

Name Of College: Magadh Mahila College			
Identifications	Teacher Name: Dr. Rajni Pandey Dept. of Home Science. Session: 2017-2019 Class: M.A. Semester-IV. No. of Students: 12	Subject: Home Science Paper :Food Processing General Lesson: Food Spoilage Time: 5 hours	
Learning Objective	By the end of the lesson students will be able to:- Understand the meaning of Food spoilage, Types of food spoilage and food born hazards of microbial origin.		
Teaching Method	Brief lecture, Question –Answer session, and Group discussion.		
Teaching Aids	General	Special	
	Black board, Duster, Chalk.	Student presentation via flow chart and photographs.	
Step	Stage	The role of the teacher	The role of the students
Preparation	Exchange of greeting	Exchange greetings with my students.	Students do the same respectfully.
	Taking attendance	take student's attendance	Students co-operate me.
	Collection of previous class question answer sheet.	Collect the question answer sheets.	Students submit the same.
	Brain storming/drawing attention	Ask few simple questions like: 1.what did you do yesterday after the college. 2 .How was the weather yesterday. 3.Did you had any memorable event yesterdays etc.	Students reply with their yesterdays experience and activities.
	Declaration of today's lesson	Declare today's lesson telling – “Today we will learn about & Food Spoilage and role of micro organism and food born hazards.	Students also take a note of it in their workbooks.
Sequence of learning	Lecture to follow.	Start the subject teaching with the lectures assisted by specific notes of the subject matters, and various visual charts for better understanding. Also ask related questions on the covered portions to judge the understanding of the students and keeping them with the subject lecture. Also I ask the students if any doubts or their views and clear their doubts.	Students attentively listen, learn and take down the notes of the lecture. Positively try to answer the questions asked and raise any doubts to be cleared. Also students actively put their views with the subject matter.
Subject Matter	<ul style="list-style-type: none"> Definitions of the basic terms used e.g. food spoilage-Microbial and non microbial, infection, intoxication, and toxin mediated infection. Microbial hazards- Bacteria, moulds, yeast. Food born infections- Causal organism and their symptoms. 		
Expected Learning Outcome	After going through this unit the students will have the proper understanding of food spoilage, types of spoilage, microbial spoilage of food and the effect of different temperatures on micro-organism.		

UNIT - I

MHSc 401

Food Spoilage

- Spoilage is the process in which food deteriorates to the point in which it is not edible to humans or its quality of edibility becomes reduced
OR.
- Any change which renders a product unacceptable for human consumption.
- Complex event in which a combination of microbial and biochemical activities may interact.
- One of the major reason that led to preservation.

Types of Spoilage

Two types of spoilage :

- Microbial Spoilage
- Non - Microbial

Most common symptoms of food borne illness are :

Diarrhea, Vomiting, fever, sore throat with fever and jaundice.

Based on rate of Spoilage.

- Highly Perishable

- Meat, fish, poultry, eggs, milk, most fruits and Vegetables.

- Semi perishable

- Potatoes, some apple varieties, nutmeats

- Stable or non-perishable.

- Sugar, flour, dry beans.

Microbial Spoilage of Food.

- Bacteria, Yeasts and Molds are the major Causes of food spoilage.

- They produce various enzymes that decompose the various constituents of food.

- Molds are the major Causes of spoilage of foods with reduced water activity e.g dry cereals and cereal products.

- Bacteria spoils foods with relatively high water activity such as milk and products.

Microbial Hazards.

Three types of foodborne illness and their def ⁿ .	
Infection	Eating food Contaminated with harmful microorganisms
Intoxication	Eating food contaminated with the toxins (poisons) formed by some types of bacteria or mold; eating food contaminated with other biological or chemical toxins (poisons)
Toxin-mediated infection	Eating food contaminated with harmful microorganisms. These microorganisms grow in the body and then form form toxins (poison).

Bacteria Basics

Bacteria are not visible to the naked eye. Harmful bacteria are those that cause food borne illness. They can only grow in potentially hazardous food.

Potentially hazardous foods are moist, low-acid, and have protein.

e.g :- Meat, milk, cooked vegetables, cooked rice, baked potatoes, poultry, and seafood.

Bacteria vary in their requirements for food, moisture, acidity, temperature and Oxygen. Bacteria can grow and develop rapidly between 20°C and 53°C.

Bacteria usually cause spoilage in foods, which are neutral in their reaction such as vegetables, milk, eggs, meat and fish.

Some of them when ingested can be harmful to human beings. A few others can produce toxins in foods.

Bacteria that require for their growth:

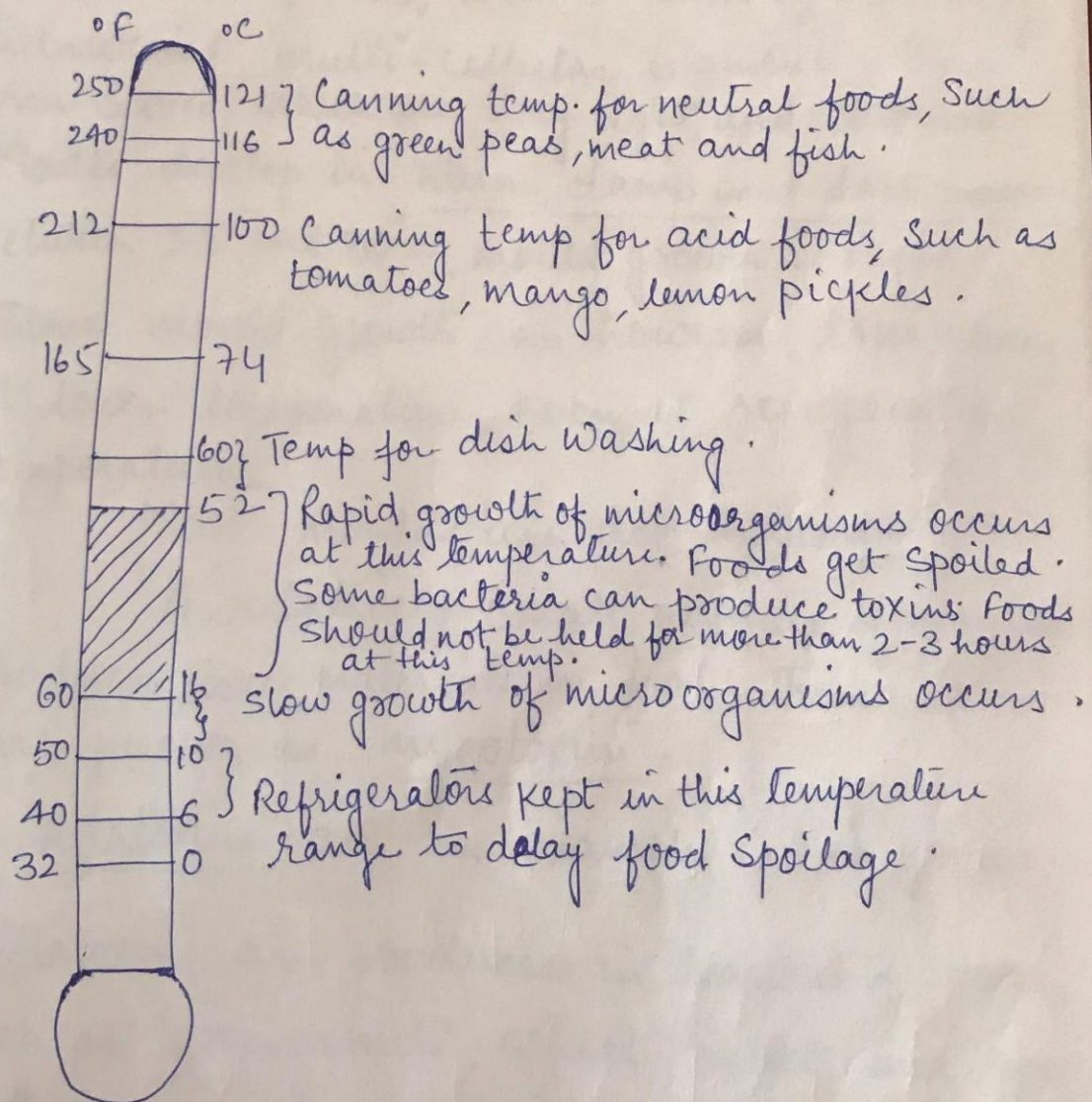
1. A higher temperature than 45°C are known as thermophiles.
2. Temperatures between 20 and 25°C are called mesophiles.
3. Temperature less than 20°C are called psychrophiles.

Some of them need oxygen for growth (aerobic) and others grow only in the absence of oxygen. (anaerobic).

Some of them when ingested can be harmful to human ~~beings~~ beings.

$$\text{Formula } (32^{\circ}\text{F} - 32) \times \frac{5}{9} = 0^{\circ}\text{C}.$$

The effect of different temperatures on microorganisms has been depicted in fig below.



Temperature of Food and Control of Microorganisms.

Moulds :

Fuzzy or cottony growth on chapati, bread ~~and~~ or cooked rice. This is mould growth, which makes the food unfit to eat.

Moulds are plants, with a mass of branching, interwoven, multi-cellular filaments. These form spores, which are very light and coloured.

Moulds develop in warm, damp and dark places. Between 25 and 30°C , mould growth is rapid.

Some mould growth can however, take place at lower temperature, even at refrigeration temperatures.

Most moulds are not harmful.

A relatively small number of moulds produce toxic materials in food. These toxins are known as mycotoxins.

Aflatoxins are an example of this group.

Aflatoxins are produced in harvested crops, such as groundnuts, wheat, millet and rye if these are not dried promptly after harvest and stored.

Yeasts:

Yeasts grow usually on foods, such as fruits which have sugar and water.

The musty smell of spoiled grapes is due to the growth of yeasts on them. Yeasts have usually spherical to ovoid cells and they reproduce by budding of these cells.

Many yeasts grow best in acid medium and in the presence of ample oxygen.

The growth is most rapid between 25°C and 30°C. Foods are often contaminated with yeasts and they can cause spoilage by conversion of the sugar present in the foods to alcohol and carbon dioxide.

Foods liable to be spoiled by yeasts are fruits, juices, syrups, molasses, honey, jam and jellies.

• Microbial Spoilage - Caused by moulds, Yeast and bacteria.

• Moulds grow in warm damp conditions in foods. Such as Bread.

• Yeasts grow in acidic medium in fruits with sugar and water.

Bacteria cause Spoilage in foods such as vegetables, milk and meat which have neutral pH. All grow best between 25-50°C.

Food - Borne Infections - a) Microorganism

i) Salmonellosis -

ii) Typhoid -

iii) Cholera -

iv) Diphtheria -

v) Shigellosis -

vi) Amoebiasis -

vii) Tuberculosis -

viii) Brucellosis -

ix) ~~Sc~~ Scarlet fever -

8
[Salmonellosis - Salmonella bacteria - cramps in stomach, Blood stools, Diarrhea, Headache etc.

Scarlet fever - Streptococcus pyogenes bacteria

Bacterial Bright red rash on the body, fever above $101^{\circ}F$.
headaches, swollen tonsils, nausea and vomiting, abdominal pain,

Cholera - Severe watery diarrhea which can lead to dehydration and even death if untreated. - Vibrio cholerae.

Diphtheria - Corynebacterium diphtheriae.
- affects the mucous membranes of the throat and nose.

[Shigellosis - Shigella - Abdominal cramping, nausea, and vomiting.

Amoebiasis - Parasitic - E. histolytica
loose stool, abdominal cramping, and stomach pain.

Tuberculosis - Mycobacterium Tuberculosis - generally affects lungs.

Brucellosis - Brucella (Bacteria). -
unpasteurized milk, cheese and other dairy products
Fever, chills, loss of appetite, sweats, weakness,
Fatigue, Headache, Joint muscle and back pain.