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On the presence of *Graphium doson* Felder & Felder (Lepidoptera: Rhopalocera) in plains of Punjab with notes on its life history

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ABSTRACT

The Common Jay, *Graphium doson* Felder & Felder belonging to family Papilionidae has been reported first time from the plains of Punjab in Khanna and Bathinda. As per the earlier checklists from the state, the species is unreported from the plains in Punjab. This seems to be a recent range extension of the species from foothills to the plains. Different stages of life history of *Graphium doson* have been observed on *Polyalthia longifolia* var. pendula (False Ashoka Tree) belonging to family Annonaceae. The plant is largely grown as an avenue tree in the residential colonies and institutions. Observations on egg laying, larval feeding, growth and pupation of this butterfly have been made.

Keywords: Butterflies, Punjab, *Graphium*, *Polyalthia*, Instar.

1. Introduction

The Common jay, *Graphium doson* Felder & Felder is widely distributed in China, Sunda Islands, South India, Sri Lanka, Burma, Assam Hills and the Himalaya upto Kumaon [1, 2, 3, 4, 5]. Out of the 14 subspecies found within its distribution range, two subspecies namely, the Himalyan Common Jay, *Graphium doson axion* Felder & Felder and the Dakhan Common Jay *Graphium doson eleius* Felder & Felder are recognized in India. Scrutiny of the relevant literature reveals that documentation of the butterfly diversity of Punjab has been attended by Verma [6], Dalio [7], Rose [8], Rose and Sidhu [9], Rose et al. [10], Mehta [11], Sharma and Joshi [12] and Sharma et al. [13]. During the present study, presence of *Graphium doson axion* has been first time reported from plain region of Khanna (situated 254m ASL, geographical coordinates: 30°42'N, 76°13'E) and Bathinda (situated 210m ASL, geographical coordinates: 30°11'N, 75°00'E) in Punjab and the larvae has been successfully reared on *Polyalthia longifolia* var. pendula (False Ashoka Tree) belonging to family Annonaceae. The butterfly is characterized with wing Expanse of 70-80 mm; upper surface ground colour black; both wings with a pale green semi-transparent discal band from near apex of forewing to dorsum of hindwing; this band passes through cell hindwing and broken up into spots on forewing. Both wings with a marginal series of small pale greenish spots. Under surface hindwing with short red-centered costal bar near base; extreme end cell brown, not joined to dark basal bar; tailless.

2. Materials and Methods

Survey cum collection visits were undertaken during different seasons between April 2010 and December, 2013 for documenting the butterfly diversity dwelling in the agricultural field, residential areas, water bodies and vegetation in and around Khanna and Bathinda. The adults were collected using a sweeping net (ring circumference 37", pole length 35" and bag depth 31") and were killed in a killing bottle using ethyl acetate vapours. Subsequently, the specimen were pinned, stretched and preserved for identification [14]. The eggs and other larval instars were collected from the field and reared on the larval host plants in the laboratory using butterfly rearing cages under natural conditions. Field and laboratory photography has been done using a Sony Alfa-77 DSLR Camera. Observation has been undertaken using Zoom Stereotrinocular Microscope. The identification has been attempted from relevant works/web sources on Indian butterflies [1, 2, 3, 4, 5, 15].

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3. Observations

Food Plant: *Polyalthia longifolia* var. *pendula* (False Ashoka Tree) belonging to family Annonaceae.

Eggs: Observed during morning hours (9:00 am to 11:00 am) in the months of April-May and September-October. Eggs are laid singly on both, the upper and under surface of young leaves, sometimes also seen on mature leaves. Eggs are creamy white, spherical and smooth measuring about 1.0 mm in size. Colour turns yellowish on maturity and hatching takes place on the 3rd or 4th day.

First Instar Larva: The newly hatched larva feeds on the egg shell. Colour is initially yellowish and then turns dark brown as it starts feeding. Thorax with three pairs of large, equal sized dorso-lateral spines. Dorsal surface of body flat with dorso-lateral tubercles beset with long setae. Body outline squarish and more or less uniform in width. Anal segment with a pair of white spines. The instar feeds by scratching the surface of leaves. Within 3 days attains a length of about 5.5 mm before moulting into second instar.

Second Instar Larva: Length about 6.5 mm at moulting. Body shape distinct from first instar, with enlarged and swollen thorax. Dark brown and somewhat cylindrical. Abdominal setae are wanting but all the three pairs of thoracic spines of relatively shorter length are present. Anal spines shorter and shining silver with blackish tinge. Feeds on margins of young leaves. After two days length is 10 mm and ventro-lateral sides of body with white streaks. On fourth day body length increased upto 12 mm and moulting takes place.

Third Instar Larva: Body length 13 mm, skin rubbery soft and colour similar to second instar. Thoracic spines of freshly moulted third instar are translucent shining yellowish and become deep black when full grown. Anal spines connected by a white bar at base. Spiracles initially without visible rings but black ringed in full grown third instar. Full grown third instar is somewhat greenish brown with metathoracic spines ringed black at base. Osmeterium exit visible as a white streak on second day. Feeds voraciously on leaves. On disturbance reluctantly protrudes yellowish-green camphor smelling osmeterium from prothoracic pocket. On third day body length is about 26 mm and it moults into fourth instar.

Fourth Instar Larva: Moulting takes 25 minutes. Body is yellowish brown to soft greenish including the anal segment and spines. Anal spines outwardly black streaked. Metathoracic spines with shining purple sheen and encircled at base with black rings having green inner region. Prothoracic spines interconnected by a black streak. Osmeterium horn like yellowish green fluid filled sacs, about 5 mm with well-marked transverse slit like opening at base of prothoracic spines. Spiracles shining white and prominently black ringed. Abdominal legs pale green. It lasts for 3-4 days attaining a length of 33 mm before moulting.

Fifth instar larva: Resembles with fourth instar. Body is darker green or yellowish brown. Metathoracic spines encircled at base with black rings having bicoloured yellowish/orange inner region. This stage lasts for 4-5 days and the instar is about 34 mm in length. Towards the end of this stage, the body becomes pale green, shortens in length, black lines on anal setae disappear, spiracles

change to mere white streaks, larva stops feeding, searches for a pupation site and ultimately stops hanging downwards.

Pupa: Pupation occurs after a day or so. Moults of the fifth instar is discarded by a longitudinal split developed in the head and thorax region. Cremaster is positioned after second abdominal segment. Pupa is pale green and about 28 mm. There are two dorsal carinae on abdomen, a mesothoracic horn and two small cephalic horns. In summer months, pupal stage generally lasts for 8-10 days but may last for 15 days for pupation occurred during third week of October. Before emergence of the adult, the wing pattern becomes visible through the pupal skin.

4. Discussion

As per scrutiny of the available works by Verma [6], Dalio [7], Rose [8], Rose and Sidhu [9], Rose et al. [10], Mehta [11], Sharma and Joshi [12] and Sharma et al. [13], there has been no record of this species from the plains of Punjab. It has been reported from the Shivalik foothills in Ropar Wetland environs [16]. During the present study it has been reported from the typical plains of the agroecosystem of Punjab and has been found to be not rare in and around Khanna, and Bathinda, where it can be easily sighted visiting flowers of *Tabernaemontana* sp. and *Lantana* sp. puddling sites and its host plant for egg-laying during the months of April-May and September-October. The host plant of this species is a lofty evergreen tree grown as an avenue tree in the residential colonies, educational institutions and other such localities. The butterfly has made its presence felt during the past three years, as prior to this it has not been seen in the region of study. It seems that the species has recently extended to this area. Similar recent range extension has been reported in case of butterfly, *Elymnias hypermnestra undularis* (Drury) [9].

It takes 28-31 days from egg to emergence of the adult from pupa. All larval instars become slightly inactive and stop feeding a few hours before moulting. During moulting, first the head capsule is discarded and then the body actively squeezes out of the larval skin. By stopping feeding a few hours before moulting, larval skin becomes a bit loose and then the next instar pulls itself out of the previous larval skin. The larvae immediately eat the moult except the head capsule. However, head capsule discarded at moulting of fourth instar to fifth instar has not been traced in rearing dishes. The fourth and fifth instars may be yellowish brown specked with dark brown patches. A day before pupation, the ring like area at base of the metathoracic spines turns bicoloured orange red in upper half and yellow in the lower half. During sunshine, the larval instars generally remain hidden under the leaves. However on cloudy days, they can be easily spotted on the leaves in open. The size of spines decreases from first to fifth instar stage.

The state of Punjab has suffered a massive scale deterioration and modification of the wildlife habitats during the period of Green Revolution, owing to the indiscriminate use of agrochemicals, deforestation for expanding agriculture, modern agricultural practices, increased transportation network, urbanization and industrialization. The current status of the non-pest insect diversity including the butterflies of the state needs to be adequately addressed. Present study highlights the need for fresh surveys to access the status of butterfly diversity. The data on life history aspects, availability of larval host plants and nectral food plants is a prerequisite for devising appropriate conservation strategies.



Fig 1: Male, Upperside



Fig 2: Male, Underside



Fig 3: *Polyalthia longifolia*



Fig 4: Mating Pair



Fig 5: Freshly laid Egg



Fig 6: Late First Instar



Fig 7: Late First Instar



Fig 8: Late Second Instar



Fig 9: Early Third Instar



Fig 10: Late Third Instar



Fig 11: Early Fourth Instar



Fig 12: Early Fifth Instar



Fig 13: Late Fifth Instar



Fig 14: Early Pupa



Fig 15: Late Pupa

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