

## EFFECTS OF DIFFERENT PRUNING OPERATIONS ON THE INCIDENCE OF RED SPIDER MITE OF TEA IN BANGLADESH

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*Key words:* Tea, Pruning operation, Incidence, Red spider mite

### Abstract

Effect of different pruning operations on the incidence red spider mite infesting tea was observed. The pruning operations were Light Pruning (LP), Deep Skiff (DSK), Medium Skiff (MSK) and Light Skiff (LSK) types considered as treatments. Results revealed that the incidence of red spider mite was more in skiff areas. Incidence of red spider mite was the lowest in LP (2.68%) and increase was noticed in DSK (5.73%), MSK (14.64%) and the highest in LSK (17.59%). LP pruning type significantly reduced the infestation of red spider mite in tea.

Tea plants are subjected to the attack of several pests such as insects, mites and nematodes. Moreover, characteristic features like the performance of shade trees, ancillary crops, forests, uniformity of cultural practices such as sequential pruning cycles, weekly plucking rounds, weeding, mulching etc. have greater impact on the subsequent colonization, stabilization and distribution of pests (Mamun 2011). Red spider mite (RSM) is one of the serious pests of tea in Bangladesh and responsible for depredation of yield and debilitation of tea plants causing considerable crop loss. It is estimated that 9.57% crop loss occurred due to this pest (Ali *et al.* 1994). Most of the valley circles reported severe infestation of red spider mites which are more prevalent and alarming round the year for the tea industry (BTB 2014). The larvae, nymphs and adult mites cause the damage. When large numbers of mites are present, sucking one leaf cell after another and sucking out the contents, the whole leaf eventually changes to a bronze colour, dries up and drops - especially in hot and dry weather (Ahmed *et al.* 2012). To combat this problem different groups of pesticides especially miticides (acaricides) have been used in the tea fields since 1960s (Mamun *et al.* 2014). In order to search an environmentally safe alternative, scientists considered the IPM tools in the place of synthetic insecticides. In this context, agronomic practices i.e. planting, shade regulation, plucking, pruning, irrigation, drainage, weeding are being considered as environmentally safe, economical and renewable alternatives for use in IPM programmes in tea.

Pruning is an essential agronomic practice implemented in winter for renovating vegetative growth at the expense of reproduction, to increase crop productivity in subsequent years. It is one of the important cultural operations in tea husbandry. Depending on the situation pruning cycle may be three year cycle or four year cycle. Three year cycle = Light Pruning → Light Skiff → Deep Skiff. Four year cycle = Light Pruning → Deep Skiff → Medium Skiff → Light Skiff. Three and four year pruning cycles were the conventional recommendations for the tea plantation in Bangladesh (Anon. 1986). Nowadays three year pruning cycle is not practiced except prolong drought area only. With the change of time, like many other tea growing countries, from long term results, four-year pruning cycle i.e. LP, DSK, MSK and LSK have been adopted to increase the productivity of tea. The different pruning cycles with pruning height and scheduled are presented in Table 1.

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An experiment was conducted to determine the effect of different pruning operations on the incidence of red spider mites infesting tea at the main farm of Bangladesh Tea Research Institute (BTRI), Srimangal, Moulvibazar during January, 2013 to December, 2013. The experiment was set up following randomized complete block design (RCBD) with three replications in clonal sections. Different types of pruning operations i.e. Light Pruning (LP), Deep Skiff (DSK), Medium Skiff (MSK) and Light Skiff (LSK) were made in the respective plots and considered as treatments (Fig. 1). Untouched/unpruned section was considered as control. Other agronomic practices i.e., plucking, spraying, weeding, mulching, irrigation etc. were done by the farm management as and when required. Systematic random sampling was made on the leaf count method in sections received LP, DSK, MSK and LSK. Pre-treatment observation (no. of mites/10

**Table 1. Pruning schedule of mature tea followed in the tea plantation of Bangladesh.**

Pruning type	Pruning height	Pruning time
Light Pruning (LP)	55 cm	1st week of December to last week of December
Deep Skiff (DSK)	65 "	1st week of January to last week of January
Medium Skiff (MSK)	70 "	Middle of January to 1st week of February
Light Skiff (LSK)	75 "	Last week of January to whole month of February



Fig. 1. Different types of pruning operations in the experiment. A. Light Pruned (LP) section. B. Deep Skiffed (DSK) section, C. Medium Skiffed (MSK) section, D. Light Skiffed (LSK) section.

mature leaves) was made before pruning operation performs. Data on the infestation were recorded at weekly interval. Observations on mite population were made on both adaxial and abaxial side of the collected leaves using mite brushing machine (Model- Leedom Engineering, 1362 Casa Court, Santa Clara, California 95051, USA) and a compound microscope. The degree

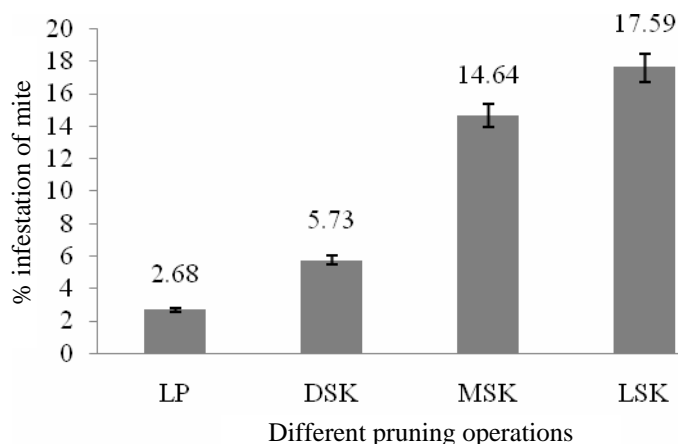
of infestation was also assessed on all bushes in each plot by eye estimation using an index system of 0 to 4 (Das 1960), as follows: 0 = Practically no infestation, 1 = Slight infestation, 2 = Moderate infestation, 3 = Severe infestation and 4 = Very severe infestation.

Pruning has a significant effect on the incidence of red spider mite in tea. Result revealed that the incidence of red spider mite was found less in prune section than skiff sections. Incidence of red spider mite was found the lowest in LP (2.68%) and increase was noticed in the DSK (5.73%), MSK (14.64%) and LSK (17.59%) sections subsequently (Fig. 2). The rate of reduction of red spider mite infestation over control was 86.79% in the case of LP (Table 2). Light pruning (LP) significantly reduced the infestation of red spider mite. According to Das (1960), Infestation index of red spider mite was in LSK (3.48) and in LP (1.24) in a scale of 4 (Fig. 3). The mite infestation was gradually decreased from LSK to LP exponentially.

**Table 2. Month wise incidence of red spider mites in different pruning operations in tea.**

Treatment	Pre-treat-obs.	% incidence of red spider mites under different pruning operations*												Overall mean (%)
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	
T <sub>1</sub> LP	76	0.00	0.54	1.43	3.20	3.74	5.12	4.32	3.14	2.54	3.22	3.71	1.24	2.68a
T <sub>2</sub> DSK	82	0.62	2.38	3.93	6.36	9.64	10.66	9.84	5.43	3.88	4.64	5.26	1.84	5.73b
T <sub>3</sub> MSK	68	3.44	6.28	14.36	21.48	26.43	32.62	20.22	14.88	8.56	10.28	12.56	4.67	14.64c
T <sub>4</sub> LSK	79	6.38	10.61	17.58	24.32	29.49	35.84	24.24	17.08	10.83	13.16	15.34	6.26	17.59d
T <sub>5</sub> Control	70	10.48	14.32	18.44	26.12	32.48	38.98	28.34	21.63	12.34	14.86	16.58	8.92	20.29e

\*Average of three replications. Within the column value means followed by a different letter(s) are significantly different by DMRT ( $p < 0.05$ ).



**Fig. 2.** Incidence of red spider mite under different pruning operations in tea.

The effect of pruning has been demonstrated for *Xyleborus fornicatus* in Sri Lanka (Sivapalan 1985). Similar works have been done for *Brevipalpus phoenicis* in Kenya and *Oligonychus coffeae* in North East India by Ratan (1992) and Das (1960), respectively. Dutta (1960) found that blister blight can be fully removed by doing LP operation in India. Ahmed and Mamun (2012) also found the similar trends in case of major pests of tea in Bangladesh. They reported that the incidence of

*Helopeltis* was high in LSK (15.82%), MSK (15.14%) and DSK (13.56%) sections whereas termite was high in MSK (21.47%), LSK (17.38%) and DSK (14.76%) sections. RSM incidence was minimum in the LP (1.68%) and the highest in LSK (14.24%) and MSK (12.54) sections. Harrison (1937) also concluded that tea left unpruned (skiffed) and carrying much old leaf and banjhi growth especially susceptible to red spider mite. It is to be noted that the incidence of red spider mite depending on the various factors, varies from country to country, circle to circle, estate to estate and even section to section in the same tea estate.

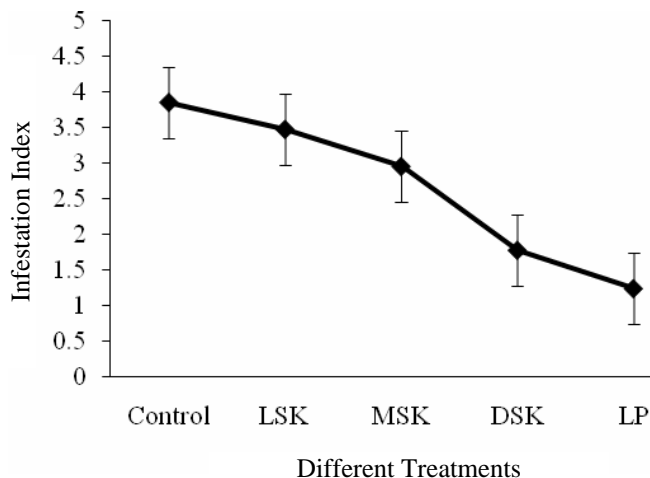


Fig. 3. Infestation index of red spider mite under different pruning operations in tea.

Pruning has a strong positive effect on the yield, quality and the incidence of red spider mites of tea in Bangladesh. LP is the best pruning operation for the maximum removal of red spider mite from the tea bushes. LP with defoliation appears to be a real safeguard against red spider mite attack. Such pruning can effectively be adopted as the important agronomical operation i.e. cultural measure in both organic and inorganic tea estates.

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*(Manuscript received on 29 March, 2015; revised on 1 July, 2015)*