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Farm School - An extension tool to increase productivity of rubber smallholdings by improving tapping standards

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Rubber plantation industry in India is unique in that about 90 per cent of it is under the small holding sector with an average unit size of less than 0.5 ha (Rubber Board, 1958 – 2008). Such small holder farming families manage the units on their own or at the most assisted by a labourer, mainly for harvesting latex through tapping. The involvement of such a large number of persons, having liberty to follow the cultural/maintenance practices as they feel feasible, give room for a wide range of variations with regard to the plantation maintenance status, production as well as productivity of units (Rajeevan, 2009). Rubber tapping, the skilled job among the plantation maintenance practices is crucial in that the quality of tapping influences the productivity and production of NR (Thomas *et al*., 2009). Quality of tapping is directly related to the involvement of the tapper (Ramesh, 2004) and the dearth of involvement leads to (a) loss of produce (b) decline in yield (c) damage to bark of trees leading to reduction in economic life span and (d) cessation of tapping due to tapping panel dryness (TPD). Similarly, the involvement of the owner is necessary to provide the infrastructure facilities for improving the tapping standards. The Rubber Producer's Society (RPS) acts as a facilitator by arranging the tools and infrastructure for implementation of the scientific recommendations on tapping. The 'farm school concept' attempted for extension management is to ensure proper adoption of the scientific harvesting techniques.

The study was undertaken in Tripura, in North East of India, which is a non-traditional area for rubber cultivation. As the rubber cultivation is relatively a new farming activity in Tripura, strong extension support was essential to guide the farmers in scientific rubber cultivation and plantation maintenance (Krishnakumar *et al.,* 1997).

The study was conducted through workshops having two phases by adopting Nominal Group Technique in the service area of Rubber Producer's Societies (RPS) namely Purbanoagaon, South Anand Nagar and Kukrania, spread over different parts of West Tripura district. In all the three areas, rubber plantations were started during early 1980s and a considerable number of plantations were under tapping for more than ten years. Ten units were selected under each RPS and the 10 planters, their 10 tappers and five representatives of the RPS concerned were included as the delegates in workshops.

A proper blend of the conventional paradigms of agricultural extension was the key feature of the methodology that was designed to match the resources and culture of the stakeholders ensuring reasonable recognition for the local expertise and traditional wisdom together with involvement of the group in decision making. Care was taken to make the educational part informal, demand-driven and participatory (FAO,1997).

A modified creative problem solving process was followed to generate novel and workable solutions to the problems associated with the

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practice of tapping system. This method involved facilitating every stakeholder to have a casual group visit and a close observation of their own plantation as well as the units of their neighbours. The confidence building approach helped them to identify the problems and arrive at acceptable problem solving process through comparison without disturbing the self-esteem of the participants (Krishnakumar, 2005).

Workshop on the mode of operation

During Phase 1, two days informal gathering of all the workshop participants was arranged. The workshop began with a demonstration of scientific tapping by the rubber tapping demonstrator (RTD), supplemented with comments on harvesting and plantation maintenance, by the extension officials. This was done with special care aiming at 'making better the best', (Objective Finding Stage). Thereafter, the delegates were grouped at random into five groups taking care to see that each team represents planter, tapper and RPS nominee.

The groups were deployed at different parts of the plantation and each group was asked to closely observe the quality of tapping (fact finding stage) on 20 trees. Opinion leader of each group was guided to consolidate the observations and to note the copiable merits and also the demerits, if any, to be rectified.

Thereafter, the groups assembled in the same plantation presented their observations highlighting the merits on the tapping methods observed. Finally, the observations of all the 5 groups were consolidated by the RTD and supplemented with the views of extension officials. The points for rectification were demonstrated by the RTD and noted in triplicate in an instruction booklet (solution finding stage). The original of the note was handed over to the planter/tapper (for reference), the first copy to the RPS for prompting and the second copy retained with the extension official concerned for follow up.

The willingness of the tapper and planter to do the rectifications suggested was checked (acceptance finding stage). Problems / hurdles in carrying out the rectifications like providing required tools/implements and assistance to the tapper for 'marking' *etc*. were resolved in the common platform to ensure compliance. The period for carrying out the rectifications also was fixed, keeping a period of maximum of one month. The schedule of the follow up visit also was fixed tentatively before leaving the plot.

The entire team then moved to the second plot. All the five team were deployed to different corners, asked to observe 20 trees each and the whole exercise continued as above, taking nearly 45 minutes. Visits to the units of all the 10 participant planter/tapper were completed by the forenoon of day 2 of the phase I of the workshop.

An evaluation session was conducted in the afternoon of the second day in which all the participants were given an opportunity to share their experience. During this capacity building programme session, the feedback data received from the delegates were consolidated and video films on cultural practices were also exhibited. The labour welfare schemes implemented by the Rubber Board were explained and facilitated the enrollment of participant tappers. This session was envisaged to provide a platform for interaction of tapper and planter and encouraged them to offer their contribution to improve the efficiency of tapping and thereby improving the crop productivity.

The follow up phase (Phase II) was conducted 3-5 weeks later. On the first day and the forenoon of the second day of the fellowship phase the planters, their tappers and the RPS representatives visited their respective plots together and evaluated the level of adoption. Any practical problems, faced while adopting the scientific practices during phase I was also sorted out. A review meeting was conducted on the afternoon of second day in which the participants presented their achievements supported by data on improvement in yield and standard of tapping. This resulted in a confidence building exercise for all the participants.

Baseline data pertaining to the pre-workshop and post-workshop period were gathered through survey administering schedules-I and II (appendix 1 and 2) on the standard of tapping and the crop productivity from 30 plots (10 plots per RPS) covered under study. The five variables of standard of tapping studied were (1) the extent of bark consumed during the preceding tapping season, (2) the number of injuries on 60 sq. cm. area of the preceding season tapped panel, (3) the excessive/ deficient length of the S/2 cut (in cm) than the

optimum, (4) the slope of tapping cut and (5) the number of latex spill over points. Each plot under study were divided into 10 quadrets, each of a maximum of 100 sq. m. and the central trees of each quadret were marked for recording the data. The data on all the five variables were collected after the succeeding tapping season.

Yield data pertaining to the units under study were collected from the RPS concerned. Group processing centres (GPC) were in operation for a minimum of 3 years in all the RPS. The 10 planters who were surveyed for data collection under each RPS were regular suppliers of latex to the GPC. Their monthly yield data pertaining to the 'productive' months of July to December of pre and post-workshop year were collected from the records of the RPS. From this, yield data pertaining to the months when tapping was regular, (September to December) and the yield data recorded were compared.

The pre-workshop and post-workshop data were analyzed in detail to assess the changes in the standard of tapping. These changes were then correlated with the difference in yield. Analyzes the data statistically following paired 't' test.

Remarkable improvement in all the five variables with regard to the standard of tapping could be observed as a result of the participatory extension management practice adopted in the workshop. The close association of delegates and the group-based problem identification process facilitated during the workshop could make the rectification process a demand-driven activity. Since the level of participation in designing the pragmatic problem solving and implementation process was high, the level of adoption of rectification measures was also high. The improvements in tapping standards could bring about a significant increase in yield. The analysis of the results was carried out adopting the following two approaches.

Impact on improving the tapping standards

Significant improvement in the standard of tapping was noticed between the pre and post-workshop period on each of the five variables. The overall improvement in yield in all the units was highly significant.

(a) Slope of the tapping panel during pre-workshop (26.7°) improved after the workshop (29.6°) and was very close to the scientifically stipulated 30°. The deviation in the slope of tapping panel from the optimum could be brought down significantly (Table 1). This could be achieved by convincing the advantage of using template for marking the tapping panel on trees annually and passing the message that tapping without marking will not be able to keep the desirable slope of the tapping panel.

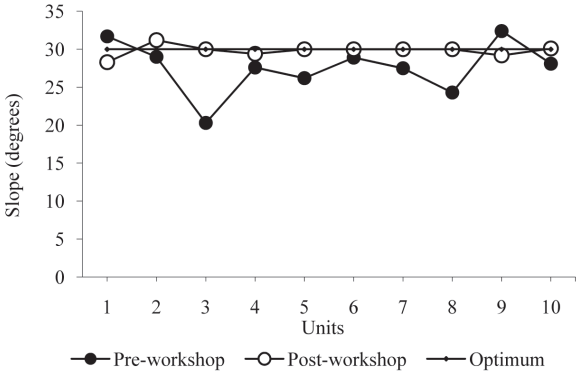

Fig. 1. Slope of tapping panel recorded in Kukrania R P S

(b) Length of tapping panel in half spiral (S/2) cut is important for ensuring maximum yield. Deficit in the length of tapping cut results in reduction in yield; similarly, excessive tapping by crossing the (S/2) limit line hinders the scientific tapping on the opposite panel. The percentage of improvement in optimizing the length of tapping cut (Fig. 2) through the workshop was found highly significant in all the three RPS.

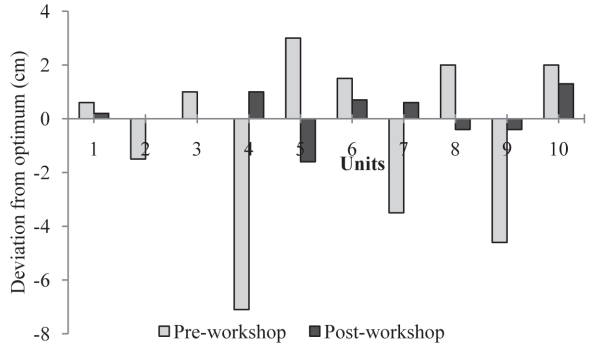

Fig. 2. Length of half spiral tapping cut observed in Purbanoagaon RPS

(c) Bark consumption is influenced by the skill of the tapper in minimizing the thickness of shavings in each tap and the number of tapping made during a specific period. The former factor depends totally on the sincere involvement of the tapper in his /her job and the latter depends on the initiative of the tapper to carry out regular tapping as well as the social and environmental factors. This variable has direct influence on total production from a panel and the economic life span of the tree. The interaction beyond barriers and the close association between planter and tapper facilitated during the workshop could avoid excessive bark consumption (Fig. 3). Tappers were motivated to ensure maximum days tapping days (in a recommended frequency) thereby bringing the extent of bark consumption to optimum level. This was another significant change achieved.

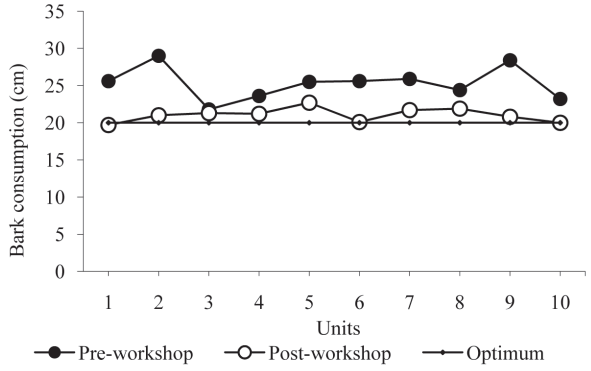

Fig. 3. Consumption of bark recorded in SA Nagar R P S

(d) Injuries on tapping panel leading to direct damage of the cambium on the tapping panel may lead to adverse impact on yield from the renewed bark. Therefore, the 55 per cent improvement in reducing the injuries to cambium (Fig. 4) achieved as a result of the workshop, had remarkable influence on crop production from the unit in the long run.

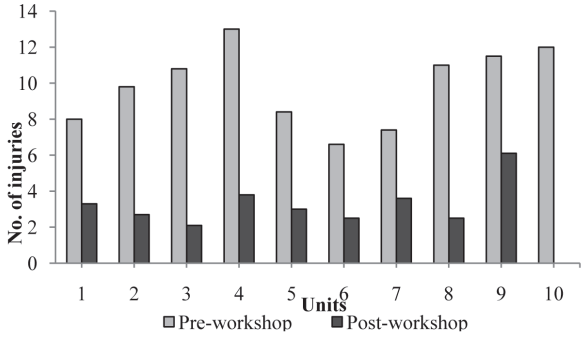

Fig. 4. Injuries to tapping panel observed in SA Nagar R P S

Table 1 depicts the pooled analysis of each of the parameters across these ten units observed from all the three RPS included in the study.

(e) Spill over latex is seldom collected as scrap; hence this portion of the produce is generally becoming waste. The sincere involvement of the tappers in his/her job gained through the sense of responsibility developed as a result of the workshop reflected in maintaining an inward slope of the tapping channel to avoid latex spill over. Nearly 80.3 per cent (Fig.5) improvement in avoiding wastage of latex due to spill over was recorded in the units studied. The achievement through the workshop in this regard is highly significant.

Table 1. Significance of improvement in variables of the standard of tappin

Variables	Optimum		Pre- workshop	Post-workshop	't'value
Deviation in bark consumption (cm)	20	Mean	5.18	1.54	06.48**
		SD	2.70	1.30	
Deviation in slope of tapping panel (degrees)	30	Mean	3.94	1.11	04.43**
		SD	3.00	1.87	
Deviation in length of half spiral cut (cm)	-	Mean	2.82	0.63	06.20**
		SD	1.94	0.57	
No. of injuries to cambium	0	Mean	12.17	5.62	11.22**
		SD	4.24	3.76	
No. of latex spill over points	0	Mean	11.95	2.40	10.25**
		SD	4.44	4.10	

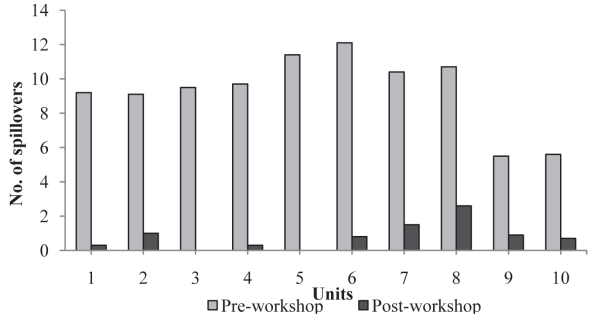

Fig. 5. Rate of latex spill over observed in Purbanoagaon RPS

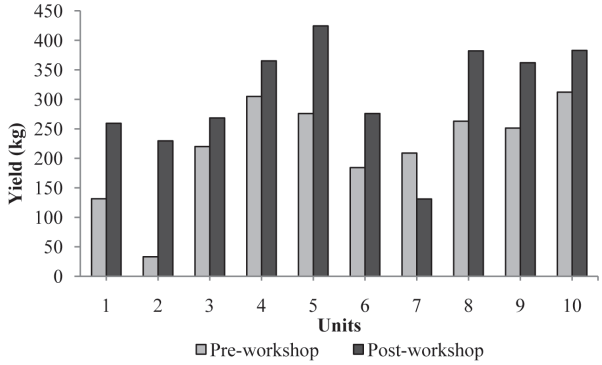

Fig. 6. Yield difference observed at Purbanoagaon R P S

Impact on improving yield

The individual impact as well as the collective impact of improvement in each of the above five variables (a-e) contributing to the standard of tapping was analyzed in detail in relation to yield. The mean increase in yield as a result of the collective improvement of the five variables was 49 per cent, 35 per cent and 44 per cent under RPS, Kukrania, Purbanoagaon and South Anand Nagar, respectively. The overall increase in the mean yield of all the units during the post-workshop period was highly significant (Table 2).

Table 2. Improvement in mean annual yield (kg) of units under study

Mean & SD	Pre- workshop	Post-workshop	't'value
Mean	384.97	558.85	5.85**
SD	402.33	507.91	

Wide variations were observed among the units covered under each RPS regarding the difference in yield during pre-workshop and post-workshop period (Fig. 6). However, 90 per cent of the units in two RPSs and 100 per cent units in the third RPS recorded considerable increase in yield. Under Purbanoagaon RPS the range in yield increase varied from18.5 per cent to 97 per cent. In South Anand Nagar the range was between 2.6 per cent to 52.0 per cent and in Kukrania it was 5.5 per cent to 68.5 per cent. An overall increase of 45.2 per cent yield was observed in the study area in the post-workshop period that can be attributed to the improvement in the standard of tapping methods.

One unit under RPS Purbanoagaon recorded 97 per cent increase in yield. In this unit the level of adoption of the scientific stipulations with regard to bark consumption and maintenance of slope of tapping cut were 96.6 per cent and 99 per cent respectively. The level of maintenance of length of tapping cut to optimum level increased after the workshop to 83.3 per cent from the 62.5 per cent during the pre-workshop period. Injuries reduced by 55 per cent and the improvement in minimizing the spill over points was 91 per cent. The cumulative impact of significant positive changes in all the variables resulted in the remarkable increase in yield.

Out of the 30 units covered under this study, two units at Purbanoagaon and one unit each at S.A. Nagar and Kukrania recorded a yield improvement above 50 per cent (Fig. 7). Interestingly it could be observed that in the cases where the yield increase recorded were above 50 per cent, all the five variables were improved almost near to optimum levels recommended. In units where the yield increase was nominal the level of adoption of the recommendations was less than 20 per cent. Thus, the increase in yield was found to be directly proportional to the level of adoption of the recommended tapping standards, collectively. The number of tapping days was reduced considerably during post-workshop period by 39 per cent and 29 per cent respectively from the preceding season in one unit each under RPS Purbanoagaon and S.A. Nagar, consequent to some unforeseen casualties. Moreover, wind damage caused loss of some trees. Consequently, the level of adoption of corrective measures proposed for the variables of tapping standards were below average. Hence, a decline in the yield was recorded in these units after the workshop.

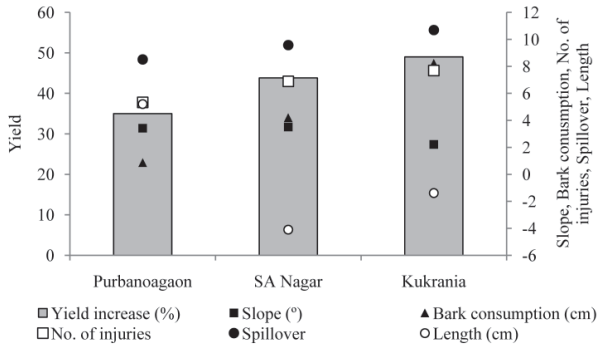

Fig. 7. Comparison of yield in relation to the variables of tapping standards

The variables studied contribute to the yield per tree and thereby the productivity of the unit. The impact of each of the variables on the yield was found to differ considerably. Minimizing of latex spill over and injuries to cambium contribute significantly for yield improvement. The impact of maintaining the slope of tapping cut near to the stipulated 30°, maintaining optimum length of tapping cut and optimum bark consumption also influence the yield improvement. Since the influences of these variables are inter-related the cumulative impact of improvement in more than one can be highly significant for improving the production.

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