OBSERVATIONS

In the present investigation host plants of Eri silkworm have been collected from different localities of Karnataka and subjected to Morphological characterisation, Pollen analysis, Chemo-assay (Phytochemical investigations) and Bioassay studies (Rearing trials). The observed results have been described in the following paragraph.

*Ricinus communis, L.*

It is a castor plant, grown worldwide in tropical and temperate climates. This plant is native of India and cultivated throughout the country in gardens and fields and also grows wild in waste place. It is grown for its oil yielding seeds. Often, it is grown as an ornamental plant in private gardens because of its massive palmate leaves and rapid growth. Further, it grows in waste land as an escape.

It is an erect perennial, monoecious, evergreen shrub, rarely a small tree grown up to 4 - 5m high (Fig. 15). Tap root is much branched. Stem aerial, erect, cylindrical, herbaceous, but woody below, branched and hallow. Leaves simple, alternate, stipules united, deciduous leaving scar around node. Petiolate, petioles long (9-25cm) and hallow, blades peltate, palmately lobed with 7 to 11 lobes, apex with 2 glands, glabrous on both surface, lobes lanceolate, glandular, serrate, acuminate, palmately reticulate, divergent (Fig. 16). Inflorescence is a compound raceme or panicle and terminal. Both male and female flowers are found on same inflorescence. Male flowers are found below and female flowers near the apex (Fig. 17). Male flowers apetalous, bracteate, ebracteolate, ovate-lanceolate, greenish yellow, glabrous, actinomorphic and
incomplete and posses 5 tepals arranged in single whorl, valvate aestivation. Stamens numerous, monadelphous, found in a dense fascicle, filaments branched and united to form five branches, unequal in length, anthers dithecous, yellow, globose, basifixed, longitudinally dehiscent, spreading in open flower (Fig. 18). Female flowers bracteate, ebracteolate, pedicellate, actinomorphic, incomplete and hypogynous, tepals 3 arranged in single whorl, valvate aestivation, staminodes present. Ovary superior, globoid, tricarpellary syncarpous, trilocular with one ovule in each locule on axile placentation, styles 3, bifid with feathery stigma covered with fleshy soft green spines. Fruit globoid or sub globoid capsule called regma, 3-lobed, usually spiny, dehiscent into three 2-valved cocci, each coccus 1-seeded (Fig. 19). Seeds ovoid, smooth, brown or grayish, silvery with dark streaks on the seed coat, carunculate (Fig. 20). Castor plants attains flowering throughout the year. Propagation is done through seeds.

**Micro morphological Data**

Stomatal size, Stomatal index and Stomatal frequency were found to be 211µm², 22.10 and 358.50mm⁻² respectively (Table - 3; Figs. 56, 104-106).

**Uses:** Leaves are used for rearing eri silkworm, and it is a primary food plant. Castor plants are grown usually for producing oil which is used as biofuel / biodiesel. Castor oil is extensively used in Ayurveda, Unani, Homeopathic and Allopathic systems of medicine. Oil is an excellent lubricant, purgative and coolant. It is also used for manufacturing varnishes, paints, enamels, polishes, waxes, typewriter ink, soaps and aromatic perfumes. Often, castor cakes
are used as manure to enrich the soil with nitrogen and other minerals.

**Palynological Data**

The pollen grains of *Ricinus communis* are prolate, sub spheroidal to sub-prolate, tricolporate, reticulate. Average size of the pollen grain is 82µm (Fig. 62).

**Phytochemical constituents**

Mature leaves of *Ricinus communis* recorded 72.75 % moisture. Amino acid content was found to be 47.25 µmoles/g. Protein content was observed to be 34.75 mg/g. Starch content was registered to be 5.50 mg/g. Total soluble and reducing sugar contents were found to be 66.25 mg/g and 69.75 mg/g respectively. Total phenol content was estimated to be 6.75 mg/g. Total chlorophyll content was recorded to be 4.05 mg/g. Chlorophyll ‘a’ and ‘b’ were found to be 3.25 mg/g and 0.80 mg/g respectively (Table - 4; Figs. 68 - 77).

**Manihot esculenta, Crantz.**

It is a cassava/tapioca plant belongs to the family Euphorbiaceae. Genus *Manihot* has about 98 species, among which the only commercially cultivated one is *Manihot esculenta*. Tapioca is a crop of economic importance, both as a food and as a raw material for industrial products. It is considered to be the cheapest source of carbohydrates amongst the cereals, tubers and root crops. The cassava plant has its origin in South America and now it is found in almost all the parts of tropical region in India.
It is a tall semi woody, perennial, monoecious shrub, growing upto 3-5 mts high (Fig. 21). Roots fleshy tubers (Fig. 24). Stem aerial, erect or spreading, glabrous, cylindrical containing milky latex, with leaves towards the upper portion and prominent leaf scars. Leaves palmately compound, alternate, stipulate, petiolate, stipules 2-3 lobed, deciduous, petioles 4-11cm long, usually longer than the blades. Leaf blades palmately divided, 7.5 to 15 cm long and minutely pubescent along veins, lanceolate, glabrous on both surface, acuminate at the apex (Fig. 22). Inflorescence axillary recemes (Fig. 23). Flowers unisexual, incomplete, actinomorphic, hypogynous, monoecious, male flowers are found towards lower portion and female flowers are found towards apical portion, white or cremay white coloured. Stamens 10 in 2 whorls of 5 each, alternately short and long, anthers dithecos, oblong, basifixed, longitudinally dehiscent. Ovary superior, subglobose, glabrous, tricarpillary syncarpus, trilocular with one ovule in each locule on the axile placenta. Fruit is a trilocular capsule, ovoid or globose, about 1.2 cm across with winged angles, dehiscent into three 2-valved cocci, each coccus 1 seeded (Fig. 25). Seeds are ellipsoid, gray with dark blotches, carunculate (Fig. 26). Seeds 3 per capsule. Cassava plants attains flowering during November – February season. Propagation is done through mature stem cuttings and seeds.

Micro morphological Data

Stomatal size, Stomatal index and Stomatal frequency were found to be 253.50 µm², 26.21 and 404.25 mm⁻² respectively (Table - 3; Figs. 57, 104-106).
Observations

**Uses:** The leaves are used for rearing eri silkworm and as cattle feed. The roots which are the most valuable portion of the plant, is used in cosmetic, puddings, making biscuits and confectionery items due to high quantity of carbohydrate. Cassava leaves also offer a good source of supplementary protein and vitamins.

**Palynological Data**

The pollen grains of *Manihot esculenta* are polyporate, spheroidal and round with richly ornamented reticulated crotonoid pattern of exine. The intine is differentiated with a granular texture. Average size of the pollen grain is found to be 148.2µm in diameter (Fig. 63).

**Phytochemical constituents**

Mature leaves of *Manihot esculenta* recorded 74.50 % moisture. Amino acid content was found to be 45.75 µmoles/g. Protein content was observed to be 33.50 mg/g. Starch content was registered to be 4.25 mg/g. Total soluble and reducing sugar contents were found to be 64.50 mg/g and 67.75 mg/g respectively. Total phenol content was estimated to be 5.75 mg/g. Total chlorophyll content was recorded to be 3.55 mg/g. Chlorophyll ‘a’ and ‘b’ were found to be 2.75 mg/g and 0.80 mg/g respectively (Table - 4, Figs. 68 - 77).

**Jatropha curcas, L.**

It is commonly called physic / purging nut. It is grown in tropical and subtropical regions around the world. *J. curcas* is considered as one of the important oil crops since its seeds are used
Observations

as an essential raw material for making several industrial products. The genus *Jatropha* contains approximately 170 species. *Jatropha* is native to Mexico and continental America. In India it has widely spread in wild and semi wild status as hedge plant, as fence on field boundary, road side and forest eco-systems in various states. In India there are 18 *Jatropha* species. Among these, *Jatropha curcas* is the most primitive form and has the potential to be cultivated for biodiesel and medicinal properties.

It is a large, soft wooded, monoecious, succulent perennial shrub or small evergreen tree, which can reach a height of 3 – 5 mts (Fig. 27). Much branched tap root. Stem aerial, erect, branched, young shoots pubescent, older glabrous, soft wooded. Leaf simple, alternate, stipulate, petiolate, stipules caducous; petioles as long as the blades, glabrous, swollen at the base; blades broadly ovate, 3 to 5 lobed, venation is palmate, glabrous on both surfaces, cordate at the base, acuminate at the apex, a thick white milky latex is present (Fig. 28). Inflorescence is complex, cymose, terminal, glabrous or pubescent with a pistilate flower at the center and staminate flowers on much branched peduncles (Fig. 29). Flowers unisexual, incomplete, actinomorphic, hypogynous, yellowish-green colour, found in terminal, peduncled paniculate cyme. Male flowers possess 5 calyx lobes, the lobes ovate-oblong, imbricate. Petals 5, obovate – oblong, erect with a recurved apex, imbricate aestivation. Stamens 10 in 2 indistinct whorls, outer stamens slightly shorter than the inner ones and free; inner stamens connate at the base, anther dithecous, basifixed, longitudinally dehiscent. Female flowers, possess 5 sepals, lobes ovate – oblong, pubescent on both sides, imbricate, often petaloid. Petals 5, gamopetalous, imbricate. Ovary superior, carpels 3, syncarpous, glabrous, trilocular with one ovule in each locule on axile placentation. Styles 3, connate at
the base, stigmas 3, each bifid. Capsules ovoid, 3 lobed with persistent calyx; dehiscent in to three 2-valved cocci, each coccus 1 seeded. Seeds ovoid – oblong, black, glabrous, carunculate, the exocarp remains fleshy until the seeds mature (Figs. 30 - 32). *Jatropha curcas* plant attain flowering during May – August season. Propagation is done through seeds or mature stem cuttings.

**Micro morphological Data**

Stomatal size, Stomatal index and Stomatal frequency were found to be 179.50 µm$^2$, 22.26 and 315.00 mm$^{-2}$ respectively (Table - 3; Figs. 58, 104-106).

**Uses:** Leaf extract of *Jatropha curcas* is used for promoting lactation and treatment of toothache. Seed oil is used for illuminating and for manufacturing candles and soaps. The latex of the plant and seeds are used for medicinal purposes. Seed oil is renewable and safe source of energy. *Jatropha* oil is a viable alternative to diesel, kerosene, furnace oil, coal and fuel wood. It is highly valued as ‘Bio Diesel’. *Jatropha* oil cake serves as an effective organic fertilizer and a viable substitute for chemical fertilizers. It is an excellent species for agro forestry programme. It can be used in control of floods, nutrient leaching, soil erosion and shifting of sand dunes.

**Palynological Data**

The pollen grains of *Jatropha curcas* are oblate, spherical, omniaperturate, heavily sculptured with clivate structures, which aligned reticulately to form a crotonoid pattern. Exine is usually covered with globular structures. Average size of the pollen grain is found to be 94µm in diameter (Fig. 64).
Phytochemical constituents

Mature leaves of *Jatropha curcas* recorded 72.75% moisture. Amino acid content was found to be 43.50 µmoles/g. Protein content was observed to be 25.25 mg/g. Starch content was registered to be 4.50 mg/g. Total soluble and reducing sugar content were found to be 62.25 mg/g and 64.75 mg/g respectively. Total phenol content was estimated to be 4.25 mg/g. Total chlorophyll content was recorded to be 3.00 mg/g. Chlorophyll ‘a’ and ‘b’ were found to be 2.25 mg/g and 0.75 mg/g respectively (Table - 4, Figs. 68 -77).

*Plumeria rubra, L*

It is commonly called temple tree and belongs to the family Apocynaceae. *Plumeria* is native to continental tropical America. It is widely cultivated throughout the world in tropical regions. It is distributed throughout India. Three species of *Plumeria* are found in India namely, *P.rubra, P.alba* and *P.obtusa*. *Plumeria rubra* produces red toned flowers, *P.alba* and *P. obtusa* flowers are white with yellow centre and often variable in form and colour (Figs. 38 – 43).

It is a small deciduous tree growing up to 3 to 7 mts (Fig. 33). Tap root system which is much branched. Stem smooth, erect, branched, cylindrical, white milky latex oozes out when bark is broken. Leaves are usually glossy, evergreen, generally ovate, may be blunt tipped or pointed, simple, opposite, rarely alternate or whorled, when whorled 3 per whorl, pinnately veined, parallel, petiole 2.5 to 5 cm long (Fig. 34). Inflorescence is compound pedunculate cyme found in leaf axil. Flowers regular, bisexual, actinomorphic, complete, pentamerous, hypogynous, fragrant (Fig.
Observations

35). Sepals 5, gamosepalous. Imbricate. Petals 5, gamopetalous, twisted (Fig. 43). Stamens 5 alternating with petals, epipetalous, free or filaments rarely united. Ovary superior, bicarpellary, united at stylar region (above) and free at basal region. Each ovary is 1 – celled with axile placentation. Fruit linear, oblong or ellipsoid, paired follicle or two horn like pods on a long stalk (Fig. 36). Seeds many, membranous, winged with tassel of silky hairs (Fig. 37). *Plumeria rubra* plant flowers during March - December. Propagation can be done through seeds or mature stem cuttings.

**Micro morphological Data**

Stomatal size, Stomatal index and Stomatal frequency were found to be 272.50 µm², 26.79 and 515.00 mm⁻² respectively (Table 3; Figs. 59, 104-106).

**Uses:** It is a highly valued tree for ornamental and religious purpose and often planted near temples. Flowers are used in wreath making and offered to deities in temples. Flowers are used for the treatment of dysentery. The latex acts as a purgative, applied externally for itches. The decoction of bark extract is used as counter irritant on the gum for tooth ache.

**Palynological Data**

The pollen grains of *Plumeria rubra* are prolate, tricolporate, provided with pseudocolpi with thick exine and thin intine. Average size of the pollen grain is found to be 52.2 µm in diameter (Fig. 65).
Phytochemical constituents

Mature leaves of *Plumeria rubra* recorded 70.50 % moisture. Amino acid content was found to be 41.75 µmoles/g. Protein content was observed to be 24.50 mg/g. Starch content was registered to be 3.57 mg/g. Total soluble and reducing sugar contents were found to be 58.25 mg/g and 66.50 mg/g respectively. Total phenol content was estimated to be 5.75 mg/g. Total chlorophyll content was recorded to be 2.60 mg/g. Chlorophyll ‘a’ and ‘b’ were found to be 1.66 mg/g and 0.93 mg/g respectively (Table-4, Figs. 68-77).

*Ailanthus excelsa*, Roxb.

It is commonly called ‘Tree of Heaven’ belongs to family Simarubaceae. The plant is fast growing and extensively cultivated in many parts of India in the vicinity of villages. The tree is indigenous to Southern and Central India and distributed in Western Peninsula, Rajasthan, Bihar, Orissa, Madhya Pradesh, Panchmal district of Gujarat, and in dry deciduous forest of Maharastra. It is often planted as an avenue tree along road sides. This plant is known for its high economical and commercial importance.

It is a large, deciduous fast growing tree, it reaches the height of 25 -30 m tall and 60 to 80 cm in diameter (Fig. 44). Much branched root system. Stem woody, wood soft and white, bark is rough and grayish brown in colour and aromatic. Leaves alternate, pinnately compound, large, 30-60 cm in length. Leaflets 8 – 14 or more pairs, long stalked, ovate or broadly lance shaped, very unequal base, 6 – 10 cm long, often curved, long, pointed, hairy
gland present, edges coarsely toothed and often lobed (Fig. 45). Inflorescence panically cymose, rarely spicate (Figs. 46 & 47). Flower polygamous found in large much branched axillary panicles which are shorter than the leaves. Calyx 5 lobed, equal lobes, imbricate. Petals as many as sepals, oblong to narrowly oblong, imbricate. stamens 10 in male, 5 – 6 in bisexual flowers and absent in female flowers. Ovary superior, Carpels 2 – 5, 5-locular, ovules solitary in each locule, axile placentation, styles as many as carpels. Fruit 1 seeded samara, papery pod, 4 – 6 cm long, 4 – 1.5 cm broad, lance shaped, acute at both ends, once or twice twisted at base (Figs. 48 & 49). *Ailanthus excelsa* plant flowers during November – February. Propagation is done through seeds.

**Micro morphological Data**

Stomatal size, Stomatal index and Stomatal frequency were found to be $215.00 \mu m^2$, 26.14 and 324.50 mm$^{-2}$ respectively (Table - 3; Figs. 60, 104-106).

**Uses:** *Ailanthus* wood is used in manufacturing of plywood, match sticks, toy and packing materials. Mature leaves are best fodder for sheep’s. Leaf extract is used for washing wounds. The pulp is obtained from debarked wood and used in paper industry. The decoction of bark is used for curing wounds and sores.

**Palynological Data**

The pollen grains of *Ailanthus excelsa* are tricolporate, with long, narrow colpi, reticulate exine, lumina open and elongated towards the colpus, striate. Pollen grains are hexagonal in polar
view, elliptical in equatorial view. Average size of the pollen grain is found to be 84μm in diameter (Fig. 66).

**Phytochemical constituents**

Mature leaves of *Ailanthus excelsa* recorded 70.25 % moisture. Amino acid content was found to be 41.50 μmoles/g. Protein content was observed to be 26.25 mg/g. Starch content was registered to be 3.50 mg/g. Total soluble and reducing sugar contents were found to be 61.75 mg/g and 64.75 mg/g. Total phenol content was estimated to be 5.12 mg/g. Total chlorophyll content was recorded to be 2.77 mg/g. Chlorophyll ‘a’ and ‘b’ were found to be 1.86 mg/g and 0.91 mg/g respectively (Table-4, Figs. 68-77).

**Carica papaya, L.**

It is commonly called papaya or tree melon. It belongs to the family Caricaceae. It is one of the major fruit crops cultivated in tropical and sub-tropical zones and found throughout India. Mainly cultivated in Uttar Pradesh, Punjab, Rajasthan, Tamil Nadu and Karnataka.

It is a fast growing, small, unbranched, soft wooded evergreen tree, with a single stem growing to 5-10 m tall, with spirally arranged leaves confined to the top of the trunk (Fig. 50). Roots are much branched. Stem usually unbranched, cylindrical, erect, aerial, grayish, marked with fallen leaf scars. Leaves simple, glabrous, palmatifid, seven to nine lobed, lobes pinnatifid, 30 – 60 cm across on long hollow petioles forming a round tuft at the top (Fig. 51). In both stem and leaves, thick milky white latex is found.
Inflorescence axillary panicles. Flowers milky yellow, dioecious or polygamous. Male flowers are found in long stalked drooping panicles. Female flowers are found in cymose inflorescence. Papaya plants are sometimes trioeic i.e., separate plants bear either male, female or bisexual flowers. Male flowers posses 5 sepals which are small, gamosepalous, valvate aestivation. Corolla 5, gamopetalous, tube long, contorted aestivation. Stamens 10, arranged in two whors, 5 longer and 5 shorter, inserted at the throat of the corolla tube, anthers dithecous, longitudinal dehiscence. Rudimentary ovary is present (Fig. 52). Female flowers also posses 5 calyx, small, blunt lobed, green, gamosepalous, valvate aestivation. Corolla 5, milky yellow or yellow white, oblong, lanceolate, gamopetalous with a short corolla tube, contorted aestivation. Stamens absent. Ovary superior, ovate, pentacarpellary syncarpous, unilocular, many ovules on parietal placentation. Style single, terminal stigma pentafid, often cracked (Fig. 53). Bisexual flowers larger than male flowers. Calyx 5, lobes blunt, short, green, valvate aestivation. Corolla 5, lobes oblong, creamy yellow, gamopetalous, contorted. Stamens 5 or 10 in 1 or 2 whors, anthers dithecous, longitudinal dehiscence. Ovary superior, smaller than in female flowers, pentacarpellary syncaropus single locule, many ovules, parietal placentation, style single, terminal and ends with five stigmatic lobes. Fruit is a berry (melon like), cylindrical, oblong, indehiscent, yellow at maturity (Fig. 54). Seeds numerous, ovoid, black and embedded in sweet pulp i.e., aril. Papaya plant flowers throughout the year and propagated through seeds (Fig. 55).
**Micro morphological Data**

Stomatal size, Stomatal index and Stomatal frequency were found to be 377.50 µm², 19.21 and 572.75 mm⁻² respectively (Table 3; Figs. 61, 104-106).

**Uses:** Papaya is popular as a delicious table fruit. Ripened fruit is rich in vitamins and calcium. Leaves are used for the treatment of wounds and fresh cuts. White milky latex is used as a cosmetic and to heal toothache and tooth decay. The papaya fruit, as well as all other parts of the plant contain a milky juice in which an active principle known as papain is present. Papain is used as an ingredient in the manufacture of chewing gum and for enzymatic degumming of silk. Seeds are used for cleaning of stomach, proper function of liver. Roots are used as a tonic against excessive bleeding of dog bite. The ripened fruit is considered to be good for digestive troubles and skin diseases.

**Palynological Data**

The pollen grains of *Carica papaya* are sub spheroidal, tricolporate, reticulate, with thick exine. Average size of the pollen grain is found to be 48µm in diameter (Fig. 67).

**Phytochemical constituents**

Mature leaves of *Carica papaya* recorded 73.50 % moisture. Amino acid content was found to be 42.75 µmoles/g. Protein content was observed to be 24.75 mg/g. Starch content was registered to be 3.73 mg/g. Total soluble and reducing sugar contents were found to be 58.50 mg/g and 69.50 mg/g respectively.
Total phenol content was estimated to be 4.64 mg/g. Total chlorophyll content was recorded to be 2.75 mg/g. Chlorophyll ‘a’ and ‘b’ were found to be 1.94 mg/g and 0.80 mg/g respectively (Table - 4, Figs. 68-77).

**Results of Bioassay studies (Independent and combination of host plants)**

In the present study the rearing performance of eri silkworm, *Philosamia ricini* fed with different host plants viz., *Ricinus communis*, *Manihot esculenta*, *Jatropha curcas*, *Plumeria rubra*, *Ailanthus excelsa* and *Carica papaya* independently from brushing to spinning was assessed. Further, sequential rearing trials were also conducted i.e., feeding the worms with castor leaves from 1st instar to 3rd instar and then they were fed with the leaves of *Manihot esculenta*, *Ailanthus excelsa* and *Jatropha curcas* separately during 4th and 5th instar periods. Commercial traits like larval duration, larval weight, effective rate of rearing, cocoon weight, pupal weight, shell weight and shell ratio were recorded. The details of the schedule are as follows:

**A. Independent rearing schedules**

**T1 treatment**

In this treatment eri worms were reared exclusively on *Ricinus communis* from brushing to spinning. The mean larval duration of 19.75 days was recorded. Larval weight was observed to be 8.45 g. ERR was registered to be 92.14 %. Cocoon weight, pupal weight and shell weight were found to be 3.85 g, 3.03 g and 0.54 g
Observations respectively. Shell ratio was found to be 14.19% (Table – 5; Figs. 78 & 79; 90 - 96).

**T2 treatment**

The eri worms which were fed on *Manihot esculenta* leaves recorded the mean larval duration of 21.25 days. Larval weight was observed to be 7.61 g. ERR was registered to be 89.60%. Cocoon weight, pupal weight and shell weight were found to be 3.17 g, 2.67 g and 0.49 g respectively. Shell ratio was found to be 15.69% (Table – 5; Figs. 80 & 81; 90 - 96).

**T3 treatment**

The eri worms which were fed on *Jatropha curcas* leaves recorded the mean larval duration of 23.00 days. Larval weight was observed to be 5.84 g. ERR was registered to be 85.47%. Cocoon weight, pupal weight and shell weight were found to be 3.03 g, 2.57 g and 0.46 g respectively. Shell ratio was found to be 15.24% (Table – 5; Figs. 82 & 83; 90 - 96).

**T4 treatment**

The eri worms which were fed on *Plumeria rubra* leaves recorded the mean larval duration of 24.75 days. Larval weight was observed to be 6.02 g. ERR was registered to be 83.70%. Cocoon weight, pupal weight and shell weight were found to be 2.88 g, 2.44 g and 0.43 g respectively. Shell ratio was found to be 15.15% (Table – 5; Figs. 84 & 85; 90 - 96).
Observations

**T₅ treatment**

The eri worms which were fed on *Ailanthus excelsa* leaves recorded the mean larval duration of 23.50 days. Larval weight was observed to be 6.23 g. ERR was registered to be 81.65 %. Cocoon weight, pupal weight and shell weight were found to be 3.20 g, 2.74 g and 0.46 g respectively. Shell ratio was found to be 14.41 % (Table - 5; Figs. 86 & 87; 90 - 96).

**T₆ treatment**

The eri worms which were fed on *Carica papaya* leaves recorded the mean larval duration of 25.50 days. Larval weight was observed to be 5.92 g. ERR was registered to be 80.27 %. Cocoon weight, pupal weight and shell weight were found to be 3.00 g, 2.56 g and 0.44 g respectively. Shell ratio was found to be 14.67 % (Table - 5; Figs. 88 & 89; 90-96).

**B. Sequential rearing schedules**

**T₇ treatment**

Healthy leaves of *Ricinus communis* were fed to eri worms from 1ˢᵗ instar to 3ʳᵈ instar and then the larvae were fed with the leaves of *Manihot esculenta* during 4ᵗʰ and 5ᵗʰ instar period. The mean larval duration was found to be 20.67 days. Larval weight was 6.48 g. ERR was registered to be 80.00 %. Cocoon weight, pupal weight and shell weight were found to be 3.31 g, 2.86 g and 0.48 g respectively. Shell ratio was found to be 14.50 % (Table – 6; Figs. 97-103).
**T₈ treatment**

Healthy leaves of *Ricinus communis* from 1ˢᵗ instar to 3ʳᵈ instar and *Ailanthus excelsa* during 4ᵗʰ and 5ᵗʰ instar period were fed to eri worms. The mean larval duration of 23.33 days was recorded. Larval weight was 6.00 g. ERR was registered to be 76.00 %. Cocoon weight, pupal weight and shell weight were found to be 3.16 g, 2.69 g and 0.46 g respectively. Shell ratio was found to be 14.55 % (Table – 6; Figs. 97-103).

**T₉ treatment**

Healthy leaves of *Ricinus communis* (1ˢᵗ to 3ʳᵈ instar) and *Jatropha curcas* (4ᵗʰ and 5ᵗʰ instar) were fed to eri worms. The mean larval duration was found to be 24.67 days. Larval weight was 5.78 g. ERR was registered to be 71.33 %. Cocoon weight, pupal weight and shell weight were found to be 2.67 g, 2.52 g and 0.41 g respectively. Shell ratio was found to be 15.35 % (Table – 6; Figs. 97-103).