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Life Cycle and Biology of *Danaus Chrysippus* (L.) (Plain Tiger) on *Asclepias Curassavica* (L.) at Andhra University Campus, Visakhapatnam.

K. Ella Rao[1], *G. Sujan Chandar[2], J.B.Atluri[3]
[1,2,3](Department of Botany, Andhra University, Visakhapatnam- 530003, Andhra Pradesh)
corresponding Author E-mail: sujangc@gmail.com

Abstract: *The Danaidae butterfly Danaus Chrysippus (Plain Tiger) it occurs throughout the year. The larval performance and life cycle of Danaus Chrysippus was studied at Andhra University campus using the leaves of Asclepias Curassavica as the larval host both in laboratory and in the natural conditions. The behavior and morphological characters of eggs, caterpillars, pupae and adult emergence were observed in the laboratory at 28°-30°c. The life cycle was completed in 17-18 days, with egg hatching 3 larvae 7-8, and pupae 7-8 days. The values of consumption index (CI), growth rate (GR), and approximate digestibility (AD) across the instars decreased as the larvae aged. The average values of the CI and GR are 0.97, 0.22 respectively, and that of AD is 74.43. But the values of both efficiency of conversion of digested food (ECD) and efficiency of conversion of ingested food (ECI) either increased or decreased from instar to instar.*

Keywords: *Oviposition, Danaidae, Danaus Chrysippus, Instars, Food utilization indices.*

I. Introduction

The phytophagous insects like butterflies are closely related with the plants and provide economic and ecological benefits to the human society. Butterflies are dependent on vegetation both as adults and larvae and involve themselves in complex feeding relationships with green plants. As larvae, they feed chiefly on the foliage of plants and they are typically host specific and often show a 'botanical instinct' in that closely related plant.

If the requirements of the butterfly species in the wild are thoroughly understood, it is possible to conserve them in captivity or wild. A suitable habitat for butterflies should include mating site(s) for the adults, nectar sources for adults and, larval food plants for oviposition. As butterflies are holo-metabolous with distinct developmental stages as egg-larva-pupa-adult, their reproductive output is dependent on the combined effect of larvae-derived and adult-derived nutrients or energy. These findings require a study of adult nectar resources, larval food plants, and food consumption and utilization by the larvae. However, most butterfly ecologists and conservationists express that the existing knowledge of the exact requirements of butterflies in India is woefully inadequate, and the life history of 70% of Indian butterflies is still unknown. Therefore, efforts are being made in the Andhra University to study the biology, ecology and conservation of butterfly fauna available at Visakhapatnam and its surroundings.

The present study relates to the plain tiger - *Danaus chrysippus* (L.) (Lepidoptera: Rhopalocera: Danaidae) and describes its adult food resources, oviposition and larval host plant A*sclepias curassavica* (L.) egg deposition pattern, life history including the duration of early life history stages.

II. Material and Methods

II.1. Study Region

The present study was carried out at Visakhapatnam during 2011 and 2012. Visakhapatnam (17o 42' N latitude and 83 o 20' E longitude) is located on the east coast of India in the State of Andhra Pradesh. The climate of the area is tropical monsoon type. Most of the precipitation during the year is June to November, and the total rainfall, though varies from year to year, normally ranges between 1000 – 1500 mm. The mean temperature is at its maximum on some days (38 - 45°C) during May/June. Monsoon rains cool the tropical heat from June/July onwards, with the mean temperature remaining relatively high through October and there after decreasing to a minimum (18–20°C) in January/February.

II.2. Study Site

The present study was conducted at Andhra University campus, which spreads over an area of 168 hectares and is in proximity to the coastline. The wilderness on the Andhra University Campus was searched for the reproductive activity of the butterflies. A large number of tree and herbaceous species occur on the Campus.

Some of the plants occurring on the campus are heavily foraged by adult butterflies for nectar. Many herbaceous taxa serve as the larval hosts for the butterfly species distributed on the vast campus.

II.3. Field Study

Regular walks in different patches of the study site were undertaken at 10-day intervals or when required even at shorter intervals or even daily. Butterflies are day active mostly during 0830 – 1500 h. Hence, walks were made during these hours of the day to record the flight behaviour, foraging, and ovipositing activity of the *Danaus Chrysippus* chosen for the present study. These activities were observed during the entire period of adults on wing. Nectar resource plants and oviposition plants used by this species were recorded.

II.4. Laboratory Study

II.4.1. Life History Study

After noting the period of breeding season and the oviposition plants close and prolonged observations were made of the breeding females laying eggs on its host plants. Freshly laid eggs were spotted, and the plant material (leaves/twigs) on which they were laid, was plucked without causing any damage. The date and time of day of collection were noted. Then the material was transferred to Petri dishes of 10 cm diameter and 1.5 cm depth. The inside of each of these Petri dishes was lined with moist blotting paper to provide moist conditions. They were brought to the Department and incubated in the laboratory having a temperature of 28 ± 2°C, and relative humidity of 80 ± 10%. The Petri plates were kept in a clean, roomy cage (60 x 50 x 30 cm) covered with wire gauge. The light condition was the normal indirect sunlight, but its duration was not uniform throughout the year. It varied from a low of about 11 h during November – February (winter months) to a high of about 13 h during May – June.

The eggs thus incubated in the laboratory were examined at 6-hour intervals daily for recording their incubation period and hatchability. The eggs were treated as hatched when the larvae came out from them.

In order to assess the total larval period and the number of instars that may be produced, the newly hatched larvae were transferred individually into the Petri dishes with the help of a camel hairbrush. Fresh young leaves were offered as food to the growing larvae. Moulting was noted, and thus the number of instars produced was recorded. Observations as color shape and size of each instar was maintained. As the larvae grew, they needed more space. Increased space was provided by transferring the growing larvae to bigger Petri dishes (15 cm diameter; 2.5 cm depth).

The full-grown larvae pupate, and particulars of pupae including color, shape, size, weight and duration were also recorded. Millimeter graph paper was used for taking measurements. Taking the number of eggs studied, their developmental success (%) was calculated. In describing the details of adult characters, the butterflies that have emerged from the pupae in the laboratory, and those caught in the wild were used.

II.4.2. Food Consumption and Utilisation

The larvae represent the main feeding stage. Quantitative data of food consumption and utilization were recorded for each instar of the butterfly species under study using the gravimetric method of [1]. The larvae and the host leaves were weighed separately and then placed in Petri dishes. The larvae were allowed to feed on the leaves for 24 h and then the weights of the larvae and the remaining leaf material, and faecal matter in the Petri dish were determined. Fresh food was supplied, and the related weights were also taken every 24 h. From these fresh weight measurements, growth and food utilization indices were calculated. These indices included Consumption Index (CI), Growth Rate (GR), Approximate Digestibility (also called Assimilation Efficiency) (AD), Efficiency of Conversion of Ingested Food (also called Gross Conversion Efficiency) (ECI), and Efficiency of Conversion of Digested Food (called Net Conversion Efficiency) (ECD). The formulae of [1] used in the calculation of these indices are:

$$\text{CI (Consumption index)} = \frac{\text{Weight of food consumed}}{\text{Weight of instar x Number of feeding days}}$$

$$\text{GR (Growth rate)} = \frac{\text{Weight gained by the instar}}{\text{Mean weight of instar x Number of feeding days}}$$

$$\text{AD (Approximate digestibility)} = \frac{\text{Weight of food ingested} - \text{Weight of faeces}}{\text{Weight of food ingested}} \times 100$$

$$\text{ECD (Net conversion efficiency)} = \frac{\text{Weight gained by the instar}}{\text{Weight of food consumed} - \text{Weight of faeces}} \times 100$$

$$\text{ECI (Gross conversion efficiency)} = \frac{\text{Weight gained by the instar}}{\text{Weight of food consumed}} \times 100$$

Weight of food ingested

The weights are expressed in units of milligrams (mg). The values are based on five different observations for each parameter; standard deviations were also calculated.

II.5. Statistical Analysis

The relation between the food consumed and the weight gained per instar by the larvae of each of the butterfly species under study was statistically analysed on the basis of Legenders principle by fitting a straight line. Larval weights are represented on Y- axis, and the food consumed on X-axis. Correlation coefficient was calculated in each case along with_t'value.

III. Results

III.1. Adult Description (Plate. A**)**

Wingspan 70-80 mm. Both sexes pale orange with black marginal borders, and black upper side forewing tips having a sub-apical white band of elongated spots. Similar to Striped Tiger but without the bold outlines to veins. Three or four small black discal spots on both sides of Hind wing. Under side much paler. Male has a pouch containing scent scales on under side hind wing and patch of scent scales on Upper side hind wing. Thorax black with white spots. Upper side reddish brown with black borders in both wings and black apex in Fore wing. Forewing with variable number of white spots in the costa and apex. Underside dull orange. Fore wing dark brown in the upper half with white spots in the black area and Hind wing with six black spots.

Also known as the African Monarch, the African Queen. It is the commonest of all Indian butterflies and strongest flier of the geneus Danaus. Found throughout the year, Mimicked by Leopard Lacewing, Tamil Lacewing, Indian Fritillary and Female Danaid Egg fly.

III.2. Habit

This butterfly is known to everyone. From dawn to dusk, it may be seen flying about in any garden, setting on a flower for a moment to sip its nectar, and then moving on to the next blossom. In the evening, it flutters low among bushes or stems of grass to find a resting place for the night. Less frequently, the males can be observed sailing to and from with their scent brushed exposed trying to attract a mate.

They appeared in open places, mostly near their oviposition host plants (milkweed). Slow flight close to the ground. Prefers open country, but seen in forests too, and up to 2,500m in the hills. On the wing throughout the year.

III.3. Nectar Host Plants

The butterfly collected nectar present in the flowers of *Antigonon leptopus* Hook. & Arn. belonging to Polygonaceae with flowering season during- January- April and August–December having pink flowers; *Catheranthus roseus* L. (Apocynaceae) that flowers throughout the year, with pink/white flowers; *Tecoma stans* L.Kunth. (Bignoniaceae.) which flowers during May – December with yellow flowers; *Lantana camara* L. Var. (Verbenaceae) that flowers throughout the year, with yellow and pink flowers; *Vernonia cinera* L. (Asteraceae) that flowers throughout the year, with pink flowers; *Tridax procumbens* L. SP. (Asteraceae) that flowers throughout the year, with yellow flowers; and *Asystasia gangetica*: L. T. (Acanthaceae) that flowers throughout the year, with white flowers.

III.4. Oviposition host plants

The larval host plants of the butterfly belong to the family Asclepiadaceae. The recorded oviposition host plants of this butterfly including *Asclepias curassavica, Calotropis gigantea, Calotropis procera, Cryptostegia grandflora, Pentropis atropurpurea, Mmarsdenia leichnardtiana*. The plant used for ovipositing by this butterfly in the study area was *Asclepias curassavica* (L.) (Asclepiadaceae).

III.5. *Asclepias curassavica* (L.) (Asclepiadaceae) (plate.C)

It is evergreen perennial sub shrubs that grow up to 1 m (3.3 ft) tall and have pale gray stems. The leaves are arranged oppositely on the stems and are lanceolate or oblong-lanceolate shaped ending in acuminate or acute tips. Like other members of the genus, the sap is milky. The flowers are in cymes with 10-20 flowers each. They have purple or red corollas and corona lobes that are yellow or orange. Flowering occurs nearly year round. Moreover, the flowers are necteriferous.

III.6. Breeding and egg laying patterns

Mating (Plate.B) was observed mostly during morning & evening hours and the copulating pair stays at a place. The breeding female laid eggs mostly during 730-1130 hrs in morning and 1430-1700 in evening. Eggs are laid singly on the underside of the leaves, and upper side of the leaf tip. At each time, a single egg is

laid on a plant and then it flies to another plant for oviposition. It laid eggs close to the ground. The eggs laid on *Asclepias curassavica* are collected. The different life stages and food consumption indices on *A.curassavica* is described here.

III.7. Biological Observations Table. 1.

III.7.1. Egg stage (plate.D)

The newly laid egg is dome shaped with longitudinal ridges. At deposition, they are white but change to cream colour in a day. The egg measured 1.00 (1.04±0.05) mm in length and 0.80-0.90 (0.86±0.05) mm in width. They hatched in 3 (3.00±0.00) days of incubation. The larva immediately after emerging consumed its eggshell. It passed through five instars over a period of 17-18 (17.54 ± 0.54) days.

III.7.2. Larval Stage (Plate.E, F, G, H &I)

Instar I: It grew for 2 days and attained a length of 4 – 5 (4.30 ± 0.44) mm and a width of 1.10 – 1.20 (1.14 ± 0.05) mm. Its body was yellow, with minute hairs on head and body. Head was black 1.20 – 1.30 (1.22 ± 0.04) and wide with a pair of black horns. Yellow lines were present on the dorsal side longitudinal to the body.

Instar II: It lasted 1– 2 days, and grew to a length of 7.0 – 10.0 (8.40 ± 1.14) mm and a width of 1.50 – 2.00 (1.74 ± 0.25) mm. Body became totally green with black square shaped head, 2 (2.00 ± 0.00) mm wide. Anal spines were black. There were well-developed longitudinal yellow lines dorsally, and a pair of thinner yellow lines present on each lateral side of the body. Body and head were rough and hairy.

Instar III: It grew for 1– 2 days and reached a length of 11.00 – 16.00 (13.00 ± 2.00) mm and a width of 2.00 – 2.50 (2.36 ± 0.21) mm. Head was black, hairy, with two forked horns. It had white marks. Head wide was 3.4 – 3.5 (3.48 ± 0.04) mm. There were well-developed dorsal and lateral yellow lines on the body, the dorsal pair extending up to the black anal spines. Segmentation was clear. There were no changes in other characters from the previous instar.

Instar IV: It also grew for 1 day; it was 14.00 – 21.00 (18.40 ± 2.96) mm long and 2.50 – 3.00 (2.80 ± 0.27) mm wide. Head grew to 4.30 – 4.6 (4.6 ± 0.13) mm width and turned to reddish brown in colour along with the head horns. The white markings on head turned to cream in colour, well developed and triangular in shape. Anal spines developed orange colour dorsally. There were no changes in other characters from the previous instar.

Instar V: It grew for 2 days and attained a final length of 26.50 – 34.00 (30.20 ± 2.88) mm and a width of 4.20 – 5.20 (4.92 ± 0.41) mm. Head grew to a width of 5.80 – 6.70 (6.48± 0.38) mm. Anal spines were orange coloured with black tips. Body was completely hairy. It was rough dorsally and ventrally soft and light green in colour. Orange and dark blue to green coloured spots (three pairs each) were seen on dorsal yellow pair of lines. There were no changes in other characters from the previous instar.

III.7.3. Pupal Stage (plate.J)

Pupa: This stage lasted for 7 - 8 days. It measured 15.00 – 17.00 (16.20 ± 0.83) mm in length and 7.00 – 8.00 (7.30 ± 0.44) mm wide at the broadest region. Pupa was bright green in colour. Its anterior part was broader than posterior end, which was pointed (1 mm long) bearing yellowish green colour. There were two pointed projections 1 mm in length, yellowish green in colour present towards the anterior side. On dorsal side, a projection was present anteriorly having red and cream linear markings. On the dorsal side, there were cream spots with red border, and on lateral sides red spots with yellow border. Ventral side was plain without any markings. Pupal weight was average of 567.6 mg.

III.8. Duration of Life Cycle

The time taken for the development from egg to adult stage was 17 – 18days (egg 3; larva7 - 8; and pupa 7 – 8).

III.9. Food Consumption and Growth

The data on the weight of food consumed and weight gained by the larvae on host plant was incorporated in Tables. 2. The amount of food consumed increased from instar to instar, the proportion of total food consumption was of successive instars was *Asclepias curassavica* 1.66, 5.51, 11.95, 31.03 and, 49.83%. Thus, there was a greater consumption of food by the final instar on the host plant. Out of the total weight obtained, the weight proportions of successive instars was *A. curassavica* 1.13, 4.09, 12.23, 24.28 and 58.18. Thus in the final instar alone there was more than 41.73 – 71.7 % of growth on the host plant. The weight gain by different instars was plotted against the food consumption (Fig.1). The figures indicated a direct relationship between these two parameters. The values of growth rate (GR) on *A. curassavica* increased from III, III, and I,

IV and then decreased from instar and V, and consumption index (CI) decreased from first instar to fifth instar. The values of GR varied between 2.25 – 1.41 mg/day/mg and those of CI between 19.86 mg/day/mg.

III.10. Indices of Food Utilization

The estimated AD values for the five instars were high and ranged between 36.09 – 96.40%, the highest and lowest values being associated with the first and the final instars respectively (Table.2). By contrast, the values of ECI and ECD increased progressively from first instar through successive instars, the former ranging between 11.49 – 32.94% and the latter between 12.11 – 19.61%.

IV. Discussion

Data were obtained with reference to *Danaus chrysippus* on nectar, oviposition, larval host plants, egg-laying patterns, hatching period, the number of instars the larva passed through, their duration, and pupal period, and development success of eggs to adult in the laboratory. In addition, data were collected on larval performance on the basis of growth rate GR, food consumption index CI, approximate digestibility of food AD, efficiency of conversion of digested food ECD and efficiency of conversion of ingested food ECI. These different aspects of biology and food utilization are discussed below in the light of the relevant information available from temperate and tropical regions of the world.

It is generally understood that the gravid females directly deposit their eggs on the plants on which their larvae later feed. [2] expressed that the relationship between female preference and offspring performance is more complicated than a simple correlation between oviposition preference and some aspect of performance like development time. The larval survival, growth rate, development time, pupal weight and the nutritional indices AD, ECI, and ECD have been estimated for *Danaus chrysippus* on its natural oviposition host plants and the effect of potential host plants on the offspring. The potential host plants chosen for this butterfly species was *Asclepias curassavica.* The developmental time assumes importance in temperate regions where the length of favourable season sets a limit on the time when larval growth is possible.

Based on the spectrum of plant species utilized by the larvae for feeding, three groups of butterfly species viz. (1) monophagous, (2) oligophagous and (3) polyphagous, are generally recognised [3]. The present report of the host plants of the butterfly species under study in the context of the above concept of food plant utilization indicated that, *Danaus chrysippus* could be treated as oligophagous. *Danaus chrysippus* has been shown to have a wider range of potential host plants suitable for larval growth than the range of plants now used for oviposition.

While [4] recognized three categories of butterflies based on their egg-laying habit, most authors considered only two categories: (1) the cluster or batch layers, and (2) those laying eggs singly. Analysis of the egg-laying habits the species of the present study *D. chrysippus* exhibited single-egg laying habit respectively. Dispersing the eggs on different host plants may prevent parasitoids and predators.

The basic life cycle of a butterfly from egg to adult varies from 3 weeks to 2 years [3]. As is the case with the butterfly species of *Danaus chrysippus*: average of 17-18 days.

IV.1. Food Consumption and Utilisation Across The Instars

The larvae of *Danaus chrysippus* were found to eat firstly the shell, thus getting the valuable nutrients available immediately to them. After finishing the cell, the larvae continued to feed on young leaves of the oviposition host plants of *Asclepias curassavica.* Therefore, the larvae were reared in the laboratory feeding them with fresh young leaves of their natural host plants every day. The young leaves support better larval growth than older ones [5] [6]. Young leaves are known to be rich in nitrogen content [7], and thus satisfy the nutritional requirement of larvae. Not only are the nutrients of the leaf but also its water content important in relation to larval growth and development [8]; [7]. The leaf water contents of the host plants of *Danaus chrysippus* ranged on *A. curassavica* was 76.54% and tallied with the values given by [9].

ECI increased linearly with food N content, just as [10] reported. Most leaf-feeding insects have ECI values between 10 and 30% on their usual diet. The mean ECI value of all instars of each butterfly is nearly comparable with the above range of values of ECI. The mean AD values (36.09 – 96.40) of *D. chrysippus.*

IV.2. Food consumption and growth

The data obtained with respective to *D. chrysippus* on the quantity of food consumed and growth achieved in terms of larval body weight, and the values of consumption index (CI) and growth rate (GR) showed a definite trend of increasing absolute and declining relative rates of CI and GR under study. There is a straight-line relationship between food consumption and growth (Fig.1). Of all instars, the penultimate and final instars together consumed a greater amount of food: *A.curassavica* 80.86 of total food consumed over the entire larval period. The strategy of increased food consumption with the progression of larval age appears to be

characteristic of all Lepidoptera and the same has been reported in other Lepidoptera in general [11]; [1]; [12]; [13]; [14].

Consumption index (CI) of instar I was the highest and the values decreased as the instars progressed (**Table.2**). This decline in CI as the larvae aged may be related to the increase in body size of the larvae or to the increase in conversion efficiency of ingested food to body mass (ECI). When the values of ECI increase, the values of CI decrease or the *vice versa* [9]. Therefore, the high consumption index of early instars is due to the low conversion efficiency. The values of conversion efficiency (ECI) showed an increasing trend as the values of CI decreased across the instars (Tables.2**).**

The values of CI obtained in the present study for early and late instars agree well with the values reported for some other butterfly species from the study area [13];[14]. Like food consumption, a larger proportion of total growth in terms of larval body weight took place during the last two instars. Thus as the instar larvae progressed there was a trend of increasing absolute weights, but the relative rates (values of GR) generally declined (Table.2). Probably GR is size dependant, and therefore its values declined as the instar larvae progressed gaining weight and size. A similar declining trend in GR has been reported in other butterfly species [13]; [14] and in the moth *Pericallia ricini* [12]. The GRs of penultimate and final instars of the butterfly species of the present study is in line with the decreasing trend in growth rate from penultimate to final instars.

IV.3. Food utilization efficiencies

Like those of CI and GR, the values of assimilation efficiency or approximate digestibility (AD) also declined from early to late instars (Table.2). The inverse relationship of AD profile with the amount of food intake by the successive instars is in conformity with [1] who observed a similar relationship, and stated that AD would be at its highest in instar I. In the present study, the same expectation has been realized with AD value being at its highest in the first instar.

The AD values of the present study ranged between 36.09 – 96.40 % (Table.2). These values appear to be on the higher side of the range 19 – 81% given for 60 species of lepidopteran larvae by [15], and the range 28.7 - 84.6% for *Pericallia ricini* [12]. They are comparable to those (72.0 - 98.0%) of [16] and those (39.40 – 97.25%) of [14]. An inverse relationship is expected between assimilation efficiency AD and efficiency of conversion of digested food or net conversion efficiency ECD. The values of ECD across the instars showed no definite trend in the increase or decrease (Table.2) [9], remarked that it is rather difficult to determine the causes of such reduction in ECD.

The ECI values in the present study varied between 11.49 – 32.94 % (Table.2). This showed a continuous increase from first instar to final instar. In line with the opinion of [9], it may be said that because both age and size of larvae are increasing during development, and because feeding habits may also be changing, it is frequently difficult to interpret the causes of the changes in performance values of the larvae.

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Table 1: Biological Observations of Early Life Stages of Danaus Chrysippus on Asclepias Curassavica.

Stage	Length(mm)			Width (mm)			Duration (days)	
	Min.	Max.	AV.±S.D.	Min.	Max	AV. ±S.D.	Range	AV.±S.D.
Egg	1.00	1.00	1.04±0.05	0.80	0.90	0.86±0.05	3	3.00±0.00
I	4.00	5.00	4.30±0.44	1.10	1.20	1.14±0.05	2	2.00±0.00
II	7.00	10.00	8.40±1.14	1.50	2.00	1.74±0.25	1-2	1.20±0.44
III	11.00	16.00	13.00±2.00	2.00	2.50	2.36±0.21	1	1.00±0.00
IV	14.00	21.00	18.40±2.96	2.50	3.00	2.80±0.27	1	1.00±0.00
V	26.50	34.00	30.20±2.88	4.20	5.20	4.92±0.41	2	2.00±0.00
Total larval Period							7-8	7.20±0.44
Pupa	15.00	17.00	16.20±0.83	7.00	8.00	7.30±0.44	7-8	7.40±0.54

Table 2: Food consumption, growth and food utilization efficiencies of Danaus chrysippus larva fed with Asclepias curassavica.

Instar	Wt. of food ingested (mg)	Wt. of faeces (mg)	Wt. gained by larva (mg)	GR (mg/day)	CI (mg/day)	AD (%)	ECD (%)	ECI (%)
I	86.50±26.47	2.40±1.05	8.76±2.67	2.02	19.86	96.40	12.11	11.49
II	287.04±292.15	23.60±12.26	31.54±8.61	2.25	10.12	88.14	32.38	28.06
III	622.44±403.91	196.64±152.05	94.24±27.16	2.09	13.34	76.64	90.61	32.94
IV	1615.86±951.77	434.74±367.12	187.48±61.65	1.77	12.18	59.41	17.67	13.72
V	2593.30±1330.06	1697.06±472.82	448.82±129.72	1.41	2.42	36.09	35.46	20.31

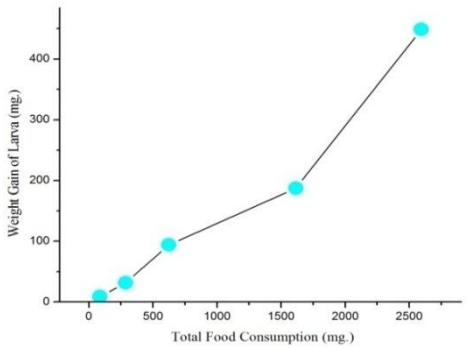
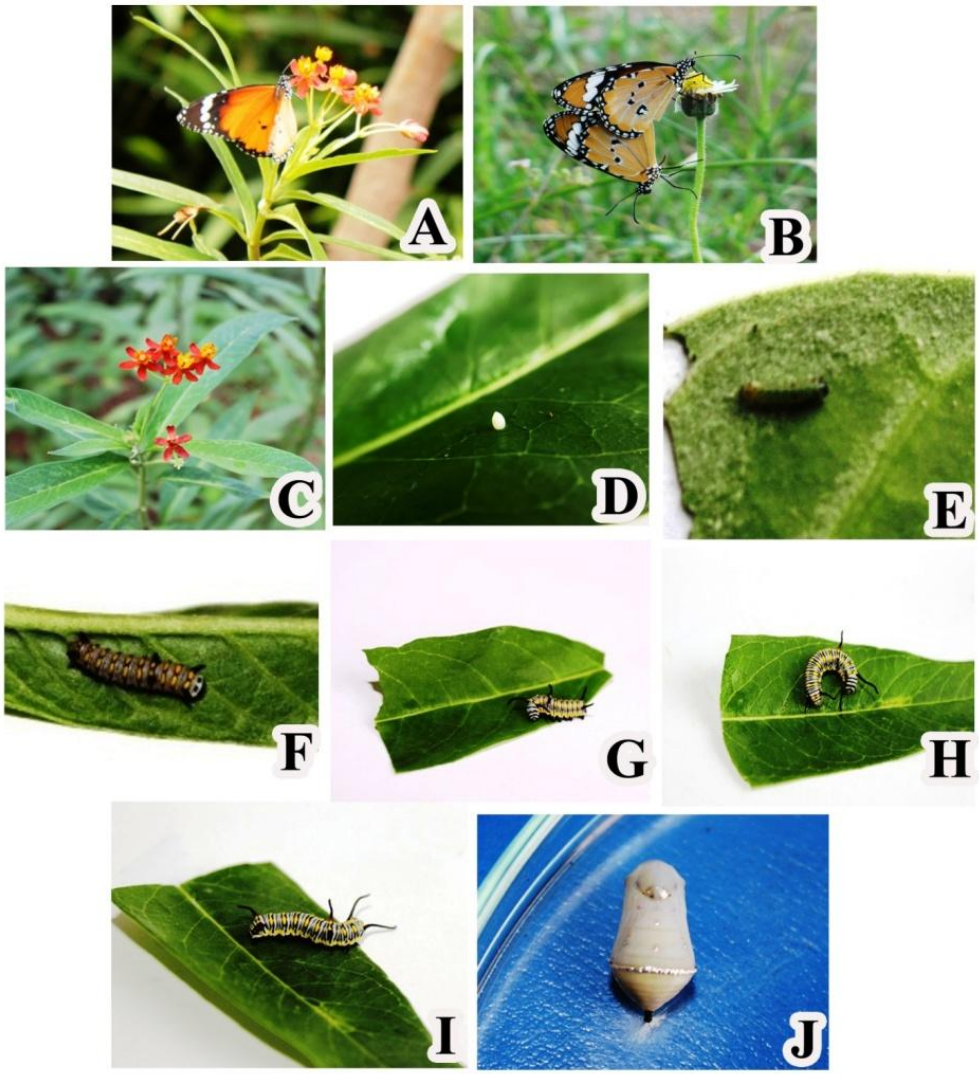


Figure1. Relation between food consumption and growth in *Danaus chrysippus* on *A.curassavica*



PLATES

Plate: A. *Princeps demoleus* (L.) adult butterfly; B. Adult Mating; C. A*sclepias curassavica* (L.) host plant; D. Egg; E. First Instar (larva); F. Second Instar (larva); G. Third Instar (larva); H. Fourth Instar (larva); I. Fifth Instar (larva); J. Pupa.