

## Seasonal and Varietal Influences of Tukra Disease on Mulberry

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Mulberry silk worm is the major economic insect in the country. More than 80% of silk alone accounts from mulberry silkworm. Andhra Pradesh occupies 2<sup>nd</sup> position in silk production in India. Ananthapur and Chittoor districts with a contribution of 50.47, 33.59, respectively in the silk production (Anonymous 2006). Mulberry leaf is a major economic component in sericulture since the quality and quantity of leaf produced per unit area have a direct bearing on cocoon harvest. In India, more than 100 insects have been recorded on mulberry of which, few attain damaging proportions. Feeding the silkworm with the infected leaves adversely affects the health of silkworm and the cocoon yield in terms of quality and quantity (Umeshkumar 1991). Tukra is the major disease transmitted by pink mealy bug (*Maconellicoccus hirsutus* Green) its seasonal incidence during the pre-monsoon and summer seasons in sericulture practicing states of India, causing crop loss up to 4500 kg/ha/year (Muralikumaran and Baskaran 1992). Hence the present investigation was undertaken to know the severity and seasonal incidence of tukra disease in six villages of Ananthapur and Chittoor districts of Andhra Pradesh.

A survey on the incidence and severity of tukra and powdery mildew disease in different seasons on different varieties of mulberry was conducted during 2006 August to 2007 July. The experiment was carried out in six sericultural areas of Chittoor and Ananthapur districts. In Chittoor district, at Chandragiri mandal three villages were selected viz Gangundupalli, Dornakambala and Mamunduru and in Ananthapur district at Raphthadu mandal Raphthadu, Marur and Ramunepalli were selected. In each village, five

farmer's fields were selected at random where different varieties viz Victory 1, M<sub>5</sub> and Local were grown. In these three varieties, the incidence of tukra disease at 15 days interval recorded. Per cent disease index of the tukra was recorded at fifteen days interval from August 2006 to July 2007 and monthly average was calculated. Five vigorous branches in one m<sup>2</sup> area of four end corners and in the middle of the mulberry plot were selected for recording the per cent disease index (PDI) by adopting a 0-5 scale (McKinney 1923) and calculated by this formula:

$$PDI = \frac{\text{Sum of all diseased leaf ratings}}{\text{Total number of ratings} \times \text{maximum grade}} \times 100$$

Data collected was analysed in one way ANOVA and Tukeys HSD test was performed to know the significant differences among the mean of different PDI's of different varieties, different villages and different months.

**Table 1 Mean PDI of tukra disease among different varieties**

Variety	Mean of PDI
V <sub>1</sub>	46.7 ± 2.06a
M <sub>5</sub>	5.3 ± 0.55b
Local	2.0 ± 0.24b
F	402.66
df	2,213
P	<0.0001

Means in column followed by same letter are not significantly different at 0.05% (Tukeys HSD test)

**Table 2 Mean PDI of tukra disease among different villages**

Mulberry variety	Chittoor distt.			Ananthapur distt.		
	Dornakambala	Gangundupalli	Mamunduru	Gondireddypalli	Ramapuram	Ramunipalli
V <sub>1</sub>	42.2 ± 5.12a	44.5 ± 5.0a	46.0 ± 5.03a	49.0 ± 5.3a	48.0 ± 5.06a	51.0 ± 5.41a
M <sub>5</sub>	4.8 ± 1.3b	5.2 ± 1.42b	5.7 ± 1.50b	4.6 ± 1.17b	5.7 ± 1.48b	6.1 ± 1.56b
Local	1.7 ± 0.6b	2.0 ± 0.60b	2.1 ± 0.60b	1.8 ± 0.6b	2.1 ± 0.61b	2.4 ± 0.66b
F	54.09	61.8	63.64	68.85	68.53	67.95
df	2,33	2,33	2,33	2,33	2,33	2,33
P	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Studies on the incidence of Tukra disease was carried out to know the seasonal fluctuations in the disease incidence and to synchronize the management strategies of the disease in different villages viz Gangundupalli, Dornakambala and Mamunduru of Chittoor district and Ramapuram, Gondireddypalli and Ramunipalli of Ananthapur district. Among three different varieties the high PDI  $46.7 \pm 2.06$  was noticed in V<sub>1</sub> variety followed by  $5.3 \pm$

$0.55$  and  $2.0 \pm 0.2$  PDI in M<sub>5</sub> and local varieties respectively (Table 1). Across different villages of Chittoor and Ananthapur districts relatively high ( $46.0 \pm 5.03$ ,  $51.0 \pm 5.41$ ) PDI was noticed in Mamunduru and Ramunipalli villages of Chittoor and Ananthapur districts respectively (Table 2). Its seasonal incidence was high in summer and pre monsoon season. It was ranged between  $43.1 \pm 2.14$  and  $67.3 \pm 1.60$  PDI compared to other months during 2006-07.

Table 3 Mean PDI of tukra disease among different months

Months	Mean of PDI		
	V <sub>1</sub>	M <sub>5</sub>	Local
2006 August	$59.5 \pm 1.07b$	$4.7 \pm 0.26c$	$2.5 \pm 0.15c$
September	$51.9 \pm 0.82c$	$2.7 \pm 0.19d$	$1.7 \pm 0.2d$
October	$45.4 \pm 0.84cd$	$1.9 \pm 0.02d$	$0.5 \pm 0.15e$
November	$33.9 \pm 1.51e$	$0.2 \pm 0.10 e$	$0.1 \pm 0.08e$
December	$22.2 \pm 0.72f$	$0 \pm 0e$	$0 \pm 0e$
2007 January	$16.0 \pm 1.15f$	$1.45 \pm 0.20ed$	$0 \pm 0e$
February	$30.2 \pm 1.51e$	$2.3 \pm 0.05d$	$0 \pm 0e$
March	$43.1 \pm 2.14d$	$5.0 \pm 0.17c$	$1.8 \pm 0.10d$
April	$61.5 \pm 1.69$	$11.0 \pm 0.73b$	$2.5 \pm 0.11c$
May	$67.3 \pm 1.60a$	$13.0 \pm 0.59a$	$5.5 \pm 0.18a$
June	$46.2 \pm 1.41ab$	$12.7 \pm 0.53a$	$5.24 \pm 0.16ab$
July	$34.0 \pm 1.70ab$	$9.4 \pm 0.19b$	$4.8 \pm 0.10b$
F	288.38	200.69	159.51
Df	11,60	11,60	11,60
P	<0.0001	<0.0001	<0.0001

The highest percent disease incidence (PDI) occurred during summer season whereas the lowest per cent disease index was observed during winter season (Sriharan *et al.* 1979). Tukra incidence was high during summer and monsoon periods when high temperature (above 30°C) and high relative humidity (above 70%) supported with intermittent pre-monsoon and monsoon rains (Rao *et al.* 1993). Among three different mulberry varieties viz V<sub>1</sub>, M<sub>5</sub> and local varieties, high per cent disease index of tukra was noticed in V<sub>1</sub> variety followed by M<sub>5</sub> and local varieties. The vigorous nature, fast growth rate, high protein and sugar content of leaves in V<sub>1</sub> variety might be attracting the mealy bugs (Aftab *et al.* 1999).

## SUMMARY

Survey was conducted in mulberry fields to know the severity and seasonal incidence of tukra disease across six villages of Chittoor and Ananthapur districts of Andhra Pradesh. The per cent disease index (PDI) was noticed in three different varieties of mulberry viz V<sub>1</sub>, M<sub>5</sub> and local. Across different villages relatively high PDI was noticed in Mamunduru and Ramunipalli villages of Chittoor and Ananthapur districts respectively. Among three different varieties high incidence of tukra  $46.7 \pm 2.06$  noticed on V<sub>1</sub> variety of mulberry. Its seasonal incidence was high in summer and pre monsoon season compared to other months.

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