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Effect of Pruning Time and Lac Inoculation on *Ber* (*Z. mauritiana*) : Consequences on Shoot Growth, Fruit Production and Partitioning of Assimilates*.

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ABSTRACT

Ber (Z. mauritiana) is a popular lac-host among the farmers. Besides lac crop lac growers also harvest fruits from this host. Pruning is pre requisite operation in lac culture. Present study examines how pruning time and lac infestation affects growth and fruit yield of *ber* trees. Results show that the number of fruits produced was significantly lower in trees carrying lac the reduction was 68.9 and 21.4% on branches with and without lac encrustation, respectively, while number of secondary branches reduced by 33.9 and 12.6%, respectively. Late pruning (May) resulted in reduction in length and diameter of branches compared to pruning in February. Results also reveal that allocation of assimilate for growth and development of fruits and lac insect is more from the harbouring branch than that contributed by central reserve pool.

Ber (*Z. mauritiana*) is a very common lac host in West Bengal and Jharkhand for lac insect culture. Farmers prefer this host for growing lac due to its abundance and better yield. In Jharkhand, utilization of the host is more than 50% (Pal and Bhagat, 2006) of the available population. Indian lac insect *Kerria lacca* has two strains *i.e. kusmi* and *rangeeni* which grow well on this host. Growing *rangeeni* lac on ber trees for baisakhi (summer season) crop is a common practice. Since yield of *rangeeni* lac is comparatively low and satisfactory brood lac production is not possible, it is advisable to grow *aghani* (winter season) crop of *kusmi* lac on ber trees. Average lac productivity per annum is almost two times in *kusmi* lac than *rangeeni* on *ber* trees (Mishra, *et. al.* 2000). Ber fruits are consumed by local farmers, particularly the tribals are interested in harvesting fruits also. Pruning is recommended for fruit production, where only 25% of one year aged shoots are recommended for pruning (Gupta and Singh, 1977) where as 100% pruning is done in lac cultivation. So, lac cultivation hampers fruit yield substantially due to heavy pruning and stress imposed by lac insect. Pruning in February is a normal practice for *aghani* lac cultivation, but farmers growing *rangeeni* crop in *baisakhi* season perform pruning-cum-harvesting operation in May. So, two kinds of shoots are available at the time of

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inoculation. Late pruning (in May) give rise to shoots of lesser length, hence, the stress posed by lac insect is aggravated more seriously. Present study examines the effect of different pruning time, and of lac cultivation there by on fruit production of *ber* as well as shoot growth.

MATERIALS AND METHODS

The study was undertaken in farmers' field condition at Gosaidih village, Purulia, West Bengal. Two sets of *ber* trees were pruned respectively in the Feb. and May, 2005 and the trees were inoculated for the *aghani* crop in August @ 20 g. brood per metre of shoot length. For crop protection, lac culture was sprayed once with endosulfan @ 0.05% and carbendazim 0.01% at 25 days after inoculation (DAI). Mature crop was harvested in February, 2006.

Pattern of variation in shoot growth and fruit production parameters of branches with and without lac infestation was observed for comparison against control (branches of un-inoculated trees). Thus, there were six treatment combinations. Fifteen branches uf different sizes were selected randomly for shoot growth and fruit production attributes in the month of January when cessation of growth took place. 54.8 and 52.1% stress in terms of average lac encrustation was found in Feb. and May pruned branches, respectively.

RESULTS AND DISCUSSION

Average number of fruits per branch, size of fruits, average length of primary branch, basal diameter of branch and number of secondary branches per primary branch recorded for the experiment are presented in table 1 and illustrated in fig.I & 2.

Pruning time

The mean length of primary branches was significantly higher in trees pruned in February as compared to those pruned in May. Mean lengths of branches were 279.8 and 241.5 cm, respectively. Similarly, fruit length obtained in Feb. pruned trees was significantly higher than May pruning registering 16.6% increase. Mean fruit length were 2.1 to 1.8 cm, respectively. The difference in growth attributes due to difference in pruning time prevailed even at a time lapse of eight months for May pruned trees. The stored food materials in the shoots of Feb. pruned trees was due to its higher vigour which eventually contributed towards achieving higher fruit length. The fact implies that May pruning is not suitable for getting shoots of proper size.

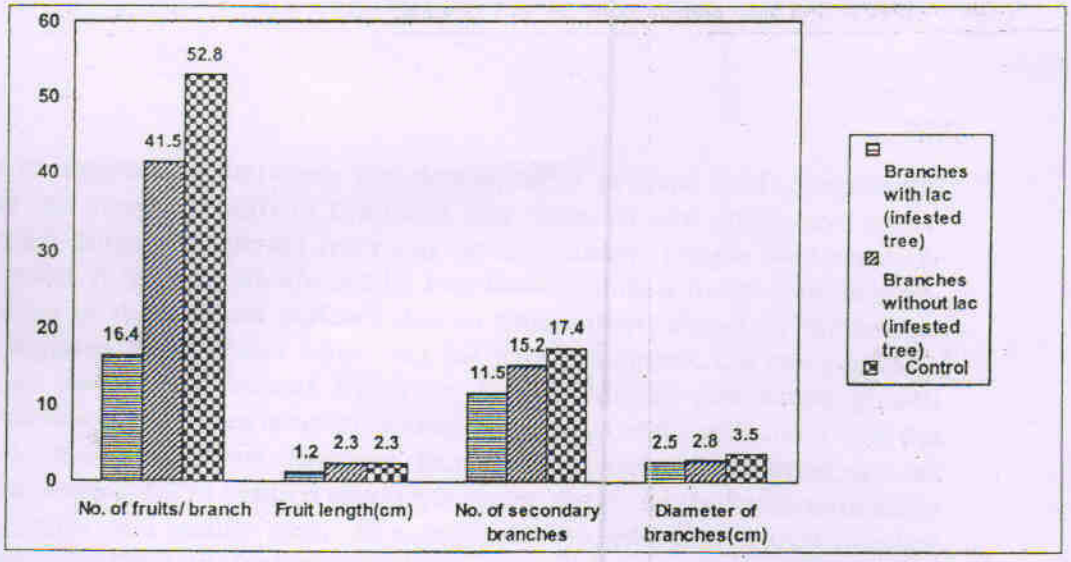

Fig. 2: Growth and yield attributes of *ber* as affected by lac inoculation

Mode of infestation

Lac infestation affected adversely all the parameters studied. In the lac infested trees, branches with lac showed a reduction of 68.9, 47.9, 33.9, 29.3 and 22.5% in number of fruits, fruit length, number of secondary branches, branch diameter and length of branches, respectively as compared to control, while branches without lac of the same tree showed 21.4,0, 12.6, 19.7 and 18.6% reduction. It means, effect of lac infestation on growth and fruit production on branches with lac is much more than branches without lac in the same tree.

Lac insect suck the sap from the branches on which it settles. So, the high demand of assimilates in these shoots is fulfilled partially from the photosynthate and reserve food of its own and partially from the central pool of reserve food material *i.e* tree trunk. Reduction of fruit number in un-infested branches could be due to insufficiency of assimilate in the central pool which could be diverted to fruiting branches in un-infested condition. So, a reduction of 21.4% fruits on branches without lac is the outcome of failure of plant system to supply assimilate due to lac infestation in some portion of the tree. In this connection, it can be stated that 68.9% reduction in fruit on branches with lac included 21.4% reduction of the same which was due to short supply from the central pool. Therefore, analysis of data revealed that supply of assimilate for fruit formation and development comes from the central pool and the bearing branch at a proportion of 21.4; 47.5, respectively. Similar calculation is applicable for other parameters also.

The reason why some parameters showed general effect (on whole tree) while the others local effect (on lac bearing branches) could be attributed to

duration of interaction between the development process and competition offered by lac insect. Length of branches and diameter are characters which were affected during the period from August to January. Length and diameter attained before Aug. were unaffected by inoculation. Only a fraction of development process of these traits suffered due to competition offered by lac insect. So, local suppression of these traits was not very prominent. On the contrary, diversion of assimilates towards fruits for its development and active growth period of lac insect continues simultaneously. In normal condition fruits, being the strong sink, draw assimilates effectively. But, under inoculated condition, the lac insect draw assimilates in a much effective manner, depriving the fruits to develop both by quantity and quality (size). As a result, 68.9% reduction in fruit number and 47.9%. reduction in length have been observed, majority of which were influenced locally.

Since fruiting was influenced locally due to inoculation, it is advisable to inoculate the tree patially enabling it to produce fruits in un-infested branches suffering only 21.4% loss, in fruit number with fruit size unaffected.

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REFERENCES

Gupta, M. R. and Singh, S. (1977) Effect of pruning on the growth, yield and fruit quality in *Ber*. *Punjab Hort. J.*, **17:** 1-2, 54.

Mishra, Y. D.; Sushil, S.N; Kumar, S. and Bhattacharya, A.(2000) Variability of lac productivity and related attributes of *Kerria* spp. (Homoptera : Tachardiidae) on *ber* (*Zizyphus mauritiana*) *J. Entomol. Res.* **24** (1): 19.

Pal, G. and Bhagat, M.L (2006) Economics of lac cultivation in Jharkhand. Pp. 42 *Ann. Rep.*(2005-06), Indian Lac Research Institute, Namkum pp. 77.

Table 1— Growth and yield parameters of ber as affected by pruning time and lac inoculation

Factors	No of fruits/ branch	Fruit length (cm)	Length of branches (cm)	No of secondary branches	Diameter of branches (cm)
Pruning time					
Feb.	40.7	2.1	279.8	15.0	3.04
May	33.1	1.8	241.5	14.5	2.90
SED±	4.05	0.13	11.24	0.93	0.18
$CD_{(0.05)}$	NS	0.22*	18.65*	NS	NS
Infestation mode					
Branches with lac	16.4	1.2	234.1	11.5	2.51
Branches without lac	41.5	2.3	245.6	15.2	2.85
Control	52.8	2.3	302.0	17.4	3.55
SED±	4.96	0.16	13.7	1.15	0.11
$CD_{(0.05)}$	8.24*	0.27*	22.8*	1.90*	0.18*

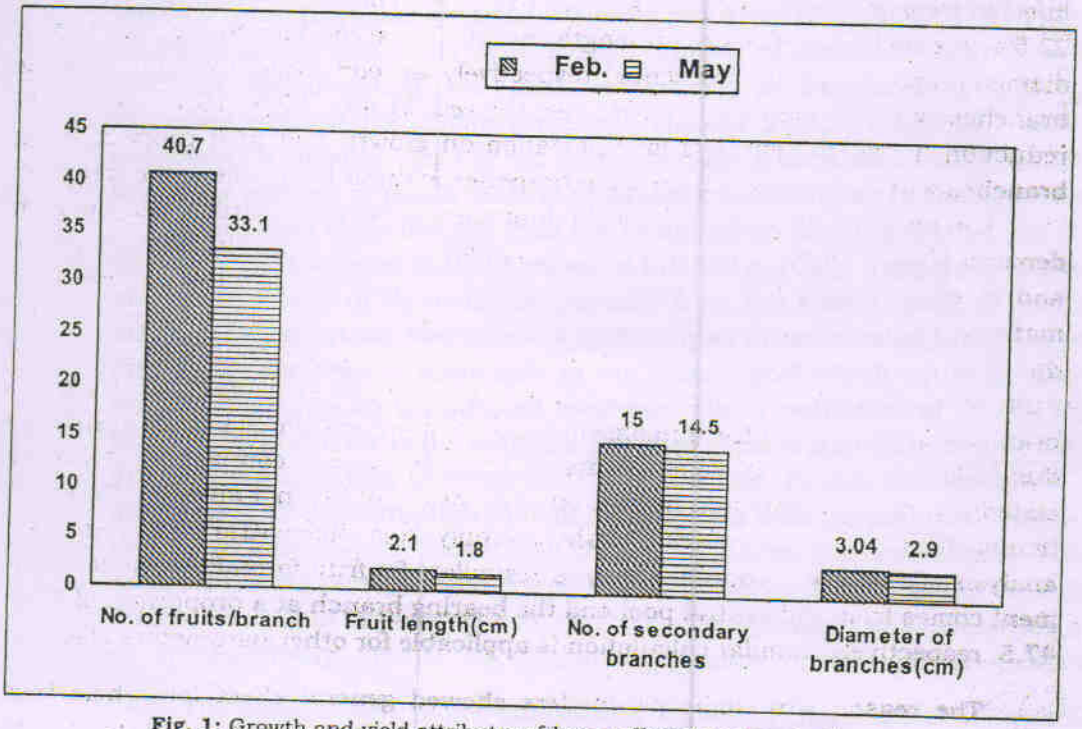

Fig. 1: Growth and yield attributes of *ber* as affected by pruning time