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Indian Forester, 139 (5) : 448-452, 2013
http://www.indianforester.co.in

ISSN No. 0019-4816 (Print)
ISSN No. 2321-094X (Online)

GROWTH ANALYSIS OF LAC PRODUCTION IN MADHYA PRADESH

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ABSTRACT

District-wise and crop-wise status of lac growing districts of Madhya Pradesh have been assessed with parameters like minimum, maximum, average production and simple growth rate (SGR) for four years (2006-07 to 2009-10). The study reported that the state contributes 16 per cent production of the country; however, the growth rate during the study period was negative and to the tune of 10.1 per cent per annum. Seoni district contributed maximum in lac production (41.6 per cent) followed by Balaghat (30.6 per cent), Hosangabad (8.4 per cent) and Mandla (7.0 per cent). Strain-wise growth rate for the whole state showed that both *rangeeni* and *kusmi* lac production attained a negative growth of 5.2 and 32.1 per cent per annum. Crop-wise growth rate for the state showed that *rangeeni*-summer attained positive growth (12.1 per cent per annum) while *rangeeni*-rainy registered negative growth (37.5 per cent). Similarly, both *kusmi*-winter and *kusmi*-summer crop registered negative growth rate of 34.0 and 29.9 per cent per annum respectively. Major reduction in lac production was due to loss of *rangeeni*-rainy crop which caused less availability of broodlac for next season. Thus less production in one season indirectly affected production of succeeding season crops also.

Key words : Lac production, Growth rate, *Schleichera oleosa*, Rangeeni and Kumi lac

Introduction

Madhya Pradesh state has 95221 km.^{2} forest cover which constitutes 30.89 per cent and 12.29 per cent forest cover of the state and the country, respectively (FSI, 2003). Millions of people in the state are directly and indirectly associated with this forest for their livelihood, income and employment generation. Besides many trees, lac host trees *i.e.* the 'kusum' (*Schleichera oleosa*), 'ber' (*Ziziphus mauritiana*) and 'palas' (*Butea monosperma*) are available in plenty in and outside the forest area. These hosts of lac are exploited for lac production which provides livelihood support to millions of rural, forest and sub-forest dwellers. In view of economic benefit derived from these trees, the inhabitants of forest areas are not felling these trees and thus forest is saved. A study made in Jharkhand (Pal *et al.*, 2007) shows that the ratio of farm and off-farm income of lac growers was 70:30. Income from lac cultivation was found to contribute 18.5 and 26.4 per cent of total income and farm income, respectively.

The 'palas' trees are utilized for 'rangeeni' lac cultivation and consist of two crop cycles per year (a) the summer crop is the commercial crop of 'rangeeni' raised in October and mainly harvested at immature stage in April, marketed as 'ari' crop (b) rainy crop raised in July and harvested in October mainly as broodlac but marketed after one month of harvesting as scraped lac from 'phunki' (*i.e.* empty broodlac). 'Ber' trees are also utilized for 'rangeeni'-summer crop but crop is harvested in May. 'Kusum' trees are exploited for production of 'kusmi' lac and it also consists of two cycle, the summer and winter crop of approximately six months duration. The winter crop normally considered as main commercial crop and output from summer crop used as broodlac and later on marketed in the form of scraped lac from 'phunki' lac.

Considering the importance of lac in socio-economic life of forest and sub-forest dwellers in Madhya Pradesh, the present study was taken up with the objective to analyze district-wise and crop-wise; minimum, maximum, average production and growth rate of lac production in Madhya Pradesh. An analysis of district and crop-wise lac production and current situation in the state will help in crop specific identification of suitable and potential area in the state as well as good performing districts. Besides, it would also help in the identification of constraints and to suggest scientific remedial measures.

Material and Methods

The district-wise and crop-wise data on lac production during last four years (2006-07 to 2009-10) for various lac producing districts of Madhya Pradesh state was collected from published source (Pal *et al.*, 2007-10). Besides average, maximum and minimum production of lac during four years, simple growth rates for various districts and crop, over times were worked out by fitting the simple regression equation using least square technique to the time series data (Holden *et al.*,

Madhya Pradesh contributes 16 percent of the total lac production of the country; Seoni district of the state being largest contributor of 41.6 per cent.

1990) as Y = a+bt where Y is production, t is time in years, 'a' the intercept and 'b' the regression co-efficient from which annual growth rate 'r' is calculated using the formula (b/y*100) (Pandey and Guglani 1990).

Result and Discussion

Analysis of data (Table 1) indicated that the average lac production of Madhya Pradesh during last four years (2006-07 to 2009-10) was 3,070 tons while maximum, minimum lac production during this period was 3,755 and 2,390 tons, respectively. The state contributed around 16 per cent in national production. The overall growth rate during this period recorded a negative growth of 10.1 per cent per annum against the national growth rate of -15.3 per cent per annum. The mean value indicated that Seoni district in Madhya Pradesh contributed maximum in lac production (41.6 per cent) followed by Balaghat (30.6 per cent), Hosangabad (8.4 per cent) and Mandla (7.0 per cent). Contribution by rest of the districts is nominal. Two districts namely Seoni and Balaghat together contributed more than 2,000 tons per annum sharing 72 per cent production of the state. Any change in the production of these districts will reflect overall production of the state.

During the period under study, three districts namely Seoni, Anuppur and Chhindwara recorded positive growth rate of lac production. Highest positive growth was recorded in Seoni district (6.9 per cent) followed by Anuppur (6.6 per cent) and Chhindwara (1.6 per cent). The highest negative growth was recorded in Narsinghpur district (97.6 per cent) followed by Hosangabad (49.0 per cent), Dindori (42 per cent), Mandla (40.5 per cent) and Balaghat (-14.4 per cent) district. Balaghat is a major lac producing district and recorded a negative growth of 14.4 per cent, Similarly, Mandla and Hosangabad district which together contributed 15.4 per cent share of state total production and recorded a negative growth of 40.5 per cent and 49.0 per cent, respectively. The maximum production recorded during last four years indicated that Balaghat and Seoni have potential to produce 2770 tons of lac per annum. There is no definite trend for performance of particular crop for the districts showing positive growth rate.

Table 2 presents Crop-wise production of lac and simple growth rate in lac production during the period 2006-07 to 2009-10. In Anuppur district, positive growth of 25.2 per cent was recorded for 'kusmi' lac and both winter and summer crop of 'kusmi' performed well with 34.3 and 15.4 per cent growth rate. Though the overall production of 'rangeeni' remained stable but 'rangeeni'-summer registered a growth of 13.3 per cent per annum and 'rangeeni'-rainy registered a negative growth of 17.1 per cent per annum. In Chhindwara district, 'kusmi' lac registered a growth of 14.4 per cent per annum. Contrary to this, in Seoni district positive growth was recorded for 'kusmi'-winter crop (24.0 per cent) and 'rangeeni'-summer (19.1 per cent) crop. Irrespective of crop season, overall 'kusmi' lac production remained stable but 'rangeeni' lac production increased with positive growth of 6.9 per cent per annum.

Three major lac producing districts, Balaghat, Hoshangabad and Mandla which together contributed 46 per cent share of state's production, showed that both 'rangeeni' and 'kusmi' crop recorded negative growth except in Balaghat where 'kusmi' lac recorded positive growth (72.9 per cent) but production is nominal only. Despite negative growth of 'rangeeni' lac in Balaghat district in general, the summer crop recorded a positive growth rate of 3.6 per cent per annum but rainy season crop showed a decline at the rate of 29.3 per cent per annum. In view of relatively high value of average production, this rate of decline influenced state production considerably. Both in Hosangabad and Mandla the decline of rainy season crop is faster than summer crop. It is quite possible that high temperature influenced rainy season crop more than summer crop.

Table 1: District-wise lac production (tons) and growth rate (period 2006-07 to 2009-10)

Sl.	District/State	Minimum	Maximum	Mean	Per cent share	Simple Growth Rate
1	Anuppur	24.0	30.0	26.8	0.9	6.4
2.	Balaghat	547.0	1400.0	939.3	30.6	-14.4
3.	Chhindwara	50.0	140.0	91.3	3.0	1.6
4.	Dindori	27.0	110.0	59.3	1.9	-42.0
5.	Hosangabad	120.0	505.0	256.3	8.4	-49.0
6.	Mandla	100.0	335.0	216.3	7.0	-40.5
7.	Narsinghpur	18.0	100.0	42.0	1.4	-97.6
8.	Seoni	1090.0	1375.0	1276.3	41.6	6.9
9.	Other districts	105.0	200.0	161.25	5.3	-18.9
	Madhya Pradesh	2390.0**	3755.0**	3069.8	100 (15.8)*	-10.1
	India	16,495	23,229	15,508	-	-15.3

* Figures in parentheses indicate contribution (%) by the state in country's production.

** Total state production figures are not necessarily sum total of district-wise production as figures may belong to different years during 2006-07 to 2009-10.

Table 2: Crop-wise production of lac (in tons) and growth rate (period 2006-07 to 2009-10)

District	Parameters	*Rangeeni*			*Kusmi*		
		Summer crop	Rainy crop	Both crop*	Winter crop	Summer crop	Both crop*
Anuppur	Minimum	10.0	5.0	20.0	2.0	2.0	4.0
	Maximum	15.0	10.0	20.0	5.0	5.0	10.0
	Mean	11.3	8.8	20.0	3.5	3.3	6.8
	Growth rate	13.3	-17.1	0.0	34.3	15.4	25.2
Balaghat	Minimum	150.0	90.0	540.0	0.0	0.0	0.0
	Maximum	900.0	800.0	1400.0	5.0	5.0	10.0
	Mean	412.5	522.5	935.0	2.5	1.8	4.3
	Growth rate	3.6	-29.3	-14.8	80.0	62.9	72.9
Chhindwara	Minimum	10.0	5.0	15.0	15.0	15.0	30.0
	Maximum	10.0	10.0	20.0	80.0	40.0	120.0
	Mean	10.0	8.8	18.8	41.3	31.3	72.5
	Growth rate	0.0	-17.1	-8.0	-3.6	14.4	4.1
Dindori	Minimum	5.0	2.0	7.0	10.0	10.0	20.0
	Maximum	10.0	15.0	25.0	35.0	50.0	85.0
	Mean	6.3	6.8	13.0	21.3	25.0	46.3
	Growth rate	24.0	-57.8	-41.5	-35.3	-48.0	-42.2
Hosangabad	Minimum	20.0	5.0	30.0	50.0	40.0	90.0
	Maximum	80.0	80.0	160.0	210.0	135.0	345.0
	Mean	38.8	31.3	70.0	112.5	73.8	186.3
	Growth rate	-45.2	-72.0	-57.1	-47.1	-44.1	-45.9
Mandla	Minimum	35.0	15.0	65.0	15.0	20.0	35.0
	Maximum	100.0	100.0	140.0	100.0	100.0	200.0
	Mean	56.3	48.8	105.0	55.0	56.3	111.3
	Growth rate	-2.7	-52.3	-25.7	-56.4	-52.4	-54.4
Narsinghpur	Minimum	5.0	3.0	8.0	5.0	5.0	10.0
	Maximum	5.0	5.0	10.0	60.0	30.0	90.0
	Mean	3.8	3.3	7.0	23.8	11.3	35.0
	Growth rate	0.0	-30.8	-14.3	-115.8	-111.1	-114.3
Seoni	Minimum	700.0	60.0	1075.0	5.0	5.0	10.0
	Maximum	1300.0	375.0	1360.0	10.0	10.0	15.0
	Mean	1050.0	213.8	1263.8	6.3	6.3	12.5
	Growth rate	19.1	-52.6	6.9	24.0	-24.0	0.0
Other districts	Minimum	35.0	15.0	60.0	10.0	30.0	40.0
	Maximum	50.0	50.0	100.0	70.0	50.0	120.0
	Mean	43.8	30.0	73.8	42.5	45.0	87.5
	Growth rate	1.1	-33.3	-12.9	-35.3	-13.3	-24.0
Madhya Pradesh	Minimum	1045.0	205.0	2115.0	130.0	145.0	275.0
	Maximum	2095.0	1340.0	3010.0	437.0	362.0	779.0
	Mean	1632.5	875.0	2507.5	308.5	253.8	562.3
	Growth rate	12.1	-37.5	-5.2	-34.0	-29.9	-32.1

*Both crop figures not necessarily sum total of individual crops as figures of individual crop may belongs to different year during 2006-07 to 2009-10.

The high temperature mortality takes place sometimes in May-June and it affects production of rainy season crop as it directly affects the quantity output of broodlac in the month of June-July.

In fact the production from any particular crop is also dependent on production from crops of preceding year also which acts as broodlac (Saha and Jaiswal, 1993). Apart from this, it was also known that the production from 'kusmi'-winter crop may be estimated based on production from preceding summer crop. The output from rainy season crop of 'rangeeni' lac largely depends on input (broodlac), rain during critical period of larval emergence and male emergence besides incidence of pest and diseases. The availability of quality broodlac for this crop comes from summer crop and field observation indicated that high temperature during summer resulted into death of lac culture resulting scarcity of broodlac in June-July.

Scarcity of broodlac can be minimized to a large extent by partial pruning of inoculated trees during February and by adopting suitable technique for inoculation. Another approach would be to introduce *Ficus* spp. in the area which are evergreen and conserve lac insect efficiently during summer season as well as

ensure broodlac availability for rainy season crop. Similarly, for minimum losses due to rain, it is suggested to adopt self-inoculation of tree rather than artificial inoculation (cutting broodlac from one tree and tying on other tree). In view of short span of larval emergence (one week) and time taken during transportation and inoculation, artificial inoculation causes considerable loss of brood value. Adoption of these measures along with recommended technology of pest management during rainy season for 'rangeeni' crop may help to improve the overall situation in the state.

Conclusion

Madhya Pradesh is the third largest lac producing state of the country after Chhattisgarh and Jharkhand. The state has great potential for lac production as it contributes 16 per cent of national production. Lac production in the state registered a decline in growth with -10.1 per cent per annum for the period 2006-07 to 2009-10. Amongst top eight lac producing districts of the state, maximum production is shared by Seoni (41.6 per cent) and Balaghat (30.6 per cent). Highest negative growth rate was reported for Narsinghpur (97.6 per cent) while Seoni, highest producing district, reported highest positive growth rate (6.9 per cent). Three other districts which have major contribution namely Balaghat, Hosangabad and Mandla recorded negative growth rates to the tune of 14.4, 49.0 and 40.5 per cent respectively. Strain-wise growth rate for the whole state shows that both 'rangeeni' and 'kusmi' lac production registered a negative growth of 5.2 and 32.1 per cent per annum. Crop-wise growth rate for the state shows that 'rangeeni'-summer recorded positive growth (12.1 per cent per annum) while 'rangeeni'-rainy registered negative growth (37.5 per cent). Similarly, both 'kusmi'-winter and 'kusmi'-summer attains negative growth rate of 34.0 and 29.9 per cent per annum respectively.

मध्य प्रदेश में लाख उत्पादन का वृद्धि विश्लेषण

ए.के. जायसवाल, गोविन्द पाल, जे.पी. सिंह और भारती पटेल

सारांश

न्यूनतम, अधिकतम, औसत उत्पादन और चार साल (2006–07 से 2009–10) के लिए साधारण वृद्धि दर जैसे पैरामीटरों के साथ मध्य प्रदेश के लाख उत्पादन जिलों के जिलावार एवं फसलवार स्तर को मूल्यांकित किया गया। अध्ययन से ज्ञात हुआ कि राज्य देश के 16 प्रतिशत उत्पादन में सहयोग करता है। तथापि, अध्ययन अवधि के दौरान वृद्धि दर नकारात्मक थी और 10.1 प्रतिशत प्रति वर्ष थी। राज्य के सीवनी जिले ने लाख उत्पादन में अधिकतम (41.6 प्रतिशत) सहयोग दिया, इसके बाद बालाघाट (30.6 प्रतिशत), होशंगाबाद (8.4 प्रतिशत) और मांडला (7.0 प्रतिशत) रहे। पूरे राज्य के लिए नसलवार वृद्धि दर ने दर्शाया कि रंगीनी और कुसमी दोनों लाख उत्पादन ने 5.2 और 32.1 प्रतिशत प्रति वर्ष की एक नकारात्मक वृद्धि हासिल की। राज्य के लिए फसलवार वृद्धि दर ने दर्शाया कि रंगीनी–ग्रीष्म ने सकारात्मक वृद्धि (12.1 प्रतिशत प्रति वर्ष) हासिल किया जबकि रंगीनी–वर्षाती ने नकारात्मक वृद्धि (37.5 प्रतिशत) दर्ज किया। इसी प्रकार, कुसमी–सर्दी और कुसमी–ग्रीष्म दोनों फसल ने क्रमशः 34.0 और 29.9 प्रतिशत प्रति वर्ष की नकारात्मक वृद्धि दर दर्ज की है। लाख उत्पादन में प्रमुख कमी रंगीनी–वर्षाती फसल की क्षति के कारण थी, जिसने आगामी मौसम के लिए जननलाक्षा की कम उपलब्धता उत्पन्न की। इस प्रकार, एक मौसम से कम उत्पादन ने परवर्ती मौसम की फसलों के उत्पादन को भी अप्रत्यक्ष रूप से प्रभावित किया।

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