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CURRENT STATUS OF BROWN LEAF SPOT OF TOBACCO IN NIPANI AREA OF NORTHERN KARNATAKA

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ABSTRACT

A roving survey conducted in Nippani area for brown leaf spot disease of tobacco during 2013 revealed that the disease severity ranged from 8.91 to 13.80 per cent. September and October months are favourable period for brown leaf spot. The villages Akkol and Aadi were considered as the most severe zones and hot spots for brown leaf spot in Nipani. The other areas such as Kodni, Nipani, Siraguppi, Jatrat, Khadaklat and Walki were considered as other moderate to severe zones for brown leaf spot. The areas where relatively less severity of brown leaf spot noticed were Sadalaga, Shirpewadi, Hunnurgi, Galataga, Yadanwadi and Tavandi. The pathogen *Alternaria alternata* upon infection to tobacco plant produced spots which were roughly circular, with necrotic centers, concentric rings and often surrounded by a yellow halo. Spots ranged in size from small fleck symptoms (approximately 1 mm) to large lesions 1 to 3 cm in diameter. Symptoms were seen initially on lower leaves and later spread to upper leaves.

(Key words: *Alternaria alternata,* brown leaf spot and survey)

INTRODUCTION

Tobacco (*Nicotiana tabacum* L.), which belongs to the family solanaceae, is believed to have been introduced into India from its native Central America by Portuguese in 1603. It is a major commercial crop of India, grown throughout the country. India is one of the principal tobacco producing countries of the world, and tobacco has attained its commercial importance in India.

Since, 1930 tobacco cultivation has become a way of life as well as an industry and has made great strides, while playing a key role in Indian economy despite its disapproval due to its alleged association with human health, tobacco has thrived well. It has a significant contribution to Indian economy through its earning by way of central excise and foreign exchange. India occupies second place in area and third place in production accounting for 10 per cent of the world area and about 9 per cent of the tobacco production by using just 0.3 per cent arable land. During 2014-15 the area covered was 0.46 m ha and the production was 0.84 m tonnes with the productivity of 1842 kg ha^{-1}. India is one of the leading exporter of tobacco and occupying fourth place in overall exports and ranks fifth in the export of flue cured virginia (FCV) tobacco after Brazil, Zimbabwe, China and USA. Tobacco accounts for 4 per cent (204 million US Dollars) of India's agricultural exports and 12 per cent (Rs. 8182 crores) of total excise revenue. Further, it is a source of livelihood for about 35 million people including six million farmers as well as others in direct or indirect manner (Anonymous., 2016).

Major tobacco growing states of India are Andhra Pradesh, Gujarat, Karnataka, Uttar Pradesh, West Bengal, Tamil Nadu, Orissa and Maharashtra. Among all these states, Andhra Pradesh, Gujarat and Karnataka are important tobacco growing states. In Karnataka, the principal types of FCV (about 70,000 ha) and bidi tobacco (about 20,000 ha) are grown with good quality leaf of which the former is raised as a monsoon crop on light soil areas of Southern transition zone of Mysore, Hassan, Shimoga and Chikkamagalur districts, while the latter is grown as a rainfed crop mainly on heavy to medium soils of Nipani tract of Belgaum district, on conserved soil moisture. During 2014-15 the area covered was 94 thousand ha and the production was 67 thousand tonnes with the productivity of 713 kg ha^{-1}. People from all walks of life, rich and poor, young and old, educated and illiterate, great men and not so great men have enjoyed tobacco in one form or the other over centuries. Different users use tobacco for different reasons, some smoke or chew tobacco because it relaxes them, some to concentrate and some enjoy it. Whatever be the reason it is certain that tobacco users derive certain benefits. Apart from these, tobacco is a source of medicine, edible protein oil, pesticide and organic acids (Anonymous, 2016).

The tobacco environment has often provided ideal conditions for spread and multiplication of organisms, which are later, adapted as tobacco parasites. Bidi tobacco suffers from many abnormalities caused by a wide range of

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pathogens, *viz.,* fungi, nematodes, bacteria, viruses, flowering plant parasites and phytoplasma (Lucas, 1975). The losses due to these diseases are estimated to be in range of 5 to 15 per cent depending on their intensity. Among all foliar diseases, brown leaf spot of tobacco, has become a major threat in recent years.

The brown leaf spot of tobacco caused by *Alternaria alternata* (Fr.) Kiessler is a very important disease of the crop, which causes both qualitative and quantitative loss in the leaf yield. Several epidemics of the disease on the crop in different tobacco growing areas have been observed. The lower and matured leaves are affected first by the disease. The disease is characterized by circular spots, ranging from 0.25 inch to 1.25 inches in diameter on the leaves.The spots are found primarily on the lower leaves of the plant. It produces target-like spots having a yellow or yellowish-green halo around them.

This disease is causing considerable losses in North Carolina and Connecticut and Massachusetts, every year (Shew, 2000, LaMondia, 2001). Brown leaf spot is one of the most destructive leaf spot diseases on tobacco, was only a minor problem in North Carolina until the mid-1950. From that time until the mid- 1970's, the losses due to the disease is about 0.5 per cent year^{-1} in North Carolina (Shew, 2000). The disease occurs commonly in bidi tobacco in the nursery as well as in the field. Humid and warm weather during August – September is highly congenial for development of the disease. The heavy and continuous rains after one month of crop growth including high atmospheric relative humidity for longer periods resulted in leaf spot and increases to epiphytotic proportions (Mandelson, 1933).

The prevalence and severity of the disease in many areas, as well as many basic aspects of the pathogen are not yet understood clearly. New knowledge about these are the essential to device proper management practices of the disease. In order to collect the information on the severity of brown leaf spot of tobacco in Nipani area of Northern Karnataka the present study was undertaken.

MATERIALS AND METHODS

A roving survey was conducted to know the per cent incidence of brown leaf spot disease in bidi tobacco growing areas of Nipani during 2013-14. Survey was taken up for four months starting from September to December. The leaf spot disease incidence was assessed by recording the number of plants showing disease symptoms and the total number of plants examined. In each village, five fields were selected and in each field ten plants were examined randomly and the observations on per cent disease index was recorded by following scale of 0- 5. The rating is described here under.

0 = No symptoms observed (Highly resistant)

1 = 1- 20% leaf infection (Resistant)

2 = 21- 40% leaf infection (Moderately resistant)

3 = 41- 60% leaf infection (Moderately susceptible)

4 = 61- 80% leaf infection (Susceptible)

5 = 81- 100% leaf infection (Highly susceptible)

Per cent disease index (PDI) was calculated by using the following formula (Wheeler, 1969).

$$PDI = \frac{\text{Sum of all disease rating}}{\text{No. of leaves plant}^{-1}\text{ observed}} X \frac{100}{\text{Maximum grade}}$$

RESULTS AND DISCUSSION

Roving survey was carried out during 2013-14 in Nippani area. Twenty two locations were surveyed for four months during the cropping period and data are presented in table 1.

The mean disease severity ranged from 8.91 PDI to 13.80 PDI. The disease pressure was high initially in the month of September, October and November, and later decreased slowly up to the month of December. The maximum disease severity of 16.50 PDI was recorded in Akol and Kodni area followed by 16.10 PDI in Padlihal area in September, 2013. The minimum disease severity of 10.20 PDI was noticed in Yadanwadi in the month of September.

In the month of October, 2013, the mean disease severity was 12.22 PDI. The disease severity ranged from 8.10 to 15.70 PDI. The Akol village recorded highest disease severity of 15.70 PDI, which was followed by Ade (14.73 PDI) and Kodni (14.70 PDI). Minimum disease severity of 8.10 PDI was noticed in Yadanwadi. In the month of November, Akkol recorded maximum disease severity of 14.40 PDI followed by 14.25 PDI in Aadi and 13.55 PDI in Madampur area. The minimum disease severity of 7.30 PDI was noticed in Yadanwadi. The mean disease severity during November, 2013 was 10.71 PDI.

In the month of December, 2013, the disease severity showed a decreasing trend. The disease severity ranged from 6.10 to 13.80 PDI. The mean disease severity during the month was 8.91 PDI. Akol village recorded the maximum disease severity of 13.80 PDI, which was followed by 13.70 PDI in Ade and 12.46 PDI in Kodni. The minimum disease severity of 6.10 PDI was noticed in Yadanwadi, Galataga and Hunnargi.

Among the different location mean, maximum mean of 15.10 PDI was recorded in Akol, followed by Ade (14.52 PDI), Kodni (13.87 PDI) and Madampur (13.66 PDI). The mean disease severity ranged from 8.35 to 15.10 PDI.

The investigation revealed that September and October months were favorable period for brown leaf spot, recording a mean disease severity of 13.80 PDI and 12.22 PDI, respectively. The villages Akkol and Aadi were considered as the most severe zone and hot spots for brown leaf spot in Nipani. The other areas such as Kodni, Nipani,

a) Infected tobacco field
at Akol village

b) Infected tobacco field
at Mamadapur village

c) Infected tobacco field
at Bolevadi village

d) Intercropping of tobacco with
sugarcane at Ade village

e) Intercropping of tobacco with
sorghum at Jatrat village

Plate 1(A). Survey for disease severity of brown leaf spot of tobacco during 2013

Table 1. Survey and surveillance of brown leaf spot of tobacco in Nipani area

Village	PDI during				
	September	October	November	December	Location mean
Ade	15.40	14.73	14.25	13.70	14.52
Akol	16.50	15.70	14.40	13.80	15.10
Appachiwade	12.60	10.90	9.80	7.50	10.20
ARS, Nipani	14.30	12.20	11.50	10.50	12.12
Bennadi	13.30	12.50	11.43	10.70	11.98
Bolevadi	14.15	12.50	11.30	9.50	11.86
Galataga	11.00	10.80	8.80	6.10	9.17
Hunnargi	10.60	9.20	7.50	6.10	8.35
Jainwad	15.60	14.80	10.60	6.90	12.72
Jatrat	14.70	12.85	10.64	9.65	11.96
Khadaklat	15.20	14.80	10.90	9.60	12.62
Kodni	16.50	14.70	13.50	10.80	13.87
Mamdapur	14.85	13.80	13.55	12.46	13.66
Padlihal	16.10	12.30	10.10	6.90	11.35
Pattankudi	15.40	12.10	11.40	6.90	11.45
Soundalga	11.60	9.20	8.10	7.00	8.97
Sidnal	12.10	10.60	8.80	6.90	9.60
Sirguppi	14.20	12.60	10.80	9.20	11.70
Sirpevadi	12.80	10.30	9.60	7.90	10.15
Tavandi	11.50	10.10	8.60	7.20	9.35
Walki	15.20	14.10	12.90	10.80	13.25
Yadanwadi	10.20	8.10	7.30	6.10	7.92
Monthly Mean	**13.80**	**12.22**	**10.71**	**8.91**	

Siraguppi, Jatrat, Khadaklat and Walki were considered as moderate to severe zones for brown leaf spot. The areas where relatively less severity of brown leaf spot noticed were Sadalaga, Shirpewadi, Hunnurgi, Galataga, Yadanwadi and Tavandi. Irrespective of areas surveyed September, October and November months were major cropping period of tobacco identified as critical months for brown leaf spot management. Generally, the intermittent rainfalls, cloudy weather and high relative humidity prevailed during these three months are the major environmental factors that helped in development and spread of the disease.

Leaf samples with typical brown spot symptoms were collected from different locations and studied for the variability of the fungus. The pathogen isolated from the infected material was identified as *Alternaria alternata* based on its morphological, cultural characters and pathogenicity test in accordance with description given by Tubaki and Nishihara (1969).

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