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TAPPING PANEL DRYNESS OF RUBBER: PREVALENCE, INCIDENCE AND SEVERITY IN TRIPURA

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A field survey was conducted in 43 rubber holdings of West and South Tripura districts to understand the occurrence, severity and seasonal variation of tapping panel dryness (TPD) of rubber. The lowest mean TPD of 7.5% was observed in BO-1 panel and the highest in BI-2 panel. The maximum mean TPD of 13% was observed at Kariamura II followed by Mirza (12.9%), Promodnagar (11.3%) and Rangamala (11.1%). The lowest TPD incidence was observed at Baghmara (1.9%) followed by Dariabagma (2.9%). The variation of TPD was observed for six consecutive seasons from winter (December-January) of 2007-08 to summer (April-May) of 2009. Mean TPD was maximum (16.6%) during the winter season of 2008-09 and minimum (9.1%) during the summer season of 2008. TPD intensity was observed to increase from summer to winter season. A tapping rest of around two months from middle of February to middle of April reduced TPD marginally in the subsequent summer season compared to that in the previous winter season.

Keywords: *Hevea brasiliensis*, Incidence, Season, Tapping panel dryness, Tripura

INTRODUCTION

Tapping panel dryness (TPD) is one of the factors affecting the yield of rubber tree, *Hevea brasiliensis* (Willd. ex Adr. de Juss) Muell. Arg. The etiology of TPD is not fully understood yet. Both partial and complete dryness in varying intensity in tapping panel are seen irrespective of clone, age, year of exploitation or location. This disorder may occur gradually or suddenly and ultimately results in economic loss. The primary symptoms of TPD are drying of the tapping cut at varying degrees, bark discolouration, bark thickening, scaling and flaking, woody burr formation, bark sloughing, cracking, peeling and drying on root stock near the bud union (Mathew *et al*., 2006). In some cases, bark drying, cracking and bulging are seen even in untapped trees, while in some TPD-affected trees, the bark dries up internally without showing any visible external symptoms.

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Similar to the traditional rubber growing regions of Kerala, TPD is observed in non-traditional rubber growing areas also. Tripura is known as the second rubber capital in India next to Kerala where the potential area of its cultivation is around one lakh hectares and around 50070 ha area is already planted with rubber (Rubber Board, 2011). But the productivity of rubber in Tripura is low *i.e.* around 1000 kg/ha (Sasikumar *et al*., 2005) compared to the national productivity of 1867 kg/ha (Rubber Board, 2010a). TPD is one of the factors affecting productivity of rubber and a key stumbling block in realizing the full yield potential of elite clones in the traditional areas (Jacob and Krishnakumar, 2006). Global loss of natural rubber due to TPD was estimated to be US $900 million per year (Sethuraj, 1998). Chen *et al*. (2002) reported that TPD leads to 12-20% loss in annual dry rubber production. Information on occurrence of TPD in different areas in relation to plant age and its seasonal variations under the agroclimatic conditions of Tripura is scanty. Hence, a survey was carried out in Tripura to study the occurrence of TPD and its seasonal variation.

MATERIALS AND METHODS

The TPD survey was conducted in 43 plantations in 12 locations of West and South Tripura districts (Table 1). West Tripura lies between 23°16' to 24°14' N latitude and 91°09' to 91°47' E longitude and South Tripura lies between 22°56' and 24°32' N latitude and 91°59' and 92°22' E longitude. TPD was surveyed in 4484 plants of clone RRIM 600 under various stages of tapping from the first year (BO-1 panel) to the third year (BI-2) in six consecutive seasons, *viz*. winter (December 2007 - January 2008), summer (April - May 2008), monsoon (June - September 2008), pre-winter (October - November 2008), winter (December 2008 - January 2009) and summer (April - May 2009).

Table 1. **Details of TPD surveyed areas**

District	Location	No. of holdings surveyed	No. of plants observed	Panel status
West Tripura	Rangamala	5	510	BO-1, BO-2
	Santarampara	4	419	BO-1
	Bhagawanpara	1	122	BO-1
	Baghmara	3	300	BO-1, BO-2
	Promodnagar	1	100	BO-2
	Padmanagar	1	100	BO-1
	Kariamura I	1	100	BO-1
	Kariamura II	1	100	BO-1
	Laxmandhepa	6	600	BO-1, BO-2
South Tripura	Bagma	4	526	BO-1, BO-2, BI-1
	Dariabagma	2	200	BO-2
	Mirza	14	1407	BO-1, BO-2, BI-1 & BI-2
	Total	43	4484	

Half-spiral alternate daily tapping frequency (S/2 d2) was followed in the surveyed locations with a tapping rest of two months from the middle of February to middle of April. TPD per cent was calculated based on the length of the dry portion of panel observed at the time of tapping using the following formula,

$$\text{Intensity of TPD (\%)} = \frac{\text{Length of dry panel}}{\text{Total panel length}} \times 100$$

Based on the intensity of TPD (%), trees were grouped into five categories, *i.e.* healthy (0%), low (≤ 25%), medium (26-50%), high (51-75%) and very high (> 75%) intensities. TPD incidence in a particular panel was calculated by taking the average TPD incidence in each year of tapping on that panel (total five years). The continuous occurrence of TPD on adjacent trees along the direction of tapping and clustering of TPD trees were also assessed.

RESULTS AND DISCUSSION

Incidence of TPD in different panels and seasons

Average TPD incidence was observed to be 7.5% in BO-1, 9.3% in BO-2, 17.1% in BI-1 and 19.6% in BI-2 panels (Table 2). Seasonal average TPD was observed to be 9.1% in summer, 13.2% in monsoon, 15.7% in pre-winter, 16.6% in winter (2008-09) and 16.1% in summer (2009). The highest TPD incidence was observed during winter period with more fresh incidences. Slight reduction in TPD was observed during summer period immediately after two months of tapping rest in winter (Fig. 1). Das *et al* (2006, 2008) also reported that TPD was more serious in the winter season in Tripura than in the other seasons and a tapping rest for a few weeks during winter considerably decreased the progression of TPD in the other seasons. Deka *et al.* (2005) reported 15.5 and 12.1% of TPD in clones RRII 105 and RRIM 600, respectively in Tripura. No definite trend in the incidence of the syndrome was observed with the age of the tree and years of exploitation in the survey (Deka *et al.*, 2005). However, in another study in Tripura, four per cent rubber trees were fully dried in BO-1 panel and the drying percentage increased in the subsequent panels (Dey, 2006).

Severity of TPD

On an average, 76.7% trees were found healthy over the seasons studied. Among the TPD affected trees, 8.3% trees were observed in low, 4.3% in medium, 2.4% in high and 8.3% in very high TPD groups (Fig. 2). TPD

Table 2. **TPD in different panels in various seasons**

Panel	Per cent TPD (>50 % panel dryness)						Mean
	Winter (2007-08)	Summer (2008)	Monsoon (2008)	Pre-winter (2008)	Winter (2008-09)	Summer (2009)	
BO-1	7.0	5.7	6.3	7.6	8.7	9.9	7.5
BO-2	5.7	7.6	9.6	11.7	12.2	9.4	9.3
BI-1	9.9	9.3	19.0	20.6	22.2	21.6	17.1
BI-2	16.0	13.7	18.0	23.0	23.4	23.6	19.6
Mean	9.6	9.1	13.2	15.7	16.6	16.1	

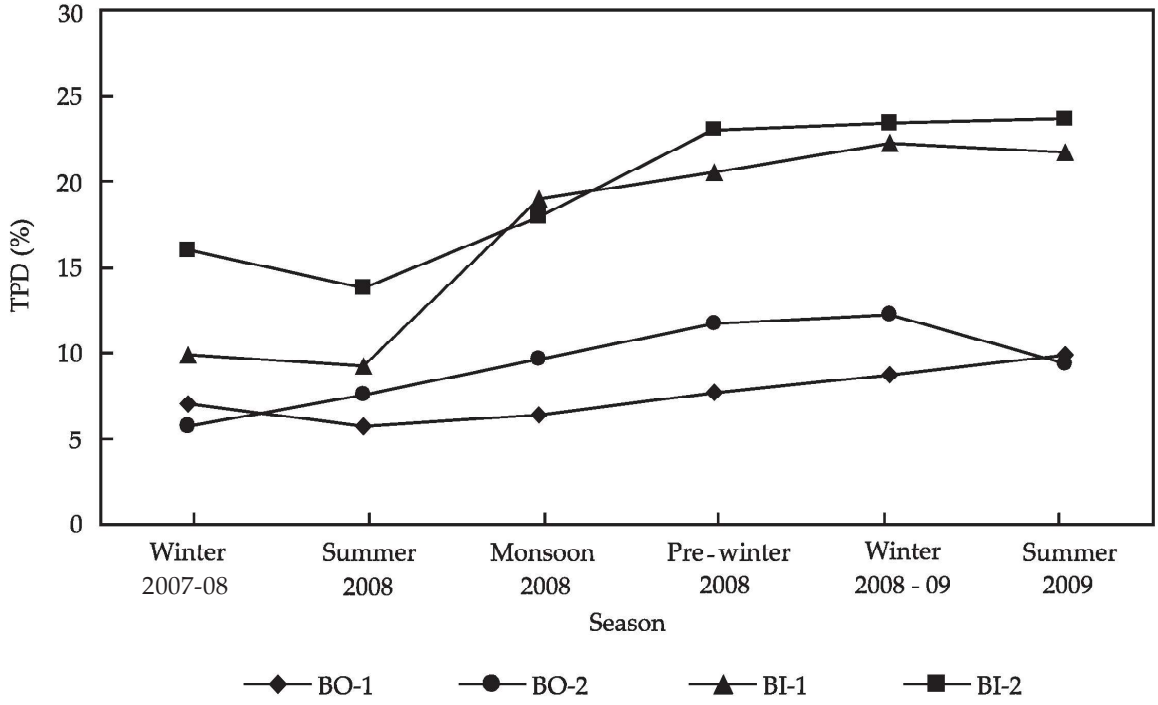

Fig. 1. Trend of TPD incidence in various seasons

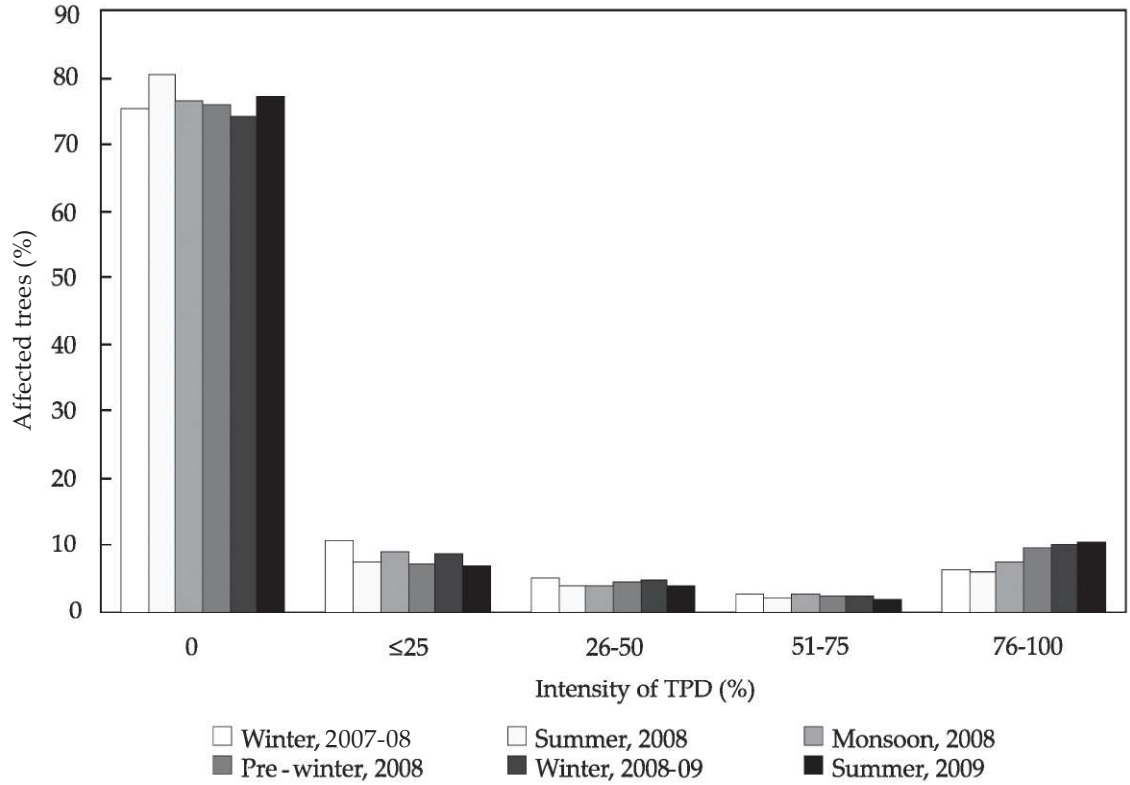

Fig. 2. Trend of TPD intensity in various seasons

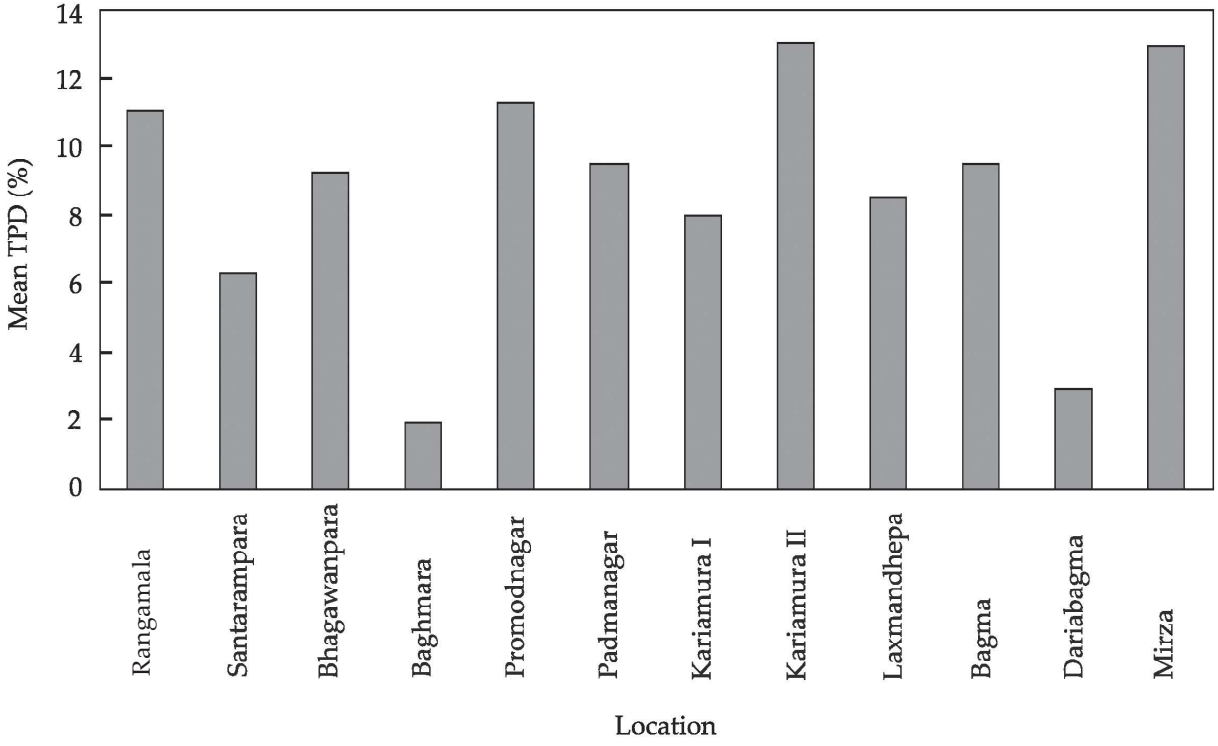

Fig. 3. TPD at various locations of West and South Tripura

intensity was increased marginally from summer to winter season.

Occurrence of TPD at different locations

Per cent incidence of TPD was observed to vary from 1.9 to 13.0 at the various locations (Fig. 3). The maximum mean TPD (13%) was observed at Kariamura II, followed by Mirza (12.9%) and Promodnagar (11.1%). The lowest incidence was observed at Baghmara (1.9%) and Dariabagma (2.9%). Across the surveyed locations and seasons, the mean TPD incidence was 8.9%.

Continuous occurrence of TPD (two or more plants with ≥ 50% panel dryness) in the direction of tapping was observed in the surveyed locations. In some areas, 10 to 15 fully dry trees were observed in a row. On an average, 8.2% TPD-affected plants were observed in clusters of two or more trees and more clusters were seen in winter than other seasons. Abraham *et al.* (2006) reported that the number of TPD trees in clusters of two or more showed a remarkable increase as tapping progressed from BO-1 to BI-2 panel compared to the single TPD trees in southern rubber growing regions of Kerala, indicating a chance of possible spread of TPD from one tree to the neighbouring tree.

Management of TPD

The predicted revenue loss due to TPD in India is a staggeringly high amount of Rs. 1463.4 crore per annum. So it is imperative to manage TPD effectively in order to prevent economic loss and to meet the growing demand of natural rubber. Some

recommended management practices are mentioned below (Rubber Board, 2010 b).

i) When 10% of the population in a holding is noticed to be affected by TPD, tapping intensity should be reduced. It is advantageous to follow S/2 d3 tapping frequency instead of S/2 d2 frequency.

ii) Stimulation of tapping panel with ethephon should be withdrawn immediately once TPD symptoms begin to appear. Many studies have shown that early and indiscriminate stimulation is bound to be harmful and should be avoided in TPD-affected trees.

iii) Early detection of TPD symptoms (like continuous dripping of latex with a drop in the dry rubber content, partial drying up of tapping cut with outer latex vessels drying up first, light brown discolouration of the affected bark) and giving tapping rest to these trees are very important for reducing the incidence of TPD.

iv) Low frequency tapping should be adopted in trees which exhibit early symptoms of TPD.

v) When the lower panel is affected by TPD, controlled upward tapping (CUT) seems to be a practical way of managing TPD trees to some extent.

vi) The dry bark of the TPD-affected panel should be removed by thick shaving to avoid bark cracking and insect attack.

CONCLUSION

It can be concluded from the present survey that there was considerable incidence of TPD in Tripura and this varied among the four different seasons, *viz*. summer, monsoon, pre-winter and winter. Average TPD was high during winter and low in summer. Two months of tapping rest during February to April decreased TPD marginally during the subsequent summer months. With the increase in years of exploitation, average TPD incidence is also increased. However, the trend was not uniform in all the locations for all the panels observed in the present investigation.

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