CHAPTER VI

SUMMARY AND CONCLUSION

Dighloti (*Litsaea salicifolia* Roxb.) is an evergreen bush with many hidden qualities, e.g. net rearing and supervision is convenient, responds well to cutting, air-layering and pruning. Moreover, it was also found to be a host plant of a number of wild silkworms. We have collected wild muga, wild eri and wild Kotkari muga exclusively from the Dighloti plants. Despite tremendous potentialities, the plant has been hitherto considered as secondary host plant of muga silkworm and no scientific studies have been made on it in detail. Therefore, the present investigation was undertaken to explore the hidden possibilities of Dighloti for promoting it as a viable primary host plant of muga silkworm.

Dighloti is grown naturally along the bank of rivers, road sides and in the forest. Flowering season of the plant is from January to April-May and fruiting from April to July. The best time for collection of seed for nursery purpose is in the month of August.

Seed viability of Dighloti was tested through water floating method and also by germination and tetrazolium test. Usually seeds were sensitive to desiccation and short-lived. After 10 days of open storage seed viability was found to decline significantly and ceased completely after 40 days. In moist condition under sand Dighloti seeds can be stored up to a month without any significant loss of viability.

Due to its short-lived nature, only freshly collected Dighloti seeds should be used for higher germination percentage in the nursery.
Seeds can be better stored upto a month under moist storage technique evolved. Now, muga farmers can effectively use the water floating technique for selection of viable Dighoti seeds.

Germinability of Dighoti seeds with pericarp, without pericarp and without seed coat was tested. Effect of pre-sowing treatment in water on seed germination was also simultaneously tested. Highest germination percentage and germination value were observed in the seeds without pericarp and pre-treated in water for 12 hours. From the results of the test it can be concluded that the Dighoti seeds without pericarp and pre-treated in water for 12 hours will hasten the percentage and value of germination in the nursery.

An observation was made on the effect of different concentrations of GA₃ and IAA on seed germination. Maximum germination percentage (96.30) and value (7.04) have been recorded in seeds pretreated with GA₃, 200 ppm for 12 hours. It was also found to be 10.66% more over the control. Hence, pre-treatment of Dighoti seeds with GA₃, 200 ppm instead of plain water will further increase the percentage and value of germination. A striking point to be noted here is that the achievement of maximum germination with minimum concentration of hormones. A technology can be called a "farmers friendly" when it is easy to handle and economic. Thus, the farmers can treat large number of seeds with minimum amount of GA₃.

The study included the influence of normal light and darkness on seed germination. Dighoti seeds were not found to be sensitive to normal light in laboratory conditions. However, under laboratory
conditions, a positive influence of darkness has been observed on seed germination. An increase of 5.75% seed germination in darkness was recorded over the normal light. Based on the findings of the experiment, a reasonable depth (2.5 cm) of sowing the seeds in nursery beds was determined. This also helped the seeds to get maximum moisture from the soil as the Dighloti seeds were found to be desiccation sensitive. Furthermore, this resulted with 98.50% germination in the nursery beds. Thus, with this depth of sowing farmers may achieve good success in raising nursery seedlings. With a view to develop a suitable nursery technique for large scale production of Dighloti seedlings, suitability of different types of containers in comparison to nursery beds were tested. Seedlings raised in the nursery beds were observed to be more healthier and vigorous than the seedlings raised in the containers. Hence, large scale production of Dighloti seedlings in contains is not advisable. However, polyethylene bags can be used for small-scale raising of Dighloti seedlings.

Based on the current study, a suitable nursery technique has been standardised for large scale production of Dighloti seedlings in the nursery beds. The technique can be recommended to the muga farmer for large scale production of Dighloti seedlings at ease. Moreover, research workers may also get benefit from the technique for further research and development in Dighloti.

In the selection trial of four different types of cutting materials, stem cuttings of Dighloti were considered to be the best for raising saplings in nursery. The main selection criteria were the percentage of rooting and convenience of handling and management. Apical
tip cuttings were rejected because their rooting percentage was not found up to the mark. The leaf-bud cutting was mainly rejected for their exceptionally smaller size. Moreover, more attention and equipments are required for raising saplings from both these two types of cuttings which is not economic and easily achievable by the common farmers. Thus, stem cuttings of 15x20 cm long from 8-10 month old juvenile branches with one or two leaves at the upper end are recommended for vegetative propagation of Dighloti.

Effect of auxins on the rooting behaviour in the stem cuttings were studied. IBA, 500 ppm was found to be the most suitable concentration for treatment of stem cuttings of Dighloti. Highest rooting percentage (78.33), maximum number of primary (12.00) roots and highest post transplantation survival were recorded in the stem cuttings treated with IBA, 500 ppm for 5 seconds. More than 10% rooting was observed in the stem cuttings treated with IBA, 500 ppm over the control. Thus, rooting efficiency in the stem cuttings can be increased further by application IBA, 500 ppm for successful raising of saplings in the nursery.

Trials were undertaken to study the rooting behaviour of nursery raised stem cuttings of Dighloti in the two growing seasons. Percentage of rooting length of roots and shoots, number of roots and leaves were higher in the saplings raised in the spring season. Consequently, saplings raised in the spring season were more healthy and vigorous than the saplings raised in the autumn. Contrarily, the post transplantation survival was recorded higher in the saplings raised in the autumn. In
conclusion it can be said that the season plays a very important role in rooting behaviour and survival of Dighloti cuttings. Though insignificant differences were observed in respect of rooting behaviour and survivability between the saplings raised in the two growing seasons, both the seasons are equally suitable and recommendable for raising saplings from cuttings.

Propagation of Dighloti by cuttings has been well achieved and a suitable package of practice has been formulated for large scale production of planting materials in the nursery. The nursery technique was found to be quite effective with 88.50% rooting in spring and 84.25% in the autumn. The main advantage of propagation by cuttings over seeds is that transplantation of saplings in the former can be done after 6 months against 9 months from the latter. Moreover, propagation by seeds can be done only once in a year due to short viability period of the seeds, but propagation by cuttings can be done in both the growing seasons, spring and autumn of the year. Now, through this technique all the positive points of vegetative propagation mentioned earlier can be utilised in Dighloti farming. Thus, the technique can be recommended for large scale production of planting materials at the farmers level.

An attempt was made to standardise the technique of air-layering in Litsea salicifolia Roxb. with and without the aid of auxins in both the growing seasons of the year. Application of IBA, 400 ppm in the spring season was found to be most effective, in which root initiation was observed only after 22 days and percentage of rooting was recorded to be 95.50%. Though percentage of rooting as well as post
transplantation survival were found to be higher in spring; vegetative propagation of Dighloti can be done by this technique in both the seasons effectively. It has now been established that propagation of Dighloti by air-layerings can also be done within 2 months against 6 months by cuttings and 9 months by seeds. Though the technique is time consuming and a bit expensive but useful for production of large-sized plants in a short time and will be really farmers friendly. Moreover, this technique is useful to propagate those rare male Dighloti plants which do not produce seed and also difficult to root by cuttings.

An ambitious attempt was made to study the prospect of micropropagation of Dighloti plant by tissue culture technique. It was the first attempt of application of in vitro propagation technique in *Litsaea salicifolia* Roxb. MSBM supplemented with NAA and BAP could induce shoot elongation and multiple shoots formation from the axillary meristem. Though differentiation of root and formation of callus from the explants could not be achieved in the present attempt, the result is very encouraging with the formation of multiple shoots. It may form the basis for further investigation on micropropagation of Dighloti by tissue culture technique in future.

Biochemical analysis for four very important constituents of tender, medium and mature leaves of *Litsaea salicifolia* Roxb. var. ellepsoidea Meissn. was carried out. Tender leaves were found to have higher moisture and crude protein content and lower crude fibre content than the medium and mature leaves. Moisture content of tender leaves of Dighloti was also recorded to be higher than all the primary, secondary
host plants of muga silkworm. From the results and discussion of the present investigation it may be concluded that Dighloti with higher moisture content, lower sugar : protein ratio and lower crude fibre content can suitably support the rearing of young stage muga silkworm for higher cocoon yield. With higher moisture content Dighloti may also be a more suitable host plant for domestication of muga silkworm through indoor rearing technique. Moreover, in no way Dighloti is inferior to the other primary host plants so far as the moisture content, crude protein, crude fibre and total sugar is concerned. However, analysis for other biochemical constituents of Dighloti leaves is to be done and its corresponding impact on qualitative and quantitative cocoon characters is to be evaluated through bioassay moulting test. Then only the ranking of Dighloti as muga host plant will be possible.

Feeding behaviour of semi-domesticated and wild muga silkworms was observed on Dighloti plants and their rearing performance evaluated. The most successful crop of muga silkworm on Dighloti was found to be Oct./Nov. followed by April/May. The plus point of rearing of muga silkworm during April/May on Dighloti is that because of its bushy nature damage due to hailstorm is less. Contrarily, rearing in April/May on Dighloti is inconvenient because muga silkworms at noon come down very fast due to high temperature and management is difficult. However, the problem can be solved if Dighloti plants are raised in between Som and Soalu plantation which will provide sufficient shade to the Dighloti plants and cool down the environment.

Higher hatchability, E.R.R., silk ratio per cent, denier and
longer single cocoon filament of wild muga silkworm than semidomesticated type is a notable observation and the variabilities may be effectively utilised for breeding.

Though certain variabilities were observed in respect of fecundity, hatchability, E.R.R., silk ratio per cent, colour of silk, filament length and denier between Dighloti fed and Som and Soalu fed muga silkworms the differences were not remarkable. So, it may augur that the Dighloti can be commercially raised and recommended as an apparently viable primary food plant of muga silkworm particularly for rearing of autumn commercial brood. Dighloti plant can thus equally be used for seed cocoon production also. Moreover, wild counterpart of *Antheraea assama* Westwood can be maintained on Dighloti plant in the germplasm bank for future breeding programme. The present study provides the basis for further investigation on the wild counterpart of muga silkworm. It may facilitate in the planning of muga silkworm breeding for further development of improved muga silkworm breeds.

E.R.R. of muga silkworm under different types of net were observed. Highest E.R.R. was recorded under mosquito nets followed by nylon nets with smaller meshes (0.5 cm) and bigger meshes (1.0 cm). Due to bushy nature of Dighloti, net rearing was found to be very convenient on it. Based on the results it can be recommended that for higher E.R.R. of muga silkworm, mosquito nets in the Chawki stage (upto 3rd instar) nylon nets of smaller meshes (0.5 cm) in the 4th instar stage and nylon nets with bigger meshes (1 cm) in the 5th instar stage can be used. As the enemies of muga silkworm in the
advance stage (5th instar) are larger in size namely-birds, bats, lizards, snake, money, jackel etc. nylon nets with comparative bigger meshes will also serve the purpose. Hence, higher cocoon yield with less man power and labour may be possible on Dighloti.

Feeding behaviour of wild eri silkworm was observed on Dighloti plants both in wild and domestic conditions and their rearing performance in different broods were recorded and evaluated. April/May was found to be the best season for rearing of wild eri on Dighloti with 88.0% E.R.R. and 14.28% silk content.

This is the first report of collection of *Philosamia cynthia* Drury from Dighloti and also a pioneering work in rearing of wild eri in domestic condition on Dighloti.

Dighloti is now established as a new host plant of wild eri silkworm (*Philosamia cynthia* Drury). Dighloti can be raised in the same farm both for muga and ericulture for commercial and seed cocoon production as well as maintaining various domesticated wild silkworm races for breeding programme. The *P. cynthia* Drury can serve as a resourceful material for breeding muga and eri to evolve ever important disease resistant, genetically stable, improved bivoltine silkworm races.

If the reealibility of the wild eri (*P. cynthia* Drury) cocoon could be transferred to the domesticated eri (*P. ricini* B.) through cross breeding, that could be a major break through in the field of ericulture. Moreover, taking cue from our own experience of outdoor rearing of *P. cynthia* Drury on Dighloti plants, large scale production
of eri cocoons may be possible which was hitherto a challenge in the field of eri culture. However, outdoor rearing of eri silkworm (P. ricini B.) on Ailanthus sp., tried by noted sericulture scientist Dr. S.N. Chowdhury in the Assam Agricultural University, Jorhat, could not succeed. Therefore, greater attention is required for further investigations on these lines. Thus, the study has established on a sound basis the genetically useful and important traits of P. cynthia Drury, such as hibernation, reelability, disease resistance etc. for all future breeding programmes of both P. ricini Boisduval and A. assama Westwood in evolving commercially and economically desirable improved strains of silkworms.

It can be concluded in a nut shell that the Dighloti (Litsaea salicifolia Roxb.) is a potential plant which can offer tremendous contribution towards the improvement of deteriorating unique muga silk industry of Assam if it is scientifically exploited. Moreover, this potent plant may also play a significant role in the development of the age-old eri silk industry of Assam.

Thus, the present research programme has promised successfully a silver lining on the future development of muga and eri silk industry of Assam.