Research Paper :

Air-borne spore population of *Puccinia penniseti* in relation to rust disease of bajra at Ahmedpur

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SUMMARY

Aerobiological investigations were carried out over the Bajra (*Pennisetum typhoids*) fields at Ahmedpur for *Kharif* season of year 2005. Air sampling was carried out by using Tilak air sampler. Bajra (*Pennisetum typhoids*) var.NBH-1035 shanti is an important cereal crop. It gets affected by variety of pathogens causing heavy loss in the yield and quality. The Aerobiological investigation was carried out to find out the concentration of *Puccinia penniseti* zimm. spores in the air and its relevance to the disease incidence, meteorological parameters and growth stages of the crop. The air sampling started from 5th July 2005 to 9th October 2005. The spores contributed 4.53% to the total airspora during investigation. Their maximum concentration (15456/m³ of air) was recorded in the month of September 2005. The highest spore concentration (532/m³ of air) was observed on 8th September. The first incidence of rust disease was observed on 17th September 2005. In that month, comparatively low temperature and high humidity was found to be favorable for causing disease incidence and development. This investigation would be of immense use in further supplement in establishing useful disease forecasting system for the prevention, avoidance and treatment of bajra diseases.

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Bajra is most important millet grown in India. It is mainly used as staple food. Bajra contains all the essential nutrients of food like energy, proteins, carbohydrates, fats, iron, calcium and vitamins. Not only is the grain valuable as a stock feed but also the entire plant is an important fodder crop.

India is one of the leading countries in the world for the production of bajra next to Jowar, Wheat and rice, it is important food and fodder crop of India. Bajra is grown in maximum districts of Maharashtra. In Latur district, total area of bajra cultivation is 9500 hectors.

Like many other crops, bajra is also subjected to various types of plant diseases, which cause extensive damage by reducing the grain production quality as well (Wilson *et al.*, 1996).

Fungal pathogens play a significant role in causing the disease and bringing in the losses in yields. The major fungal disease which causes extensive damage to bajra crop in India is Rust disease caused by *Puccinia penniseti* Zimm. It is one of the most serious disease of bajra causing considerable damage to the crop resulting heavy loss in quality and quantity of the grains.

During present investigations, more emphasis was given on fungal components of airspora over bajra crop fields in order to have confirmation and rigidity to the conclusion. This study deals particularly with the airspora analysis of pathogenic spore as rust spore over bajra fields and their concentration with reference to meteorological parameters and growth stages of crop.

MATERIALS AND METHODS

Airspora studies was carried out by keeping the Tilak air sampler (Tilak and Kulkarni, 1970) in the Bajra (*Pennisetum typhoids* staff and Hubb.) field (var.NBH-1035 Shanti) at village Tambatsangvi, 4 kms away from Ahmedpur Dist. Latur. Nearly 04-05 acres of land was under bajra cultivation in *Kharif* season. The air sampling was started from 5th July 2005 to 9th October 2005.

Air sampler was installed in the bajra fields with its orifice kept at a constant height at 1.5 meters above the ground level at Ahmedpur. Slide preparation and scanning was done for estimating air borne components and their percentage contribution per day as per the criteria given by Tilak and Srinivasulu (1967). During the period of investigations, meteorological data such as temperature,

relative humidity and rainfall were maintained. The identification of spore types and other components were made with the help of standard literature by Ellis (1971), Burnett and Hunter (1972), Tilak (1980) and Nair *et al.* (1986).

RESULTS AND DISCUSSION

The pathogen *Puccinia penniseti* Zimm. cause rust disease to the cereal crop bajra (*Pennisetum typhoids* stapf and Hubb.). The disease was found in the form of reddish brown rusty coloured spots on the leaf surface. The fungus, in pathogenic form, was collected in the field from the affected leaf blade of bajra during the period of investigation. The spores are unicellular, diakaryotic, brown coloured with distinct double wall and germ pore.

The air sampling was started from 5th July 2005 to 9th October 2005. The first appearance of rust spore in the air was on first day of sampling. The spores were regularly trapped during the investigation. The spores contributed 4.53% to the total airspora during investigation. Their maximum concentration (15456/m^3 of air) was recorded in the month of September 2005. The highest spore concentration (532/m^3 of air) was observed on 8th September.

The average monthly percentage contribution of rust spores to the total airspora was 10.90, 31.79, 46.19 and 8.77 in the month of July, August, September and October, respectively (Table 1). The diurnal periodicity studies showed that, they belong to "day spora" group, main peak at 14.00 hours and subsidiary peak at 18.00 hours.

Pady (1954) with his slide exposure technique caught numerous rust spores in June, July and September. Hirst (1953) and Hamilton (1959) reported these spore types from air.

Table 1 : The average monthly percentage contribution

Sr. No.	Months	Rust spore concentration
1.	July	10.90
2.	August	31.79
3.	September	46.19
4.	October	08.77

The first incidence of rust disease was observed on 17th September 2005. In that month, comparatively low temperature and high humidity were found to be favorable for causing disease incidence and development. The maximum spore concentration was also observed in the month of September. Beside the meteorological factors, crop age also played an important role in the disease development. The younger plants were resistant while senescent plants were susceptible to rust disease. The disease spread and intensity was higher in the flowering and seed forming stage of the crop. Nagpurne (1993) reported the disease spread and intensity was higher in the flowering stage and onwards as compared to seedling and tillering stages. Kadam *et al*. (2008 a) reported that in the late stage both sides of the leaves were found affected by rust. It indicates that positive inoculum and environmental factors caused the disease but plant age was also important which determines disease incidence and intensity of various ways.

Nagrajan *et al.* (1976) proved that, the rust infection of the central India was due to the *Uredospores*, which were transported from Nilgiri hills and deposited along with rains. Mane (1981) reported the incidence of rust spores and their approach to the rust disease of Bajra at the fields of Vaijapur. Kadam *et al*. (2008 b) observed the rust disease over bajra fields at Ahmedpur.

In the present investigation, it is clearly evident that there was a close co-relation between the rust spore concentration in the atmosphere, meteorological factors, disease incidence in the field and growth stages of the crop.

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