INTRODUCTION

Lac is one of the most valuable gifts of nature to man. It is the only resin of animal origin, being actually the secretion of a tiny scale insect, Kerria lacca Kerr. It thrives on the tender shoots of its host plants, like Palas (Butea monosperma) and Kusum (Schleichera oleosa). These primary host plants are plentifully available in different zones (buffer and peripheral) of the Similipal Biosphere Reserve (SBR) where people (mostly tribals) are cultivating lac in a conventional way. A comparison between non-conventional (scientific) and conventional (traditional) methods of lac cultivation at SBR shows 25-35% more resin production in former method. The resin production is also more in its two strains (Kusmi on Kusum and Rangeeni on Palas) in buffer zone than that of the peripheral zone. Further, the result shows that resin production is greater in Kusmi strain compared to Rangeeni strain.

MATERIALS AND METHODS

Study area

The study was conducted in Similipal Biosphere Reserve, Mayurbhanj, Odisha during 2009-09. The land is undulating and filled with valley forest, plain forest and hilly forest. The altitude varies from 50 to 1,150 m. ASL. The ecosystem and
the climatological parameters vary in an altitudinal gradient. Moreover, the selections of study sites in the Biosphere Reserve were done keeping in the mind the availability of lac hosts in the different ecoclimatic pockets. Furthermore, survey was taken up in two different zones of SBR with having diversified forest types. These places were Jadida, Jadunathpur (100-200 m ASL) and Chakidi (200-300 m ASL) in peripheral zone, Notto (400-500 m ASL), inner Kendumundi (500-600 m ASL) and Gudugudia (800-900 m ASL) in buffer zone (Tripathy and Patro, 1997). As per the record of Forest Department the areas in which major host plants Palas and Kusum of lac insects are found were taken as study sites. Assistance was taken from the staffs of Forest Department, Government of Odisha. The officials of Nuclear Broodlac Farm, Chakidi and skilled reapers were also used to help in the survey. The geophysiography of study sites were undertaken keeping in the view of the altitude of natural blocks, forest types and zones of SBR. Culture method was adopted as per Indian Institute of Natural Resins and Gums (IINRG), Namkum, Ranchi and from scientific publications. It will not be out of context to mentioned here that the research publications on lac cultivation are mostly from IINRG (previously ILRI), Namkum, Ranchi (ILRI Ann. Rep., 2005-06). Temperature, humidity, rainfall, duration of sunshine hours per month were observed daily at the different locations. Month and season-wise values of the above parameters were observed.

**Cultivation of lac**

Indian lac insect is known to have two distinct strains ‘Kusmi’ and ‘Rangeeni’. The Kusmi strain is grown on Kusum or on other alternate host plants using Kusmi broodlac and the crops are (i) Jethwi (June/July) and (ii) Aghani (Jan./Feb.). The Rangeeni strain thrives on host plants like Palas and it has also two crops; they are (i) Katki (Oct./Nov.) and (ii) Baisakhi (June/July). Pruning of host trees and method of inoculation (Kumar et al., 2002; Sharma, 2007 and Sharma et al., 2007), and application of pesticides, forecast of larval emergence and crop harvesting (Sharma and Jaiswal, 2002) were done in time. Pruning of trees were done 6 and 12 months before inoculation of lac insect for both Palas and Kusum plant, respectively.

**Extraction of resin**

To measure the weight of resin (per cell) sticklacs collected from fields were weighed and scraped, water soluble materials were removed by water wash, left for air dry and then grinded to get fine products. Resin was extracted by alcoholic solvent extraction method, i.e., dissolved in 90% alcohol (1:4 weight/volume). When it was made into solution, insoluble residues were allowed to settle; the solution was then filtered and was kept open for evaporation of alcohol (Bose et al., 1963). Weight of resin (15-20 % wax and other residues) was measured by physical monopan balance. To calculate the weight of resin (per cell), resin produced/cm² was divided by number of female cells/cm² area.

**Resin productivity using conventional method**

Inhabitants mostly tribals in and around SBR are cultivating/ harvesting lac in a conventional way on the primary as well as on secondary host plants. For example, it was observed that pruning is rare and whenever there is pruning proper duration is not maintained for inoculation. Many times they did not collect sticklacs for seed purpose. They collect phunki after emergence of larvae so that crawlers are settled in old branches. Therefore, a comparison was made between non-conventional method (present study) and conventional method of lac (resin) productivity in SBR. For comparison, the winter crop (Aghani) of Kusmi strain on Kusum tree and the summer crop (Baisakhi) of Rangeeni strain on Palas tree in 5 places each were compared between two methods of lac cultivation in 2008-09. Because Aghani crop of Kusmi strain and Baisakhi of Rangeeni strain are the main crops contribute about 90% of lac production; remaining 10% is contributed by Jethwi and Katki crops (Sharma and Jaiswal, 2002). So Kusum and Palas plants were taken for the study.

**Statistical analysis**

Paired t-test was used to find out the level of significance between peripheral and buffer zones of same crop, and resin production between conventional and non-conventional methods; and Fisher t-test for same zones in different crops of respective strain on two host plants, like Kusum and Palas (Chainy et al., 2008).

**RESULTS**

Weight of resin produced by female of K. lacca in non-conventional method of cultivation To know whether there is any significant difference in the weight of resin produced by female between different crops of the same zone and same strain, and also between two zones of the same crop, the paired t-test was employed between two different zones of same crops and Fisher t-test for same zones of different crops of respective strain on two host plants, like Kusum and Palas (Chainy et al., 2008).

**Comparison of resin productivity using non-conventional and conventional methods**

In conventional method the average resin produced by female insect in case of winter crop of Kusmi strain on Kusum plant was 12.45 mg and 14.87 mg in peripheral and buffer zones, respectively (Table 1). Similarly, the resin output in summer crop of Rangeeni strain on Palas plant was 10.31 mg and
The non-conventional method of resin production in Aghani crop of Kusmi strain on Kusum plant in peripheral zone was significantly higher (p < 0.01) than the conventional method. Similar trend (p < 0.01) was also found in buffer zone. In case of Baisakhi crop of Rangeeni strain on Palas plant in peripheral zone, the non-conventional method of resin production was significantly higher (p < 0.01) than the conventional method of cultivation. Similar trend (p < 0.01) was also found in buffer zone (Table 1).

**DISCUSSION**

The tiny lac insect *Kerria lacca* provides not only livelihood to a large number of poor tribal people (Sohail, 1998) but it has become a part of civilization. Lac cultivation also helps in conserving vast stretches of forests and biodiversity associated with lac insect complex (Sharma et al., 2006; ILRI Ann. Rep., 2005-06, 2006-07; INRG Ann. Rep., 2007-08; Dey et al., 2010; Mohanta et al., 2012 a, b). Resin productivity of buffer zone was more than the peripheral zone both in Kusmi and Rangeeni strains. This may be due to average higher temperature (35.20 °C) in peripheral zone than buffer zone (31.24 °C). It implies that cold climate and higher rain fall favours more lac production. But when mean of peripheral and buffer zone was compared crop-wise, Aghani was little better (21.26 mg) than Jethwi crop (21.91 mg) in Kusmi strain on Kusum Plant. Similarly, the mean of peripheral and buffer zone in Rangeeni strain of Baisakhi crop (17.71 mg) was more than Katki crop (6.25 mg) on Palas tree (Table 1).

According to the data of resin production in conventional method during the year 2008-09 (Table 1) Aghani crop of Kusmi strain on Kusum plant has better result (13.66 mg; mean of peripheral and buffer zones) than that of the Baisakhi crop (11.71 mg; mean of peripheral and buffer zones) of Rangeeni strain on Palas plant. Yield of 25-30% more resin by non-conventional method of lac cultivation over conventional method indicates that the rearers will be benifitted economically following non-conventional method. The present result on production of resin among two strains showed that resin production was more in Kusmi strain than that of the Rangeeni strain. It has been reported that Aghani crop of Kusmi strain and Baisakhi of Rangeeni strain are main crops contributed about 90% of lac production. Kusmi crop is considered superior resin, because of lighter colour of resin and it fetches better price in Indian market (Sharma and Jaiswal, 2002). So potential of more resin production by Kusmi strain at SBR is a gift of the nature.

**REFERENCES**


Mohanta, J., Dey, D. G. and Mohanty, N. 2012a. Lac cultivation as a rural employment for women residing around similipal biosphere reserve, Odisha, India. 99th Indian Science Congress (3-7 Jan.), KIITS, Bhubaneswar, Odisha. Sect.- Animal, Veterinary and Fishery Sciences. P. 221.

Mohanta, J., Mohanty, N. and Dey, D.G. 2012 b. Studies on lac insect (*Kerria lacca*) in Similipal Biosphere Reserve for conservation...
of biodiversity. UGC-SAP Sponsored National Seminar on Current Trend of Wildlife Research in India with Special Reference to Herpetology (10th March), Department of Zoology, North Orissa University, Baripada, Odisha. pp. 89-90.


