# BROODLAC AND STICKLAC YIELD AS AFFECTED BY SITE OF INOCULATION, SHOOT LENGTH COVERAGE AND IRRIGATION LEVELS

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**Abstract :** *Flemingia semialata* is an important bushy lac-host plant which is utilised, in alternation with other lac-hosts for lac cultivation during rainy season. However, plant and lac insect mortality due to stress of heavy inoculation and lack of irrigation is a common problem in bushy lac-hosts which not only adversely affects the production of raw lac but also the quality of broodlac. Studies on effect of site of inoculation, percentage shoot length coverage and different levels of irrigation revealed that all the plants inoculated at lower part and 57.2% of the plants inoculated at upper part did not yield lac and the middle portion of one year old stalk was preferred by the lac insect for settlement. Average broodlac (63.5 g) and sticklac (33.0 g) yield was maximum in the middle inoculated plant. 40% coverage of inoculable shoot length gave maximum returns for broodlac cultivation, though, sticklac yield increased with increase in shoot coverage up to 80%. Irrigation of crop at regular intervals improved the quality of the broodlac. Number of lac larvae emerging from 10 g of broodlac cultured on daily irrigated plants covered 91.8 cm shoot in comparison to 35.4 cm covered by lac larvae emerging from broodlac obtained from un-irrigated plants. Survival of female lac insects till crop maturity also increased from 23.1% in control to 65.5% in daily irrigated plants.

## INTRODUCTION

Several species belonging to genus *Flemingia* Roxb. ex Aiton f. (Syn. *Moghania* St.-Hil., Family : Leguminosae) have been recorded as lac-hosts. *Flemingia semialata* is one of these important species which accepts both, *rangeeni* as well as *kusmi* strain of lac insect though performance of *kusmi* is better (Kumar *et al.*, 1997). This bushy plant, in alternation with other plant-hosts is utilised for cultivation of lac during rainy season. However, plant and lac insect mortality due to stress of over inoculation and lack of irrigation is a common problem in bushy lac-hosts which not only adversely affect the yield of sticklac (raw lac or used-up broodlac after removing the twig) but also the quality of broodlac (gravid female lac insects forming a continuous lac encrustation on the twig). Broodlac is an essential component for propagation of next crop. Hence, experiments were initiated to study the effect of site of inoculation, percentage shoot length coverage and different levels of irrigation on sticklac and broodlac yield.

## MATERIAL AND METHODS

*Kusmi* lac insect (*Kerria lacca* collected from kusum, *Schleichera oleosa*) was cultured on one year old single stalked plants of *F. semialata* during *aghani* season (July-February). Three experiments were laid; first two in RBD with seven replicates each and third in CRD as follows to record the:

i) *Effect of Site of inoculation on broodlac and sticklac yield :* Three sites - upper (top one third), middle (middle one third) and lower (bottom one third) part of the stalk were utilised for lac insect cultures. Cotton bands were used for creating physical barrier so that lac larvae settled on the selected part of the stalk only;

ii) *Effect of Per cent shoot length coverage on broodlac and sticklac yield :* Lac larvae were allowed to settle on 10, 20, 40 and 80% of the total inoculable shoot length by using cotton bands; and

iii) *Effect of Irrigation on broodlac and sticklac yield :* Lac bearing plants, from the month of October

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onwards were subjected to five levels of irrigation, *i.e.,* daily, every alternate day, twice a week, once a week and control (no irrigation). A narrow slit was cut through lac encrustation length-wise and number of living female lac insects were counted. Broodlac obtained from each of the five treatments was used to inoculate next crop on ber (*Ziziphus mauritiana*). Shoot length covered by the lac larvae emerging from the broodlac was measured and divided by the weight of broodlac used to get uniform shoot coverage per 10 gm of broodlac for recording the effect of irrigation on quality of broodlac.

Recommended crop protection measures were applied in all the three experiments as and when required. Broodlac and sticklac yield from each experiment was recorded after harvesting the lac crop on maturity in February, 2001.

## RESULTS AND DISCUSSION

I) *Effect of Site of Inoculation on Broodlac and Sticklac Yield :* Data recorded revealed that not only survival of lac insects but also the yield of broodlac and sticklac were affected by the site of inoculation (Table-1). All the plants inoculated at the lower parts and 57.2% of the plants inoculated at the upper region did not yield lac because insects died soon after inoculation without showing any signs of feeding, whereas only 14.3% of the middle inoculated plants were non bearing. Average broodlac and sticklac yield per plant (63.5 g and 33.0 g respectively) was highest in the middle inoculated plants which showed that the middle part of the stalk is preferred by lac insects for settlement and hence, was most suitable for lac production.

II) *Effect of Per cent Shoot Length Coverage on Broodlac and Sticklac Yield :* Plant and lac insect mortality due to heavy inoculation is a common problem in *Flemingia semialata* and other bushy lac-hosts. The experiment aimed at quantifying the inoculable shoot length coverage for maximum returns. Broodlac and sticklac yield both were affected by change in per cent shoot length coverage (Table-1). Broodlac yield per plant followed a typical quadratic curve giving maximum profitability at 40% shoot coverage. No significant increase in broodlac yield was observed when shoot coverage was increased to 80% because survival of lac insect was adversely affected due to increased stress on plant resulting in decreased quantity and quality of broodlac. However, sticklac yield increased with increase in shoot coverage because rejected / bad quality broodlac also contributed some amount to sticklac.

III) *Effect of Irrigation on Broodlac and Sticklac Yield :* Broodlac and sticklac, in terms of yield per plant were not influenced by different irrigation levels (since broodlac includes weight of the twig also, a patchy settlement of lac insects sometimes, tends to distort the weight of broodlac). However, quality of broodlac improved significantly as number of viable female cells at maturity, steadily increased from 23.1% in control to 65.5% in daily irrigated plants (Table-2). In the absence of irrigation, twig shrinks and lac encrustation on *F. semialata* loosens; this loosening becomes more pronounced after December (Kumar *et al.*, 1996). Moreover, with advent of dry season after monsoon, *kusmi* strain which matures in February develops cracks (Anonymous, 2000) and insects start dying. With

**Table-1:** Broodlac and sticklac yield as affected by site of inoculation and shoot length coverage

| Lac yield / plant (g) | Site of inoculation | | | Initial shoot length coverage | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Upper | Middle | Lower | 10% | 20% | 40% | 80% | S. Em ± | CD at 5% |
| Broodlac | 33.8 | 63.5 | 0 | 87.5 | 210.2 | 310.0 | 318.7 | 69.8 | 128.0 |
| Sticklac | 12.1 | 33.7 | 0 | 41.2 | 68.7 | 85.0 | 126.2 | 20.2 | 37.1 |
| Total | **45.9** | **97.2** | **0** | **128.7** | **278.9** | **395.0** | **444.9** | | |
| % Non bearing plants | 57.2 | 14.3 | 100 | | | | | | |

**Table-2:** Quality of broodlac and sticklac yield as affected by different levels of irrigation on *Flemingia semialata*

| Irrigation frequency | Brood yield per plant (g) | % Viable cells at crop maturity | Shoot length covered by 10 g brood (cm) | Sticklac yield per plant |
|---|---|---|---|---|
| Daily | 282.5 | 65.5* | 91.8* | 122.5 |
| Alternate day | 136.4 | 49.8* | 62.1* | 71.5 |
| Twice a week | 183.1 | 47.3* | 42.9 | 74.8 |
| Once in a week | 273.7 | 42.4* | 26.4 | 91.2 |
| Control | 160.6 | 23.1 | 35.4 | 68.0 |

* Significant at 5%

increase in frequency of irrigation, the survival of lac insect improved and as a result there was a proportionate increase in living cells at harvest. Number of lac larvae emerging from the broodlac obtained from frequently irrigated plants also increased. This is reflected in more number of lac larvae emerging from per unit weight of broodlac. Lac larvae emerging from 10 g broodlac taken from daily irrigated plants covered 91.8 cm of inoculable shoot length, whereas the shoot length covered was only 26.4 cm when broodlac used was from the plants irrigated once in a week. These results clearly indicate that irrigation improves broodlac quality significantly.

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