

## RESIN TAPPING IN BOMDILA FOREST DIVISION OF ARUNACHAL PRADESH – A CASE STUDY

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### Abstract

The present study was conducted to explore a case from Chir Pine Forest in West Kameng district of Arunachal Pradesh on resin tapping and its contribution to state's economy. Resin tapping and its related activities like extraction, collection and transportation are one of the major sources of employment for a large number of rural poor people. Based on the quantity of blazes made for resin extraction, revenue is generated to the government. However, some challenges have been identified at local level regarding the loss of chir pine habitat in the area. It, therefore, concludes that some practical measures are necessary to overcome the issues and challenges so that resin tapping could be done in a sustainable manner. The survey and enumeration work of resin tapping was done by Northern Resource Survey (NRS) Division, Kamengbari during the month of May-June 2019.

**Key words:** Chir pine, West Kameng.

### INTRODUCTION

Bomdila Forest Division lies in the western part of Arunachal Himalayas where the biodiversity richness is greatest within the state. The area is very rich in orchids, bamboos, rhododendrons, medicinal and aromatic plants, birds, butterfly and one of the important winter sites for endangered migratory bird 'the Black Neck Crane'. A large portion of the area is the natural habitat of chir pine trees altitude ranging from 500 to 2000 m. Two pine species are common in the area viz. blue pine (*Pinus wallichiana*) and chir pine (*P. roxburghii*). Resin gums are obtained from both the pine species which further yield rosin, turpentine and callophine. These products fetch high price in both national and international markets. Rosin and its derivatives are used in cement varnishes, paints, sealing wax, adhesives, inks, paper making, boot polish, surface coatings, textiles, rubber making, soap making, dressing for machine belts, bows of violins and cellos and many others. In Bomdila Forest Division, resin gums are obtained from chir pine only due to availability of higher numbers of chir pine and

more yield of resin. The present survey was carried out during the month of May and June 2019. The survey deals with the procedure and challenges of resin extraction from chir pine in Bomdila Forest Division under West Kameng district of Arunachal Pradesh.

### STUDY AREA

The study was conducted in the pine bearing unclassified community forests under Bomdila Forest Division in West Kameng district of Arunachal Pradesh. Study area lies approximately between 92°19' E to 92°41' E longitude and 27°13' N to 27°27.7' N latitude. The northern part of the area is bounded by Tibet, eastern by Seppa Forest Division, southern by Shergaon Forest Division and western by Bhutan and Tawang. The area is mostly mountainous consisting narrow valleys surrounded by high hills. The hill slopes are moderate to steep at places and precipitous ranging from 25° to 65° and having three aspects viz. North-South; East-West and South-North. The study area falls under temperate pine forest where chir pine is the dominant tree. The area

occurs in the unclassified forests i.e. community forests areas and in Arunachal Pradesh, the Forest Rights Act, 2006 is yet to implemented in such unclassified forest due to lack of any Governmental regulation.

### Agriculture custom and wants of people

Till date the tribal people in and around the areas have community ownership on forest as per tradition and custom. They practice shifting cultivation mostly around the areas covered by the working scheme. They mainly grow maize, millets, rajmas, potato, beans and green vegetables in their agricultural fields. The people cherish their rich age-old tradition and customs and they are dependent upon forests to meet up their day to day requirements. They derive their timber requirement from the forests. Dwelling houses are made with stone, bamboo and wood. Palatable leaves and grasses are essential fodder for their cattle.

A total of 395.29 km<sup>2</sup> forest area was allotted for resin tapping. Nafra block constitute the highest resin tapping area with 75 % followed by Bomdila 20 % and Dirang 5 % (table 1).

Table 1: Pine forest allotted for resin tapping

Block	Number of compartments	Area (km <sup>2</sup> )
Nafra	72	295.78
Dirang	5	20.00
Bomdila	9	79.51
Total	86	395.29

### Growing stock of chir pine

As per the latest working scheme, 273,590 nos. pine trees under Bomdila Forest Division are allotted for resin tapping. Maximum trees are located in Nafra block (table 2).

Table 2: Number of pine tree and blazes made in the latest working scheme

Block	No. of chir pine		Total
	Size: 90–150 cm gbh (OB)	Size: above 150 cm gbh (OB)	
Nafra	196,640	2,720	199,360
Dirang	20,490	440	20,930
Bomdila	52,610	690	53,300
Total	269,740	3,850	273,590

### OBJECTIVES OF RESIN TAPPING

- i. The main objective of resin tapping in chir pine forests on a sustainable basis maintaining the ecology and environment.
- ii. Enforcement of the scientific extraction of resin from chir pine trees occurring in the tract dealt with and utilization of the produce.
- iii. Earning of Government revenue on sustainable basis from the scientific tapping of resin.
- iv. Employment generation of local people in the forestry development activities and creating awareness amongst them towards protection and conservation of forest resources.
- v. Gradual involvement of local people in the forest developmental activities and creating awareness amongst them towards protection and conservation of forest resources.

To achieve the above objects, two working circles were constituted: The Resin Tapping Working Circle and The Wildlife Protection Working Circle.

The Resin Tapping area has pure crop of *Pinus roxburghii* Sarg. (chir pine). The crop as a whole is having density more than 0.5 and in some places the density goes up to 0.8. The main associates of chir pine under this working circle are *Quercus*, *Alnus*, *Cupressus* and *Emblica officinalis*. The whole area is classified into

three blocks: Nafra, Dirang and Bomdila. Local communities have been exercising their traditional rights over the areas since time immemorial, hence to benefit the local people, resin tapping operations were conducted mainly near the village sites. Operation sites under Nafra block are Ditchik, Koina, Rurung, Jerigaon, Upper Dzong, Nakhu, Nachibon, Khazalong, Lapusa, Nizang, Khellong, Growing No. I, Growing No. II, Ditchin, Sachida and Ramu. Under Dirang block there are only two operation block (Munna and 14<sup>th</sup> Miles) and under Bomdila block seven operation blocks are in function (Diching, Wanghoo, Rahung, Salari, Khoitam, Thembang-I and Megathung).

## **SURVEY DESIGN AND METHODOLOGY**

### **Sampling design**

The areas under this working scheme were identified and demarcated on toposheets. Thereafter, preliminary maps were prepared on 1:50,000 scale. In the resin tapping area (chir pine forests), 'Random Point Sampling' was carried out for enumeration of chir pine. A random grid points were reached within the compartment and after reaching the sampling point, i.e. the centre of the grid, a square plot of 0.1 ha was laid out by measuring 22.36 m horizontal distance i.e. half of the diagonal in all the four directions at 45° in north-east, 135° in south-east, 225° in south-west and 315° in north-west corners of the plot from true north with the help of compass. The dimension of the plot was measured at 31.62 m in horizontal distance on each side. Thus, the selected grid contained a sample plot of 0.1 ha (31.62×31.62 m). Similarly, quadrates of size 3×3m and 1×1 m were laid down at a distance of 30 m from the centre of the plot in all four directions along diagonals for the enumeration of pine saplings and seedlings respectively.

### **Sampling intensity**

With the present level of resources availability, it is decided to carry out sampling with the sampling intensity of 1 %. Accordingly, random points were taken in the compartment forming 0.1 ha plot for point sampling and the trees were enumerated. The result obtained as per this 1 % enumeration is applied to the whole areas of the compartments to arrive at the total number of trees occurring in the compartments under this working circle.

The sampling intensity has been kept at 1 % i.e. 1 sample plot in 1 km<sup>2</sup> area. Thus, 395 sample plots were studied in the total working scheme area of 395.29 km<sup>2</sup>.

### **Plot enumeration**

All the trees having girth 30 cm and above was enumerated, species wise and girth class wise from all the identified sample plots of 0.1 ha and recorded in the plot enumeration form. Branches which touched the north and the west border lines of the plot was included in the studied plot whereas the branches which touched the east and south border lines of the plot were considered out trees and not included in the current plot. Enumeration of the trees was done in clock-wise direction starting from the NE corner of the plot.

### **Precision and accuracy of survey**

The result of the survey is expected to be around the precision level of 95 % probability with error limit of ±5 %.

### **Method of resin tapping**

The tapping of chir pine trees is mainly done by the 'Rill method' of tapping as per guidelines issued by FRI, Dehradun under the title "Field Guide to Modern Method of Resin Tapping" as this method gives 22 % higher resin yield compared to other tapping methods. The

damage to the trees is also negligible. Basic steps of 'Rill method' is as follows:

- i. Preparation of the face of the tree.
- ii. Installation of a 'C' shaped resin collection system.
- iii. Making blaze on the tree to induce resin flow.
- iv. Application of chemical acid-base formulation spray to stimulate and maintain resin flow.
- v. Collection of resin, freshening of the blaze and also application of stimulant at suitable intervals.

The tapping of resin is essentially a manual operation. The most essential tools and accessories required for tapping are: i). Bark shaver tool, ii). Blaze frame, iii). Spray bottle, iv). Pot, v). Hammer, vi). Pot scraper-groove cleaner, vii). Nail puller, viii). Lips, ix). Freshening knife, x). Marking gauge, xi). Wire nails, xii). Collection can (Balti).

#### **Procedure for resin tapping**

- i. **Cleaning surroundings:** Clean the base of the pine tree by removing pine leaf needles, wood chips and dry barks from about 1.3 meters surrounding radius which will reduce the fire hazard. The removed materials should be well scattered on the ground.
- ii. **Trunk shaving:** Remove the loose and rough bark over the surface area of size 45×30 cm leaving a space of about 15 cm from the ground level using bark shaver. The surface should be fairly smooth and the thickness of the bark left should not be more than 2 mm to facilitate freshening of the blaze. At this stage, no crevices are left in the bark and it is reddish in colour.
- iii. **Marking position:** Put the blaze on the stem in the vertical position so that the lowest point of the frame is 30 cm above the ground level and mark the position of the blaze with marking gauge. Also, mark the position of

the central groove with the help of two wooden board and marking gauge.

- iv. **Cutting groove:** Cut the central groove with the help of groove cutter, drawing the cutting tool from above downwards. During the first year of tapping, when the blaze is very close to the ground level, it becomes necessary to cut the groove by moving the tool from down upwards. However, in subsequent years, the groove may be cut from top of the blaze downwards.
- v. **Fixing lip:** The lip should be fixed to the tree with the bullock shove nails. Pound the lip properly so that it fits smoothly against the tree. A 5 cm long wire nail should be driven into the tree about 2 cm below the midpoint of the lip for hanging the collection pot on it. The nail should be driven at a slight angle so that the pot hangs smoothly against the tree.
- vi. **Freshening blaze:** For freshening a blaze, the tapper should stand near the tree on one side of the blaze and hold the freshening knife at the lowest point of the central groove. Then, the knife should be pulled by the tapper along the blaze line marked on the tree. The same operation should be repeated. The average width of the bark left between consecutive rills is 5 mm.
- vii. **Treating blaze:** After making a freshening on both arms of the blaze, the chemical stimulant should be sprayed on the freshly cut rill by squeezing the plastic bottle and moving its nozzle in a steady motion along the rill. For obtaining good spray, the plastic bottle should be held at 45° angle to the tree and its nozzle should be kept about 3–5 cm away from it. Enough acid should be sprayed on the rill. The acid should be discharged from the bottle in the form of a spray. Precaution should be taken to hang the pot on the nail only after the extra acid has run down the lip.

Table: 3: Number of trees and blazes achieved

Year	No. of Chir pine Trees tapped			No. of blazes put on the trees		
	Nafra	Bomdila	Dirang	Nafra	Bomdila	Dirang
1998-1999	1,92,099	7,643	7,643	1,92,099	8,984	8,984
1999-2000	1,90,013	7,680	7,680	1,90,013	9,051	9,051
2000-2001	1,89,513	Nil	Nil	1,89,513	Nil	Nil
2001-2002	1,89,546	Nil	Nil	1,90,552	Nil	Nil
2002-2003	1,69,076	6,536	6,536	1,69,882	7,598	7,598
2003-2004	Nil	Nil	-	Nil	Nil	-
2004-2005	1,31,634	Nil	-	1,31,634	Nil	-
2005-2006	84,657	48,773	-	84,657	48,773	-
2006-2007	1,00,951	48,773	-	1,00,951	48,773	-
2007-2008	93,169	45,442	-	93,169	45,442	-
2008-2009	1,01,547	21136	-	1,01,547	21136	-
2009-2010	50,317	15080	-	50,317	15080	-
2010-2011	25,845	Nil	-	25,845	Nil	-
2011-2012	Nil	Nil	-	Nil	Nil	-
2012-2013	34,910	Nil	-	34,910	Nil	-
2013-2014	20,785	Nil	-	20,785	Nil	-
2014-2015	Nil	-	-	Nil	-	-
2015-2016	76,070	-	-	76,070	-	-
2016-2017	49,565	-	-	49,565	-	-
2017-2018	83,460	-	-	1,03,092	-	-
2018-2019	83,460	-	-	1,09,776	-	-
<b>Total</b>	<b>18,66,617</b>	<b>2,01,063</b>	<b>21,859</b>	<b>19,14,377</b>	<b>2,04,837</b>	<b>25,633</b>

### **Revenue and employment generation**

From last two decades private companies like Nafra Chemical Private Ltd and Arunachal Resin Private Ltd were involved in resin extraction from Bomdila Forest Division. At present resin has been extracted from 395 km<sup>2</sup> forest area of Nafra under Bomdila Forest division and considerable amount of revenue has been generated to the Government. By this activity, about 4000 peoples have been engaged during last year for extraction, transportation and processing. Besides, engaging local people, daily wage earner from nearby states were also hired duenon-sufficient of workers from local areas.

During the last 15 years, a revenue of Rs. 2,06,33,938 was generated from Nafra range and Rs. 31,28,140 in 5 years from Bomdila range. Year wise details of revenue earned by the State Government from resin tapping are presented in table 4.

### **Lines of export**

Tezpur-Bomdila road is the main line of transport to both Arunachal and Assam market. Resin is extracted from Nafra, Dirang and Bomdila blocks are transported to Resin factory located in the industrial estate at Tippi in the same district West Kameng. The finished products are then transported by road and railways.

Table 4: Revenue earned by the State Government from resin tapping

Year	Revenue earned in INR		Total
	NCPL (Nafra Range)	ARPL (Bomdila Range)	
2004-05	23,54,347	-	23,54,347
2005-06	14,39,169	8,29,14	22,68,310
2006-07	17,16,167	8,29,14	25,45,308
2007-08	16,77,042	8,17,96	24,95,006
2008-09	18,27,846	3,80,454	22,08,300
2009-10	9,05,706	2,71,440	11,77,146
2010-11	4,65,210	-	4,65,210
2011-12	-	-	-
2012-13	6,28,380	-	6,28,380
2013-14	4,98,840	-	4,98,840
2014-15	-	-	-
2015-16	19,01,750	-	19,01,750
2016-17	12,39,125	-	12,39,125
2017-18	25,77,300	-	25,77,300
2018-19	34,03,056	-	34,03,056
<b>Total</b>	<b>2,06,33,938</b>	<b>31,28,140</b>	<b>2,37,62,078</b>

### Degradation of pine forest

The major factors for degradation of pine forest are

- i. **Fire:** Chir pine being a fire hardy species, however, susceptible to fire damage till it established itself. The recruits and saplings are vulnerable to forest fire. Reportedly, fire is caused by natural lightning. Fire is also caused by the village people for different purposes as per their custom.
- ii. **Wind and storm:** The damage caused by wind and storm is significant.
- iii. **Human:** Anthropogenic factor is also one of the main reasons for causing damage to pine forest. Pine are used for construction of buildings, bridges, fences and as firewood.

### Regeneration of pine tree

The regeneration of chirpine has been found to be good in most of the compartments where number of seedlings>number of poles>number of trees. However, in some compartments the status of regeneration is fair where number of

seedlings<number of pole>number of trees. Out of 72 compartments in Nafra block, 58 were good while 14 were fair. Under Dirang block all three compartments were good. Under Bomdila block, 9 compartments were good and 2 fair. Overall, regeneration of pine seedlings is estimated as good in about 60 % of the study area.

### CONCLUSION AND FUTURE PRESCRIPTIONS

For a sustainable use of pine forest, following prescriptions must be strictly adhered:

- i. The trees below 90 cm girth at breast height should not be tapped. One blaze only shall be put on trees of 90–150 cm GBH and two blazes shall be put on trees above 150 cm GBH.
- ii. Acid mixture must be prepared as per Resin Collection Procedures (2064) in presence of forestry staffs, VFMC and local leaders before applying to trees. The approved

concentration of mixture is 18 litres water, 1 litre dilute sulphuric acid and 1 litre dilute nitric acid.

- iii. The marking of trees shall be done by the Forest Department by putting aluminium plate showing the reference number of trees, blaze and year for proper identification of individual tree.
- iv. At least five healthy and seed producing untapped trees per hectare must be left as mother trees which will assure quality regeneration of chir pine. The seed produced from tapped trees are of poor qualities and also the timber quality is decreased.
- v. Since, the damage to the chir pine crop is mainly from the fire, extension activities must be conducted like fire prevention training, workshops, distribution of leaflets, brochure, broadcasting on media, etc. Fireline may be constructed at fire prone areas and cleared the plant debris time to time.
- vi. Appropriate clauses shall be inserted in the lease agreement for resin tapping by the contractors that they will clean up the forest floor of the working scheme areas two times during the operation season. First cleaning of the debris and dry pine needles will be done just after putting the blazes and second

cleaning of all the debris including pine needles and other combustible materials from the working scheme areas just before the completion of the resin tapping for that year.

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### **REFERENCES**

- Anonymous, 2019.** Working Scheme of Resin Tapping for Bomdila Forest Division, Arunachal Pradesh.
- Anonymous, 2013.** Statistical Handbook of West Kameng District, Arunachal Pradesh.
- Kaushal, A.N., Sharma, K.R., 1988.** Tapping of Resin in Chir and Blue Pine. Bulletin No. RT1, pp.19–26.

**Photo plate**



Chir pine forest



Chir Pine



Rill method of resin tapping



Authors at surveyed area