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Effect of Temperature on the growth of Mucor Species on the Moist Breads.

Divya Mahar and H D Mahar

Tech. Assistant FSSAI Hyderabad, Telangana
HOD Botany RG PG College Ambikapur

Abstract: *There is the effect of climate on food production, food storage, and food poisoning in food science. Food must be eaten as soon as possible after cooking the food and if remains proper freezing preservation is a must. There is a tradition in Surguja CG, to eat rice in the morning which was of last night Called 'Basi'. On winter days it's OK, But on Summer days it gets contaminated with saprophytic microorganisms and could cause food poisoning. Smell and taste could be an identification of contamination. But children could not care it. This paper deals with the effect of climatic temperature and Humidity on food contamination.*

Key words: *Food Safety, Food contamination Factors of Fungal growth, Food spoilage, Fungi on the bread.*

INTRODUCTION: Food is any substance consumed by an organism for nutritional support. Food is usually of plant, animal, or fungal origin and contains essential nutrients such as carbohydrates, fats, proteins, vitamins, or minerals. Rice, Roti, Dals (Pulse) Vegetables, Milk Bread, Fish etc. are man Human Food. Food is broken into nutrient components through digestive process. Then, it is absorbed by villi of intestine goes to liver then to each part of body for respiration and get energy. And wastage is out by excretory system.[1]

Food spoilage: Spoilage is the process where a food product becomes unsuitable to ingest by the consumer. The cause of such a process is due to many outside factors as a side-effect of the type of product it is, as well as how the product is packaged and stored. Due to food spoilage, one-third of the world's food produced for the consumption of humans is lost every year.^[1] Bacteria and various fungi are the cause of spoilage and can create serious consequences for the consumers, but there are preventive measures that can be taken. Food poisoning: Unlike many types of food poisoning, scombroid form is not brought about by ingestion of a pathogen. symbiotic bacteria such as *Morganella morganii* (this is one reason why fish should be stored in the freezer). Histamine is not destroyed by normal cooking temperatures,

Food borne illness Spoilage of contaminated food by pathogenic bacteria, viruses, or parasites that contaminate food,^[2] as well as prions (the agents of mad cow disease), and toxins such as aflatoxins in peanuts, poisonous mushrooms, and various species of beans that have not been boiled for at least 10 minutes.

Symptoms vary depending on the cause but often include vomiting, fever, and aches, and may include diarrhea. Bouts of vomiting can be repeated with an extended delay in between, because even if infected food was eliminated from the stomach in the first bout, microbes, like bacteria (if applicable), can pass through the stomach into the intestine and begin to multiply. Some types of microbes stay in the intestine.

Food safety (or food hygiene) is used as a scientific method/discipline describing handling, preparation, and storage of food in ways that prevent food borne illness. The occurrence of two or more cases of a similar illness resulting from the ingestion of a common food is known as a food-borne disease outbreak.^[1] This includes a number of routines that should be followed to avoid potential health hazards. In this way, food safety often overlaps with food defense to prevent harm to consumers.

METHODOLOGY: On 12-July-2023 Wednesday, at the room temperature, 29°C and Hygrometer reading is 65% with claudy weather and 18 Klux and (rainy season).. A packet bread was purchased from morning bread selling vender, Two breads were cut form middle and made 1/2, thus four pieces are made. And these are put in separately 4Petri dishes. As depicted in figure1. Ten-ten drops of water is put in the middle of bread pieces and covered by other by cover glass. It is marked A,B,C, and D as depicted in figure 2. Then, all 4 Petri dishes were put inside Polythene bags Bread A was put in open air in room temperature and room light, i.e. 20°C-30 °C, moisture 40% to 98%..

Bread piece B was put in room temperature but in dark inside an Almirah. Bread piece C was put in a fridge I e. 0°C to 10°C. And lastly bread piece D was put in the inside cabinet of fridge having -5°C to 0°C. After two days, 6 days and 9 days the growth of bread fungi was repeatedly observed and microscopic study of grown fungi was done. Finally on First September 2023, Figure 13 was took from the sample put in fridge 9 where Temperature was 5°C -10°C and figure 14 was took from inside chamber of fridge i.e. 0°C.

OBSERVATION AND RESULT: On 13-July-2023, the bread piece 'A' put on the table of Lab was eaten by mouse and effect of light could not be observed. But rest the bread samples BCD was safe for fungal growth. Growth of bread mold fungi is observed

from 6 days as depicted in figure5 and it was fully grown on 9th day at room temperature as depicted in figure 6 Figure 7 represents that on the Ninth day bread mould is fully grown on room temperature. I slide on Cotton Blue Mount was observed depicted in figure 8 represents actual viewed in figure 9, and its magnified view is represented in figure 10. While on the same time a little color change in the fridge depicted in figure 11 There is Not any sign of fungus at zero degree centigrade-temperature inside the chamber of fridge , as depicted in figure 12 took photograph on 18-07-2023. On first September 2023 The fridge Sample was seen overgrowth of fungus, depicted in figure 13, but in the chamber of fridge there was a color of fungus at the same time, depicted in figure 14. Figure 15 represents the graph showing clearly that Growth of fungi is directly proportion to the Environmental temperature.

DISCUSSION:

Identification and Classification of the fungi grown on bread is as following:

Cryptogamea: Flower absent Since it is a microorganism.,

Thallophyta: Thalloid body.

Mycota: Saprophyte Nature.

Phycomcetes : Coenocytic Mycelium

Zygomycetes: Sexual reproduction by Gametangial contact and Zygosporangia development. *Mucor indicus* and *Rhizopus stolonifer* is also very common black bread mold. Both fungi are from Zygomycetes Subclass of Class Phycomycetes of Mycota (Fungi) as a microbial genera of bread mold. Although, there are differences between both:

- 1 Mucor has branched sporangiophore while the sporangiophore of Rhizopus is generally unbranched.
2. Mucor does not have apophyses whereas Rhizopus has apophyses in the sporangia.
3. Mucor is cylindrical and round-shaped, while Rhizopus contains some distinct forms.
4. Mucor is known as pin mold, while Rhizopus is known as black mold.
- 5 Mucor does not contain rhizoids and stolons, while Rhizopus contains stolons and rhizoids.[9]



Figure1 Bread in Petri dishes Figure2 +H2O & covered Figure3 Safety Packing in 4 Polythene



Figure4 2 Day after, Figure5, after 6days Figure6 fresh in fridge on 6th day Figure7 9th day

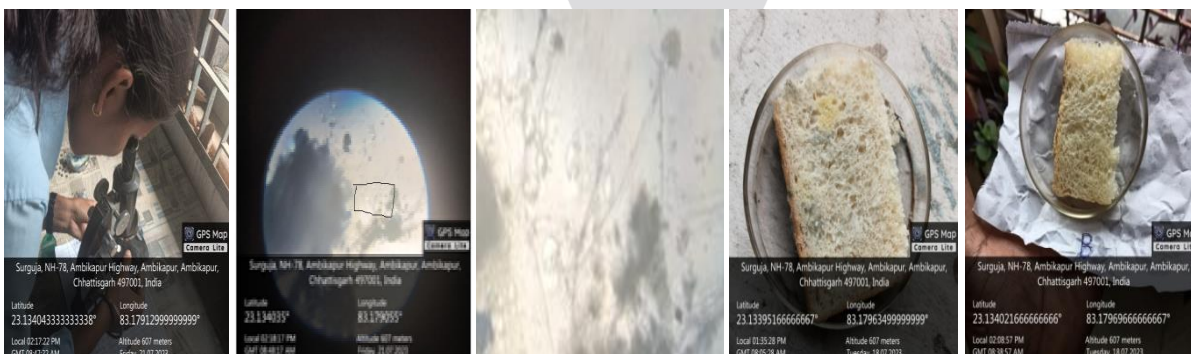


Fig.8 Microscopy Fig. 9 Observation Fig. 10 Magnification Fig.11 in out Fridge Fig.12 Inner Fridge

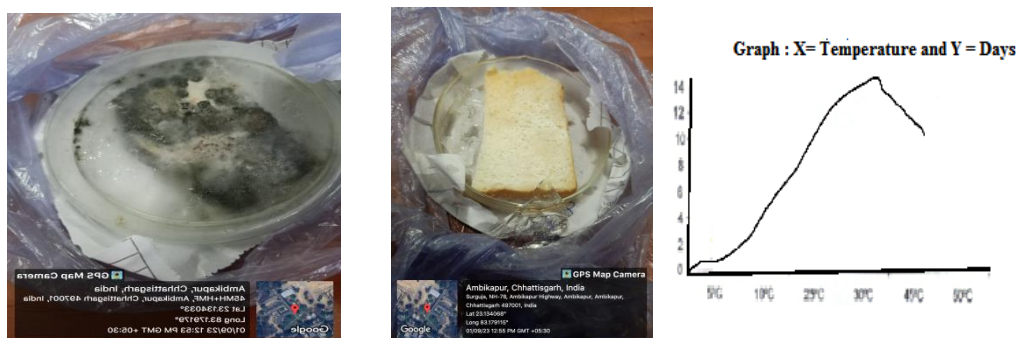


Fig.13 First September in Fridge Fig.14 From the Chamber of Fridge Fig.15 Graph of Growth

A laboratory study found that if mold is left in a room temperature environment, then there will be more fungal growth. Another study found that when temperature and relative humidity are optimum, controlling the air flow alone cannot prevent fungal growth. In real applications where nutrients are less sufficient than in this laboratory study, fungal growth rate may be reduced under the same operating conditions.[10]

Caution:

Slide cultures of slow-growing organisms suspected to be dimorphic pathogens such as *Mucor*. Its observation could be very dangerous, as it could cause a laboratory-acquired infection. As a microbiologist, the author suggests the precaution that there are laboratory protocols in fungal biology. Some fungi are saprophyte but can grow as epiphyte on skin and epithelium of nasal and ears inner layers and cause mycosis diseases. Therefore, protection should be maintained. Like a mask and gloves be worn at experiment and post-experiment proper sanitation of hands be done. [11-18]

CONCLUSION: Temperature is an important factor for life growth and its physiology. And it affects directly in biochemistry and physiology of the life.

REFERENCE:

- <https://en.wikipedia.org/wiki/Food> Retrieved on 22-8-2023.

https://en.wikipedia.org/wiki/Scombroid_food_poisoning Retrieved on 22-8-2023.

<https://www.who.int/news-room/fact-sheets/detail/food-safety> Retrieved on 22-8-2023.

What's that black thing growing on my bread?!

<https://fromtbot.com/life/bread-mould/> Retrieved on 22-8-2023.

Alfaro-Sifuentes et al., Effectiveness of Chemical and Thermal Treatments on Control of *Rhizopus stolonifer* Fruit Infection Comparing Tomato Cultivars with Different Sensitivities to Cracking. *International Journal of Environmental Research and Public Health*. 16, 2754 (2019). 10.3390/ijerph16152754. context

J. Baggio et al., Direct penetration of *Rhizopus stolonifer* into stone fruits causing rhizopus rot. *Plant Pathology*. 65, 633-642 (2015). 10.1111/ppa.12434. context

Allergenic Significance of Airborne *Rhizopus stolonifer* (ehrenb.) Vuill, a Common G. Sircar and S. Bhattacharya, 221 Bread Mold. *World Allergy Organization Journal*. 5, S73 (2012). 10.1097/01.wox.0000411978.49685.7f. context

M. Chayakulkeeree, M. Ghannoum and J. Perfect, Zygomycosis: the re-emerging fungal infection. *European Journal of Clinical Microbiology & Infectious Diseases*. 25, 215-229 (2006). 10.1007/s10096-006-0107-1. context.

Difference Between *Mucor* and *Rhizopus*

<https://pediaa.com/difference-between-mucor-and-rhizopus/> Retrieved on 22-8-2023.
- Fungal growth is affected by room temperature.**

<https://www.studocu.com/en-us/document/nova-southeastern-university/biology-iilab/the-effect-of-temperature-on-fungal-growth/11975870>. Retrieved on 22-8-2023.

A revised method for the observation of conidiogenous structures in fungi Retrieved on 22-8-2023.
- Prakash, P. Yegneswaran.; Bhargava, K., 2016: A modified micro chamber agar spot slide culture technique for microscopic examination of filamentous fungi. Retrieved on 22-8-2023.
- Amrita Vishwa Vidyapeetham: Slide culture technique for fungi. Retrieved on 22-8-2023.
- Fun with Microbiology (What's bugging' you?): Slide culture technique Retrieved on 22-8-2023.
- Divya Mahar, Durgesh Mahar, H D Maha: "HYDROTHERMAL POWER STATION APPLICATION AND BIODIVERSITY OF HOT WATER SPRING TATAPANI (HWST) BALRAMPUR, CHHATTISGARH, 417119, INDIA." International Journal for Research Trends and Innovation (www.ijrti.org) © 2022 IJRTI | Volume 7, Issue 11 | ISSN: 2456-3315/IJRTI2211076/531

7. Divya Mahar, Durgesh Mahar, H D Maha: 'Effect of Human Diet on Biodiversity and Environment' International Journal for Research Trends and Innovation (www.ijrti.org) © 2023 IJRTI | Volume 8, Issue 1 | ISSN: 2456-3315/IJRTI2301044/279
8. Divya Mahar , Durgesh Mahar and Dr H. D. Mahar: Culture and application of Trichoderma species from Soil Sample of Ambikapur CG, India. International Journal for Research Trends and Innovation (www.ijrti.org) © 2023 IJRTI | Volume 8, Issue 5 | ISSN: 2456-3315/IJRTI2305108/689.
9. Laboratory Protocols in Fungal Biology, Edition: January 2013 In book: Laboratory Protocols in Fungal Biology. Current Methods in Fungal Biology (pp.299-308) DOI:[10.1007/978-1-4614-2356-0](https://doi.org/10.1007/978-1-4614-2356-0)

