Asian Journal of Applied Science and Technology (AJAST)
Volume 1, Issue 5, Pages 06-07, June 2017

Association and Occurrence of Seed-borne Fungal Pathogens (SFP) in Tomato (*Solanum lycopersicum L.)*

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Article Received: 02 June 2017 *Article Accepted: 17 June 2017* *Article Published: 21 June 2017*

ABSTRACT

In blotter paper method highest incidence was recorded by Rhizopus spp. (15%) in sterilized seeds and 28.5% incidence was recorded by Rhizopus sp. in unsterilized seeds. In PDA method incidence was not recorded by Rhizopus sp., A. niger, A. flavus, F. oxysporum and A. solani in sterilized seeds and 36.50% incidence was recorded by Rhizopus spp. in unsterilized seeds. Our findings may be used also to predict occurrence and association of SFP of tomato as well as the study indicate the dominancy of common well known SFP viz., Rhizopus, Aspergillus, Fusarium and Alternaria.

Keywords: Aspergillus, Rhizopus spp., and Tomato.

1. INTRODUCTION

Tomato [*Solanum lycopersicum* L.] is one of the most widely cultivated vegetable crops in the world. It is a solanaceous fruit vegetable believed to have its origin in Tropical America (Thompson and Kelly, 1957). It is known as Love apple, *Tomate*, *Tomat*, *Tomatar*, *Rangam* and *Tomati* in different parts of the world. It is also popularly called as 'Poor man's orange'. It is grown extensively and marketed throughout the world. It ranks second largest vegetable crop after potato (Vanita *et al*., 2011). It is a traditional vegetable crop commercially cultivated throughout the world over an area 4.02 million hectares with a production 152.9 million tones and productivity 37.83 tonnes/ha.

Tomato crop grown in almost all kinds of ecological condition. In India, tomato is cultivated as one of the leading vegetable crop, covering an area of 8.82 lakh hectares with total production of 187.35 lakh tonnes having productivity of 21.20 MT/ha (NHB, 2014). The major tomato producing states are Bihar, Karnataka, Odisha, Maharashtra, Himachal Pradesh, West Bengal, Tamil Nadu, Uttar Pradesh and Gujarat(Chadha, 2002), among them Karnataka is the highest tomato producer state in India. In Gujarat, tomato is one of the major vegetable crop cultivated in an area of 38.80 million hectares with the total production of 978.40 million tonnes/ha with the productivity of 25.00 tonnes/ha (NHB, 2014). It is cultivated in almost all 33 districts of Gujarat of Gandhinagar, Mehsana, Sabarkantha, Patan, Vadodara, Surat, Navsari, Valsad, and Dang.

Tomato is commercially grown across the global, there is no place where the plant is free from disease. 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 (Islam and Borthakur, 2012). With the line of this fact, the present study is considered as primary investigation which aimed to detect the occurrence of seed-borne fungal pathogens (SFP) of tomato.

2. MATERIALS AND METHODS

Tomato seed samples collected and subjected to plating by using the Blotter method as recommended by Mathur and Kongsdal (2003) and Potato Dextrose Agar (PDA) plate method. Each seed sample at the end of the incubation examined thoroughly under microscope. Whatsoever pathogens found associated with seeds that carefully examined and identified based on 'habit characters'. Slides of the respective pathogens prepared and examined using compound microscope. Data on the incidence and severity of pathogenic associated mycoflora collected by examination of incubated seeds under microscope as recommended by Mathur and Kongsdal (2003).The percent severity of microbe was determined by using the following mathematical formulae,

$$S\% = \frac{Tn}{TSp} \times 100$$

Where, Tn = Total number of seeds infected (infested)
TSp = Total number of seeds examined
S = Severity of fungi

3. RESULTS AND DISCUSSION

For the study of SFP in tomato cultivar GT-2 using standard blotter paper method and PDA method, the 400 seeds of tomato were kept in Petri plate in both methods. The results on the occurrence of seed borne pathogens were presented in Fig. 1

Blotter paper method

In sterilized seeds the highest incidence of *Rhizopus* spp. (15%) was recorded, the next least incidenceis recorded in order of *A. niger* (5.75%), *A. flavus* (4.50%), *F. oxysporum*

(2.0%) and *A. solani* (0.0%). (Fig. 1) While in unsterilized seeds highest incidence was recorded by *Rhizopus* spp. (28.5%), the next least incidence is recorded in order of *A. niger* (20.0%), *A. flavus* (13.75%), *A. solani* (7.0%) and *F. oxysporum* (5.5%).

Potato Dextrose Agar (PDA) plate method

Generally there was a higher incidence of fungi in unsterilized seeds. Highest incidence of *Rhizopus sp*. was recorded in unsterilized seeds. *A. niger* and *A. flavus* were found in more samples by the PDA method in both sterilized and unsterilized samples (Fig. 1). In sterilized seeds of cultivar GT-2, the incidence of *Rhizopus* sp., *A. niger*, *A. flavus*, *F. oxysporum* and *A. solani* was not observed. While in unsterilized seeds highest incidence of *Rhizopus* sp. (36.50%) was observed, the next least incidence is recorded in order of *A. niger* (27.25%), *A. flavus* (20.25%), *F. oxysporum* (5.50%) and *A. solani* (3.75%).

Similar results described by Patel (2015) the incidence of *Rhizopus* spp. and *Aspergillus* spp. were found on tomato cultivar GT-2 seeds. Similar were described by Sowley and Kodua (2012) and Zakaria (2010).

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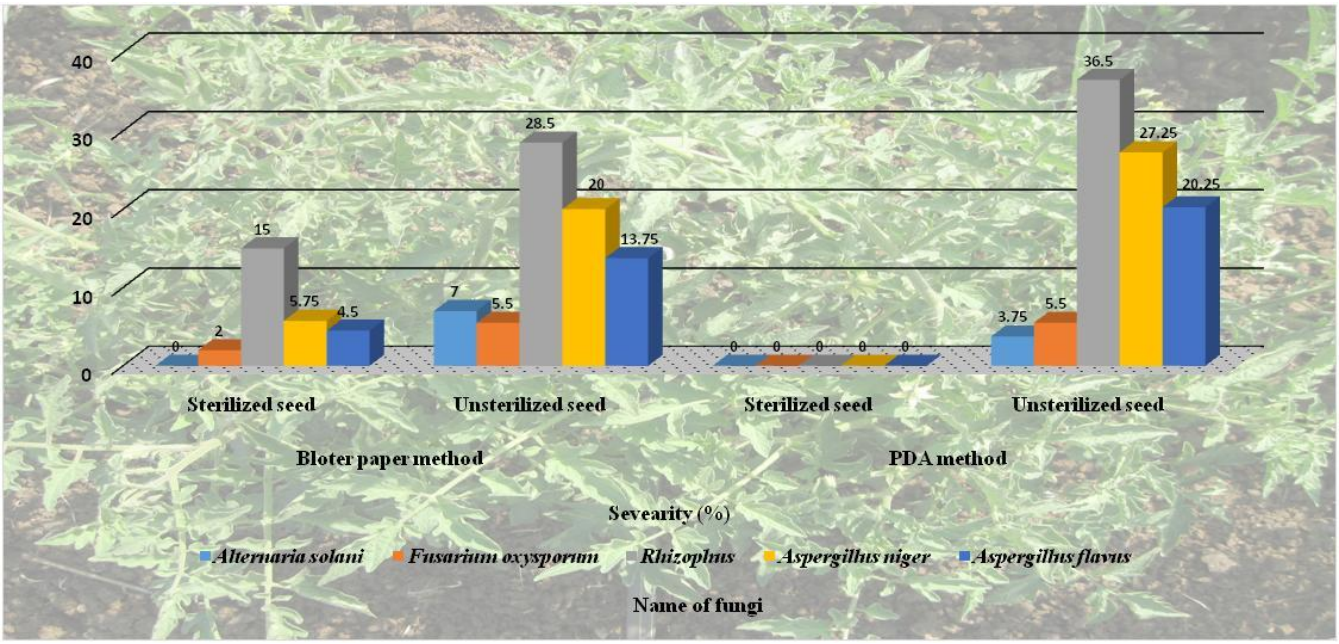

Fig. 1: Percent Severity of fungi in tomato seeds by the Blotter paper method and PDA methods (n=400).