

Summer Sustainability Of High Yielding Broodlac With Special Reference To *Flemingia semialata* Grown In *Acacia auriculiformis* Plantation Under Rainfed Condition.

Ranjana Sinha, Dept. of Botany DSPM Univ. Ranchi;
Manish Kumar, Dept. of Biotechnology, St. Columbas College, Hazaribag

Abstract

Lac is the most predominant source of natural resin and dye used for varied applications. Lac is secreted by tiny coccid insect *Kerria lacca*. India has its monopoly in production of lac and Jharkhand contributes to 60% of total lac produced in the country. The conventional host plants for lac production are *Butea monosperma* (Palash), *Schleichera oleosa* (Kusum) and *Zizyphus mauritiana* (Ber). Other host trees *Acacia* spps., *Albizia* spps., *Ficus* spps., grow abundantly in Jharkhand. Out of the two lac strains *Rangeeni* & *Kusmi*, quality of *Kusmi* lac is superior and in great demand. Traditionally *Kusmi* lac cultivation is done on *Schleichera oleosa* (Kusum) as summer crop & on *Zizyphus mauritiana* (Ber) and *Flemingia semialata* as winter crop. As lac cultivation on *F. semialata* is expanding to wider areas of Jharkhand, the demand for *Kusmi* broodlac for inoculating newly sown *semialata* plants is rising. The above experiment was undertaken to assess and achieve sustainable Broodlac production during summer on *F. semialata* in *Acacia auriculiformis* (Akashi) plantation for two consecutive seasons at a village farm in Angara Block of Ranchi district. The Broodlac yield on *semialata* plant was encouraging especially on those plants growing in shade of *Akashi* plantation. *Semialata* plants near (plants in 3m. radius proximity of *Akashi* trees) and far from *Akashi* trees (plants located beyond 3m. radius but between *Akashi* trees) recorded 352.54g/plant and 299.18g/plant higher average Broodlac yield respectively over Control (plants located in open area) which was 207.21g/plant. Broodlac yield recorded during summer season under *A. auriculiformis* plantation was lower than Broodlac yield potential (500-1000g/plant) of normal winter season crop of *F. semialata*. Nonetheless, the result of experiment for taking up lac cultivation on *semialata* under *Akashi* plantation during summer months is encouraging for sustainable broodlac cultivation as broodlac is an essential component for propagation of next lac crop. This will maintain crop cycle and sustainable lac cultivation.

Keywords: Broodlac, *Flemingia semilata*, *Acacia auriculiformis* (Akashi), *Kusmi* lac.

Introduction

Lac cultivation offers sustained income for poor farmers & tribals as it is highly remunerative requiring meager investment. Jharkhand possess untapped potentiality for lac production. It is suggested that for increased productivity of *Kusmi* lac, lac cultivation should be practiced in association with various types of forestry such as agroforestry and farm forestry. For enhancing lac production, culture of lac insect (*Kerria lacca*) is being encouraged and promoted on bushy type of lac host plants of *Flemingia* spps. on plantation basis (Bhattacharya & Jaiswal 2004, Singh et al 2008). On *F. semialata*, after a year broodlac is cultured and every year lac crop can be harvested up to 7 to 8 years with 200-500g/plant lac crop in initial years & 1kg-2kg/plant in later years (Arvind Kumar & Aditya Kumar). Therefore the possibility of lac culture for obtaining broodlac on *semialata* during summer must be explored to maximize profitability for poor farmers & tribals. During summer, plants & lac insects mortality due to climatic stress like extreme temp., dry winds compounded by shortage of water pose grave challenge. Summer crop (*Jethwi*) on *F. semialata* for broodlac purpose may be taken only under irrigated condition where maximum temp. should not

exceed 42° C. Hence present field study was aimed at assessing the efficacy of lac yield on *F. semialata* under *Acacia auriculiformis* (*Akashi*) plantation for conserving broodlac under rainfed condition during summer.

Materials and Methods

A field experiment was conducted at a village farm plantation of *Akashi* trees at Putadag in Sursu Panchayat, Jonah area, Angara Block for two consecutive years during 2015 & 2016. The summer temperature of the region ranges from 40°C-42°C with average rainfall during monsoon. Soil of the field in which the above experiment was undertaken was lateritic type with pH 5.2. A new plantation of *F. semialata* was established under old *Akashi* plantation. *Akashi* trees were at a distance of 7.5m (Row spacing) X 8m (Plant spacing). An area accommodating 3 rows and 15 trees of *Akashi* was taken for establishment of new *F. semialata* plantation. *Semialata* was planted with space of 1m between plants and distance of 0.5m between rows. In between *Akashi* trees 6 single rows (arranged as 3 paired rows) of *semialata* plantation was established in July'2014. A 2m space between 2 paired rows was maintained. On both sides of *Akashi* trees, 1.0m space was left between the trees and the 6 linear rows of *semialata* plantation. Thus in total 480 *semialata* plants were planted. After a year i.e. Feb'2015 broodlac on *semialata* was inoculated @ 30g/bush & harvesting cum-pruning was done in July'2015. The following year i.e. again in Feb'2016 the inoculation process was repeated and harvesting done in July'2016. All standard procedures of lac cultivation were adopted.

Three treatments were undertaken in the field. In treatment T₁ *semialata* plants which grew within 3.0m radius of *Akashi* trees were taken for observation. Treatment T₂ consisted of *F. semialata* plants which grew beyond 3.0m radius but were between the plantations of *Akashi* trees. T₃ was treated as Control where *semialata* plants grew far from *Akashi* trees under open environment. For recording observation, 7 spots (Replications) of each treatment having 5 *semialata* plants were selected randomly in purview of treatments. Thus, there were 35 plants of *semialata* of each treatment. At maturity of lac crop, height of shoots, no. of tillers per bush were recorded. After harvesting of lac crop, Encrustation length was measured. Rejected lac was separated and weight of Broodlac in gm/plant was recorded. Lac encrustation was scraped & weight recorded.

Various treatments were compared under randomized block design. Data are presented year wise for better interpretation of experimental results.

Results & Discussions

The distance of location from *Akashi* plantation greatly impacted the height of *semialata* at time of harvesting, Analysis Of Variance (ANOVA) was applied. Plants near the *Akashi* plantation growing in proper shade attained greater height as compared to Control. Plants in between *Akashi* trees but beyond 3.0m radius from trees attained height slightly more than that of Control. Paez & Lopez observed that plant height and leaf areas increased in shade.

No. of tillers per bush was significantly higher under Control condition as compared to *semialata* planted in shade in *Akashi* plantation. Total length of lac encrustation on *semialata* bush and weight of Brood showed significant difference under various location or Treatments as compared to Control (Open area). Lac encrustation length/bush in T₁ treatment in 2015 was 98.6cm which rose to 174cm in 2016. In T₂ treatment during 2015 & 2016 length of lac encrustation was 84.23cm and 106cm respectively. In T₃ treatment of Control *semialata* growing in open area, lac encrustation length in 2015 & 2016 was 52.81cm and 84cm respectively. Broodlac yield in gm/plant in T₁ treatment in 2015 was 254.72g/plant which rose to 450.30g/plant in 2016. Broodlac yield in T₂ condition in 2015 was 220.16g/plant which rose to 378.20g/plant in 2016. In T₃ treatment Broodlac yield in 2015 & 2016 was 184.10g/plant and 230.32g/plant respectively.

Conclusion

In jethwi crops, the high temperature and direct sunlight during summer months are detrimental for lac insects as the decreasing moisture reduces sap of lac host trees causing food scarcity for lac insects. Bushy plants when provided with shade & entrance of partial sunlight in *Akashi* tree plantation lowers the heat and maintains soil moisture levels thus providing congenial atmosphere for lac insects to thrive & produce lac. From present investigation it is concluded that broodlac may be conserved on *F. semialata* during summer (*Jethwi* crop) under *Akashi* plantation, where suitable lac host for summer (*Kusum* tree) is not available. This may help in sustainable lac production on *F. semialata* in newer areas of lac cultivation.

Table 1: Growth of plant, lac encrustation & weight of Brood under *Akashi* plantation.

Treatment	Av. Height of shoots at harvest (m)		No. of tillers/bush		Encrustation length/bush (cm)		Broodlac/m shoot length (g)		
	2015	2016	2015	2016	2015	2016	2015	2016	
T ₁	Near <i>Akashi</i> trees	1.29	2.06	4.52	6.7	98.6	174	155.0	186
T ₂	In between <i>Akashi</i> trees	0.98	1.32	4.8	6.9	84.23	106	129.91	148.73
T ₃	Control (Open area)	0.95	1.24	5.02	7.06	52.81	84.0	97.67	124.02

Scrap weight & lac yield under *Akashi* plantation.

Treatment	Scrap weight/m shoot length (g)		Broodlac yield g/plant		
		2015	2016	2015	2016
T ₁	Near <i>Akashi</i> trees	57.40	64.32	254.72	450.36
T ₂	In between <i>Akashi</i> trees	50.02	55.57	220.16	378.20
T ₃	Control (Open area)	41.24	45.48	184.10	230.32

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