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**Department of Botany, Annasaheb Awate Arts,
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The Life Cycle Study of *Holotrichia serrata* (Fab) (Coleoptera: Scarabaeidae)

Theurkar S.V.^{1*}, Pokale S.T.² and Jamadar R.J.³

¹Department of Zoology, Hutatma Rajguru Mahavidyalaya (Affiliated to Savitribai Phule Pune University, Pune), Rajgurunagar, Tal Khed, Pune, Maharashtra, India

²Department of Zoology, Annasaheb Awate College (Affiliated to Savitribai Phule Pune University, Pune), Manchar, Tal Ambegaon, Pune, Maharashtra, India

³Department of Zoology, Gramonnati Mandals ACS College (Affiliated to Savitribai Phule Pune University, Pune), Narayangaon, Tal Junnar, Pune, Maharashtra, India

*Corresponding Author

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Abstract: The scarab beetles or May- June beetle or Chaffer beetle causing loss to economic crops, hence is called National pest. An adult feed on wild plant leaves such as *Azadirachta indica*, *Zizupus zizupa*, *Acacia arabica*, etc. and damage leaves infestation to the medicinal and forest plants. After feeding and mating, female laid the eggs which may commence 2 to 4 days of pre-monsoon season. The incubation period ranges from 12 to 18 days. The duration of first instar larvae is 24-28 days; the duration of second instar larvae is 34-38 days and duration of third instar larvae is 124-130 days and pupal period was recorded 170-190 days. Adult period was determined about 35-42 days. In the present study, life cycle of *Holotrichia serrata* (Fab) was determined to be univoltine.

Keywords: *Holotrichia serrata* (Fab), May-June beetles, Medicinal plants, Univoltine

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Introduction

Near about 300 scarab species or white grubs were recorded from India and their biology, ecology and behavioural pattern of white grubs have been worked out researchers (Veeresh, 1977). The adult of *Holotrichia serrata* (Fab) are nocturnal and feeds on leaves of several deciduous host trees (Potter *et al.*, 1992). During the day time, scarab beetles burrow into the soil or hide under leaves and debris. The *Holotrichia*

is one of the largest Melolonthidae genera. The larvae of the most of their species feed on the roots of cultivated economical crops and they cause to damage the crops (Wolcott, 1933).

The *Holotrichia serrata* (Fab) is the most abundant species and scattered all over India. The larval damage has been reported to the root of tea, coffee, areca nut, cashew nut, rubber, nursery plants, lawn and adult feeds on leaves of forest or

wild plants viz. *Azadirachta indica*, *Zizupus* sps. and *Acacia arabica*. Several species have been observed to cause serious damage through the country right from Himalaya to Kerala and Gujrat to North Eastern regions (Missra and Chandla, 1985). The duration of life cycle in different white grub species was determined as variable ranging from one to five years (Kangoo *et al.*, 2011).

Northern Western Ghats is the part of hottest Hotspot of Western Ghats, Maharashtra, India for biodiversity. Khed Tahasil placed in a Northern Western Ghats is covered by forest and agricultural area. The Khed Taluka is a rich source of the agricultural resources and also infected by various agricultural pests. The commercial crops are cultivated by potato, maize, groundnut, soyabean, sugarcane etc. This region observed huge level of infested by scarab beetles. The white grub damaging in Khed Taluka and its biology have not been studied and assessed so far hence, in this study we have investigated the life cycle of *Holotrichia serrata* (Fab) (Coleoptera: Scarabaeidae)

Materials and Methods

Khed Tahasil is situated at 19.132°N 73.554°E and covers about 131 km² area. The beetles of *Holotrichia serrata* (Fab) emerged from soil after the first monsoon or pre- monsoon shower. The emergence of beetles was collected from monsoon or pre-monsoon season and cultured into the laboratory for morphological study from May to next +June. The *Holotrichia serrata* (Fab) were collected during evening from 19.00 to 21.00 by using handpicked method and confirmed by standard identification key (Mittal and Panji, 1977; Khan and Ghai, 1982; Veeresh, 1997). For artificial culture, six saran screens eager (2× 1.5 m) were erected and the soil floor was covered with black plastic. Ten earthen pots (0.05 m³ volume) were placed in each cage, filled with sandy loam soil, and planted with potato slips during June- July. Soil temperature and moisture were maintained daily during the experimental period.

After collection and identification, 10-20 beetles of *Holotrichia serrata* (Fab) were selected for culture and released into the earthen pots. For daily feeding, fresh *Azadirachta indica* leaves were supplied and confined to the pots with an upper earthen pot. Pots were periodically watered to maintain adequate soil moisture. A culture stands deep in kerosene water bowl to prevent fire ants to enter into the pots. The earthen pots were kept at room temperature at the laboratory of Hutatma Rajguru Mahavidyalaya, Rajgurunagar. After cultivation of *Holotrichia serrata* (Fab), adults were scrutinized on the weekly basis. From June to July pots were checked for egg laying counts. After weekly interval pots were checked for larva to determine the stages.

Results and Discussion

Adults of white grubs are nocturnal. The adult of *Holotrichia serrata* (Fab) comes at dark and feeds on host plants viz. *Azadirachta indica*, *Zizupus* sps., *Acacia arabica*, *Acacia catechu*, *Syzygium cumini* and *Terminalia arjuna* but most preferred host plants were *Azadirachta indica* and *Zizupus* sps. (Table 1). Adults of *Holotrichia serrata* (Fab) make their emergence from the soil after the first monsoon during the second week of June and continued up to the August. Beetle feeds on young tender succulent leaves in between 19.00 to 21.00. Males get attracted towards the females due to pheromones. Mating takes place at the twig of host plant. During the copulation time males hold the female up and downward in position which last for 4 to 6 min, separated out and return back down to the soil. The emergence of *Holotrichia fissa* (Fab) adults were seen after the onset of monsoon in second week of June (Potter *et al.*, 1992; Mishra and Singh, 1999; Mittal, 2000).

Life cycle

Eggs:

Mating takes place once in the year but adults came out 8 to 10 days for feeding. A matured female lays 2-5 eggs per day continuously 10-13 days with total 25-45 eggs during entire life span.

Table 1: Host plants of Scarab beetles and Grubs

Adult Host plants	Grub Host plants
<i>Azadirachta indica</i> (Neem)	<i>Arachis hypogaea</i> (Groundnut)
<i>Zizupus</i> sps. (Ber)	<i>Zea mays</i> (Maize)
<i>Acacia arabica</i> (Babhul)	<i>Ipomea batatas</i> (Potato)
<i>Acacia catechu</i> (Khair)	<i>Glycine max</i> (Soyabean)
<i>Syzygium cumini</i> (Jamun)	<i>Saccharium officinarum</i> (Sugarcane)
<i>Terminalia arjuna</i> (Arjuna)	<i>Oreza sativa</i> (Paddy)

Table 2: Life cycle history of *Holotrichia serrata* (Fab)

L	L	L	P	P	A	A	E	L	L	L	L
J	F	M	A	M	J	J	A	S	O	N	D

L- Larva; P- Pupa; A- Adult; E- Egg;

J- January; F- February; M- March; A- April; M- May; J- June; J- July; A- August; S- September; O- October; N- November; D- December

The freshly laid eggs were white in colour and oval in shape. Eggs become yellowish in colour during the hatching period. The incubation period was 12 to 18 days (Table 2). After incubation of eggs, larvae were developed on the tip of potato roots.

Larva:

A 'C' shaped, white coloured young grubs are semicircular in shaped. The first and second instar larvae are translucent and lives in up to 30 cm deep under soil. After moult, third instar larvae are about 30-40 mm long and dirty white in colour. The larva has brownish coloured head having mandibulate type of mouth parts. Pair of strong, sclerotized mandibles is used for cutting the roots of plant. Each abdominal segment shows brown spots possessing hairs. Larvae are nocturnal in form, so they always go down deep in

soil. Average duration of first instar larva is 24 to 28 days. Average duration of second instar larval period is about 34-38 days and third instar larval duration is about 124 to 130 days. Third instar larva feeds voraciously on agricultural economical crop roots of *Arachis hypogaea*, *Zea mays*, *Ipomea batatas*, *Glycine max*, *Saccharium officinarum* and *Oreza sativa* (Table 1).

Pupa:

After larval period, larva stops the feeding and prepared a small earthen cell for resting stage. The exarate pupa measured near about 14 to 20 mm in length and 6 to 8 mm in breadth. The pupal period of *Holotrichia serrata* (Fab) were recorded very short period about 10-18 days. The pupal period of *Holotrichia coriacea* (Hope) was ranged for 12 to 20 days; *Holotrichia fissa* (Fab) ranged for 14 to

18 days and *Holotrichia karschi* (Brenske) ranged for 17 to 20 days (Bhawane *et al.*, 2011).

Adult:

The adult of *Holotrichia serrata* (Fab) were brownish in colour. The adult size measured about 18 to 212 mm long and 7 to 9 mm wide. Insect head consist pair of compound eyes, pair of lamellate antennae and mandibulate mouth part. Female beetle is larger than male beetle. The adult of *Phyllophagas* sp. (Coleoptera: Scarabaeidae) shows immature stage and teneral adults (Guppy and Harcourt, 1970).

Ethical Statement

This study was in accordance with the Research Advisory Committee (RAC) of the Hutatma Rajguru Mahavidyalaya, Rajgurunagar, Tal Khed, Pune, Maharashtra, India.

Author Contributions

Pokale S.T. and Theurkar S.V. performed the experiments and analyzed the data. Jamadar R.J. wrote the manuscript with contributions from all the authors. All authors have read and agreed to the published version of the manuscript.

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Conflict of Interest

The authors declare no conflicts of interest.

References

Bhawane GP, Gaikwad SM, Mamlayya AB and Aland SR. (2011) Life cycle of *Holotrichia karschi* (Brenske) (Coleoptera: Scarabaeidae: Melolonthinae) Bioscan 6(3): 471-474.

Guppy JC and Harcourt GD. (1970) Spatial pattern of the immature stages and teneral adults of *Phyllophaga* spp. (Coleoptera: Scarabaeidae) in permanent meadow. Canadian Entomol. 102(11): 1345-1359.

Kangoo AM, Khan ZH and Ahmad S. (2011) External morphology of *Holotrichia consanguinea* Blanchard (Coleoptera: Scarabaeidae: Melolonthinae). Res J Agricult Scis. 2(1): 146-147.

Khan KM and Ghai S. (1982) Taxonomical status of genus *Holotrichia* Hope (Melolonthidae: scarabaeid) with description of five new species from India along with re-descriptions of two poorly described species and a key to species. J Entomol. 23(1/2): 28-45.

Misra SS and Chandla VK. (1985) White grubs infesting potatoes and their management. J Indian Potato Association 16(1/2): 29-33.

Mishra PN and Singh MP. (1999) Determination of predominant species of white grub in Garhwali region of Uttar Pradesh hills (India). J Entomol Res. 23(1): 65-69.

Mittal IC. (2000) Survey of Scarabaeid (Coleoptera) fauna of Himachal Pradesh (India). J Entomol Res. 24(3): 259-269.

Mittal IC and Pajni HR. (1977) New species belonging to Melolonthidae (Coleoptera: Scarabaeid: Melolonthidae) from India. Entomologist 2(1): 85-88.

Potter DA, Patterson CG and Redmond CT. (1992) Influence of turf grass species and tall fescue endophyte on feeding ecology of Japanese beetle and southern masked chafer grubs (Coleoptera: Scarabaeidae). J Economic Entomol. 85(3): 900-909.

Veeresh GK. (1997) Studies on the root grubs of Karnataka with special reference to bionomics and control of *H. serrata* F. (Coleoptera: Melolonthidae). UAS Monograph Ser. No. 2, pp. 87.

Wolkott GN. (1993) An economic entomology of the West Indies. San Juan, Entomological Society of Puerto Rico, pp. 688.