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SHORT COMMUNICATION

MONITORING OF TLCV AND CMV IN VIRGINIA TOBACCO OF SLS AND SBS OF PRAKASAM DISTRICT, ANDHRA PRADESH

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Among the viral diseases, tobacco leaf curl and cucumber mosaic virus cause considerable damage to the crop. To explore the virus incidence and prevalence, roving survey of Flue-cured Virginia (FCV) tobacco was undertaken during 2017-18 and 2018-19 in certain villages of Southern Light Soils (SLS) and Southern Black Soils (SBS) of Prakasam district, Andhra Pradesh. TLCV incidence during 2017-18 was 6.0 % in SLS and 5.9 % in SBS while in 2018-19, it decreased to 4.4 % in both the regions. CMV incidence in 2017-18 was 3.6 % in SLS and 2.1 % in SBS while in the next season, it increased to 4% and 3 % respectively. Comparatively SLS has higher virus disease menace TLCV (5.21%) and CMV (3.8 %), where as in SBS average disease incidence of TLCV (5.1%) and CMV (2.6 %) was recorded. The survey implies that tobacco leaf curl is progressing as a major threat to tobacco.

INTRODUCTION

Tobacco (*Nicotiana tabacum* L.) is one of the valuable cash crops of India, widely cultivated across the world. At present, tobacco production in India is about 804 M kg from an area of 446 thousand hectares (Tobacco Board, 2019). FCV tobacco is an important commercial crop grown utilizing north-east monsoon in Southern light soils and Southern black soils of Andhra Pradesh. The biophysical conditions of these regions are congenial for cultivation of tobacco which is relatively more remunerative than other crops grown in the region. Insect pests and viral diseases play a major role in determining the yields. Plant pathological viruses are known to cause multifarious symptoms like mosaic, curling, yellowing etc. on leaves as well as stunted growth of the plant. The yield losses that can be ascribed to plant viruses in agriculture worldwide are estimated to cost more than US $ 30 billion annually (Sastry and Zitter, 2014). Three major viruses *viz.*, *Tobacco mosaic virus* (TMV), *Tobacco leaf curl virus* (TLCV), *Cucumber Mosaic virus* (CMV) are very common in this region. Leaf curl and cucumber mosaic viruses are transmitted by insect vectors, and difficult to manage hence selected for the study.

Tobacco leaf curl virus disease (TLCV) caused by a virus of the genus *Begomovirus* belonging to the family Geminiviridae. It is transmitted by the insect vector, whitefly, *Bemisia tabaci* Gennadius that cause huge economic losses to cotton and other vegetable crops in addition to tobacco (Moffat, 1999; Briddon *et al.*, 2010). Infected plants shows leaves puckered with margins curling downwards become brittle (Figure 1). Leaves show vein clearing, abnormal vein thickening and twisting of petioles. Internodes shorten resulting in stunted plants. Pal and Tandon (1937) reported five types of tobacco leaf curl- A, B, C, D, and X type in Northern India. Late infection does not show severe symptoms, however top leaves do not grow well

Fig. 1: Leaf and whole plant symptoms *Tobacco Leaf curl virus*

Keywords: TLCV, CMV, SLS, SBS, Leaf curl, incidence

and curl inwards (Reddy and Nagarajan, 1982). TLCV sometimes causes severe stunting of the plant parts. Leaf curl could cause 70 per cent crop loss (Valand and Muniyappa, 1992).

Cucumber mosaic is caused by CMV, a virus of the genus *Cucumovirus*, belonging to the family Bromoviridae. It is transmitted by aphids, *Myzus persicae nicotianae* Blackman. Infected plants show typical mottling and mosaic pattern, stunting, narrowing and distortion of the leaves (Figure 2). CMV is one of the most common types of mosaic virus that often affects cucumbers, but it is also a common problem for tomatoes, peppers, brinjal, potatoes, lettuce and spinach (Ohshime *et al.*, 2016). The characteristic malformation symptoms are stunting coupled with filiform or shoestring like leaf blades where leaf edges fail to expand. Leaf veins develop as long, narrow stripes. Leaves are mottled with yellow, white, light green and dark green spots, which look elevated, crinkled with a blister-like appearance (Palukaitis, 1992 and Gallitelli, 2000).

The incidence of these viruses can vary from region to region. Virus damage is mainly dependant on the variety, alternate hosts, weeds, insect vectors, weather factors and management practices adopted in that area. Proper diagnosis, estimation of incidence and intensity of virus diseases causing considerable loss to FCV tobacco is quite essential for management of the plant pathogenic viruses and to minimize the losses. There is a need of data for developing forecast model for major viruses and tobacco based cropping system which in turn will help in taking up timely management practices.

Figure 2: Leaf and whole plant symptoms of *Cucumber Mosaic virus*

Hence, a survey was conducted for the assessment of virus incidence in SLS and SBS tobacco for two consecutive years 2017-18 and 2018-19.

MATERIALS AND METHODS

Roving survey was taken up from December, 2017 to March, 2019 in major tobacco growing regions of Andhra Pradesh *viz.*, Southern light Soils (SLS) and Southern black Soils (SBS) to assess the incidence of viruses infecting tobacco. Seven villages were selected in both the zones. In each village, five fields were selected and in each field plants were selected at random leaving the border rows. Symptoms were observed on three leaves per plant, one each from top, middle and bottom. Per cent disease incidence (PDI) was calculated using the formula given after Salam *et al.* (2011).

Percent disease incidence **(PDI)** =

$$\frac{\text{Number of plants infected}}{\text{Total number of plants}} \times 100$$

RESULTS AND DISCUSSION

The data presented in Tables 1 and 2 show that viral diseases were prevalent in almost all parts of SLS and SBS. Tobacco leaf curl incidence during 2017-18 was 6.0 % in SLS and 5.9 % in SBS while in 2018-19, it decreased to 4.4 % in both the cases. Cucumber mosaic virus incidence during 2017-18 was 3.6 % in SLS and 2.1 % in SBS while in the next season, it increased to 4 and 3 % respectively. On the basis of two year data, SLS appears to have higher average disease incidence of TLCV (5.21 %) and CMV (3.8 %), where SBS has average disease incidence of TLCV (5.1 %) and CMV (2.6 %).

Southern Light Soils

In SLS tobacco, it was found that average leaf curl disease incidence over the two consecutive years was 5.2 %. The prevalence of viral diseases in SLS during 2017-18 and 2018-19 was given in figures 4 and 5. Among the villages of this region, higher incidence of TLCV was recorded at Parlapalli (10.0 %) and Mussapuram (9.0 %) during 2017-18 and at Uppalapadu (6.0 %), and Naladalpur

Table 1: Percent Disease Incidence (PDI) of TLCV and CMV in SLS

S.No.	2017-18			2018-19		
	Name of Village	**LCV (%)**	**CMV (%)**	**Name of Village**	**LCV (%)**	**CMV (%)**
1.	Marripalem	5	4	Uppalapadu	6	3
2.	Polavaram	4	3	Lakshmipuram	3	4
3.	Mahadevapuram	5	3	Machavaram	4	3
4.	Polinenivaripalem	4	2	Alavalapadu	4	3
5.	Parlapalli	10	4	V V Palem	5	4
6.	Jangalapalli	5	4	P V Palem	4	5
7.	Mussapuram	9	5	Naladalpur	5	6

Table 2: Percent Disease Incidence (PDI) of TLCV and CMV in SBS

S.No.	2017-18			2018-19		
	Name of Village	**LCV (%)**	**CMV (%)**	**Name of Village**	**LCV (%)**	**CMV (%)**
1.	Chekurupadu	5	3	Paidipadu	6	2
2.	Kanduluru	5	1	Marlapadu	3	2
3.	Lingamgunta	6	4	M Nidamaluru	4	3
4.	M Nidamluru	8	2	K Uppalapadu	5	4
5.	K Uppalapadu	6	3	Kamepalli	4	3
6.	Mallavarappadu	5	2	Kanduluru	3	3
7.	Mitta Palem	6	0	Alakurapadu	6	4

and VV Palem (5.0 %) in 2018-19. Least incidence was observed at Polavaram and Polinenivaripalem (4.0 %) in 2017-18 and Lakshmipuram (3.0 %) in 2018-19. Pal and Tandon (1937) reported that tobacco leaf curl disease in Pusa H 142 variety was in the range of 5-10 % under mild infections in normal years.

Average CMV disease incidence in SLS over two years was 3.8 %. Among the villages surveyed in SLS, higher incidence was observed at Mussapuram (5.0 %) in 2017-18 and at Naladalpur (6.0 %) and PV Palem (5.0 %) during 2018-19. Least incidence of 2 % was recorded at Polinenivaripalem in 2017-18 and 3 % each was recorded at Uppalapadu, Machavaram and Alavalapadu during 2018-19.

Southern Black Soils

In SBS tobacco, average per cent leaf curl disease incidence was more (5.1 %) for the two consecutive years. The prevalence of viral diseases in SBS during 2017-18 and 2018-19 was represented in figures 6 and 7. Among the villages surveyed, higher TLCV incidence was recorded in M. Nidamaluru (8.0 %) followed by K. Uppalapadu and Lingamgunta (6.0 %) in 2017-18 while greater incidence was recorded in Alakurapadu and Paidipadu (6.0 %) in 2018-19. Least incidence of TLCV (3 %) was observed in Kanduluru and Marlapadu. Analogously, Valand and Muniyappa (1992) reported that tobacco leaf curl could range from 1.2 % to 77 %.

Average CMV incidence in SBS was 2.6 %. Among the villages surveyed in 2017-18, Lingamgunta (4.0 %) had higher prevalence followed by Chekurupadu and K Uppalapadu (3.0 %). There was no virus incidence at Mittapalem. During 2018-19, Alakurapadu and K. Uppalapadu recorded higher incidence (4.0 %) whereas lowest incidence was noticed at Paidipadu and Marlapadu (2.0 %).

Tobacco leaf curl disease was noticed to be the predominant among the both. The cultivation of susceptible local cultivars could be a probable reason for multiplication and spread of virus in addition to prevalence of whitefly vector

transmitting the virus (Muniyappa, 1980). Monocropping of tobacco with one or two varieties under vast stretches of farmland in the district could also contribute to the rapid spread of the viral diseases. As viral diseases are highly destructive, regular monitoring is very essential to understand the incidence and severity so as to resort to timely management practices and also to make necessary strategies for the next crop season.

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