EFFECT OF WIDTH OF BLAZE AND STIMULANT (IN RESIN TAPPING) ON THE GROWTH OF CHIRPINE (*PINUS ROXBURGHII* SARGENT)

BY

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Introduction

The blaze made on the trees for extraction of oleoresin cuts the phloem and cambium layer and also partly wood, specially in wood chipped blazes, thus reducing conduction of the photosynthate and minerals in this part and is likely to affect the growth of the trees. The effect of wound is expected to increase with increasing obstruction in the movement of assimilation products in the tree. However, widely different results have been reported in the literature on the effect of resin tapping on growth of various species of pines. For instance, it has been reported for *Pinus nigra* (Crivellari, 1958) that the reduction in volume increment by French as well as German methods of tapping was negligible. However, Schopmeyer (1955) reported that during the first season of tapping the diameter increament of slash pine is reduced and that there is a high correlation between the diameter increament and the intact circumference (total circumference minus width of wound). Schwerdtfeger (1959) even reported an increased in growth by resin tapping. The inconsistency in the results on this point in the literature appears to be due to the fact that no uniformity has been maintained in respect of the factors which affect the results of the experiments. One must take into consideration such factors as the duration of tapping, thetype, width and number of blazes etc. Further the point of measurement of diameter growth on the stem with respect to the blaze position is important, and so also is the time of measurement i.e. whether the effect of tapping is determined during the tapping period or when tapping has been stopped. In the latter case the period elapsed between the stoppage of tapping and the time of measurement of growth is also important. It has been reported (Tehnerjadnov, 1968) that although tapping reduced the ring width both during and after tapping, but subsequently it recovered to the pretapping level.

On chirpine, Mobbs (1935) reported that the diameter increment increased in the region of tapping by about 12 to 18% while it dropped by about 30% at 4.5 m height. The increment was measured many years after the tapping was stopped.

The effect of the width of blaze and the stimulants on growth of Chirpine was studied by the authors.

Experimental method

90 trees of chirpine tapped in an experiment conducted at Forest Research Institute, Dehradun (Verma, *et al.* 1976) by making different number of blazes of 10, 20, and 40 cm

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width and thus wounding different percentage of their girth as shown in Table I below were selected for determination of the effect of blaze width on the growth.

Table I

Group	Width of blaze (cm)	No. of blazes	Total width	Average girth of trees (cm)	Percentage of girth wounded	Remarks
1	2	3	4	5	6	7
I	10	1	10.0	130.9	7.6	
II	20	1	20.0	130.3	15.3	
III	20	2	40.0	130.6	30.6	
IV	20	3	60.0	130.9	45.8	
V	20	4	80.0	130.0	61.4	

Each group consisted of 18 trees which were divided into two subgroups. The blazes on the trees of subgroup A1 were treated with a 20% solution of a mixture of sulphuric and nitric acids (in equal proportion) and those of subgroup A2 were tapped without any stimulant. Tapping was carried out from 1971 to 1975 by the French method. Since the width of annual growth ring represents the thickness of the timber added to the tree annually and is an index of its growth rate, therefore, the radial increement of the trees was determined by measuring the width of annual rings both for the tapping period as well as for five years immediately preceding it. For this purpose four cores were taken at breast height (i.e. in the region of wound) from four directions on each tree and the average width of the annual ring during the corresponding period of 5 years was calculated for various treatments. For the purpose of comparison similar cores were taken from 9 untapped trees standing in the same area and of almost the same average diameter at breast height.

Results and discussion

The average width of annual ring of the trees during the period of 5 years before tapping and during tapping and the decrease in it under different treatments is given in Table II below:—

Table II

Group	Average width of annual ring (mm)						Means for treated and for untreated blazes
	Acid treated blazes			Untreated blazes			
	Before tapping	During tapping	% Fall	Before tapping	During tapping	% Fall	
1	2	3	4	5	6	7	8
I	2.65	2.32	12.	2.71	2.32	14.3	13.35
II	2.48	2.07	16.5	3.11	2.67	14.1	15.30
III	2.97	2.42	18.5	2.99	2.49	16.6	17.55
IV	2.62	2.06	21.3	2.91	2.47	15.1	18.20
V	3.78	2.72	28.7	3.55	2.85	19.7	23.90
Mean			19.4			15.9	17.64
VI (Untapped)	3.52	3.50	0.5				

The data given in Tables I and II show that the average width of annual rings during the tapping period was significantly reduced. The reduction in the ring width increased with the increasing percentage of girth wounded with the increasing effective width of the blazes. Since the decrease in the ring width of untapped trees during the corresponding period was negligible (0.5% only) so the deceleration of growth in the tapped trees can be attributed to tapping treatments only and not to any adverse weather conditions etc.

Variance analysis of the percentage decrease in ring width shows that the acid treatment and blaze width account for 45.58% and 30.85% of the mean sum of squares respectively. In the untreated blazes there is no significant difference in the percentage decrease in ring width between various treatments at 5% level while in the trees tapped with stimulant only treatment V was significantly different from others.

Regression was set up for the data obtained on the percentage decrease (x) in the average width of growth rings and the percentage of girth of the tree wounded during tapping (Y), both for the acid treated and untreated blazes.

The equations computed from the data are as under :

$Y = 11.019 + 0.258X$—for treated blazes (1)

$Y = 13\ 108 + 0.087X$—for untreated blazes (2)

The relationship is demonstrated graphically in the figure given on page 39. The observed values of the percentage fall in the width of growth ring do not depart from the regression values more than what can be attributed to the random error except in the lower range of the percentage of girth wounded in tapping.

The correlation between the percentage fall in the ring width and the percentage of girth wounded in tapping is closer in the case of acid treated blazes than in untreated blazes. The linear regression equation of the acid treated blazes accounts for 84.4% of the variations in the fall of ring width, while in the case of untreated blazes only 27.4% of the variation is accounted for by the equation.

The percentage decrease in the ring width was more in the trees tapped with the stimulant (Sulphuric and Nitric acid mixture) than those with untreated blazes, although the difference was not significant at 5% level. The average fall in the width of growth ring (for all the blaze widths) was 19.4% in the trees tapped with acid stimulant and 15.9% in those tapped without any stimulant. This checks with the results reported by Vysockij (1966) that tapping with the stimulants (sulphuric acid and bleaching powder) reduced the (volume) increment per ha by about 30–40% while without stimulants the decrease was about 25–30%. The greater deceleration of the increment with the stimulants like Sulphuric acid is explained by the fact that more resinosis takes place in this case and the resin fills up the wood in the vicinity of wound thus obstructing the flow of minerals in this part and adversely affecting the physiological process of the tree.

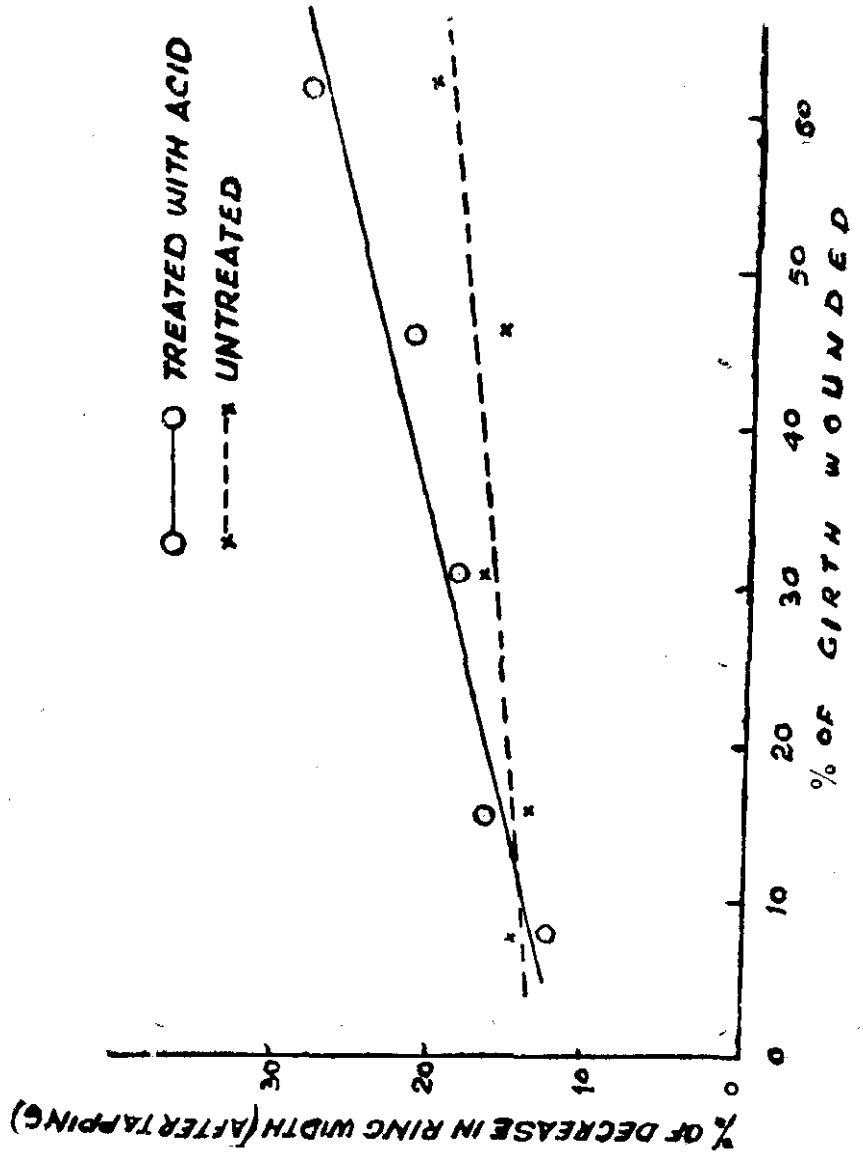
TREATED WITH ACID
UNTREATED
% OF GIRTH WOUNDED
0
10
20
30
40
50
60
% OF DECREASE IN RING WIDTH (AFTER TAPPING)
30
20
10
0

Fig. 1

The girth of the trees wounded in the practice of tapping in India varies from about 10.5 to 50% which is within the limits considered in this experiment.

SUMMARY

The width of annual rings was measured on 90 chirpine trees tapped for 5 years to different extent of their girth. Such measurements were also carried out on 9 untapped trees to compare the effect of tapping. The data showed that tapping significantly reduced the ring width during tapping period, the reduction being correlated to the effective width of the blaze. Tapping for 5 years with the normal (10 cm wide) blaze reduced the ring width by 14.3%. The trees tapped with the stimulant (20% solution of a mixture of Sulphuric and Nitric acids) showed on an average 3.5 percent greater decrease in the ring width than those tapped without any stimulant.

(लीसा च्यावन में) खरोंचे की चौड़ाई और उत्तेजकों का सामान्य चीड़ (पाइनस रावसबर्घिआई सार्जेन्ट) की वृद्धि पर प्रभाव

लेखक वी० पी० एस० वर्मा व एस० पी० पंत

सारांश

विभिन्न गोलाइयों तक पांच वर्ष च्यावित कराए गए सामान्य चीड़ के 90 वृक्षों पर वार्षिक वलयों की चौड़ाई मापी गई। तुलना द्वारा च्यावन का प्रभाव मालूम करने के लिए इसी तरह के माप 9 अच्यावित वृक्षों पर भी लिए गए। प्राप्त हुए आंकड़ों से पता चला कि लीसा च्यावन कराने की अवधि में वलय की चौड़ाई में काफी कमी आई तथा इस कमी का खरोंचे की वास्तविक चौड़ाई से सहसंबंध है। सामान्य खरोंचा (10 सेमी. चौड़ा) लगाकर पांच वर्ष तक लीसा च्यावन कराने से वलय की चौड़ाई में 14.3 प्रतिशत कमी आई। उत्तेजक (*गन्धक अम्ल और नाइट्रिक अम्ल* मिश्रण का 20 प्रशित विलयन) उपयोग करके च्यावित कराए वृक्षों में बिना उत्तेजक लगाकर च्यावित कराए वृक्षों के वलयों की चौड़ाई में आई कमी से औसतन 3.5 प्रतिशत अधिक कमी होती दिखाई दी।

Wirkung der Breite des Schalms und der Reizmittel (zur Harzschrapung) am Wachstum der Chirkiefer (*Pinus roxburghii* Sargent)

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ZUSAMMENFASSUNG

Die Breite der jährliche Ringen war an der 90 chirkiefere Bäume, für 5 Jahren zu den verschieden Umfangen geharzt, gemessen. Solche Messungen waren auch an 9 ungeharzte Bäumen, die Wirkung der Harzung zu vergleichen, angenommen. Die Angaben zeigten an daß die Harzung, während der Harzungperiode, die ringe Breite bedeutend verkleinerte, und die Verkleinerung zur wirksame Breite des Schalms, im Wechselbeziehung gebracht war. Die Harzung für 5 Jahren mit den normale (10 cm. weit) Schalm verkleinerte die ringe Breite bei 14, 3%. Die Bäume, mit dem Reizmittel (20% Lösung der Schwefelsäure und Saltpetresäure Mischung) geharzt, zeigten die durchschnitte 3,5% mehr Verkleinerung in den Ringen als die Bäume, mit keinem Reizmittel geharzt.

Effet de la largeur de carre et de stimulants (de gemmage) sur la croissance chez chirpine (*Pinus roxburghii*)

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Résumé

La mesure de la largeur des cernes fut effectuée chez 90 arbres de chirpine gemmés pendant 5 ans, à des étendues diverses de leur circonférence. Pour comparer l'effet du gemmage, des mesures furent effectuées également chez 9 arbres non-gemmés. Les données ont montré que le gemmage a provoqué, pendant la période de gemmage, une diminution significative de la largeur des cernes, la diminution se mettant en corrélation avec la largeur effective de la carre. Le gemmage à l'aide d'une carre normale (large de 10 cm) a diminué la largeur des cernes de 14.3 p. 100. En comparaison avec le gemmage sans stimulation chimique, le gemmage des arbres par stimulation a manifesté, en moyenne, une diminution plus élevée de 3.5 p 100, à l'égard de la largeur des cernes.

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