

NOTES ON ECONOMICALLY IMPORTANT WHITE GRUB SPECIES (COLEOPTERA: SCARABAEIDAE) OF INDIA

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ABSTRACT

White grubs are the pests of economically important crops like sugarcane, groundnut, potato, arecanut, etc. and are distributed widely across the country. Studies have been taken up to document the predominant white grub species in major cropped area and their distribution in different regions of the country. The five years study revealed high species diversity of white grubs with varied distribution. This paper presents major 30 predominant species documented in various crops across different states.

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INTRODUCTION

White grubs primarily belonging to subfamilies Melolonthinae, Rutelinae and partly Dynastinae (Coleoptera: Scarabaeidae) are serious pests of several economic crops viz., sugarcane, groundnut, potato, arecanut, etc. Many of the species are ubiquitous and are widely distributed throughout the world. These beetles are universally known as May/June beetles owing to their adult emergence during the month of May/June coinciding with the onset of monsoon. The adults are predominantly leaf feeders (Arrow, 1917) whereas the grubs popularly known as white/root grubs are subterranean feeders on roots, rootlets and underground stems of living plants. The larval duration of white grubs, in general is long, while active adult lives for only a few weeks or months. Eggs are laid in the soil and hatched neonate initially feeds on soil organic matter and humus and as the larvae grows shifts to roots and rootlets of the plants. The larva passes three instars. Later instars voraciously feed on the roots at varying depths depending upon temperature. Pupation occurs in the soil. There will be a brief prepupal period followed by pupal period. During pupation, the larval skin is pushed to the caudal end of pupa, which is typical of Melolonthinae subfamily unlike Rutelinae, where the pupa cradles in the last larval skin, which is retained till the adult emergence.

Rainfall sufficient to soften the soil is necessary for the emergence of adults, which are usually most active at night and are mostly attracted to light. The adults emerge from

the soil during dusk and settle on the nearby trees for feeding and mating. The single life cycle may be completed in one, two or three years or even four to five years in northern latitudes (Ritcher, 1958). Most of the species are annuals, while some species are biannuals and biennials. Certain species of sericine beetles have two generations annually in India (Kumawat, 1992) and Israel (Golberg *et al.*, 1989) and certain species belonging to genera *Melolontha*, *Lepidiota*, *Leucopholis*, etc. have a biennial life cycle.

The vigorous feeding of second and third instar larvae of white grubs results in drying and dying of the plants thus leading to economic losses. The damage is more pronounced in groundnut, sugarcane, potato and arecanut across the country. Several workers reported white grubs on various host plants and crops with varying degree of damage. But there are no systematic and consolidated reports of the predominant species occurring in different regions and crops of the country. Hence, studies were carried out for documentation of white grub fauna across several states of the country.

MATERIALS AND METHODS

Surveys were conducted in several states of India during 2013 to 2018. The adults of white grubs were collected during March to August in each year employing light traps

with mercury bulb as light source. The beetle collections were also made through manual scouting in the night on avenue trees. The attracted adults were collected and brought to the laboratory where they were sorted, killed using ethyl acetate, cleaned, relaxed, dried, pinned and labelled. These adults were grouped based on similarities and identified with the available keys (Brenske, 1899; Arrow, 1910, 1917; Khan, 1975). The studies were carried out at Division of Entomology, ICAR-Indian Agricultural Research Institute, New Delhi from 2013-2017 and at Division of Germplasm Collection and Characterization, ICAR-National Bureau of Agricultural Insect resources, Bengaluru from 2017-2018. The voucher specimens were deposited with the National Pusa Collection, Division of Entomology, Indian Agricultural Research Institute, New Delhi. The collections were documented for associated data on distribution and diversity.

RESULTS AND DISCUSSION

Fruit Colour of Mulberry Fruit Extracts

The predominant species obtained during the surveys along with their distribution and the crops infested are furnished herewith.

Order: Coleoptera

Family: Scarabaeidae

I. Subfamily: Melolonthinae:

1. *Holotrichia serrata* (F.)

Distribution: Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Madhya Pradesh, Uttar Pradesh, Rajasthan, Delhi, Haryana, Gujarat, West Bengal

Crops infested: Sugarcane, groundnut, sorghum, maize, soybean

2. *H. nagpurensis* Khan and Ghai

Distribution: Madhya Pradesh, Maharashtra, Uttar Pradesh, Rajasthan

Crops infested: Sugarcane

3. *H. consanguinea* (Blanchard)

Distribution: Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Madhya Pradesh, Uttar Pradesh, Rajasthan, Delhi, Haryana, Gujarat

Crops infested: Sugarcane, groundnut, sorghum, maize

4. *H. reynaudi* (Blanchard)

Distribution: Tamil Nadu, Karnataka, Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Rajasthan

Crops infested: Groundnut

5. *H. rufoflava* Brenske

Distribution: Karnataka, Andhra Pradesh, Tamil Nadu

Crops infested: Sugarcane, groundnut

6. *H. fissa* (Brenske)

Distribution: Kerala, Karnataka, Andhra Pradesh, Maharashtra, Madhya Pradesh, Uttar Pradesh

Crops infested: Sugarcane, groundnut

7. *H. longipennis* (Blanchard)

Distribution: Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Punjab

Crops infested: Potato, ginger

8. *H. sikkimensis* Brenske

Distribution: Himachal Pradesh, Uttarakhand, Sikkim

Crops infested: Potato, ginger

9. *Brahmina coriacea* (Hope)

Distribution: Himachal Pradesh, Uttarakhand, Sikkim, Kashmir, Punjab

Crops infested: Potato, apple,

10. *B. mysorensis* Frey

Distribution: Karnataka, Andhra Pradesh, Kerala

Crops infested: Groundnut

11. *Schizonycha ruficollis* (F.)

Distribution: Karnataka, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Maharashtra, Uttar Pradesh, Delhi, Rajasthan, Haryana, Uttarakhand, Himachal Pradesh, Bihar, Odisha, West Bengal

Crops infested: Guava, pomegranate, roses

12. *Maladera insanabilis* (Brenske)

Distribution: Karnataka, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Maharashtra, Uttar Pradesh, Delhi, Rajasthan, Haryana, Uttarakhand, Himachal Pradesh, Bihar, Odisha, West Bengal

Crops infested: Groundnut, sugarcane, maize, onion

13. *Lepidiota mansueta* (Burmeister)

Distribution: Uttar Pradesh, Assam, Uttarakhand

Crops infested: Sugarcane

14. *Leucopholis lepidophora* Blanchard

Distribution: Karnataka, Nagaland, Meghalaya, Maharashtra

Crops infested: Arecanut, sugarcane

15. *L. burmeisteri* Brenske

Distribution: Karnataka

Crops infested: Arecanut

16. *Sophrops karschi*

Distribution: Meghalaya, Tamil Nadu, Karnataka, Maharashtra

Crops infested: Coffee, cinnamon

17. *S. iridipennis* (Brenske)

Distribution: Assam, Karnataka, Andhra Pradesh, Uttarakhand, Uttar Pradesh

Crops infested: Potato, ginger

II. Subfamily: Rutelinae1. *Anomala dimidiata* (Hope)

Geographical distribution: Uttar Pradesh, Uttarakhand, Himachal Pradesh, Delhi, Rajasthan, Haryana, Sikkim, Tripura, Meghalaya, Manipur, West Bengal, J & K

Crops infested: Sugarcane, groundnut, potato

2. *A. dorsalis* (F.)

Distribution: Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Delhi, Rajasthan, Haryana, Gujarat, Punjab, Assam, Bihar, Chattisgarh, Haryana, Sikkim, West Bengal, J & K

Crops infested: Sugarcane, groundnut

3. *A. varicolor* (Gyllenhal)

Distribution: Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Himachal Pradesh, Delhi, Rajasthan, Haryana, Bihar, Chattisgarh, Sikkim, Tripura, Meghalaya, Manipur, Nagaland, West Bengal

Crops infested: Sugarcane, groundnut

4. *A. ruficapilla* Burmeister

Distribution: Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Himachal Pradesh, Delhi, Rajasthan, Haryana, Bihar, Chattisgarh, Sikkim, Tripura, Meghalaya, Assam, Nagaland, West Bengal

Crops infested: Sugarcane, groundnut

5. *A. bengalensis* (Blanchard)

Distribution: Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Gujarat, Rajasthan, Punjab, Haryana, Bihar, Tripura, Meghalaya, Assam, West Bengal

Crops infested: Sugarcane, groundnut

6. *A. rufiventris* Redtenbacher

Distribution: Uttarakhand, Himachal Pradesh, West Bengal, Sikkim

7. *A. bilobata* Arrow

Distribution: Meghalaya, Tripura, Sikkim, West Bengal

8. *A. lineatopennis* Blanchard

Distribution: Himachal Pradesh, Uttarakhand, Nagaland, West Bengal

Crops infested: Potato

9. *A. communis* (Burmeister)

Distribution: Kerala, Karnataka, Tamil Nadu

10. *Adoretus flavus*

Distribution: Uttar Pradesh, Uttarakhand, Rajasthan, West Bengal

Crops infested: Sugarcane, groundnut

11. *A. versutus*

Distribution: Kerala, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Rajasthan, Bihar, West Bengal, Assam

Crops infested: Sugarcane, groundnut, grapes

III. Subfamily: Dynastinae1. *Phyllognathus dionysius* (Fabricius)

Distribution: Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Gujarat, Rajasthan, Orissa, Himachal Pradesh

Crops infested: Sugarcane, groundnut, potato, maize

2. *Heteronychus sublaevis* (Fairmaire)

Distribution: Kerala, Karnataka, Uttar Pradesh, Assam

Crops infested: Sugarcane, maize

Maxwell Lefroy (1906) gave an account on white grubs infesting bajra and other millets in his monumental work

'Indian Insect Pests' and later reported that a dynastine species, *Phyllognathus dionysius* as a serious pest of rice in 1909 in his 'Indian Insect Life'. Fletcher (1914) reported that *Serica* and *Maladera* species are serious pests of tea, coffee, cherry, roses while Beeson (1941) reported white grub species attacking forest trees in India. Gupta and Avasthy (1956) reported first major epidemic of white grubs in sugarcane in Bihar, where the damage was reported to be 80 per cent due to *Holotrichia consanguinea* (Blanchard). Ritcher (1961) reported *H. consanguinea* as serious pest of sorghum and maize in Rajasthan.

Even after several decades of these reports, white grubs are still a menace in several crops and the melolonthine species, *H. consanguinea* and a dynastine species, *P. dionysius* are still the serious pests of groundnut and sugarcane crops besides several other crops. Regular monitoring and surveillance is required for advocating the management practices at right time in right manner.

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