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Research Article

LIFE HISTORY OF THE DARK GRASS BLUE *ZIZEERIA KARSANDRA* (LEPIDOPTERA: RHOPALOCERA: LYCAENIDAE) FROM SOUTHERN ANDHRA PRADESH - INDIA

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ABSTRACT

The life history of the dark grass blue *Zizeeria karsandra* (Moore) in south India was studied on the basis of searches. The morphology of adults, eggs, larvae and pupae were observed. Besides, the population index of Z*izeeria karsandra* on *Amaranthus spinosus (Amaranthaceae)* leaves was discussed. Life cycle completes in 16-21 days. This butterfly normally requires a tropical to subtropical environment but sometimes ranges into sheltered, hot temperate areas.

Keywords: *Zizeeria Karsandra, Amaranthus Spinosus, Instars, Life History*

INTRODUCTION

A small butterfly that belongs to a group of very similar species that ranges through much of the Eastern Ghats. It is usually overlooked for the more common *Zizina labradus*, a close relative. It is distinguished from the similar smaller species *Zizula hylax* and also from the larger *Z. labradus* in usually having a black spot inside the discal cell of the forewing underside, although this spot can be obscure in worn specimens, particularly males (Figure 1).

Figure 1: Wings of Male and Female Zizeeria karasandra

The area of blue colouration on the wing upper side of the females is usually stable. In India exact status of several species of butterflies are not clearly known and where there was accelerated distribution of forests and other natural areas giving to urbanization (Venkata, 2011; Kunte, 2000). The flight is weak and fluttery. The butterflies fly near the ground and both sexes usually remain near their host plants. During the mornings the males are often seen to fly slowly around the host plants looking for newly emerged females with which to mate (Kehimkar, 2008). On very hot days the butterflies are attracted to water or moist patches at the edges of waterholes along creek beds, where they will sip from the water's edge or directly from the damp patch. The butterflies are normally not timid and are easily approached with care.

Larval attendant ant: Larvae are usually attended by a few small black ants, *Irido myrmex* and *Monomorium* species. They are attended by ants including *Tapinoma melanocephalum* which milk them to obtain a sugary fluid secreted from their dorsal gland.

Scientific name	*Zizeeria karsandra*
Common name	Dark grass blue
Other names	› Polyommatus karsandra
	› *Zizeeria karsandra* (Moore, 1865)
Rank	SPECIES
Lineage	› cellular organisms
	› Eukaryota
	› Opisthokonta
	› Metazoa
	› Eumetazoa
	› Bilateria
	› Protostomia
	› Ecdysozoa
	› Panarthropoda
	› Arthropoda
	› Mandibulata
	› Pancrustacea
	› Hexapoda
	› Insecta
	› Dicondylia
	› Pterygota
	› Neoptera
	› Endopterygota
	› Amphiesmenoptera
	› Lepidoptera
	› Glossata
	› Neolepidoptera
	› Heteroneura
	› Ditrysia
	› Obtectomera
	› Papilionoidea
	› Lycaenidae
	› Polyommatinae
	› *Zizeeria*

Flight period in Southern Andhra Pradesh (Figure 2): In the Eastern Ghats of Southern Andhra Pradesh flight period of *Zizeeria karasandra* was recorded as late September-early October in the Far North, early March in the Penna river land, and late April-early May in the Far Northeast. In Tirumala hill region and Thalakona ever green forest it has been seen flying from January to May. There is also a record from the spring's area to the north of Sesachalam bio reserve forest at the end of December. In Southern Andhra Pradesh it is likely the butterfly would fly throughout the warmer months wherever its host plants remain in a green, growing condition and this situation would be dependent on seasonal rains or the presence of water. The butterfly is seen all year round in the tropical north of Lankamalai forest except from May- July. A brood can be completed in less than three weeks during early spring in the hot Far North area of Southern Andhra Pradesh.

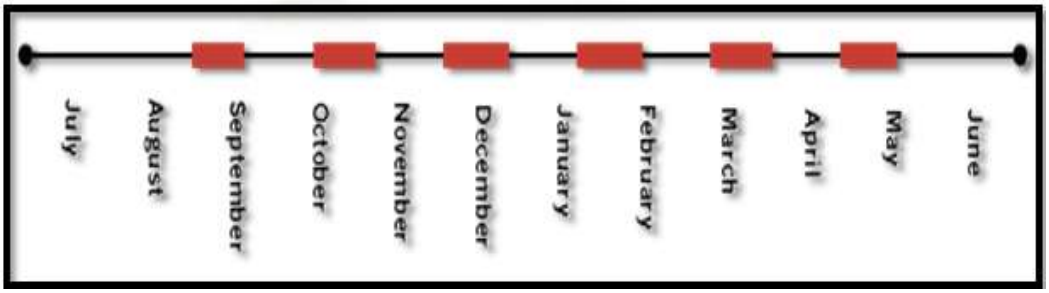

Figure 2: Flight period of *Zizeeria karsandra* in study areas

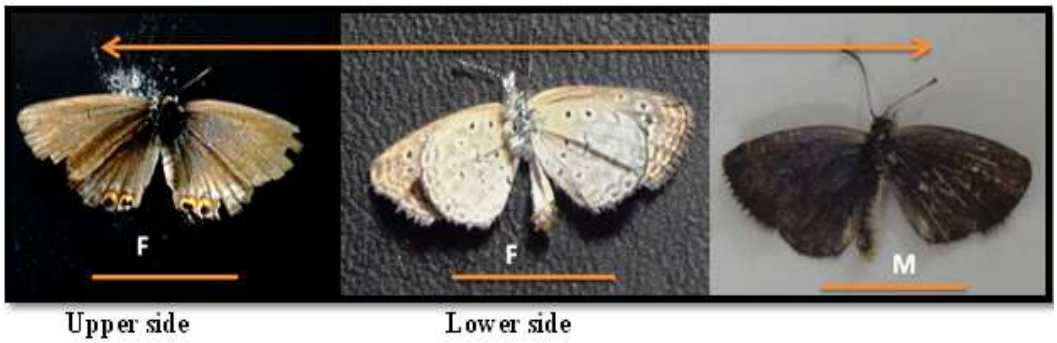

Figure 3: The pictures of Male (M) and Female (F) *Zizeeria karasandra* showing the colour variation

Adult: (Figure 5. A)

The *Zizeeria karsandra* a tiny butterfly with a wing span of 18- 24 mm, feeds on *Amaranthus spinosis* belongs to Lycaenidae family. *Z. labradus* is usually having a black spot inside the discal cell of the forewing underside, although this spot can be obscure in worn specimens, particularly males. The area of blue colouration on the wing upper sides of the female is usually stalled. Markings are variable, especially in wet season form. It is univalent, lays single egg at a time under the leaves of host plant. Eggs are laid during 10 am to 2 pm. It is on wings during mid day

Distribution (Figure 4): This butterfly normally requires a tropical to subtropical environment but sometimes ranges into sheltered, hot temperate areas. In Southern Andhra Pradesh the butterfly has at present been encountered at Lankamalai forest, and also at Thalakona forest of the Eastern Ghats. The host plants, *Amaranthus spinosus* and *Tribulus terrestris* (Zygophyllaceae) have been widely recorded in the Lankamalai forest and also along the Penna river associated with the Lake Somasela basin in the Far North pastoral areas of Southern Andhra Pradesh, and so there is a good chance that butterfly will be further encountered in these regions. It occurs uncommonly in the tropical Southern Andhra Pradesh (Venkata Ramana, 2011), and in the hot, humid, open grass land areas of Eastern Ghats of Southern Andhra Pradesh.

Figure 4: Study area showing the vegetation

The early stages of known breeding populations of the butterfly in the Far North Region of Lankamalai forest are heavily parasitised by flies and wasps, and this would suggest that these populations are relatively sedentary. However, the butterfly probably has some degree of nomadic dispersal ability (typical of the Polyommatini group of Lycaenids), with breeding stocks being replenished from interstate due to the butterflies following the major creek-lines down into Eastern Ghats of Southern Andhra Pradesh during periods of good tropical rain.

Life Cycles

Eggs (Figure 5.B):

Small, initially pale green , later turns into grayish white, hemispherical, strongly flattened top and bottom, slightly depressed on top with a small darker central micropyle area. Ornamented with a coarsely reticulated facets on side and on top. The reticulation facets on the side are trigonal, which are grouped together in an orderly fashion to form large hexagons. The facets on the top of the egg are much smaller and are of irregular shape but tending to hexagonal shape. There are short, thick, blunt spines at the pattern intersections on the side of the egg, which are absent on the top of the egg. Laid singly on the food plant, which can be the flower buds, leaves and other softer green parts.

Figure 5: Life cycle of *Zizeeria karsandra* (a) Adult (b) Egg laying (c) Host Plant (d) Egg (e) First instar (f) Second instar (g) (I) Third instar (II) Fourth instar (h) Pre Pupa (i) Pupa

First instar (Figure 5.C):

The first instar is initially pale yellow with long lateral recurved paired dorsal hairs. The head is black. Body is segmented and it measures 3.0 - 3.2 mm (3.1 + 0.004 mm).In subsequent instars the larvae become covered by secondary setae, and the long hairs become progressively shorter with each instar. The larvae will eat all the soft parts of the host plants, including leaves, flowers and fruits. The anterior and posterior ends are semicircle and flat. At the lateral side fine sensory hairs are present. A prominent streak can be seen on the dorsal side from anterior to posterior end. At the anterior end behind the second segment in the middle of the band the red colour markings are found. At the posterior end a black patch can be seen outside the band. The patch on front side appears as if it is broken up. The mouth is on dorsal side, it comes out as a protuberance during feeding time, and we can observe leaf defoliation method of feeding. This instar continues for 2 – 3 days and grows to 4.5 –mm (4.3 ± 0.02 mm) by the end of the first instar.

Second instar (Figure 5.D):

This stage remains for 2 to 3 days and grows up to 5.5 – 5.9 (5.7 ± 0.02). The growth can be seen both length wise and width wise. The red marks on the anterior region become dark in colour. Its head is 1.5 – 1.8 mm (1.6+ 0.002 mm) long. The tiny secondary setae are similar to the hairs having a long erect or recumbent simple pointed central spine set on a raised stellate base.

Third instar (Figure 5.E):

The third instar feeds most of the time than the first two instars and it grows up to 6.9 – 7.3mm (7.1 ± 0.008 mm) long and body colour becomes darken. This stage lasts for 2-3 days. The colours are cryptic and blend in with the portion of the food plant they eat. The larvae will eat all the soft parts of the host plants, including leaves, flowers and fruits. They will burrow into flower buds and fruit capsules and eat out the contents. The larvae will eat the firm surface parts of the leaves, leaving behind the fluffy tomatoes-down.

Fourth instar (Figure 5.F):

This stage remains for 2 to 3 days. The red marks at the anterior end disappear. At this stage it feeds voraciously and grows up to 9.2 – 9.9 mm (9.1 ± 0.007 mm). The mature larvae are about 10 mm long, onisciform (Slater shaped) with an indistinct longitudinal dorsal furrow. The presence of larvae on the food plant is readily discernible by holes in the buds and by the presence of small ants which usually indicate the position of actively feeding larvae. Some larvae are strongly brownish coloured, which usually indicates parasitisation.

Pre pupa (Figure 5.G):

The larva undergoes contraction and thus becomes short and thick. The fine hair on the lateral side generally lost and forms shell around it and this stage last for two day.

Pupa (Figure 5.H):

This stage last for 6 – 7 days. The pupa is short, cylindrical about 8.0 – 8.1 mm (8.0 +0.001mm) in length, dark brown in colour with blunt posterior end and broad anterior end with a small bulge on the top side. Towards anterior side we can see three prominent stripes with numerous short bristles on the abdomen, thorax region which are absent ventrally. The entire life cycle completes in 16 - 21 days. The pupal period is 13-16 days in mid-spring. It can be as short as 5 days in hot tropical areas. Sub translucent pale green when freshly pupated, later becoming opaque. Sometimes yellowish, and a few days before the adult butterfly emerges the pupae often turn brownish. It is not known if the pupae have the ability to aestivate, to adjust to the seasonal growth of the host plants. In captivity the pupae always mature quickly

Population Index

The numerical frequency of the natural occurrence of the life stages – eggs, larvae, pupae and adult on the host plant are given in Figure 6. All the stages were spotted out throughout the year in the study locality. However, there was a higher frequency of occurrence of the life stages during May to September which

corresponds with the warmer temperature. 50 – 100% survival rate from egg to larvae and 80 – 98% of Survival rate from larvae to adult.

Conclusion

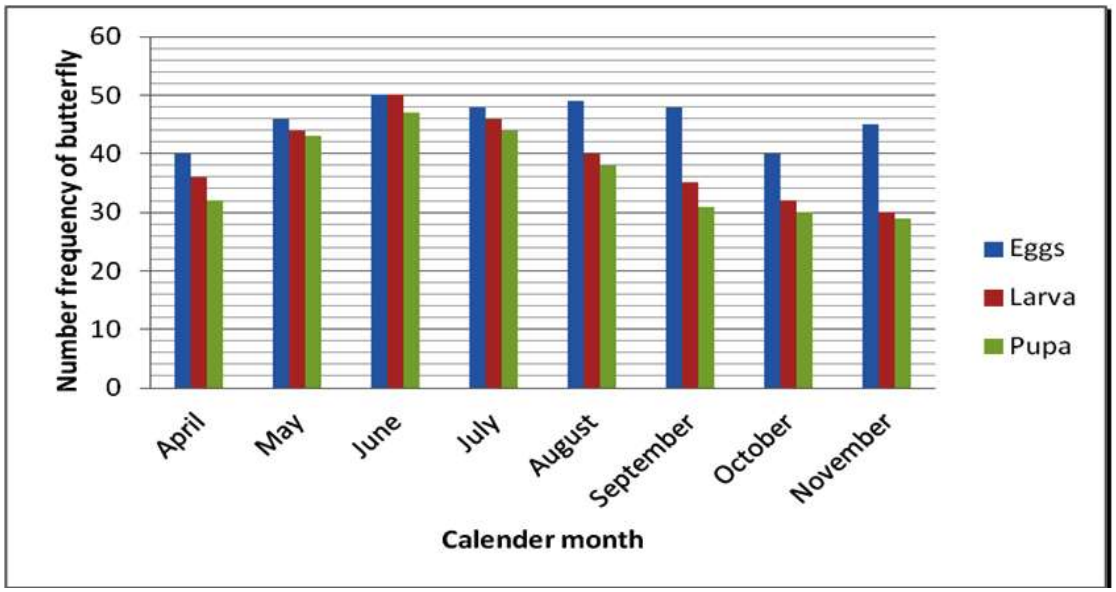

Figure 6: Population indexes of eggs, larvae, pupae of *Zizeeria karasandra* based on the searches of 50 Amaranthus spinosus plants

Development from egg to adult is completed in 16 - 21 days at laboratory conditions. The population index determined from the searches of 50 *Amaranthus spinosus* plants shows that the eggs, larvae and pupae are present throughout the year with a higher frequency during May - September (Figure 6) is in line with the prediction of Owen (1971) that the tropical or sub tropical butterflies breed throughout the year with better performance in a certain period of the year. Assuming a life span of 3 – 6 days for the adults (Opler and Krizek, 1984), 12- 13 broods yearly for *Zizeeria karsandra* is a reasonable estimate

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