Research Paper

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Microbiological Examination of Spoiled Foods

Microbiology

KEYWORDS : spoiled, fruits, bread, bacteria, fungi, rot.

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ABSTRACT

Foods are subject to spoilage by wide variety of microorganisms which include Bacteria, fungi, yeasts. In the present study we have emphasized the spoilage of various fruits ,vegetables and some common food products was done and symptoms were noted. Microorganisms associated with the spoilage were identified by microscopic examination of stained smears in case of each type of foods. Such microorganisms .Such microorganisms were also isolated in pure culture and were used for future studies.

INTRODUCTION

Foods consumed by human beings have wide variety of nutritional substances such as carbohydrates, Proteins, Fats, vitamins and minerals. However the composition of food varies from one food to another example: vegetables are rich in amino acids, proteins, minerals, vitamins and fruits contain high content of Carbohydrates (Glucose, fructose, sucrose etc.) and less proteins. The available water (a_w) also varies from one food to another.(Banwart,G.J 1989)

The growth of microorganisms in foods bring about several biochemical changes in the foods such production of acids, gases, amines. Such biochemical changes include fermentation, deamination, Putrefaction, etc. The biochemical changes are due to the enzymes produced by the micro-organisms such as pectinases, amylase, cellulases, proteases, lipase (Jay, J.M. 1991). Spoilages are usually identified by visual symptoms on the surface of the food produce. Such changes include changes include rots, slimy, rancidity, putrefactive, off odours, souring, changes in the colour, taint, phosphorescence. There are several factors responsible for the spoilage of foods. These include-Handlers, contamination during harvesting, transportation, storage area, shelf life, season of the year, temperature etc.(Frazer W.C. , Westhoff D.C. 1988) Some of the food spoilages are common ,some are rare. Such foods are unfit for consumption.

MATERIALS AND METHODS

Collection of the food samples

The spoiled food samples such as vegetables , fruits, bread were collected from the local market area, Neredmet,Secunderabad and were used in the present study.

Examination of the spoiled food samples

Each type of food sample was examined carefully for the spoilage symptoms such as colour, consistency, rots, odour, any other type of visible symptoms. In our present study we examined –Peas, Tomatoes, Apple, Beans, Potato, Bread.

Direct microscopic examination of spoiled foods

After examination of the spoiled foods for the symptoms smears were prepared from the spoiled portion s of food samples and were examined under the microscope for identification of spoilage causing bacteria and fungi respectively.

For the identification of bacteria Gram's staining method was employed .In this the prepared smear was air dried and heat fixed. Afterwards in the first step it was treated with crystal violet for 1 minute, rinsed with distilled water treated with Gram's iodine for 1minute,rinsed,washed with 70% alchohol for 10 seconds and finally with safranine for 1minute, washed with distilled water, blot dried and observed under oil immersion (100x).

For the identification of the fungi the smear prepared was stained with Lacto phenol cotton blue staining procedure and observed under 45x objective lens of the microscope.

RESULTS AND DISCUSSION

The spoiled food samples were then analysed for the different symptoms of spoilage (figure no. 1 and figure no. – 2) as described in Table no : 1

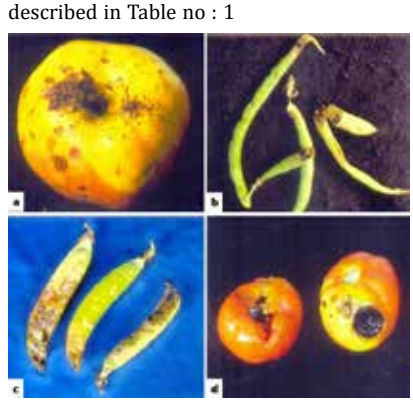

Fig1: Spoiled foods a) spoiled apple b) spoiled beans c) spoiled green peas d) spoiled tomatoes.

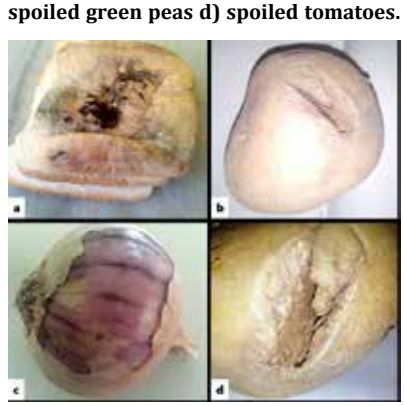

Fig 2 : Spoiled foods a) spoiled Indian bread b) spoiled potato c) spoiled onion, d) spoiled potato.

Table no. 1 : Examination of Spoiled foods for the symptoms of spoilage

Sl.no.	FOOD SAMPLES	SYMPTOMS OF SPOILAGE
1.	Tomato (figure : 1d)	Soft rotten tissue with black rot
2.	Tomato (figure : 1d)	Large black rot
3.	Tomato (figure : 1d)	Greyish black moldy growth
4.	Beans (figure : 1b)	Black rotten tissue
5.	Apples (figure : 1a)	Black spots on the surface
6.	Green Peas (figure : 1c)	Black rotten areas on the surface
7.	Green Peas (figure : 1c)	Black enlarged areas
8.	Green Peas (figure : 1c)	Greyish moldy growth on the surface
9.	Onions (figure : 2c)	Black powdery mass
10.	Potatoes (figure : 2b)	Brownish black colouration with rot areas
11.	Bread (figure : 2a)	Black moldy growth

The spoiled parts were then analysed for the kind of the micro-organisms by microscopic examinations as described in Table no : 2.

Table no. 2 : Microscopic examination of spoiled food samples .

Sl.no.	FOOD SAMPLES	MORPHOLOGY
1.	Tomato (figure : 1d)	Bacteria – Gram negative rods
2.	Tomato (figure : 1d)	Bacteria – Gram positive rods
3.	Tomato (figure : 1d)	Fungus - Mycelial filaments with bunch of spores intermittenly
4.	Beans (figure : 1b)	Bacteria – Gram positive rods with endospore.
5.	Beans (figure : 1b)	Yeast – Oval shaped cells
6.	Apples (figure : 1a)	Bacteria – Gram negative rods
7.	Green Peas (figure : 1c)	Bacteria – Gram positive rods
8.	Green Peas (figure : 1c)	Fungus - Mycelial filaments with bunch of spores intermittenly
9.	Onions (figure : 2c)	Fungus – Conidia in chains
10.	Potatoes (figure : 2b)	Bacteria – Gram positive rods with endospore
10.	Potatoes (figure : 2d)	Fungus - Mycelial filaments with septate conidia
11.	Bread (figure : 2a)	Fungus - Mycelial filaments with dome shaped sporangium
12.	Bread (figure : 2a)	Fungus – radiating conidiophores with chains of conidia
13.	Bread (figure : 2a)	Fungus – Mycelial filaments with brush like structure

DISCUSSION

Upon examination of spoiled food samples, we can conclude that the spoilage is detected by the visual or external symptoms of spoilage on the food sample. These symptoms of the food spoilage are of several types based on the causative organism for spoilage . The type of spoilage is also influenced by several other factors such as food, chemical composition, prior contaminations, pH, oxygen availability, temperature of storage, season, moisture etc. The symptoms observed were of various types and were said to be rots, softness, or mustiness of tissue, moldy, slimy, souring, taint, off flavours, off odours, spots etc. However food sample if observed by direct microscopic examination wide variety of microorganisms were observed which depends on the type of spoilage. In our observations we could observe Gram-positive rod shaped, endospore forming bacteria, non endospore forming bacteria. In addition Gram –positive cocci in bunches as well as single isolated cells or in pairs were observed . Incase of spoiled beans, tomatoes Gram-negative rod shaped bacteria were observed whereas in case of moldy spoilages wide variety of fungi were identified. They were Trichoderma(tomatoes), Nigrosporium (onions), Aspergillus sp. (bread), Mucor (bread), Alternaria (potato), etc.

CONCLUSION

Such food spoilages are mainly due to contamination from various sources such as –during harvesting of the crop, handlers, transportation, storage area, shelf life of the food product, etc. These spoilages can be prevented by prevention of contamination, by adopting preservation methods such as cleanliness at all steps.

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