

## Day to day variation of *ustilago scitaminea* Over Sugarcane (*Saccharum Officinarum*) field

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**Abstract-** The Aerobiological investigation were conducted over sugarcane field (*Saccharum Officinarum*) during March-2010 to Feb-2011. Among several fungal diseases of sugarcane crop whip smut is important and taken into consideration for study of Aerobiology of *Ustilago scitaminea* is important in order to forecast the occurrence of disease and in devising efficient disease forecasting management system. The experiments were conducted by operating Tilak air sampler, to find out the concentration of the pathogen *Ustilago scitaminea* in the air and their close relation with growth stages of crop, disease incidence and meteorological parameters. During the period of survey meteorological data maintained. Higher numbers of spores were recorded during September 2010 to February 2011. With the knowledge of occurrence of spore load intensity in particular period in relation to favorable weather factors; one can predict the development of disease on crop in particular period. The diurnal periodicity studies indicate that they belong to “Day – Spora” group. Daily maxima occurred between 10.00 hours and 14.00 hours reaching highest peak at about 12.00 noon hours. The moderate temperature and high humidity conditions are most favorable for disease incidence and spread.

**Index Terms-** *Ustilago scitaminea*, Whip smut disease, weather parameters.

### 1. INTRODUCTION

India is known to be the country of origin of sugarcane. Sugarcane crop is subjected to many fungal diseases i.e. brown stripe (*Drechslera sacchari*) Red rot (*Colletotrichum falcatum*) leaf spot diseases (*Helminthosporium stenospium*), Rust (*puccinia sp*) to cause losses to a great extent to the farmers through reduced yield of the crop. Among the fungal diseases whipsmut disease caused by *Ustilago scitaminea* *syd* has been responsible for heavy losses to farmers in India. Hence these experiments were undertaken to provide better forecasting system to sugarcane. Sugarcane occupied an important position in national economy as it is important cash crop and is mainly used for large scale sugar production. India is leading in total area and production of sugarcane among cane growing countries of the world.

### 2. MATERIAL AND METHODS

The present aerobiological studies were carried out by operation continuously Tilak air sampler (Tilak and kulkarni 1970). Air sampler installed in sugar cane field with its orifice kept at a constant height of 1.5 meters above the ground level at kandhar. Slides were prepared and scanned for estimating the spore types and their percentages concentration as described earlier workers. The air sampling was conducted for one year from March 2010 - February 2011. The disease incidence and severity of the disease was assessed by frequently visiting the field. During the period of survey daily records of temperature, relative humidity, and rain fall were maintained.

### 3. RESULTS AND DISCUSSION

The present aerobiological studies revealed that, huge number of spores recorded daily varied as the disease severity progressed. Air sampling was carried out during March 2010 to February 2011. At the onset of the sampling the spores were recorded in the atmosphere with sporadic and epidemic form occasionally in air. An attempt was made to establish the relationship between weather factors, spore concentration and disease incidence. Day to day variation in the *Ustilago scitaminea* spore catches in relation to meteorological conditions are presented in fig. I. Spores of *Ustilago scitaminea* are rounded, brown to dark brown, thick walled, wall echinulated, measuring from 10.5 – 12  $\mu\text{m}$  in a diameter. The maximum incidence of the whipsmut disease was observed from September to February 2011, which corresponds to the highest concentrations of smut spores (9828/ $\text{m}^3$ ) in air, when the average mean temperature was 23.8  $^{\circ}\text{C}$  and relative humidity 71.70 %, the rain fall 193.62 mm during this period. These finding results are agree with the results of Sreeramulu and Vittal in 1966. The highest mean daily concentration of spore (602/ $\text{m}^3$  of air) was recorded on 17<sup>th</sup> February 2011, when daily mean temperature was 23  $^{\circ}\text{C}$  and relative humidity 65.5 % and no rain fall on the same day. It was also observed that increase in spore load during harvest of the crop. The maximum number of spores (3276/ $\text{m}^3$  of air) recorded in Feb-2011 followed by Nov-(2002/ $\text{m}^3$  of air)2010. The present result in general agrees with earlier studies in that spread of spores influenced by dry condition and higher temperature. Pady 1957 observed

smut spores maximum during harvesting time. Alexander (1975) reported that only late formed whips are source of secondary infection when exposed buds are available. The total rainfall received was 1204.68 mm all over the period of sampling with maximum rainfall in the month of July 601.2 mm and maximum rain fall recorded on 3<sup>rd</sup> July (107.1mm) 2010, an average temperature 27 °C and relative humidity prevailed was 85%. The sporadic disease incidence (0.2%) was noticed in the field.

Table 1. Showing total number of *Ustilago Scitaminea* spore/m<sup>3</sup> of air from 1<sup>st</sup> March 2010 to 28<sup>th</sup> Feb. 2011

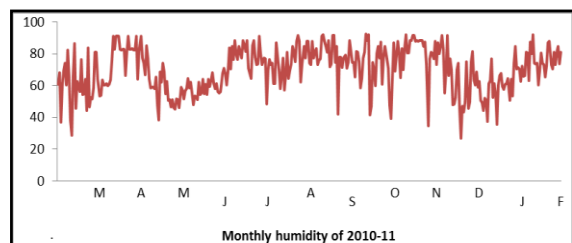
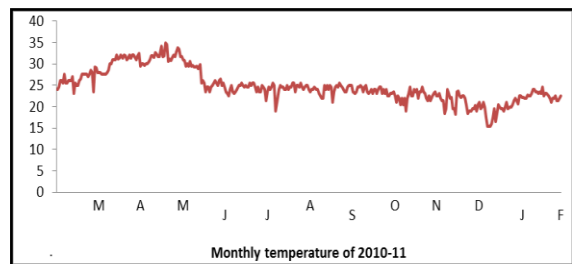
Date	No of spores/ m <sup>3</sup> air	Date	No of spores/ m <sup>3</sup> air	Date	No of spores/ m <sup>3</sup> air
March 1	28	July 1	42	28	56
2	70	2	98	29	42
5	112	3	28	30	28
7	56	4	28	Sept. 1	42
12	84	5	56	2	98
13	70	6	70	3	140
21	140	13	42	4	56
25	154	14	28	5	70
April 2	56	17	14	6	84
3	98	18	70	12	14
4	70	23	56	13	98
15	42	24	98	14	56
16	56	25	42	15	70
25	84	26	140	16	84
26	154	27	168	24	56
May 1	42	28	56	25	56
2	70	29	70	26	42
8	28	30	56	27	42
9	56	31	28	Oct. 3	28
21	70	Aug. 1	56	4	42
25	28	2	28	5	28

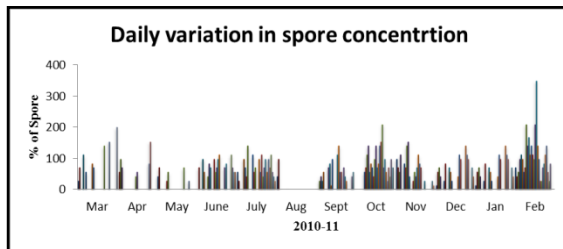
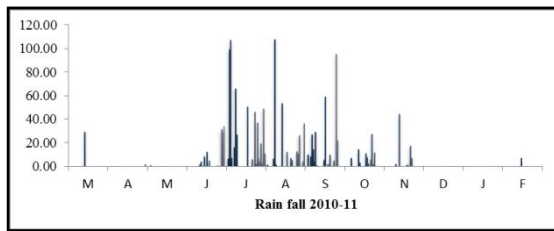
June 2	70	6	98	6	56
5	98	7	70	10	70
6	56	8	42	11	84
9	42	9	140	12	14
10	84	13	112	13	98
11	70	14	56	17	112
14	98	15	70	18	140
15	56	18	98	19	56
16	70	19	56	20	56
17	98	20	112	22	70
18	112	21	42	23	42
22	70	22	70	24	28
23	84	23	98	28	42
27	112	24	56	29	56
28	70	25	98	Nov. 7	56
29	56	26	70	8	70
30	56	27	112	9	112

Date	No of spores/m <sup>3</sup> air	Date	No of spores/m <sup>3</sup> air	Date	No of spores /m <sup>3</sup> air
Nov. 10	140	8	84		
11	56	11	70		
12	84	12	56		
13	70	13	28		
14	42	18	42		
15	98	19	112		
16	140	20	98		
17	70	24	140		
18	84	25	112		
19	140	26	98		
20	154	29	70		
21	210	30	42		
22	70	Feb. 1	70		
23	98	2	42		
24	56	3	56		
25	28	4	98		
26	70	5	112		
27	42	6	98		
28	98	7	56		
29	70	8	70		
Dec. 1	98	9	210		
2	70	10	140		
3	56	11	168		
4	112	12	112		
7	84	13	140		
8	70	14	112		
9	140	15	98		
10	154	16	210		
11	42	17	602		
14	28	18	140		
15	56	19	98		
16	42	20	28		
17	70	21	28		
18	112	22	70		
19	84	23	84		
20	70	24	112		
23	28	25	140		
29	28	26	56		
30	14	27	28		
1	14	28	84		
Jan. 11					
2	56				
3	70				
6	42				
7	28				

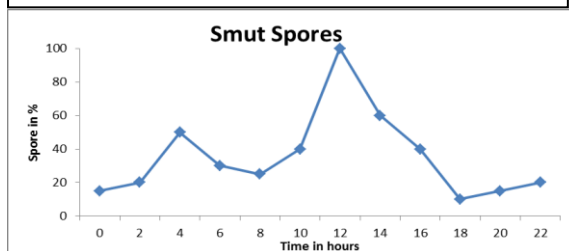
Month wise Meteorological Conditions from March 2010 to Feb. 2011

Months	Total Rainfall (mm) 2010	Mean Temperature (°C) 2010	Mean Humidity (%) 2010
March	29.2	25.85	60.00
April	2.00	25.93	73.19
May	1.00	31.76	60.91
June	93.00	27.98	57.71
July	601.2	24.62	75.17
August	286.8	24.03	72.34
September	27.28	24.16	79.96
October	90.6	24.07	71.87
November	73.6	22.57	71.98
December	-	22.05	74.33
<b>2011 January</b>	-	22.96	59.19
<b>February</b>	7.00	22.71	72.89





**Fig. I. Diagram showing day to day variation of *Ustilago scitaminea* spores /m<sup>3</sup> of air in relation to meteorological parameters during Mar. 2010 to Feb. 2011.**



**Diagram showing diurnal periodicity curves of *Ustilago scitaminea* spore type expressed as percentage of the arithmetic mean concentration**

## REFERENCES

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