

Aerobiological Monitoring of Airborne Rust and Smut Pathogens over Sunflower Fields in Marathwada Region of Maharashtra

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ABSTRACT

Aeromycological studies were carried out by using volumetric 'Tilak Air Sampler' over the sunflower fields for Kharif seasons (year 2023 to 2024) at village Murdhav in Renapur tehsil of Latur district in the Marathwada region of Maharashtra. The present investigation showed the presence of various pathogenic spores such as *Alternaria*, *Cercospora*, *Fusarium*, *Curvularia*, *Helminthosporium*, Rust and Smut spores which were predominant over Sunflower field. This paper deals with analysis air borne Rust and Smut spores over sunflower field and incidence of Rust and Smut diseases respectively. The maximum mean concentration for Rust spores was 251524/m³ and spores contributed 9.78% during Kharif season. The maximum mean concentration for Smut spores was 484862/m³ and spores contributed 18.85% during Kharif season.

The high frequency of Rust and Smut spores over the sunflower field was observed and correlated with Rust and smut diseases of Sunflower. The obtained data would be useful in establishing the disease forecasting system of Sunflower crop.

Key-words: Aeromycology, Sunflower, Rust and Smut, Disease forecasting.

INTRODUCTION:

Air is one of the most important ingredients like soil and water of the environment. The biologically important pollutant of the atmosphere includes pollen, fungal spores, algal filaments, insect scales etc. The fungal spores in air are considered to be the most important biopollutants which incite the disease over several important crops in turn causing severe losses both in quality and quantity of the yield which directly affect the economy of the farmer. Due to Economic value and importance of Sunflower aerobiologists have concentrated a lot of the various aspects of Sunflower. The aerobiological surveys were conducted in different seasons using Tilak air sampler and carried out further extensive aerobiological investigation which have brought out many important features which would help in devising an efficient forecasting system for preventing diseases of Sunflower.

The present study deals with the atmospheric concentration of Rust and Smut spores over Sunflower field.

MATERIALS AND METHODS:

Aeromycological study was carried out at a village Murdhav in Renapur tehsil of Latur district in the Marathwada region of Maharashtra by using Tilak air sampler with its orifice kept at 1.5 meter above the ground level in sunflower field. Air monitoring was carried out in the Sunflower fields for Kharif season year (2023 to 2024) at (1st June 2023 to 30th September 2023 - 2nd June 2024 to 30th September 2024). At the time of sampling the meteorological data was regularly maintained. The air was sampled at the rate of 5 liters / min. Scanning of the slides is done regularly after the slide preparation.

Rust spores:

Spores one celled, oval to broadly elliptical yellowish - reddish brown, thick walled with tiny spiny 4 germ pores, generally with stalk 20 x 30 x 20 µm. The spores were encountered throughout the period of investigation. These spores occurred abundantly in the atmosphere.

The spores contributed 9.78% during Kharif season (Table-I). The maximum mean concentration for Rust spores was 251524/m³. The spores are pathogenic in nature (Table-I).

Smut spores:

All types of Smut spores trapped were grouped in this category. The spores were black and occurred in clumps. They occurred throughout the period of investigation. The spores were pathogenic and occurrence was high. The spores contributed 18.85% during Kharif season. The maximum mean concentration for smut spores was 484862/m³.

DISCUSSION:

The present investigation in relation to Rust and Smut spores concentration over the sunflower field (*Helianthus annus* L.) was carried out for two Kharif season (i.e. 1st season from June 2023 to Sept. 2023 and 2nd season from June 2024 to Sept. 2024). During the period of present investigation incidence of Rust spores (Uredospores) was noted throughout. Contribution of uredospores was found to be 9.78% and 8.21% in two Kharif season (Table-I). The highest spore catch of uredospores 111902/m³, 88578 / m³ was recorded in the months of July 2023 and June 2024 respectively. Smut spores contributed 18.85 and 5.027 % in two kharif seasons of 2023 and 2024 respectively. The maximum concentration of Smut spores 243488 / m³, 39103 / m³ was recorded in month of June 2023 and 2024 respectively.

From the above recorded observation it could be concluded that rust disease caused by *Puccinia helianthi* (Schw.) observed a sporadic form on lower leaves of Sunflower crop. However there was very mild incidence of Rust disease in all the Kharif season during the period of investigation. Similar observations were also made by Tilak and Babu (1982), Tilak and Rao (1987), Jayswal (1993). Smut spores were mainly confined to dry periods of Kharif season. However it became very difficult to trace out the exact source of Smut spores in and around the trapping site.

Thus the high frequency of Rust and Smut spores over the Sunflower field was observed and co-related with Rust and Smut disease of Sunflower such studies would bring many results for disease forecasting which ultimately would help in protecting the crop.

Table – I: Season wise comparative account of total Rust and Smut spores of Kharif season over Sunflower field from June 2023 to Sept. 2023 (1st Kharif season) and June 2024 to September. 2024 (IInd season)

Sr. No.	Spore type	1st Kharif season		2 nd Kharif season	
		Spore Conc	% contribution	Spore Conc.	% contribution
1.	Rust spores	251524/m ³	9.782	11051/m ³	8.21
2.	Smut spores	484862/m ³	18.85	67606/m ³	5.027

Fig.I Bar graphs reveal variations in the monthly concentration of Rust spore during Kharif seasons of 2023 to 2024.

Rust spore conc. during 1st and 2nd Kharif season

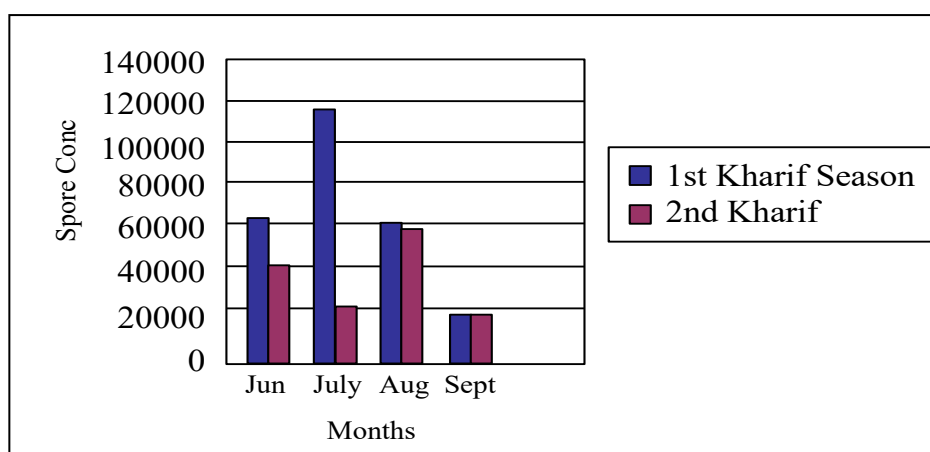
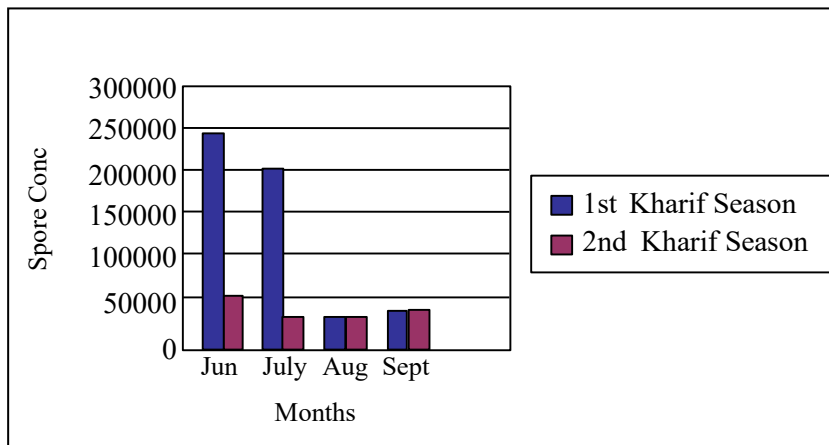


Fig.II Bar graphs reveal variations in the monthly concentration of Smut Spores during Kharif seasons of 2023 to 2024.

Smut spore conc during 1st and 2nd Kharif season



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