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STUDY OF AIR-SPORA OVER THE GROUND NUT FIELD IN JALGAON DIST. MAHARASHTRA

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ABSTRACT

Aerobiology is the science of biological, airborne organisms and their movement and effect on plant, animal and human health. *Arachis hypogea* is susceptible to various diseases such as seed boarn, soil boarn and air boarn diseases, which is caused by bacteria, viruses, fungi and nematodes. Important fungal diseases of ground nut plant are as follows. Leaf spot disease caused by *Cercospora arachidicola*. More focus has been given to fungal air-spora during this present investigation. Effect of some environmental factors such as rainfall, humidity and temperature on the diseases causing and the percentage contribution of all air boarn fungal air-spora components were recorded. In this aerobiological research investigation includes quantitative as well as qualitative analysis of fungal air spora over ground nut crop at Jalgaon dist., in Maharashtra. The metrological data for each day of relative humidity, temperature and rainfall was obtained from metrological department of Jalgaon district. After the observation of all slides, with the help of visual observation, identification of fungal spores takes place. It is observed that some factors like Humidity, temperature, rainfall, growth and age of the plant affects the frequency and the spread of the disease. During this present investigation some allergic fungal spores were found abundantly. For e.g. *Alternaria, Cladosporium, curvularia* and pollen grains. The crop variety i.e. *Arachis hypogea* L., JL-24, was recorded to be highly resistant for the diseases development. So the *Arachis hypogea* L plant was found to be very healthy.

Keywords: Aerobiology, Humidity, Airborne, Allergy, *Arachis hypogea*

INTRODUCTION:

Aerobiology is the science of biological, airborne organisms and their movement and effect on plant, animal and human health. Thus Aerobiology is not only the study of microorganisms in the atmosphere. (1)

In tropical and sub-tropical areas, Ground nut i.e. *Arachis hypogea* L. is oil seed plant and used as an important food. It is a legume crop. In the world, India is on second number for largest production of ground nut, and on forth number for the source of edible oil (2). It is available in different varieties. Ground nut is also a very good source of protein. According to total agricultural production in India, ground nut oil is on $1/9^{th}$ position. (3), (4).

Ground nut oil is used to prepared vanaspati ghee, it is used for cooking, also used as lubricant, used in making shaving cream.(5) (6). We can eat ground nut in the form of raw or roasted, also used in variety of recipes. After harvesting *Arachis hypogea* L. is used as a fodder for animals. After the extraction of oil from ground nut seed, oil cake is formed as a by-product. Which is very rich in protein content, that oil cake is also used as a fertilizer for many plants. *Arachishypogea* is susceptible to various diseases such as seed boarn, soil boarn and air boarn diseases, which is caused by bacteria, viruses, fungi and nematodes. Which is resulted in to very poor quality and quantity of the crop yield. (7)

Some important fungal diseases of ground nut plant are as follows. Leaf spot disease caused by *Cercospora arachidicola*, Collar root diseases caused by *Aspergillus niger*, Rust diseases caused by *Puccinia arachidis*, Ground nut bud necrosis disease caused by bud necrosis virus, Early root rot caused by *Macrophomina phaseolina* , late leaf spot caused by *Cercospor apersonata* . However more focus has been given to fungal air-spora during this present investigation.

Sreeramulu and Sheshvantram, Sreeramulu and Ramalingam, Sreeramulu and Vitthal, Tilak *et al*, etc. . . . Were devoted to aerobiological study over ground nut plant in different regions of India. They have placed fungal air-spora into 5 groups. Total they found 47 air boarn components, 2 from zygomycotina, 10 found from ascomycotina, 5 from basidiomycotina, 26 found from deuteromycotina, 4 from other types. (8)The percentage contribution of each group to the total air-spora component was calculated.

Among all this 5 groups, deuteromycotina group is dominant group, including high spore concentration 18662 /m3 of air and with 67.85 % contribution. It is followed by group basidiomycotina with spore concentration 14196/m3 of air and with 13.76 % contribution. Basidiomycotina group is

followed by group ascomycotina with spore concentration 11396/m3 of air and with 9.37 % contribution. Ascomycotina is followed by other types. With 7.89 % of air and with 10046/m3 of air contribution which is followed by group phycomycotina with 9814/m3 of air and with 1.67 % contribution.

Effect of some environmental factors such as rainfall, humidity and temperature on the diseases causing and the percentage contribution of all air boarn fungal air-spora components were recorded. (9), (10).The data included by this research study is very important for disease forecasting of all aerobiological diseases of ground nut crop and also to provide some control measures to prevent the diseases .(11)

MATERIALS AND METHODS:

In this aerobiological research investigation includes quantitative as well as qualitative analysis of fungal air spora over ground nut crop at Jalgaon dist., in Maharashtra. Survey of air monitoring was takes place with the help of Tilak air sampler. Tilak air sampler was kept in the middle of 1.70 hector area of ground nut crop and kept on the stool at constant height of 2 feet above the ground level. Tilak air sampler has rotatory drum, which is electrically operated. Within eight days, one rotation has been completed by rotatory drum. One surface of the cellophane tape is sticky. On the other surface petroleum jelly is used as an adhesive to stick spores.

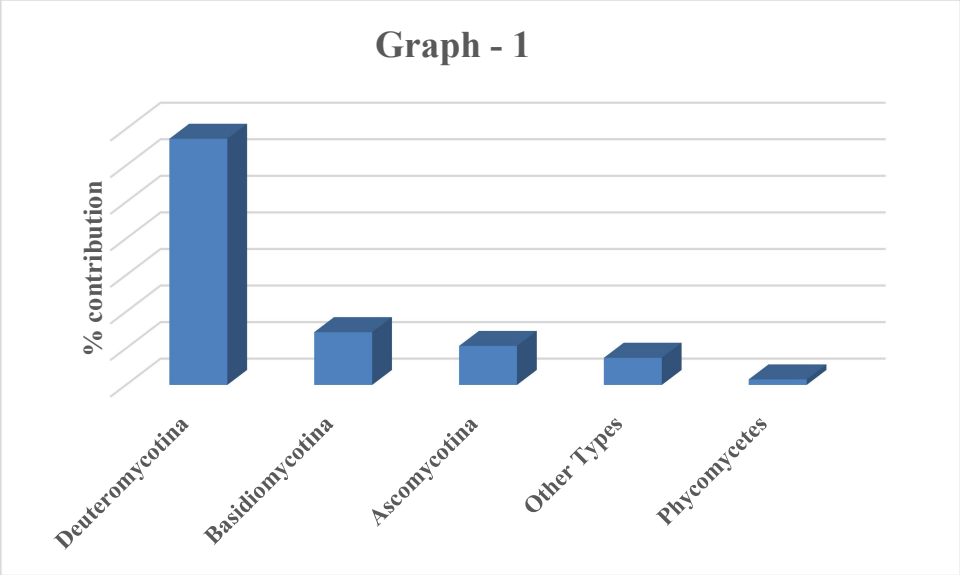
At the rates of 5 liters / minute, continuous air was sampled with the help of tilak air sampler (12), (13). After the completion of eight days, previous cellophane tape was removed, and it is replaced by new cellophane tape. After coming to the laboratory, cellophane tape was cut into 16 equal pieces. Each piece shows quantitative and qualitative data of air boarn spores components for day and night. After the preparation of slides, observation has been performed with the help of research microscope. Air sampling has started before eight days of sowing of ground nut crop and continued after harvesting also for eight days. (14), (15). Metrological data record for each day was regularly obtained with the help of digital thermometer and hair hygrometer. Record of the daily rainfall was also maintained. The metrological data for each day of relative humidity, temperature and rainfall was obtained from metrological department of Jalgaon district. (16).

Table 1: It shows average percentage contribution of each spore type to the total air-spora of three seasons over ground nut plant. (17), (18).

	SPORE TYPE	PERCENTAGE CONTRIBUTION
	(A) zygomycotina	
1	Albugo	1.52 %
2	Rhizopus	0.15 %

	(B) Ascomycotina	
1	**Chaetonium**	**0.92 %**
2	**Didymosphaeria**	**0.72 %**
3	**Hysterium**	**0.70 %**
4	**Leptosphaeria**	**1.3 %**
5	**Massarina**	**0.43 %**
6	**Melanospora**	**0.75 %**
7	**Pringsheimia**	**0.51 %**
8	**Sordaria**	**2.52 %**
9	**Sporormia**	**0.78 %**
10	**Pleospora**	**0.64 %**
	(C) Basidiomycotina	
1	**Ganoderma**	**0.4 %**
2	**Basidiospores**	**2.87 %**
3	**Smut Spores**	**5.14 %**
4	**Telutospores**	**1.40 %**
5	**Uredospores**	**3.95 %**
	(D) Deuteromycotina	
1	**Alternaria**	**4.57 %**
2	**Aspergillus**	**0.73 %**
3	**Beltraniella**	**0.19 %**
4	**Beltrania**	**1.21 %**
5	**Biospora**	**1.63 %**
6	**Cercospora**	**3.44 %**
7	**Cladosporium**	**26.89 %**
8	**Curvularia**	**3.89 %**
9	**Diplodia**	**1.37 %**
10	**Epicoccum**	**0.12 %**
11	**Harknesia**	**0.76 %**
12	**Helmithosporium**	**4.15 %**
13	**Hendersonula**	**0.45 %**
14	**Heterosporium**	**0.52 %**
15	**Hirudinaria**	**0.06 %**
16	**Lacellina**	**0.14 %**
17	**Memnoniella**	**0.72 %**
18	**Humicola**	**1.55 %**
19	**Nigrospora**	**5.18 %**
20	**Papularia**	**3.53 %**
21	**Periconia**	**2.63 %**
22	**Periconiella**	**0.27 %**
23	**Pithomyces**	**2.96 %**
24	**Fusarium**	**0.09 %**
25	**Spegazzinia**	**0.34 %**
26	**Torula**	**0.46 %**
	(E) Other Types	
1	**Insect's part**	**2.56 %**
2	**Mites**	**0.58 %**
3	**Pollen grain**	**1.84 %**
4	**Starile hyphae**	**2.91 %**

Spore Group	**Percentage Contribution**
Deuteromycotina	**67.33 %**
Basidiomycotina	**14.44 %**
Ascomycotina	**10.67 %**
Other Types	**7.43 %**
Phycomycetes	**1.52 %**



RESULT AND DISCUSSION:

In this present investigation for two kharif seasons and one summer season, 47 airspora components were recorded , out of which 26 belongs to deuteromycotina , 10 belongs to Ascomycotina, 5 belongs to Basidiomycotina , 2 belongs to Zygomycotina and 4 belongs to Other types ie insect parts , hyphal fragments, mites, algal spores etc.

After the observation of all slides, with the help of visual observation, identification of fungal spores takes place. Comparison with permanent slide was also takes place. Available aerobiological literature and result of all research study given in the tabular form (19).

It is observed that some factors like Humidity, temperature, rainfall, growth and age of the plant affects the frequency and the spread of the disease (20). Taking into consideration the number, *Cladosporium* was found to be dominant in percentage contribution ie 26.89 % to the total air-spora , which is followed by *nigrospora* 5.18 % , smut spore 5.14 % , *Alternaria* 4.57 %, *Helminthosporium* 4.15 % , *Uredospores* 3.95 % ,*Curvularia* 3.89 % , *Papularia* 3.53 % , *Cercospora* 3.44 % .

Because of high humidity, frequent rainfall and low temp in the kharif season shows the presence of rust disease more widely spread as compared to summer season (21). So the concentration of rust spore is less in summer season .Some pathogenic spore like *Alternaria*, *Uredospore*, *Cercospora*, *Periconia*, *Curvularia*, etc. found in the various concentrations. (22). during this present investigation some allergic fungal spores were found abundantly. For e.g. *Alternaria, Cladosporium, curvularia* and

pollen grains. This information is very useful for medical practitioners and allergologist also. (23).

Metrological factors shows very much effect on spore liberation and finally affected overall air-spora quantitatively and qualitatively. There is very close relationship between the spore liberation in the air, growth stages of the crop and various metrological factors. (24). During this two kharif seasons and one summer season, when the crop was growing in the field, initially climatic factors were favorable for the growth of disease. But the crop variety i.e. *Arachis hypogea* L., JL-24, was recorded to be highly resistant for the diseases development. So the *Arachis hypogea* L plant was found to be very healthy, disease free during this investigation period. (25).

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