

ASSESSMENT OF SEED-BORNE FUNGI OF TOMATO AND BRINJAL SEEDS

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¹ Department of Botany, Mahatma Gandhi Mahavidyalaya, Ahmedpur Dist. Latur**ABSTRACT**

Standard blotter and Glucose Nutrient Agar techniques were used to study the seed-borne mycoflora of tomato and brinjal vegetable seeds and their effect on germination of seeds. Seed samples were collected from various shops of Ahmednagar and Latur District were considered as treated samples whereas from local farmers of Latur district were used as untreated samples. The studies on vegetable seeds thus confirmed that untreated seeds in majority of cases get deteriorated by fungi like *Aspergillus*, *Rhizopus*, *Fusarium*, *Cladosporium* and *Monilia sp.* On the other hand treated seeds with various pesticides show general saprophyte like *Rhizopus*, *Aspergillus* and in certain cases *Mucor* showing that treatment with seed dressing chemicals reduces fungal population on the seeds and thus it may be beneficial. Seed germination rate was higher in treated seeds as compared to untreated seeds.

KEYWORDS: Glucose Nutrient Agar, Seed-borne fungi, Vegetable seeds.**INTRODUCTION**

Vegetables constitute the most important and inexpensive component of a balanced diet and plays important role in overcoming micronutrient deficiencies. India is the second largest producer of vegetables in the world, next to China. India's share of the world vegetable market is around 14%. It produces 146.5 million tonnes of vegetables from an area of 8.5 million hectares (Dastagiri et al., 2013). Potato, tomato, onion, cabbage and cauliflower account for around 60% of the total vegetable production in the country.

Tomato (*Lycopersicon esculentum*, Mill.) and Brinjal (*Solanum melongena* L.) are the most important and commonly cultivated vegetable in the country because of its taste and high nutritive value and also for its diversified use.

Tomato is rich source of Vitamin C and minerals (Deshetti et al. 2015). (6.mallu) The tomato has many medicinal uses. The pulp and juice of the fruit is digestible and mild aperients, a promoter of gastric secretion and a blood purifier. It is also considered to be an intestinal antiseptic as it has a cleaning effect in the enteric portion of the alimentary canal. It is also said to be useful in canker of the mouth "nurses sore mouth" etc. it stimulate torpid liver and is good in chronic dyspepsia. (Meraj and Nandkar, 2015).

Eggplant or brinjal (*Solanum melongena* L.) fruit is known for vegetables of diet food because of high moisture content and low caloric value. However, it is a good source of antioxidants as well as some phytonutrients. Extracts from brinjal are effective for curing a number of diseases, including cancer, high blood pressure, and hepatitis due to content of anthocyanins and strychnine. (Kandoliya et al., 2015).

The importance of quality seed has been realized by mankind long ago. Indian vegetable seed industry is going enormously annually as seed is the first and foremost important commodity for successful vegetable cultivation. Seed is the most important input for crop production. It is estimated that quality of seed accounts for 20-25% of productivity. (Koundinya and Kumar, 2014)(705_pdf). Vegetable crops are attacked by number of pathogens, majority of which are seed born. Therefore, Seed-borne fungi are of considerable importance due to their influence on the overall health, germination and final crop stand in the field. The infected seeds may fail to germinate, or transmit disease from seed to seedling and/or from seedling to growing plant.

Seeds play a vital role in the production of healthy crops. They are carriers of some important seed-borne diseases caused by biotic agents, which results in considerable losses in yields (Ismail et al., 2012). Seed health testing for the presence of seedborne pathogens is an important step in the management of crop diseases. The association of various fungi with vegetable seeds has been reported all over the world (Dumbrel et al., 2011; Irshad et al., 2015; Islam et al., 2012; Ismail et al, 2012; Meraj-ul-haque and Nandkar, 2015; Summiaya and Dawar, 2015; Zakaria et al, 2014; Sabry et

al, 2015). It has been documented that much of the vegetable seeds failed to germinate but rotted because it was attacked by various seed-borne fungi (Ismail et al., 2012). Seed-borne pathogens can affect the seed quality by damaging external or internal seed tissues and cause the important seed diseases like seed rot, seed necrosis, and seedling damage through the local or systemic. (Ismail et al., 2012; Meraj-ul-haque and Nandkar, 2015; Patekar et al. 2013)

Some of common fungi include '*Alternaria*, *Curvularia*, *Humicola Bispora*, *Chaetomium*, *Penicillium*, etc. harbor outside or inside the seeds and causing great loss. In this respect, seed transmission of pathogen, their establishment and development on the host influence by environment condition like moisture, temperature and directly affect seed germination infection process and further spread of fungal pathogen.

Most of survey conducted by various scientists indicated that common seed borne organism on spices, condiments and vegetables seeds are *Alternaria*, *Aspergillus*, *Rhizopus*, *Penicillium*, *Fusarium*, *Curvularia*, *Humicola*, *Cladosporium* etc.

The present study was carried on some of important vegetable seeds to identify the seed borne fungi and subsequently determine their effect on germination of seeds. Therefore, this investigation will be useful in increasing productivity as well as inducing early emergence of seedling.

Materials and Methods

The experiments were conducted in the Aerobiology Research Centre, Mahathma Gandhi College, Ahmedpur, Dist: Latur

$$\% \text{ germination} = \frac{\text{No. of germinating seeds}}{\text{Total number of seeds}} \times 100$$

Vegetable species and seed sources

Tomato and Brinjal vegetable seeds were selected for the study. Seeds of the two selected vegetable species were collected from two different seed categories viz. farmers seed (Untreated) and seed collected from companies (treated). Farmers' seeds were collected from farmers own produced and saved seeds from the two selected locations viz. Tisgaon town of Ahmednagar and Udgir town of Latur district.

Collection of seed

Samples were collected from each of the two sources/locations under two categories. 200 g of seeds for tomato and brinjal were collected from each of the selected locations following the International Rules of Seed Testing (ISTA, 2001). Company seeds in sealed packets were collected randomly from different seed stores of both the locations.

Detection of seed-borne fungi

Seed samples were subjected to seed health analysis by Blotter method for detection of seed-borne fungi. In this method three layers of blotter papers were soaked in sterile water and then 10 randomly collected seeds were placed in each plate. The petridishes containing seeds were incubated at 22 ± 2 °C under alternating cycles of 12 hours near ultraviolet (NUV) light and darkness for 7 days. The external and internal seed born fungi are identified or detected by two important commonly used methods viz. Blotter method and Glucose Nutrient Agar Method.

In Blotter test method, seeds were placed equidistance in petridish and incubated for 7 days and fungal growth was observed. Agar Method was also used for fungal culture. After the 7 days incubation period, each Petri dishes were examined for the presence of seed-borne fungal pathogens.

Percentage of incidence and germination of mycoflora was calculated as:

$$\% \text{ incidence} = \frac{\text{No. of seeds on which a species appeared}}{\text{Total number of seeds observed}} \times 100$$

Identification of fungi

The fungi grown out of the incubated seeds were examined under the stereobinocular microscope and were identified by observing their growth characters on the incubated seeds. In case of difficulty of identification, temporary slides were made and the fungi were identified to species level by following the keys given in various books.

RESULTS AND DISCUSSION

The Results are shown in Table 1, 2 and Figure 1,2. Analysis of collected vegetable was done by two commonly used methods such as Blotter paper method, Glucose nutrient Agar medium method. After one week of incubation period, seeds were examined under stereoscopic binocular for the presence of associated fungi. The isolated fungi were identified with the help of the keys, monograph and literature provided by Raper and Fennell (1965), Booth (1971), Ellis (1971), Barnett and Hunter (1972).

Table 1. Shows the Name of the plants.

Sr. No.	Vernacular Name	Local Name	Botanical Name
1.	Tomato	Tomato	<i>Lycopersicon esculentum</i> , Mill.
2.	Brinjal	Vange	<i>Solanum melongena</i> L.

Table 2. Incidence of different external and internal seed born fungi

Sr. No.	Seed Sample	% Incidence of Mycoflora	% of Seed germination	Length of radicle (cm)	Length of plumule (cm)	Fungi associated
I) TOMATO						
a) Tomato seeds associated with Fungi on blotter paper						
1.	Untreated	100	00	0.0	0.0	<i>Aspergillus flavus</i> <i>Aspergillus niger</i> <i>Fusarium</i> .
2.	Treated	90	30	1.0	2.0	<i>Aspergillus flavus</i> <i>Aspergillus niger</i> <i>Fusarium</i> .
b) Tomato seeds associated with Fungi on Glucose Nutrient Agar plate						
1.	Untreated	100	00	0.0	0.0	<i>Aspergillus flavus</i> <i>Aspergillus niger</i> <i>Fusarium</i> <i>Alternaria</i> , <i>Cladosporium</i> , <i>Penicillium</i> spp.
2.	Treated	90	30	0.0	2.0	<i>Aspergillus flavus</i> <i>Aspergillus niger</i> <i>Fusarium</i> <i>Alternaria</i> , <i>Cladosporium</i> spp.
II) BRINJAL						
a) Brinjal seeds associated with Fungi on blotter paper						
1.	Untreated	100	00	0.0	0.0	<i>Aspergillus flavus</i> <i>Aspergillus niger</i> <i>Fusarium</i> , <i>Rhizopus</i> spp., <i>Cladosporium</i> .
2.	Treated	80	00	0.0	0.0	<i>Aspergillus flavus</i> <i>Aspergillus niger</i> <i>Fusarium</i> , spp., <i>Cladosporium</i> .
b) Brinjal seeds associated with Fungi on GNA plate						
1.	Untreated	100	00	0.0	0.0	<i>Aspergillus niger</i> <i>Aspergillus flavus</i> , <i>Fusarium</i> , <i>Mucor mucedo</i> ., <i>Cladosporium</i> , <i>Penicillium</i> .
2.	Treated	90	30	1.0	2.0	<i>Aspergillus niger</i> <i>Aspergillus flavus</i> <i>Fusarium</i> , <i>Mucor mucedo</i> .

Figure 1. Treated and Untreated **Tomato**

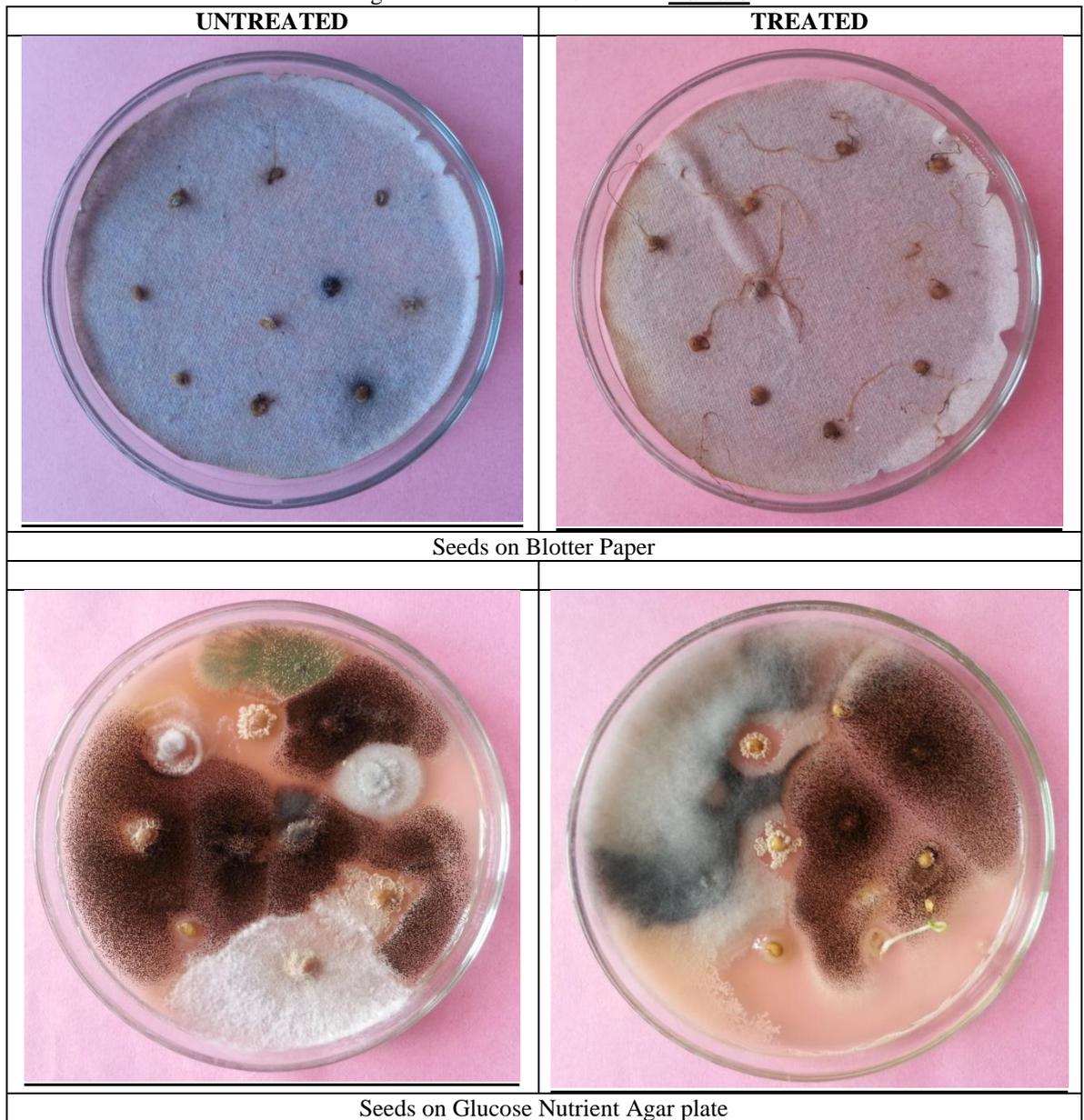
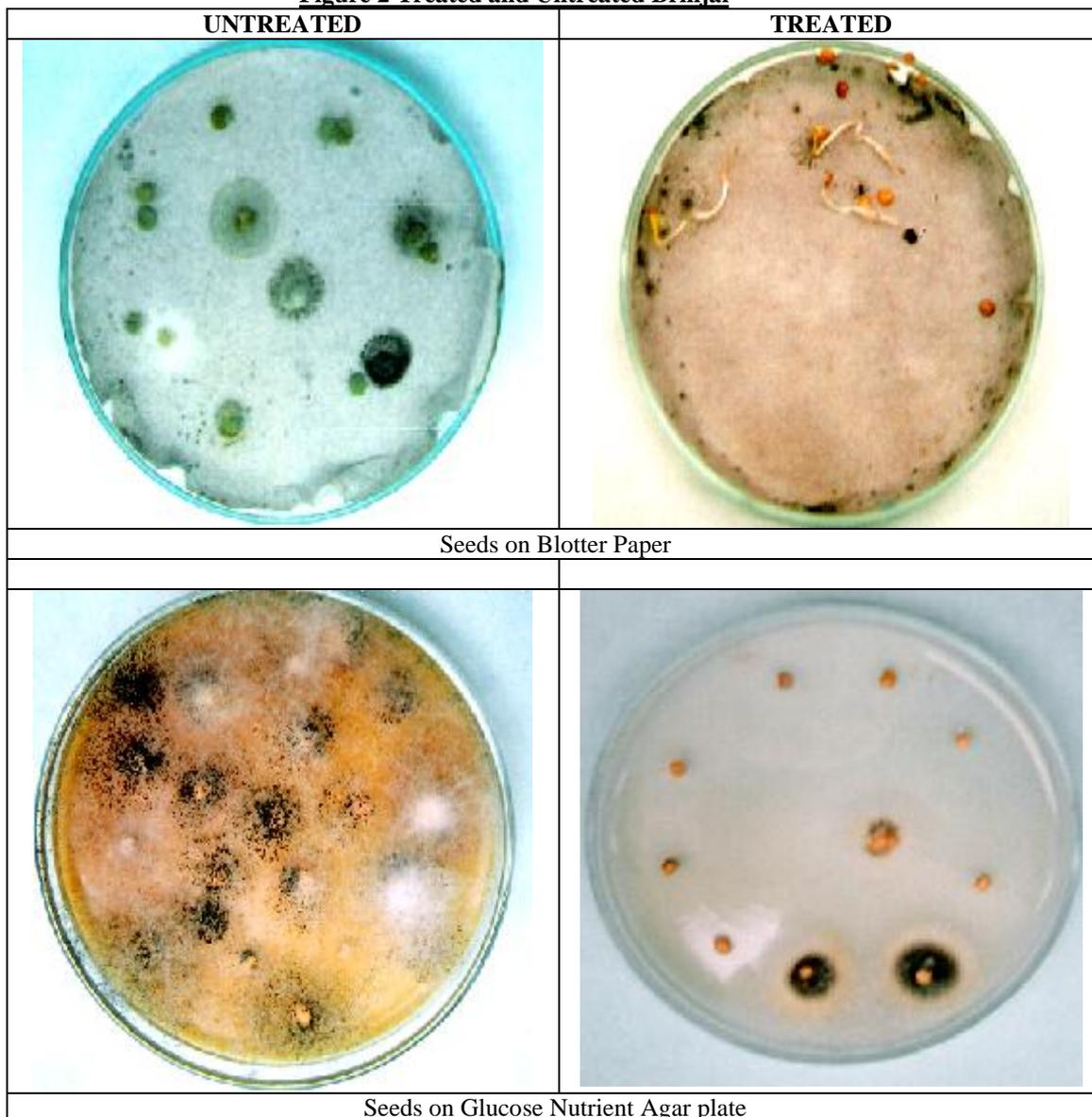


Figure 2 Treated and Untreated Brinjal



It was clearly observed from the data that there were ten different fungi identified which belongs to three *Aspergillus* species, one each from *Fusarium*, *Penicillium*, *Mucor*, *Rhizopus*, *Cladosporium*, *Bispora* and *Alternaria* respectively.

The occurrence of different external and internal seed born fungi are given in table number II. It was noted that all treated seeds transferred on Glucose Nutrient Agar medium, the occurrence of *Aspergillus niger*, *Aspergillus flavus*, *Fusarium* was more common, while on blotter there was good growth of *Aspergillus*, *Mucor*, *Rhizopus*. Untreated seeds have occurrence of good number of fungi like *Aspergillus*, *Fusarium*, *Rhizopus*, *Mucor*, *Penicillium*, *Alternaria* and *Sterile dematioid mycelium* indicating that untreated seeds have more number of fungi.

Various researchers have studied such seed born fungi. Jain and Nema (1952) reported *Aspergillus* blight of groundnut seedlings whereas Gibson (1953) observed crown-rot, a seedling disease of groundnut caused by *Aspergillus niger*. Jackson (1962) found *Aspergillus* crown rot of peanut while Chohan (1965) observed collar rot of groundnut caused by

Aspergillus niger and *Aspergillus pulverulentu*. Aflatoxin producing potential by *Aspergillus flavus* was studied by Boiler and Schroeder (1966) and Chohan and Gupta (1968) on rice and groundnut respectively. Whereas Joffe (1969) reported the affects of *Aspergillus flavus* on groundnut and on some other plants. Gupta and Chohan (1970), Ram Nath *et al.* (1970) Chohan (1971) and observed seed borne fungi and seed health testing in relation to seedling disease of groundnut.

Study of *Aspergillus flavus* were done on different seeds by many scientist such as Rati and Ramlingam (1972), Meha and Chohan (1973), Schroeder and Boller (1973), Rati and Ramalingam (1974), Flannigan and Hai (1976), Amama *et al.* (1980), Ghewande *et al.* (1984), Mixon *et al.* (1984), Bedi and Chohan (1986), Bansal and Sobti (1988), Mehan *et al.* (1988), Pitt *et al.* (1991), Mycock *et al.* (1992) and Roy utpal (2001) etc. One of the important fungi like *Aspergillus niger* was also studied by scientists namely Lin (1982), Pande (1985) and Vaidya, Anjali and Dharamvir (1989) etc. whereas study on *Aspergillus parasiticus* was conducted by Premlata Singh and Sinha (1985) and Klich and Pitt (1988).

The studies on vegetable seeds thus showed that untreated seeds in majority of cases get deteriorated by fungi like *Alternaria*, *Penicillium*, *Aspergillus*, *Rhizopus*, *Monilia*, *Bispora*, *Cladosporium*, *Curvularia* on the other hand treated seeds with various pesticides show general saprophyte like *Rhizopus*, *Aspergillus* and in certain cases *Fusarium*, *Mucor* showed that treatment with seed dressing chemicals reduces fungal population on the seeds and thus it may be beneficial.

Conclusion

Based on the present study it is evident that seeds of the two selected vegetable crops are infected by a good number of fungi. Among the fungi encountered, only *Fusarium* was capable of transmitting disease to the growing seedlings. Untreated seeds collected from farmers shows higher percentage of incidence of microflora than treated seeds.

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