

The short-horned grasshoppers (Acrididae and Pyrgomorphidae: Orthoptera) of Karnataka, India: A checklist and distribution data

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ABSTRACT

Short-horned grasshoppers' checklist is presented here. In the present study, the inventory was created using data from a survey conducted in various districts of Karnataka between 2019-2021, including Chikkamagaluru, Dakshina Kannada, Davanagere, Hassan, Kodagu, Shivamogga, Udupi, Uttar Kannada and orthopteran collections at the Insect Systematics Laboratory, Department of Entomology, KSNUAHS, Shivamogga and literature published to date from various parts of Karnataka. A total of 101 species/subspecies belonging to 66 genera, 15 subfamilies and two families i.e., Acrididae and Pyrgomorphidae were reported. Several species were recorded for the first time from the districts investigated, including 9 in Chikkamagaluru, 4 in Dakshina Kannada, 1 each in Hassan and Kodagu, 3 in Shivamogga, 9 in Udupi and 1 in Uttar Kannada. This is the first-ever checklist featuring distribution records for short-horned grasshoppers in Karnataka and is updated with the Orthoptera species file online. The index may help for future taxonomic diversity studies of grasshoppers of Karnataka.

Introduction

Orthoptera is the largest extant polyneopteran order, with more than 29,530 described valid species/subspecies worldwide (Cigliano *et al.*, 2023) and the sixth-largest order of class Insecta (Zhang, 2011). Common names for orthopterans include grasshoppers, locusts, and crickets. Caelifera and Ensifera are the two suborders, that make up this group. The short-horned grasshoppers belong to the suborder Caelifera, are common components of terrestrial insect fauna, and include some of the most voracious pests (locusts), infesting several crops, hence, they constitute an economically significant pest group. Still, pestiferous species are no more than ten per cent, including locusts, that cause

extensive damage at times, but not always. Grasshoppers occupy a variety of habitats, and their distribution patterns are changing rapidly due to habitat destruction and anthropogenic disturbances (Fartmann *et al.*, 2021). The short-horned grasshoppers (Acrididae and Pyrgomorphidae) belong to the superfamily Acridoidea and Pyrgomorpha, respectively of the superfamily group Acridomorpha. Acrididae and Pyrgomorphidae are two families: Acrididae, the largest and most diverse lineage (Kundu *et al.*, 2020), comprises around 6765 valid species within 28 subfamilies. Pyrgomorphidae, on the other hand, comprises about 149 genera and 488 species within

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two subfamilies worldwide (Cigliano *et al.*, 2023). There are about 1033 species/ subspecies belonging to 400 genera and 21 families of Orthoptera in India. Among them, Acrididae and Pyrgomorphidae include 285 species belonging to 135 genera and 47 species belonging to 21 genera, respectively (Shishodia *et al.*, 2010). Notable workers like Bolivar (1902), Kirby (1914), Uvarov (1921 and 1929), Henry (1940), Dirsh (1954 and 1975), Hollis (1971), Jago (1971), Bhowmik (1985), Shishodia and Mandal (1990), Usmani and Shafee (1985), Ingrisich (1993), Shishodia (1997 and 1999), Kulkarni and Shishodia (2004), Shishodia and Dey (2006), Chandra *et al.* (2007), Mandal *et al.* (2007), Saini and Mehta (2007), Usmani *et al.* (2010), Kumar and Usmani (2012a and 2012b) and Swaminathan *et al.* (2018) have taxonomically studied the group. Karnataka is the largest state in south India and is known for its rich biodiversity (Prajapati, 2010). Nevertheless, little information on orthopteran fauna from Karnataka has been published by Usman and Puttarudraiah (1955), Vastrad (1986), Kumar and Viraktamath (1990 and 1991), Vastrad *et al.* (1991), Mandal *et al.* (2013) and Raghavender and Vastrad (2017a and b). Since then, there have been no detailed faunal and taxonomic studies on grasshoppers from this state, covering the Western Ghats segment. Consequently, it is imperative to explore the grasshopper fauna of Karnataka. There is a need to bring together the scattered information with comprehensive taxonomic data to know the distribution of short-horned grasshoppers in Karnataka.

Material and Methods

Compilation of checklist

No comprehensive checklist for the grasshoppers of Karnataka exists. This paper attempts to generate a checklist and distribution data of Acrididae and Pyrgomorphidae found in Karnataka. The literature published to date by various researchers from Karnataka, collections of orthopteran repository at the Insect Systematics Laboratory, Department of Agricultural Entomology, KNSUAHS, Shivamogga and our current studies were considered for preparing this index.

Sampling and Morphological identification

Grasshoppers of both sexes were collected using a sweep net or by hand from diverse cropping

ecosystems in different parts of Karnataka, including Chikkamagaluru, Dakshina Kannada, Davanagire, Hassan, Kodagu, Shivamogga, Udupi, and Uttara Kannada districts during 2019-2021 (Figure-1). Later, specimens were brought to the laboratory, killed using ethyl acetate and pinned as suggested by Richards and Davies (1997). Then appendages and wings were correctly oriented and spread, dried under light for 72 hours and labelled for further taxonomic studies. The Zeiss Stemi 508 stereo zoom microscope was used to examine the labelled specimens and identified up to species level based on the external taxonomic characters by running the key available from the literature. The checklist classification was updated with the Orthoptera Species File Online (Cigliano *et al.*, 2023).

Results and Discussion

As of August 2023, there are approximately 29,530 described species and subspecies within the order Orthoptera worldwide (Cigliano *et al.*, 2023). Of which, 1,033 species/ subspecies of orthopterans have distribution in India (Shishodia *et al.*, 2010). While, Prabhakar and Chandra (2013) listed a total of 159 species belonging to 111 genera of Orthoptera from Karnataka. Of these, the records of short horned grasshoppers still meagre. The family Acrididae comprises 53 species in 37 genera under 12 subfamilies, while Pyrgomorphidae includes nine species in eight genera under two subfamilies. In total, 62 species were listed from the short-horned grasshopper families. In the present study, efforts were made to prepare the grasshoppers checklist and compare distributional records of species in Karnataka through an extensive literature survey and investigations in selected parts of Karnataka. It may aid us in understanding records from new district records that will help future diversity studies. The present checklist comprises a total of 101 species, with 86 species belonging to 56 genera under 13 subfamilies in Acrididae, and 15 species belonging to ten genera under two subfamilies in Pyrgomorphidae. Additionally, this updated checklist includes 39 new species: 33 in Acrididae and 6 in Pyrgomorphidae (Table-1). In the checklist, the family Acrididae constitutes the highest percentage, approximately 85.14 per cent of the total species; while, the family Pyrgomorphidae shares 14.85 per cent (Figure-2).

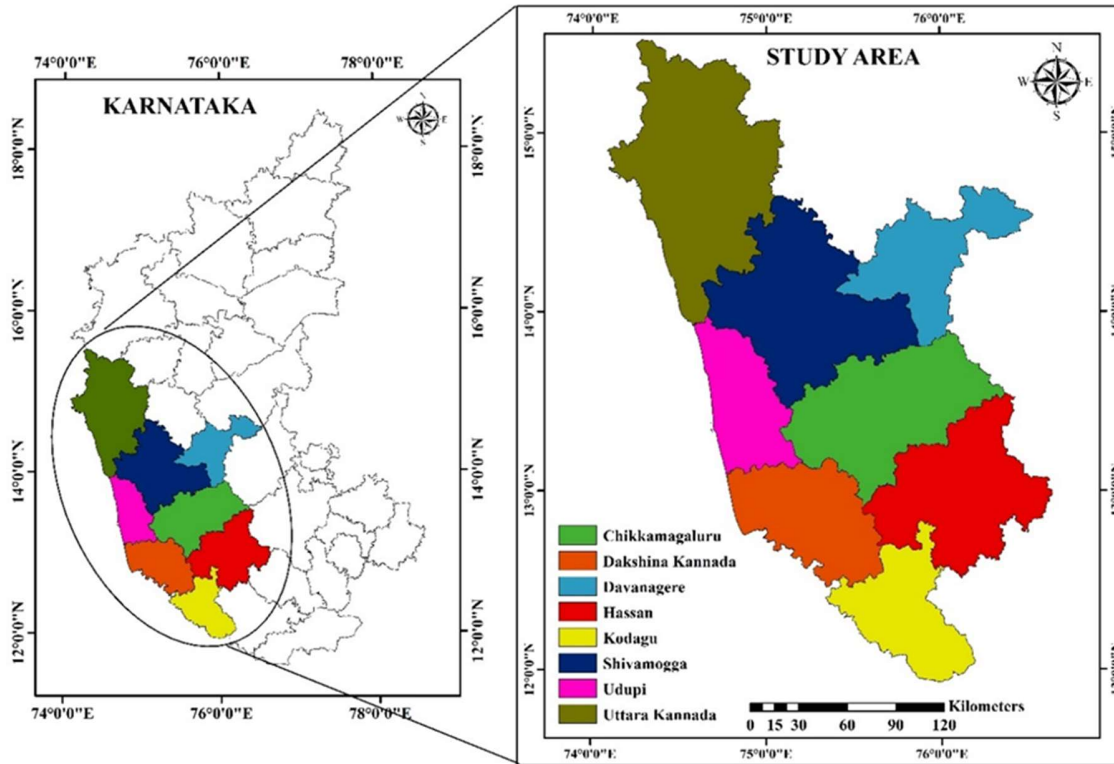


Figure 1: Surveyed districts of Karnataka's are depicted on a map

Table 1: Checklist and distribution records of short-horned grasshoppers in Karnataka

SN	Genus and Species	Type Locality	Distribution in Karnataka
Superfamily Acridoidea MacLeay, 1821			
A. Family Acrididae MacLeay, 1821			
I. Subfamily Acridinae MacLeay, 1821 (8 genera and 14 species)			
1.	Genus <i>Julea</i> Bolivar, 1914		
1.	<i>Julea indica</i> Bolivar, 1914	India: Karnataka, South Mysore, Goorghalli Estate	Mysore
2.	Genus <i>Orthochtha</i> Karsch, 1891		
2.	<i>Orthochtha ramachandrae</i> Popov, 1914	India: Karnataka, Dhimbam, Biligiriranga hills	Chamarajanagara
3.	Genus <i>Pasiphimus</i> Bolivar, 1914		
3.	<i>Pasiphimus sagittaeformis</i> Bolivar, 1914	India: South Canara District, Nagody	Dakshina Kannada
Tribe Acridini MacLeay, 1821			
4.	Genus <i>Acrida</i> (Linnaeus, 1758)		
4.	<i>Acrida exaltata</i> (Walker, 1859)	Asia-Tropical, Indian Subcontinent, Sri Lanka	Chikkamagaluru*, Chikkaballapur, Dharwad,

			Dakshina Kannada, Kolar, Mysore and Shivamogga
Tribe Phlaeobini Brunner von Wattenwyl, 1893			
5.	Genus <i>Phlaeoba</i> Stal, 1861		
5.	<i>Phlaeoba antennata antennata</i> Brunner von Wattenwyl, 1893	Myanmar: Bhamo	Chikkamagaluru, Kodagu, Mysore and Shivamogga
6.	<i>Phlaeoba infumata</i> Brunner von Wattenwyl, 1893	Myanmar: Bhamo	Chikkamagaluru, Kolar, Mysore and Shivamogga
7.	<i>Phlaeoba panteli</i> Bolivar, 1902	India: Madras	Dharwad
8.	<i>Phlaeoba ramakrishnai</i> Bolivar, 1914	South Canara: Magadi	Dakshina Kannada
9.	<i>Phlaeoba rotundata</i> Uvarov, 1929	Tamil Nadu: Kodaikanal	Mysore
Tribe Truxalini Serville, 1838			
6.	Genus <i>Truxalis</i> Fabricius, 1775		
10.	<i>Truxalis indica</i> (Bolivar, 1902)	Tamil Nadu: Kodaikanal	Bellary, Dharwad and Kolar
7.	Genus <i>Bababuddinia</i> Bolivar, 1917		
11.	<i>Bababuddinia bizonata</i> Bolívar, 1917	India: Karnataka, Mysore, Bababuddin Hills	Chikkamagaluru
12.	<i>Bababuddinia dimorpha</i> Henry, 1933	India: Karnataka, Mysore, Bababuddin Hills	Chikkamagaluru
8.	Genus <i>Capulica</i> Bolivar, 1917		
13.	<i>Capulica alata</i> Uvarov, 1929	India: Tamil Nadu, Mysore Plateau, Masinigudi	Bellary, Kamalapuram
14.	<i>Capulica pulla</i> Bolívar, 1917	India: Andhra Pradesh, Bellary district, Kamalapuram	Bellary, Kamalapuram
II. Subfamily Calliptaminae Jacobson, 1905 (one genus and one species)			
9.	Genus <i>Acorypha</i> Krauss, 1877		
15.	<i>Acorypha glaucopsis</i> (Walker, 1870)	Africa	Dharwad
III. Subfamily Catantopinae Brunner von Wattenwyl, 1893 (11 genera and 16 species)			
10.	Genus <i>Opharicus</i> Uvarov, 1940		
16.	<i>Opharicus ballardi</i> (Bolivar, 1918)	India: Andhra Pradesh, Bellary district, Kamalapuram	Bellary: Kamalapuram and Yemmiganur
11.	Genus <i>Pachyacris</i> Uvarov, 1923		
17.	<i>Pachyacris vinosa</i> (Walker, 1870)	India: West Bengal	Dharwad
18.	<i>Pachyacris violascens</i> (Walker, 1870)	Sri Lanka	Dharwad
12.	Genus <i>Palniacris</i> Henry, 1940		
19.	<i>Palniacris maculatus</i> Henry, 1940	India: Kerala: Nelliampathi Hills	Karnataka
Tribe Oxyrrhepini Tinkham, 1940			
13.	Genus <i>Oxyrrhepes</i> Stal, 1873		
20.	<i>Oxyrrhepes obtusa</i> (Haan, 1842)	Malesia: Jawa	Dharwad and Shivamogga

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26.	<i>Diabolocatantops pinguis</i> (Stal, 1860)	China	Uttara Kannada, Dakshina Kannada, Mangalore, Shivamogga* and Udupi*
27.	<i>Diabolocatantops pulchellus</i> (Walker, 1870)	India: Maharashtra, Hindustan	Dharwad
17.	Genus <i>Stenocatantops</i> Dirsh, 1953		
28.	<i>Stenocatantops splendens</i> (Thunberg, 1815)	China	Dakshina Kannada, Dharwad and Shivamogga
Tribe Genimenini Li, X. J. and Yin, X. C, 2009			
18.	Genus <i>Genimen</i> Bolivar, 1918		
29.	<i>Genimen prasinum</i> Bolívar, 1917	India: Karnataka, Mysore, Bababuddin Hills	Dakshina Kannada and Chikkamagaluru
19.	Genus <i>Mesambria</i> Stål, 1878		
30.	<i>Mesambria</i> sp.	-	Dharwad
Tribe Paraconophymatini Otte, 1995			
20.	Genus <i>Paraconophyma</i> Uvarov, 1921		
31.	<i>Paraconophyma scabra</i> (Walker, 1870)	India: West Bengal, Burdwan (Bardhaman)	Chikkamagaluru* Dharwad and Shivamogga
IV. Subfamily Coptacridinae Brunner von Wattenwyl, 1893 (3 genera and 6 species)			
21.	Genus <i>Coptacra</i> Stal, 1873		
32.	<i>Coptacra ensifera</i> Bolívar, 1902	India: Tamil Nadu, Madurai	Belgaum
33.	<i>Coptacra punctoria</i> (Walker, 1870)	India: South India	Mysore
22.	Genus <i>Epistaurus</i> Bolivar, 1889		
34.	<i>Epistaurus sinetyi</i> Bolivar, 1902	India: Tamil Nadu, Trichinopoly	Dharwad and Shivamogga*
23.	Genus <i>Eucoptacra</i> Bolivar, 1902		
35.	<i>Eucoptacra ceylonica</i> Kirby, 1914	Sri Lanka	Dharwad
36.	<i>Eucoptacra praemorsa</i> (Stal, 1861)	China: Hong Kong	Dharwad, Chikkamagaluru* and Shivamogga*
37.	<i>Eucoptacra saturata</i> (Walker, 1870)	India	Mysore and Shivamogga
V. Subfamily Cyrtacanthacridinae Kirby, 1910 (3 genera and 3 species)			
24.	Genus <i>Chondracris</i> Uvarov, 1923		
38.	<i>Chondracris rosea</i> (De Geer, 1773)	China	Shivamogga
Tribe Cyrtacanthacridini Kirby, 1910			
25.	Genus <i>Anacridium</i> Uvarov, 1923		
39.	<i>Anacridium flavescens</i> (Fabricius, 1793)	India	Dharwad
26.	Genus <i>Cyrtacanthacris</i> Walker, 1870		
40.	<i>Cyrtacanthacris tatarica tatarica</i> (Linnaeus, 1758)	Sri Lanka	Dharwad and Shivamogga

VI. Subfamily Eyprepocnemidinae Brunner von Wattenwyl, 1893			
27.	Genus <i>Tylotropidius</i> Stal, 1860		
41.	<i>Tylotropidius varicornis</i> (Walker, 1870)	India: Maharashtra, South Hindustan	Dakshina Kannada, Dharwad and Shivamogga
Tribe Eyprepocnemidini Brunner von Wattenwyl, 1893			
28.	Genus <i>Eyprepocnemis</i> (Fieber, 1853)		
42.	<i>Eyprepocnemis alacris alacris</i> (Serville, 1838)	India: South India	Chikkamagaluru*, Dakshina Kannada, Dharwad, Kolar and Shivamogga
29.	Genus <i>Heteracris</i> Walker, 1870		
43.	<i>Heteracris pulchra</i> (Bolivar, 1902)	India: Tamil Nadu, Kodaikanal	Mysore and Shivamogga *
VII. Subfamily Gomphocerinae Fieber, 1853 (8 genera and 10 species)			
30.	Genus <i>Gelastorhinus</i> Brunner von Wattenwyl, 1893		
44.	<i>Gelastorhinus semipictus</i> (Walker, 1870)	India	Dharwad, Kolar and Dakshina Kannada
Tribe Arcypterini Shumakov, 1963			
31.	Genus <i>Aulacobothrus</i> Bolivar, 1902		
45.	<i>Aulacobothrus luteipes inferrus</i> Bolivar, 1902	India: Tamil Nadu: Kodaikanal	Karnataka
46.	<i>Aulacobothrus luteipes luteipes</i> (Walker, 1871)	India: Maharashtra, Bombay, Khandala	Dakshina Kannada, Dharwad, Mysore, Shivamogga, Udipi* and Uttaraa Kannada
47.	<i>Aulacobothrus socius</i> Bolivar, 1902	India: Tamil Nadu, Kodaikanal	Shivamogga
32.	Genus <i>Crucinotacris</i> Jago, 1996		
48.	<i>Crucinotacris decisa</i> (Walker, 1871)	India: Maharashtra, Bombay	Shivamogga
33.	Genus <i>Leionotacris</i> Jago, 1996		
49.	<i>Leionotacris bolivari</i> (Uvarov, 1921)	India: Bihar, Chapra	Chikkamagaluru and Shivamogga*
34.	Genus <i>Phonogaster</i> Henry, 1940		
50.	<i>Phonogaster cariniventris</i> Henry, 1940	India: Karnataka, Dhimbam, Biligiriranga Hills	Uttara Kannada
35.	Genus <i>Stenohippus</i> Uvarov, 1926		
51.	<i>Stenohippus trapezoidalis</i> (Bolivar, 1914)	India: Karnataka, Hadagalli	Vijayanagara
36.	Genus <i>Leva</i> Bolivar, 1909		
52.	<i>Leva indica</i> (Bolivar, 1902)	India: Tamil Nadu, Madurai	Dakshina Kannada, Mysore and Shivamogga*
Tribe Ochrilidini Brunner von Wattenwyl, 1893			
37.	Genus <i>Gonista</i> Bolivar, 1898		
53.	<i>Gonista sagitta</i> (Uvarov, 1912)	Asia-Temperate: Middle Asia, Turkmenistan, Farab on Amu Darya	Mysore

VIII. Subfamily Hemiacridinae Dirsh, 1956 (4 genera and 7 species)			
Tribe Hieroglyphini Bolivar, 1912			
38.	Genus <i>Calamippa</i> Henry, 1940		
54.	<i>Calamippa prasina</i> (Bolivar, 1902)	India: Tamil Nadu, Madurai	Chamarajnagara
39.	Genus <i>Clonacris</i> Uvarov, 1943		
55.	<i>Clonacris kirbyi</i> (Finot, 1903)	India: Tamil Nadu, Kodaikanal	Karnataka
40.	Genus <i>Hieroglyphus</i> Krauss, 1877		
56.	<i>Hieroglyphus banian</i> (Fabricius, 1798)	India: Maharashtra, Bombay	Dharwad, Shivamogga and Uttara Kannada
57.	<i>Hieroglyphus concolor</i> (Walker, 1870)	India: Maharashtra, Hindustan	Karnataka
58.	<i>Hieroglyphus nigrarepletus</i> (Bolivar, 1912)	India: Karnataka, Bellary	Bellary
41.	Genus <i>Parahieroglyphus</i> Carl, 1916		
59.	<i>Parahieroglyphus bilineatus</i> (Bolivar, 1912)	India: West Bengal	Dharwad
60.	<i>Parahieroglyphus colemani</i> (Bolivar, 1912)	India: Karnataka, Anavatti	Shivamogga
IX. Subfamily Oedipodinae Walker 1871 (9 genera and 15 species)			
42.	Genus <i>Chloeobora</i> Saussure, 1884		
61.	<i>Chloeobora crassa</i> (Walker, 1870)	India: West Bengal	Belagavi and Dharwad
43.	Genus <i>Dittopternis</i> Saussure, 1884		
62.	<i>Dittopternis venusta</i> (Walker, 1870)	India: South Hindustan	Dakshina Kannada, Dharwad, Kolar, Mysore, Shivamogga and Uttara Kannada
63.	<i>Dittopternis zebrata</i> Saussure, 1884	East India	Dakshina Kannada
44.	Genus <i>Morphacris</i> Walker, 1870		
64.	<i>Morphacris citrina</i> Kirby, 1910	Lebanon-Syria: Syria	Kolar, Mysore, Shivamogga and Uttara Kannada
65.	<i>Morphacris fasciata</i> (Thunberg, 1815)	Southern Africa: Western Cape Province, Cape of Good Hope	Dakshina Kannada and Dharwad
Tribe Acrotylini Johnaton, 1956			
45.	Genus <i>Acrotylus</i> Fieber, 1853		
66.	<i>Acrotylus humbertianus</i> Saussure, 1884	Sri Lanka	Dakshina Kannada, Dharwad and Shivamogga
Tribe Epacromiini Brunner von Wattenwyl, 1893			
46.	Genus <i>Aiolopus</i> Fieber, 1853		
67.	<i>Aiolopus simulatrix simulatrix</i> (Walker, 1870)	India: Maharashtra, South Hindustan	Dharwad
68.	<i>Aiolopus thalassinus tamulus</i> (Fabricius, 1798)	India	Bengaluru, Kodagu, Dakshina Kannada, Dharwad, Kolar, Shivamogga and Uttara Kannada

69.	<i>Aiolopus thalassinus thalassinus</i> (Fabricius, 1781)	Europe: Switzerland, Maggia Delta	Dharwad
Tribe Locustini Kirby, 1825			
47.	Genus <i>Gastrimargus</i> Saussure, 1884		
70.	<i>Gastrimargus africanus africanus</i> (Saussure, 1888)	Southern Africa: Cape Province	Dakshina Kannada, Dharwad, Mysore, Shivamogga and Uttara Kannada
71.	<i>Gastrimargus marmoratus</i> (Thunberg, 1815)	Africa: Cape Province	Karnataka
48.	Genus <i>Oedaleus</i> Fieber, 1853		
72.	<i>Oedaleus abruptus</i> (Thunberg, 1815)	China	Dakshina Kannada, Dharwad and Shivamogga
73.	<i>Oedaleus senegalensis</i> (Krauss, 1877)	Africa: Senegal, St Louis	Dharwad
49.	Genus <i>Heteropternis</i> Stål, 1873		
74.	<i>Heteropternis respondens</i> (Walker, 1859)	India: Sri Lanka.	Dakshina Kannada and Dharwad
Tribe Trilophidiini Stal, 1873			
50.	Genus <i>Trilophidia</i> Stal, 1873		
75.	<i>Trilophidia annulata</i> (Thunberg, 1815)	China, Japan, Java	Bengaluru, Chikkamagaluru, Kodagu, Dharwad, Dakshina Kannada*, Kolar, Mysore, Shivamogga, Udupi* and Uttara Kannada
X. Subfamily Oxyinae Brunner von Wattenwyl, 1893 (3 genera and 7 species)			
51.	Genus <i>Chitaura</i> Bolivar, 1918		
76.	<i>Chitaura indica</i> Uvarov, 1929	India: Karnataka, Coorg, Siddapura	Chikkamagaluru, Dakshina Kannada*, Hassan*, Mysore
Tribe Oxyini Brunner von Wattenwyl, 1893			
52.	Genus <i>Gesonula</i> Uvarov, 1940		
77.	<i>Gesonula punctifrons</i> (Stal, 1861)	China	Dakshina Kannada, Kolar, Shivamogga, Udupi* and Uttara Kannada
53.	Genus <i>Oxya</i> Serville, 1831		
78.	<i>Oxya fuscovittata</i> (Marschall, 1837)	India orientalis vel Caput bonae spei	Chikkamagaluru*, Dakshina Kannada, Dharwad, Shivamogga, Udupi* and Uttara Kannada
79.	<i>Oxya hyla hyla</i> (Serville, 1831)	Africa: Senegal	Chikkamagaluru*, Dakshina Kannada, Dharwad, Kolar, Shivamogga, Udupi* and Uttara Kannada

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80.	<i>Oxya japonica japonica</i> (Thunberg, 1824)	Japan	Chikkamagaluru*, Shivamogga*, Uttara Kannada
81.	<i>Oxya nitidula</i> (Walker, 1870)	India: Maharashtra, Hindustan	Chikkamagaluru, Kodagu, Dharwad, Dakshina Kannada*, Mysore, Shivamogga and Uttara Kannada
82.	<i>Oxya velox</i> (Fabricius, 1787)	China	Dakshina Kannada and Kolar
XI. Subfamily Spathosterninae Rehn, 1957 (1 genus and 2 species)			
Tribe Spathosternini rehn, 1957			
54.	Genus <i>Spathosternum</i> Krauss, 1877		
83.	<i>Spathosternum abbreviatum</i> (Uvarov, 1929)	India: Tamil Nadu, Nilgiris, Snowdon Peak	Karnataka
84.	<i>Spathosternum prasiniferum prasiniferum</i> (Walker, 1871)	India: Maharashtra, Bombay	Chikkamagaluru, Kodagu, Dharwad, Dakshina Kannada, Shivamogga, Udupi* and Uttara Kannada
XII. Subfamily Teratodinae Brunner von Wattenwyl, 1893 (1 genus and one species)			
55.	Genus <i>Teratodes</i> Brulle, 1835		
85.	<i>Teratodes monticollis</i> (Gray, 1832)	India: Ceylon	Shivamogga
XIII. Subfamily Tropidopolinae Jacobson, 1905 (1 genus and one species)			
Tribe Tristriini Mishchenko, 1945			
56.	Genus <i>Tristria</i> Stal, 1873		
86.	<i>Tristria pulvinata</i> (Uvarov, (1921)	India: Punjab	Dakshina Kannada, Dharwad, Kolar, Shivamogga and Uttara Kannada
Superfamily Pyrgomorphoidea Brunner von Wattenwyl, 1874			
B. Family Pyrgomorphidae Brunner von Wattenwyl, 1874			
I. Subfamily Orthacridinae Bolivar, 1905 (3 genera, one sub genus and 6 species)			
Tribe Orthacridini Bolivar, 1905			
1.	Genus <i>Neorthacris</i> Kevan and Singh, 1964		
87.	<i>Neorthacris acuticeps acuticeps</i> (Bolivar, 1902)	India: Tamil Nadu, Madurai	Chikkamagaluru*, Dakshina Kannada*, Kodagu, Kolar, Shivamogga*
88.	<i>Neorthacris acuticeps nilgiriensis</i> (Uvarov, 1929)	India: Tamil Nadu, Nilgiri Hills	Dharwad
i.	Subgenus <i>Pseudorthacris</i> Kevan and Singh, 1964		
89.	<i>Orthacris (Pseudorthacris) ruficornis</i> Bolivar, 1902	India: Tamil Nadu, Kodaikanal	Kodagu
Tribe popoviini Kevan and Akber, 1964			
2.	Genus <i>Colemania</i> Bolivar, 1910		

90.	<i>Colemania sphenarioides</i> Bolivar, 1910	India: Karnataka, Honnali	Bellary, Davanagere and Mysore
3.	Genus <i>Ramakrishnaia</i> Bolivar, 1917		
91.	<i>Ramakrishnaia gracilis</i> Kevan, 1964	India: Karnataka, Kodagu (Coorg)	Kodagu
92.	<i>Ramakrishnaia notabilis</i> Bolivar, 1917	India: Karnataka Mysore, Bababuddin Hills	Chikkamagaluru and Mysore
II. Subfamily Pyrgomorphinae Brunner von Wattenwyl, 1874 (7 genera and 9 species)			
Tribe Atractomorphini Bolivar, 1905			
4.	Genus <i>Atractomorpha</i> Saussure, 1862		
93.	<i>Atractomorpha crenulata</i> (Fabricius, 1793)	India: Tamil Nadu, (Tharangambadi) Tranquebar	Chikkamagaluru*, Dakshina Kannada, Dharwad, Kolar, Mysore, Shivamogga, Udupi* and Uttara Kannada*
Tribe Chlorizeinini Kevan and Akber, 1964			
5.	Genus <i>Feacris</i> Kevan, 1969		
94.	<i>Feacris malabarensis</i> Kevan, 1953	India: Karnataka, Mangalore	Mysore and Dakshina Kannada
Tribe Chrotogonini Bolivar, 1904			
6.	Genus <i>Chrotogonus</i> Serville, 1838		
95.	<i>Chrotogonus trachypterus trachypterus</i> (Blanchard, 1837)	India: Maharashtra, Mumbai	Dharwad, Kolar, Shivamogga and Uttara Kannada
96.	<i>Chrotogonus oxypterus</i> (Blanchard, 1837)	India: Kerala, Mahe	Bellary, Dakshina Kannada, Dharwad, Kolar and Shivamogga
Tribe Poekilocerini Burmeister, 1840			
7.	Genus <i>Poekilocerus</i> Serville, 1831		
97.	<i>Poekilocerus pictus</i> (Fabricius, 1775)	India: Karnataka, Bellary	Bellary
Tribe Pyrgomorphini Brunner von Wattenwyl, 1874			
8.	Genus <i>Pyrgomorpha</i> Serville, 1838 (1839)		
98.	<i>Pyrgomorpha bispinosa bispinosa</i> (Walker, 1870)	India: Maharashtra, South Hindusthan	Dharwad, Kolar and Mysore
99.	<i>Pyrgomorpha (Pyrgomorpha) conica</i> (Olivier, 1791)	Europe: France, Cannes	Karnataka
9.	Genus <i>Zarytes</i> Bolivar, 1904		
100.	<i>Zarytes squalinus squalinus</i> (Saussure, 1884)	India	Karnataka
Tribe Taphronotini Bolivar, 1904			
Subtribe Aularchina Kevan and Akber, 1964			
10.	Genus <i>Aularches</i> Stal, 1873		
101.	<i>Aularches miliaris miliaris</i> (Linnaeus, 1758)	Asia-Tropical	Chikkamagaluru* and Dharwad

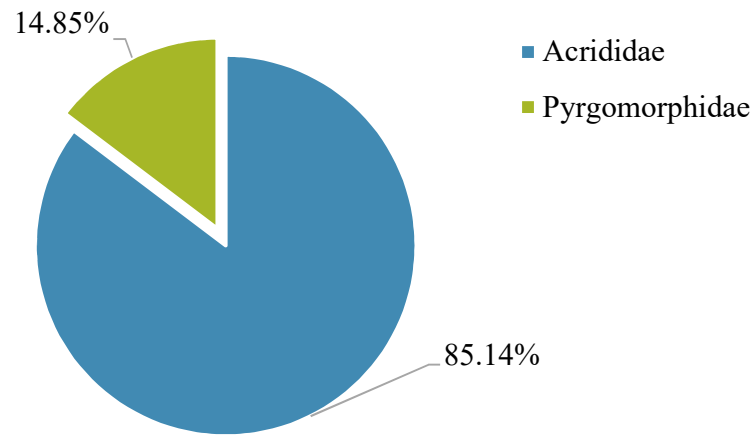


Figure 2: Per cent species composition of the family Acrididae and Pyrgomorphidae from Karnataka

In Pyrgomorphidae, Pyrgomorphinae had a maximum number of species (nine) and genera (seven), sharing 60 per cent; while, Orthacridinae had six species and three genera sharing 40 per cent (Figure-3). In Acrididae, the Catantopinae contributed the highest sum of species (16), which accounts for 18.6 per cent and 11 genera, followed by Oedipodinae, with 15 species, which shares about 17.44 per cent in 9 genera. These results are in conformity with the findings of Prabhakar and

Chandra (2013). In comparison, the least number of species was reported from the subfamilies Calliptaminae, Teratodinae and Tropidopolinae, comprising one species each accounting for 1.16 per cent each (Figure-4). In the studies of Shishodia *et al.* (2010), Prabhakar and Chandra (2013) and Mandal *et al.* (2013), the subfamilies mentioned above showed similar dominance in the species count.

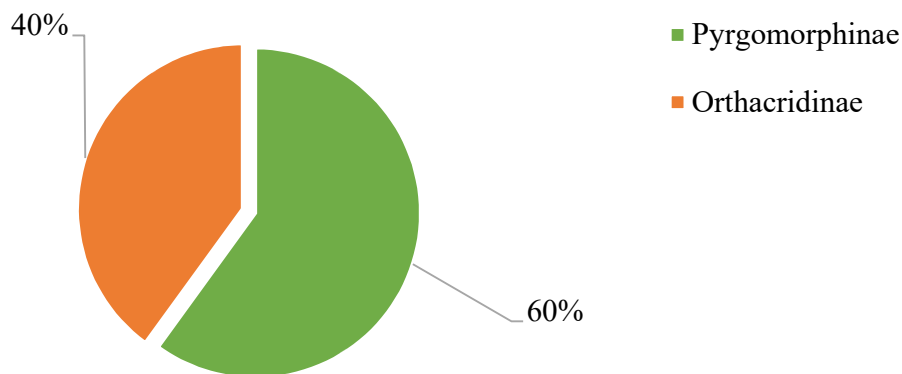


Figure 3: Per cent species composition of the family Acrididae and Pyrgomorphidae from Karnataka

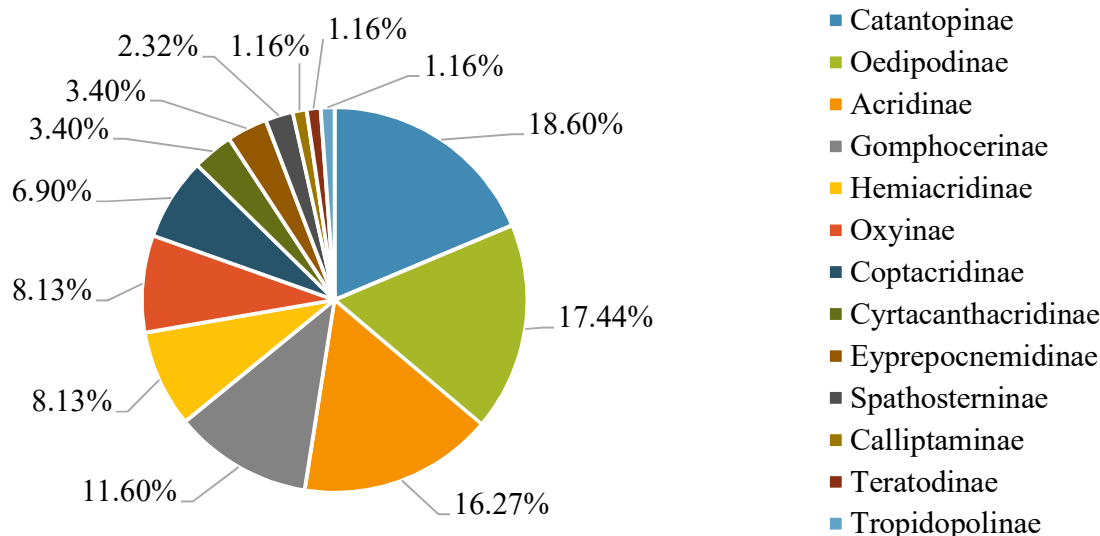


Figure 4: Showing per cent species composition within subfamilies of Acrididae of Karnataka

In the current study, Acridinae encompasses 15 species, with five new additions compared to earlier studies by Shishodia *et al.* (2010) and Prabhakar and Chandra (2013). Catantopinae comprises 16 species, expanding the checklist by four species compared to the 12 species identified in previous studies by Prabhakar and Chandra (2013) and Shishodia *et al.* (2010). Though Coptacridinae comprises six species, the previous research recorded only three and two species by Prabhakar and Chandra (2013) and Shishodia *et al.* (2013), respectively.

Thus, three additional species were added to the checklist. Cyrtacanthacridinae includes three species, two of which were previously documented by Shishodia *et al.* (2010) and Prabhakar and Chandra (2013) and *Chondracris rosea* (De Geer) is a new addition to the checklist. Three species were represented by Eyprepocnemidinae and the findings are consistent with those of Mandal *et al.* (2013). Prabhakar and Chandra (2013) and Shishodia *et al.* (2010) documented eight species and nine species, respectively from Gomphocerinae. However, this study identified ten species. Hemiacridinae is comprised of seven species, with the addition of *Parahieroglyphus bilineatus* (Bolivar), which was not included in the previous research conducted by Shishodia *et al.* (2010) and Prabhakar and Chandra (2013). Oedipodinae are represented by 15 species, while, the earlier studies by Shishodia *et al.* (2010)

and Prabhakar and Chandra (2013) recorded only five and seven species, respectively; thus, eight species were added to the present checklist. Oxyinae contributed seven species, but previous studies by Shishodia *et al.* (2010), Prabhakar and Chandra (2013) and Mandal *et al.* (2013) recorded only five species. Earlier, *Gesonula punctifrons* were placed under Hemiacridinae and later incorporated into Oxyinae. Hence, it is counted under Oxyinae. So, added two more species to the current checklist. Spathosterninae comprises two species in Karnataka, which is consistent with the previous findings of Shishodia *et al.* (2010) and Prabhakar and Chandra (2013). In the present study, Pyrgomorphinae represents nine species. But earlier studies by Shishodia *et al.* (2010) and Prabhakar and Chandra (2013) have recorded only six species. Hence, we added three more species to checklist through the current research. Orthacridinae represents six species from three genera. Of which, three were mentioned by previous workers, Shishodia *et al.* (2010) and Prabhakar and Chandra (2013); thereby, adding three more species to the present checklist. The study also exemplifies that several species were recorded for the first time in the surveyed districts. In Chikkamagaluru, 13 species were collected, of which nine are new records: *Acrida exaltata*, *Atractomorpha crenulata*, *Aularches miliaris miliaris*, *Eyprepocnemis alacris*

alacris, *Eucoptacra praemorsa*, *Oxya fuscovittata*, *O. japonica japonica*, *Neorthacris acuticeps acuticeps* and *Paraconophyma scabra*, whereas previous research has identified five species (Mandal *et al.*, 2013).

Four of the eleven species that were collected in Dakshina Kannada: *Chitaura indica*, *O. nitidula*, *Trilophidia annulata* and *N. acuticeps acuticeps* are new records, whereas six species had been recorded in previous studies (Mayya *et al.*, 2005). One species, *A. miliaris miliaris*, was collected in Kodagu and is a new record. Three of the 25 species that were collected in Shivamogga: *O. japonica japonica*, *Heteracris pulchra* and *Diabolocatantops pinguis* are new records. However, Mandal *et al.* (2013) previously recorded 22 species. In Uttar Kannada, eight species were collected, of which one is a new record: *A. crenulata*. Previous studies have documented the remaining seven species (Bhatnagar, 2013). The Hassan and Udupi districts had no prior records of short-horned grasshoppers. In the current study, eleven species, viz., *Spathosternum prasiniferum prasiniferum*, *Gesonula punctifrons*, *O. fuscovittata*, *O. hyla hyla*, *D. innotabilis*, *D. pinguis*, *Aulacobothrus lutipes lutipes*, *T. annulata* and *A. crenulata* and one species viz., *C. indica* from Hassan districts were collected, all of which are new records for the districts. This might be due to a lack of surveys by earlier workers in this region.

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Conclusion

In the literature survey and from our collection, a total of 101 species belonging to 13 subfamilies of Acrididae viz., Acridinae, Calliptaminae, Catantopinae, Coptacridinae, Cyrtacanthacridinae, Eyprepocnemidinae, Gomphocerinae, Hemiacridinae, Oedipodinae, Oxyinae, Spathosterninae, Teratodinae and Tropicodinae and two subfamilies of Pyrgomorphidae viz., Orthacridinae and Pyrgomorphinae were recorded. In Acrididae, the subfamily Catantopinae showed the maximum abundance followed by Oedipodinae; whereas, in Pyrgomorphidae, Pyrgomorphinae was dominant. Several species were recorded for the first time from the surveyed districts. The study demonstrated the presence of various new records from the districts surveyed. This also suggests the need for further intensive survey and taxonomic studies of grasshoppers in Karnataka to know the actual diversity and these records will aid as baseline data.

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Conflict of interest

The authors declare that they have no conflicts of interest.

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