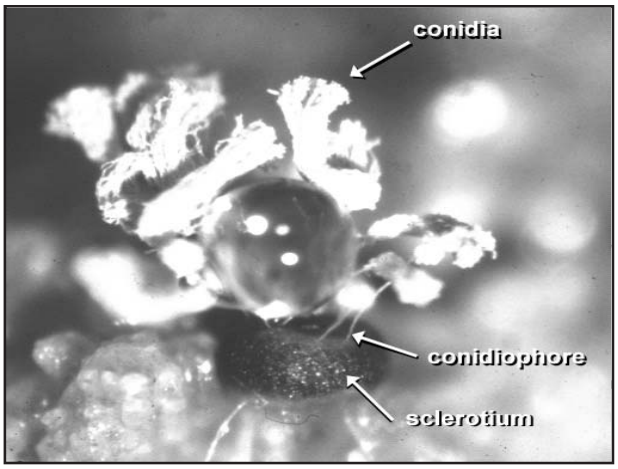
TITLE CONTAMINATION IN FOOD

AIM- TO STUDY THE EFFECT OF FUNGI ON DIFFERENT SPECIES

AUTHORS.
RAKESH. V. KALE
DR. MOSES. J. KOLET
DR. ANITA GOSWAMI



Grain Mold Pathogens

- Molds are fungi that grow by producing long filaments called hyphae (*Figure 1*). In general, hyphae are important to the survival and dispersal of fungi. Hyphal growth allows the fungus to colonize a food source (e.g., a corn kernel) as well as to grow from one food source to another; e.g., from root to root through soil or from one kernel to an adjacent kernel in a pile of stored grain (*Figure 1*). A network of hyphae is referred to as mycelium. This hyphal network is responsible for "cementing" kernels together in grain piles resulting in columns of grain that cannot be separated. Grain mold fungi also produce spores (conidia) capable of aerial dispersal in the field as well as within a grain storage bin (*Figure 2*). It is usually masses of spores that give the mold a characteristic color. Spores are dispersed passively by wind and rain. Insects can serve as vectors of these fungi usually by transporting the spores on the surface of their bodies; this is particularly important within grain storage bins. Managing grain storage insects can reduce contamination by grain molds and mycotoxins. Most species of grain mold fungi are well adapted to the conditions of grain production and postharvest handling and storage. They can survive long periods in storage facilities making sanitation of the facility an important part of a grain mold management plan.
- The most striking external symptom of grain mold is the presence of the mold itself. The degree of growth on the kernels and the appearance of the mold (e.g., color and density) varies with the species of mold, the quality of the grain being colonized, and the prevailing environmental conditions (*Figure 3*). Incidence (the proportion of ears with mold) and severity (the proportion of infected kernels on an ear) of disease depends on many factors.
- *Aspergillus* species tend to be more prevalent when there is drought during the latter half of the growing season. *Fusarium verticillioides* is associated with a high proportion of corn kernels under most growing conditions but *Fusarium* ear and grain mold develops more often when cool wet weather during silking is followed by hot dry weather. *Gibberella* grain mold is more prevalent in hybrids with tight husks. Unlike *F. verticillioides, F. graminearum* is rarely seed-borne.

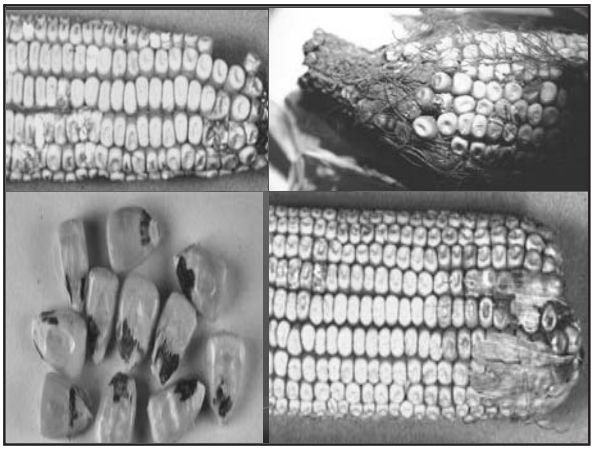


Table I. Toxigenic fungi, their metabolites and target effects.

Grain Mold Fungus	*Toxin Produced*	*Toxic Effects*	*Species Affected*
Aspergillus flavus	aflatoxin	acute toxicity (liver) liver cancer immune suppression	many human humans, animals
Aspergillus alutaceus	ochratoxin	acute toxicity (kidney) cancer	swine, poultry human
Fusarium verticillioides	fumonisin	blind staggers pulmonary edema esophageal cancer	horse swine human
Fusarium graminearum	trichothecenes	acute toxicity immune suppression	many (not ruminants) many
	vomitoxin	acute toxicity	many
	zearalenone	reproductive dysfunction	swine
Penicillium spp.	ochratoxin	acute toxicity (kidney) cancer	swine, poultry human

Table III. Key management steps to minimize grain mold and mycotoxin contamination.

- Ensure proper storage conditions — grain moisture, temperature, relative humidity
- Minimize mechanical damage — harvest and postharvest shipping and handling
- Minimize insect damage — pre-harvest and postharvest storage
- Plant tolerant hybrids — some tolerant hybrids available
- Sanitation of storage facility — critical management practice
- Chemical management — propionic acid, mineral oils
- Assay moldy grain for mycotoxins — Toxicology Lab, Vet Diagnostic Center, UNL
- Segregate, blend, or destroy contaminated grain — as per FDA regulations

Contaminants in food and beverages

Contamination in food oil (Edible Oil)

Presented by: Pooja S. Dandekar
T.Y. B.sc (Chemistry)

1

Contents

- Types of oil
- Sunflower oil and its contaminants
- Risk factors of contamination (Sunflower oil)
- Fish oil and its contaminants
- Side effects of the contamination
- Benefits of Fish oil
- Remedies to reduce contamination (Fish oil)

2

Types of oil

- Oil is a collective term for more or less viscous, generally organic chemical liquid depending on their chemical composition a distinction may be drawn between:
  - Fatty oil
  - Essential oil
  - Mineral oil
  - Silicone oil

Note: Fatty oil is also known as sweet oil.

3

Sunflower oil and its contaminants

- It is vegetable origin.
- High quality edible oil.
- Obtained from fatty kernels of sunflower

Types of Sunflower oil

- Cold pressed crude oil (color: Light yellow)
- Hot pressed crude oil (color: Brown)
- Refined oil (colorless)

4

Contaminants of sunflower oil

- Acid value
  - 0.9 -1.1 %
- Rancidity
  - Promoted by light, atmospheric oxygen, moisture
- Ferrous and rust particles
- Sea Water
- Unshelled kernels
- Packaging
- Transport
- Cargo handling

5

Risk factors of contamination (Sunflower oil)

- RF temperature

Designation	Temperature range
Travel temperature (Favorable temperature range)	15°C (5 - 26°C)
Solidification temperature	-16°C - -18°C
Pumping temperature	approx. 15°C

- RF moisture
- RF Ventilation
- RF Gases
- RF Contamination behavior
- RF Shrinkage / Shortage

6

Risk factors of contamination (Sunflower oil)

- RF temperature

Designation	Temperature range
Travel temperature (Favorable temperature range)	15°C (5 - 26°C)
Solidification temperature	-16°C - -18°C
Pumping temperature	approx. 15°C

- RF moisture
- RF Ventilation
- RF Gases
- RF Contamination behavior
- RF Shrinkage / Shortage

6

Risk factors of contamination (Sunflower oil)

- RF temperature

Designation	Temperature range
Travel temperature (Favorable temperature range)	15°C (5 - 26°C)
Solidification temperature	-16°C - -18°C
Pumping temperature	approx. 15°C

- RF moisture
- RF Ventilation
- RF Gases
- RF Contamination behavior
- RF Shrinkage / Shortage

6

Risk factors of contamination (Sunflower oil)

- RF temperature

Designation	Temperature range
Travel temperature (Favorable temperature range)	15°C (5 - 26°C)
Solidification temperature	-16°C - -18°C
Pumping temperature	approx. 15°C

- RF moisture
- RF Ventilation
- RF Gases
- RF Contamination behavior
- RF Shrinkage / Shortage

6

Benefits of Fish oil

- Reduces heart deceases
- Lowers the risk of cancer
- Chronic deceases such as:
  - Asthma
  - Depression
  - High blood pressure
  - Rheumatoid Arthritis

10

Benefits of Fish oil

- Reduces heart deceases
- Lowers the risk of cancer
- Chronic deceases such as:
  - Asthma
  - Depression
  - High blood pressure
  - Rheumatoid Arthritis

10

Benefits of Fish oil

- Reduces heart deceases
- Lowers the risk of cancer
- Chronic deceases such as:
  - Asthma
  - Depression
  - High blood pressure
  - Rheumatoid Arthritis

10

Coca Cola

By

Raghunath Sakha
T.Y.B.Sc.(Chemistry)

- On August 5, 2003, ***The Center for Science and Environment***, an NGO in India, attacked the safety of Coca-Cola .

- Tribal women courting arrest during a protest against Coca Cola's exploitation of ground water in front of the plant at Plachimada village

Communities Reject Coca-Cola in India

Coca-Cola is in trouble in India .

The Reasons for the contaminants:

- **The processes used in manufacturing Coca-cola are inherently damaging.**
- **The factories spew out toxic waste that threatens health and the environment.**
- **The company drilled more than six wells and illegally installed high-powered electric pumps to extract millions of litres of water.**

Warnings to the parents:

- **Chemical in soft drinks 'can wreck your child's DNA'.**
- **Parents are warned to limit their children's consumption of soft drinks.**

- **Take care of your child.**