

## Qualitative Assessment of airborne deuterospores over pomegranate (*Punica granatum* L.) field

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### ABSTRACT

Pomegranate (*Punica granatum* L.) is a high value commercial horticultural crop grown extensively throughout Western Maharashtra. The aerobiological survey was undertaken to understand the qualitative and quantitative incidence of fungal spores over pomegranate field for the first time from this unexplored locality by operating Continuous Volumetric Tilak Air Sampler. Out of total air spora, 42 spore types of deuterospores were recorded. Percentage contribution of each spore type of deuteromycetes to the total air spora revealed that *Cladosporium* contributed the highest toll (29.49%) followed by *Epicoccum* (9.27%), *Nigrospora* (2.86%), *Alternaria* (2.30%), *Botrytis* (2.18%), *Botrydipodia* (2.00%). Influence of meteorological factors on incidence of deuterospores was observed. The present paper provides a critical account of airborne deuterospores over pomegranate field.

**Keywords:** Airspora, Tilak air sampler, deuterospores, pomegranate field.

### INTRODUCTION

Pomegranate (*Punica granatum* L.) Var. Mrudula is an economically important fruit crop. The fruits are perishable in nature and have high water contents. In Maharashtra, 25000 hectares of land is under cultivation of pomegranate. However, it is subjected to various air borne fungal diseases like leaf spot disease, caused by *Curvularia*, fruit rot caused by *Colletotrichum*, spot on fruits caused by *Cercospora*, burning of fruits and leaves by *Alternaria alternate*. The disease is more prevalent during mrug and hasta bahar. These disease cause enormous loss to the farmers. Fungal diseases are responsible for rotting of fruits, irregular spots on fruits and leaves, discolouration of fruits, etc. Ultimately there is reduction in the prizes to the fruits in the market. Pomegranate production has increased for both fresh market and juice in the last several years and fungal diseases has become a major concern to the growers.

Aerobiology is the science which studies the atmospheric dispersion of biological materials and their impact on the environment and organism. Aerobiology could help agriculture in different ways to optimize the production of many crops. Aerobiological studies are of great importance as they provide with qualitative and quantitative information about

airborne fungi. Composition and concentration of airborne mycoflora depend on several factors including topography, time of day, meteorological parameters, type of vegetation, air pollution, agricultural, industrial and other human activities (Pepeljnjak and Segvic Klaric, 2003; Mali *et al.*, 2006). Pande (1976) studied the airspora over orange field. Tilak and Babu (1981) made intensive and critical study of pathogen and reported the concentration of urediniospores of *Puccinia penniseti* in the air relation to disease incidence and growth stages of the crop. Aher and Pande (2004) made an intensive study on pathogenic fungal spores over groundnut field. Reddy (2014) carried out qualitative assessment of ascospores over sugarcane field. The aeromycoflora of the pomegranate crop is not studied so far. Present study was undertaken with a view to study the qualitative and quantitative assessment of deuterospores over pomegranate field.

#### MATERIALS AND METHODS

The aerobiological investigation has been carried out with the help of Continuous Volumetric Tilak Air Sampler (Tilak and Kulkarni, 1970). The air sampler runs on 230 v current and drum present inside the sampler complete one rotation in 8 days. The air sampler provides continuous sampling for 8 days and constant volume of air measuring 5 litre per minute enters through the orifice. The spore number trapped in the sampler was expressed as number of spores per cubic meter of air. For estimating the spore types, their concentration and percentage contribution, slides were scanned and were calculated for specific count by multiplying the actual number of spores encountered with the conversion factor of the sampler which is 14. Scanning of slides was done under binocular microscope, the identification was based mainly on microscopic characters, comparative spore morphology and spore description. Spore types were identified upto generic level with the help of relevant literature (Barnett and Hunter, 1972 and Tilak, 1989).

#### RESULTS AND DISCUSSION

During the period of present investigation the group deuteromycotina contributed a total of 42 spore types. *Cladosporium* contributed 29.49% to the total air spora from the group followed by *Epicoccum* (9.27%), *Nigrospora* (8.33%), *Alternaria* (2.30%), *Curvularia* (1.53%) (Table 1). The high incidence of

**Table 1.** Percentage contribution of each spore type of deuteromycetes to the total airspora.

Sr. No.	Spore type	Percentage contribution
1	<i>Cladosporium</i>	29.49
2	<i>Epicoccum</i>	9.27
3	<i>Nigrospora</i>	8.33
4	<i>Alternaria</i>	2.30
5	<i>Botrytis</i>	2.18
6	<i>Botrydiplodia</i>	2.00
7	<i>Papularia</i>	2.00
8	<i>Zygosporia</i>	1.95
9	<i>Ceratophorum</i>	1.77
10	<i>Claviceps</i>	1.71
11	<i>Tetraploa</i>	1.59
12	<i>Curvularia</i>	1.53
13	<i>Nodulosphaeria</i>	1.53
14	<i>Phacorchoconis</i>	1.53
15	<i>Geotrichum</i>	1.47
16	<i>Gleosporium</i>	1.47
17	<i>Arthrium</i>	1.41
18	<i>Harknessia</i>	1.41
19	<i>Monodictys</i>	1.41
20	<i>Phaeothrichoconis</i>	1.41
21	<i>Fusarium</i>	1.36
22	<i>Myrothecium</i>	1.36
23	<i>Periconia</i>	1.35
24	<i>Beltraniella</i>	1.30
25	<i>Colletotrichum</i>	1.30
26	<i>Excipularia</i>	1.30
27	<i>Dreschslera</i>	1.24
28	<i>Cheatomella</i>	1.18
29	<i>Helminthosporium</i>	1.18
30	<i>Oidium</i>	1.18
31	<i>Cercospora</i>	1.12
32	<i>Diplodia</i>	1.12
33	<i>Haplosporella</i>	1.12
34	<i>Dictyoarthrium</i>	1.06
35	<i>Cordana</i>	1.00
36	<i>Graphium</i>	1.00
37	<i>Spegazzinium</i>	1.00
38	<i>Sirodesmium</i>	1.00
39	<i>Corynespora</i>	0.88
40	<i>Pestalotiopsis</i>	0.88
41	<i>Deightoniella</i>	0.82
42	<i>Pestalotia</i>	0.59

*Cladosporium*, *Epicoccum*, *Nigrospora*, *Botrytis*, *Alternaria*, etc. in the air was simply because of their saprobic as well as parasitic habit, their high degree of vegetative reproduction by fragmentation, budding, etc., asexual reproduction by developing conidia and also having capacity of high fruiting with passive spore liberation. The potential harm of fungal aerosol is mainly decided by the concentration and distribution of the pathogenic fungi.

The spore types of *Alternaria*, *Cercospora*, *Helminthosporium*, *Curvularia*, *Colletotrichum* *Dreschleria* are pathogenic to pomegranate crop. The highest concentration of *Curvularia* spores was recorded on 8th October 2005 when there was a record of 26<sup>o</sup>C mean temperature, 90% relative humidity and 27.7 km/hr wind velocity. These reports are in accordance with earlier reports of Pady (1957), Tilak and Bhalke (1979), Jogdand (1987) and Karne (2008). The spores of *Alternaria* with their maximum number was recorded on 9th November 2005 when there was record of 20<sup>o</sup>C mean temperature, 76% relative humidity and 34.3 km/hr wind velocity. Calvo et al. (1981) reported the occurrence of *Alternaria* spores in atmosphere greatly affected by climatic conditions.

The spores of *Colletotrichum* and *Cercospora* with its maximum concentration were recorded on 5th October 2005 on which temperature was 26<sup>o</sup>C, relative humidity was 76% and wind velocity was 26.6 km/hr. Aher (1993) reported similar observations over groundnut field at Ahmednagar.

Highest spore concentration of *Claviceps* was recorded on 7th October 2005 when there was record of 25<sup>o</sup>C temperature, 66% relative humidity and 56.4 km/hr wind velocity. Spores of *Nigrospora* showed their highest concentration on 20th October 2005 when there was record of 23.5<sup>o</sup>C temperature, 82% relative humidity and 19.7 km/hr wind velocity. Similar reports have been made by Karne (2013), Murdhankar and Pande (1991) and Aher et al. (2004) over various crop fields.

Although weather parameters were favourable for the initiation of the leaf spot disease, the crop variety grown on the field "Mrudula" was found to be highly resistant for disease incidence and therefore the crop was found quite healthy. This collected information may provide basic data which is very useful for the disease forecasting and also will bring forth many useful and meaningful results for implementing cheaper and better preventive measures of crop plant disease management.

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