

## POST-HARVEST LOSS IN MAIZE DUE TO HEAVY RAIN

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### *Abstract*

*Maize is one of major crop in India. India rank at 7<sup>th</sup> position across the globe in maize production. It is utilize in various packaging food preparation, major source of cattle feed. In India maize is primarily used in poultry farms, as a source of feed. In rural parts of the country it is directly consume by the people as food. In India cereal grains get infected by the attack of various pathogens which reduce the vigor of the seeds. This is happen due to improper handling, storage, packaging and transport. During a post-harvest period, seeds were not stored in proper aerated chambers. In certain cases moisture content were not reduced which leads to the attack of various fungal infestation. In the present study, field survey of rain affected area from Bhokardan tehsil was carried out and infected samples were collected and analyze by inoculating the samples on artificial medium. A total number of 16 fungal species were isolated from the infected samples. Fungal genus like Aspergillus, Penicillium, Fusarium, Cladosporium, Curvularia and Rhizopus were predominantly found on the maize infected samples.*



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**Keywords:** - Maize, Fungi, Post-harvest, Loss

### **Introduction:**

Maize (*Zea mays*) is very much versatile crop produced in the world; because of its cultivation, adaptability and uses, it is cultivated all over the world. It is second most widely grown crop in the world. Most of the part it is cultivated as a staple food. Animal feed and as a raw material for variety of industrial products. The major significance lies in its adaptability to diverse climates, high yield potential and nutritional value. Because of its cold-intolerant in the temperate zone it must be planted in the spring. Despite of its tremendous uses as a staple food animal feed and as a raw material for various industrial products, its yield was hampering by the attack of various diseases.

Fungal diseases and fungal invasion on maize is a severe constraint in maize production. It is susceptible to a large number of fungal, bacterial and viral plant diseases. That economic importance includes corn smut, ear rot, corn leaf blight, sheath blight and stock rot. Some fungal attack leads to produce potentially dangerous mycotoxins such as aflatoxin. Post harvested practices are very much important in maize because many mouldy fungi attack on maize grains at the time of harvesting and post harvesting. Swal et al, 2019 reported almost half of the produced maize grain loss in post-harvest in sub-saharan Africa due to infestation of pests, microbes and different filamentous fungi. Drying and proper aeration is very much important to prevent or reduce the attack of these mould fungi which contaminate the grain with mycotoxins. *Aspergillus* species *Penicillium* and *Fusarium* species are the most common mycotoxin sources. In an improper post harvesting conditions fungi like *Fusarium*, *Aspergillus*, *Rhizoctonia*, *Penicillium* and *Cathartus* were reported from maize grain (Lamboni and Hell, 2009). *Fusarium* and *Aspergillus* species is a primary source of mycotoxins. Silages are an effective technique to prevent the attack of these filamentous fungi. After the attack of this fungi the feed may get degraded which constitutes a loss in dry matter and can reduce palatability of the feed; which may be endanger the health of livestock (Storm, I.M.L.D., 2009). Poor pre-harvest practices and post harvested storage practices are a major cause of the contamination of maize by *Fusarium verticilliodes* and fumonisins. The proliferation of this field fungal pathogens and accumulation of its mycotoxins in post-harvested maize, caused by such improper practices (Tran et al, 2021).

## Materials and methods:

### Field Study:-

In the present study local area of Bhokardan tehsil of Jalna district were studied. During the September- October 2022, many villages from Bhokardan tehsil face a heavy rain. Most of the maize crop is at harvesting stage in that area. Field survey of rain affected area was done in the month of September- October 2022.

### Collection of Sample:-

Infected samples of maize were collected in the polythene zip lock bags. Samples were collected from different fields and from different localities and brought into the laboratory for further study.

### Isolation of Fungi:-

The infected samples were inoculated on PDA (Potato Dextrose Agar) medium and CZA (Czepekdox Agar medium) in aseptic condition. Inoculated plates were kept for incubation at 25+<sub>2</sub>°C for 4-5 days.

**Preparation of Potato Dextrose Agar Medium:-**

Potato	-	100 gm
Dextrose	-	20 gm
Agar agar	-	20 gm
Distilled Water	-	1000 ml

**Pure culture:-**

The individual fungal members were subculture on fresh petriplate containing PDA as a nutrient medium from the primary isolates. The Pure culture is also transfer on slants, to keep the cultures.

**Identification of Fungi:-**

Fungi were identified by using microscopic observations of the fungi under microscope. By using standard manuals, literature, monographs individual fungi were identified in the Botany laboratory of Arts, Commerce College, Warwat Bakal.

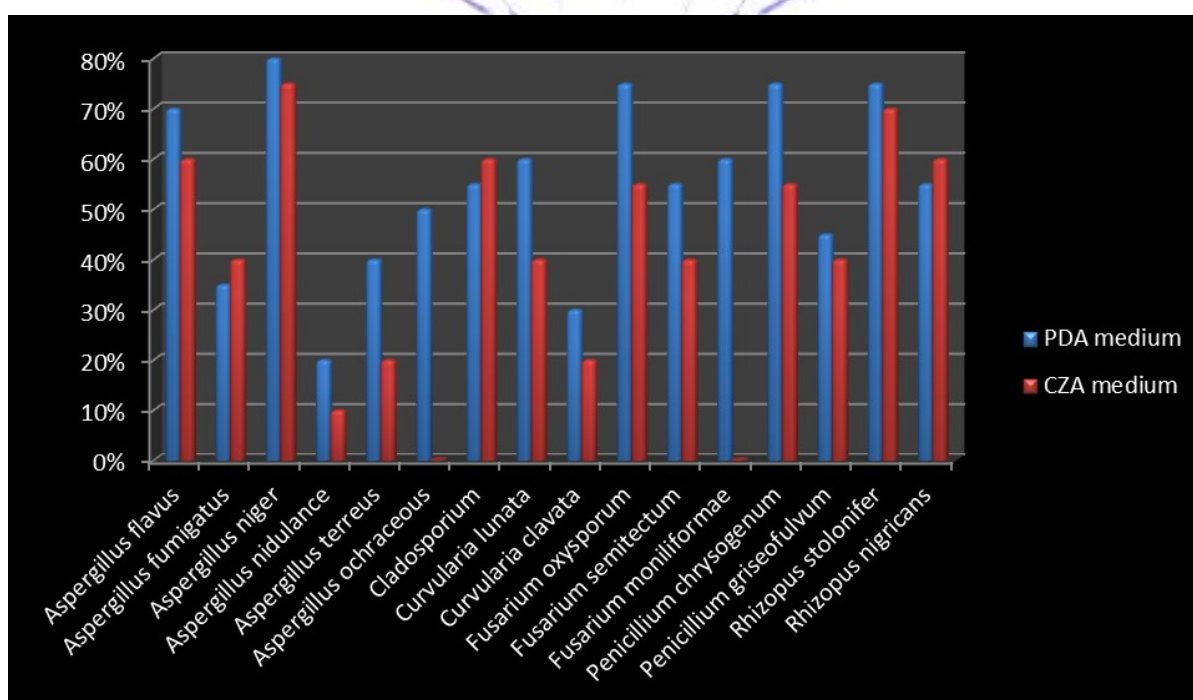
**Result and Discussion:**

Infected samples were inoculated on PDA (Potato dextrose agar) and CZA (Czepekdox agar) medium, various fungi shows their presence on both the medium (Table 01). *Aspergillus niger* (80 %) shows highest percentage of incidence on PDA medium followed by *Fusarium oxysporum* (75 %) and *Penicillium chrysogenum* (75 %). While *Aspergillus niger* (75%) shows highest percentage of incidence on CZA medium followed by *Rhizopus stolonifer* (70%), *Rhizopus nigricans* (60%) and *Aspergillus flavus* (60%). *Aspergillus niger* shows their dominancy on both the medium as compare to other fungi. Lamboni and Hell (2009) reported the dominance of *Fusarium* (36.05%) on maize grain followed by *Penicillium* (23.50%) and *Rhizoctonia* (5.65%). *Penicillium roqueforti*, *Aspergillus fumigatus*, *Geotrichum candidum* and *Fusarium* species were reported by (Storm IMLD, 2009) from stored maize grains. Fungal species like *Fusarium*, *Penicillium* and *Aspergillus* were predominantly reported from post harvested maize seed by (Garbaba et al, 2018). PDA medium prove to be a good medium for the isolation of maximum number of fungal isolates from maize. Attack of fungal species on maize not only reduces the yield, it also reduces the vigor of maize. Infected samples of maize smell pungent, which indicate the quality of material. It is due to accumulation of mycotoxins in infected parts and biodeterioration of the seeds due to the infestations of several fungal members. Proliferation of *Fusarium verticilliodes* and deposition of Fumonisin in post harvested maize seed were observed by (Tran et al, 2021). Texture of the maize seeds turns black, whitish to bluish in color instead on yellow orange.



Table 01: Percent incidence of fungi on infected samples of maize

Sr. No.	Name of Fungi	Percent incidence of fungi	
		PDA medium	CZA medium
1	<i>Aspergillus flavus</i>	70%	60%
2	<i>Aspergillus fumigatus</i>	35%	40%
3	<i>Aspergillus niger</i>	80%	75%
4	<i>Aspergillus nidulance</i>	20%	10%
5	<i>Aspergillus terreus</i>	40%	20%
6	<i>Aspergillus ochraceous</i>	50%	-
7	<i>Cladosporium</i>	55%	60%
8	<i>Curvularia lunata</i>	60%	40%
9	<i>Curvularia clavata</i>	30%	20%
10	<i>Fusarium oxysporum</i>	75%	55%
11	<i>Fusarium semitectum</i>	55%	40%
12	<i>Fusarium moniliformae</i>	60%	-
13	<i>Penicillium chrysogenum</i>	75%	55%
14	<i>Penicillium griseofulvum</i>	45%	40%
15	<i>Rhizopus stolonifer</i>	75%	70%
16	<i>Rhizopus nigricans</i>	55%	60%









**Conclusion:**

From the results it is concluded that, Maize crop is severely hampered by heavy rain during the monsoon season. Most of the crop got destroyed by the attack of various fungal pathogens. Disease intensity was quite high due to which accumulation of mycotoxin may be possible in the infected samples. Such samples were not safe for the consumption as well as cattle feed and also not used in poultry farms.

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