International Journal of Global Science Research
Vol. 9, Issue. 2, October 2022, pp. 1892-1901
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.219

Research Paper

New record of Aak Grasshopper *Poekilocerus pictus* (Fabricius, 1775) (Orthoptera: Pyrgomorphidae) with a new host plant from Ashoknagar district, Madhya Pradesh (India)

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Received: 02/09/2022
Revised: 08/09/2022
Accepted: 14/09/2022

Abstract: The present communication deals with the new record of *Poekilocerus pictus*, the Aak Grasshopper from Ashoknagar district, Madhya Pradesh (India) with its systematic account, distribution, habitat, food & feeding, life cycle, self-defence, host plants, control measures and conservation status. Being brightly coloured, it is also known as painted grasshopper.
A new host plant *Senna tora* is also recorded for this species.

Keywords: New record, *Poekilocerus pictus*, New host plant, Ashoknagar.

Introduction:

The orthopteran fauna of Madhya Pradesh has attracted the attention various workers during the past (Bindra, 1958; Roonwal, 1981; Tandon et al., 1976, 1995; Shishodia, 1995, 1999, 2006, 2008; Chandra, 2003; Joshi et al., 2004; Chandra et al., 2007, 2009; Gupta, 2008, 2009a-c; Gupta & Chandra, 2008, 2009, 2011; Gupta & Shishodia, 2009; Chandra & Gupta, 2009, 2011, 2012) but there is no published record on the occurrence of *Poekilocerus pictus* (Fabricius, 1775), the Aak or Painted Grasshopper under family Pyrgomorphidae, from Ashoknagar district. Recently good examples of the same were found on *Calotropis procera*, the Aak plants and *Senna tora*, the *Tora* plants at Piprai in Ashoknagar district of the state and recorded here as new find for the district. Shishodia & Kulkarni (2001), Shishodia et al. (2010), Sharma, 2013 and Srinivasan & Prabhakar (2013) shown its distribution in Madhya Pradesh but without mention any locality. The record by Shishodia (2000) was from Bastar district then in M. P. which is now part of Chhattisgarh state. Bindra (1958) while studying the food preference of the species recorded it from Gwalior. Another record from near Ujjain is mentioned in a website (texasento.net).
The host plant *Senna tora* is also new record for this species.

STUDY SITE: Piprai, Mungaoli tehsil, Ashoknagar district, Madhya Pradesh, India

ISSN: 2348-8344 (Online)
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Location: Piprai (Lat. 24°.30'14.8104"- 24°.30.2468'N and Long. 77°.57'52.3944"- 77°.57.8732'E; altitude 409 m; area 582 hectares) falls in Mungaoli tehsil under Ashoknagar district, 19 km the tehsil and 27 km from the district head quarters (Ashoknagar), Madhya Pradesh.

Climate: Temperature ranged between 32°and 22° C on 07.vii.2022 and ca. 28° and 23° C on 20.viii.2022 the days of sighting the grasshoppers.

Flora around: *Mangifera indica*, the Mango (Anacardiaceae), *Calotropis procera*, the Aak (Apocynaceae), *Butea monosperma*, the Flame-of-the- Forest, *Chhewla*, *Dhak* or *Palash*, *Cassia fistula*, the Golden Shower and *Senna tora* (syn. *Cassia tora*), the *Tora* (Fabaceae), *Azadirachta indica*, the *Neem* (Meliaceae), *Ficus benghalensis*, the *Bargad* or Banyan tree and *Ficus religiosa*, the *Peepal* (Moraceae), *Syzygium cumini*, the *Jamun* (Myrtaceae) *Duranta erecta*, the Sky-flower (Verbenaceae), vegetable and flowering plants.

SYSTEMATIC ACCOUNT, DISTRIBUTION AND OTHER ASPECTS

***Poekilocerus pictus* (Fabricius, 1775)**

Synonymy-cum-References on distribution and other aspects:

Gyrllus pictus Fabricius, 1775. *Syst. Ent.*: 289 (type-locality: Indian Subcontinent).

Poekilocerus sonneratii Serville, 1831. *Ann. Sci. Nat.* (*Zool.*), 22: 276 (Asia-Tropical, Indian Subcontinent).

Poecilocerus tessellatus Bolivar, 1904. *Bol. Soc. Espan. Hist. Nat.*, 4: 432-433 (Asia-Tropical, Indian Subcontinent, India, Karnataka, Bellary); Kirby, 1914. *Faun. Brit. India*, *Orth.*: 171 (Madras).

Poecilocerus pictus, Kirby, 1914. *Faun. Brit. India*, *Orth.*: 172-173, fig. 113 (Baluchistan, Sind, Madras etc.).

Poekilocerus pictus, Pruthi & Nigam, 1939. . *Indian J. Agric. Sci.*, 9 (4): 629-641; Bindra, 1958. *Ind. Hort.*, 15: 80-86; Ambar, 1966. *Sind Univ. Sci, Res. Journal*, Karachi: 1; Tandon & Shishodia, 1969. *Oriental. Ins.*, 3 (3): 265; Khan & Sharma, 1971. *Ent. Newsl.*, 1: 64-69; Parihar, D. R., 1971. *Zeitschrift fur Angewandte Entomologie*, 67 (1-4): 9-19; Parihar, 1974. *J. Zool. Soc. India*, 26 (1-2): 99-129, 3 pls.; Ghouri, 1975. *Pl. Prot. Bull. F.A.O.*, 23: 52-53; Sheri, 1976. *Pakistan Journal of Agriculture Science*, 13: 37-40; Riazuddin et al., 1977. *Zoological Anz.*, 198: 63-67; Riazuddin, 1978. *Folia Morphol.*, 26: 16-27; Parihar, 1984a. *Annals of arid zone*, 23 (1): 89-94; Parihar, 1984b. *J. An. Morph. Physio.*, 31: 79-88; Wagan et al., 1992. *Sindh Univ. Res. Jour.* (Sci. Sr.), 24 (1-2): 27-31; Hazra et al., 1993. Orthoptera: Acridoidea. In: Fauna of West Bengal. *State Fauna Series*, 3 (4): 293; Shishodia, 1997. Orthoptera. In: Fauna of Delhi. *State Fauna Series*, 6: 175; Shishodia, 2000. *Rec. zool. Surv. India*, 98 (1): 41; Sanyal & Saha, 2001. *Uttar Pradesh J. Zool.*, 21 (1): 82; Shishodia & Kulkarni, 2001. Insecta: Orthoptera. In: Fauna of Nilgiri Biosphere Reserve. *Fauna of Conservation Area Series*, 11: 62; Moizuddin, 2002. *Proceedings of Pakistan Congress of Zoology*, 22: 37-42; Moizuddin, 2003. *Proceedings of Pakistan Congress of Zoology*, 23: 151-156; Mandal & Yadav, 2007. Orthoptera: Acridoidea. In. Fauna of Andhra Pradesh, *State Fauna Series*, 5 (3): 184, 190; Umerani et al., 2007. *Journal of Agriculture*, 23 (4): 211-217; Mathen & Hardikar, 2010. *Journal of Experimental Threrapeutics & Oncology*. 8 (3): 177-185; Sawant, M., 2010. *J. Bombay nat. Hist. Soc.*, 107 (2): 122-129; Shishodia et al., 2010. *Rec. zool. Surv. India*, Occ. Paper No. 314: 135-136; Chandra & Gupta, 2012. Insecta: Orthoptera. In: Fauna of Maharashtra. *State Fauna Series*, 20 (2): 432; Prabhakar & Chandra, 2013. Insecta: Orthoptera. In: Fauna of Karnataka. *State Fauna Series*, 21: 90;

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.219

Sharma, 2013. *Rec. zool. Surv. India*, 113 (Part-2): 193-194; Srinivasan & Prabhakar, 2013. *A pictorial handbook on grasshoppers of Western Himalayas*: 69-70; Soomro et al., 2014. *Pak. J. Entomol.*, 29 (1): 21-25; Riffat et al., 2015a. *Pakistan Journal of Entomology*, 30 (2): 161-164; Riffat et al., 2015b. *Pakistan Journal of Zoology*, 47 (3): 739-743; Riffat et al., 2015c. *Pakistan Journal of Entomology*, 37 (2): 147-150; Prakash et al., 2016. *Journal of Applied Zoological Research*, 27 (2): 191-192; Riffat et al., 2017. *Entomology and Zoology Studies*, 5 (3): 537-540; Yadav & Kumar, 2017. *J. Exp. Zool. India*, 20 (Supplement 1): 1468-1469; Bhatnagar, P. S., 2021. Insecta: Orthoptera: Acrididae. In: Chandra et al. (Eds.). *Current status of faunal diversity in Telangana* : 145; Ramanujam et al., 2021. *International Journal of Tropical Insect Science*, 42 (4): 4 pp.; Thiruvengadam, 2021. *Acta Scientific Microbiology*, 4 (4): 71-73.

Common Names: Aak or Ak Grasshopper and Painted Grasshopper.

Vernacular Name: *Titighodo* (in some tribal areas) (Srivastava et al., 2009); *Aak*, *Ak* or *Madar* (in Hindi) (texasento.net).

Sighting: 1 example (on *Calotropis procera*, the *Aak* plant), Piprai, 19 km from Mungaoli and 27 km from Ashok Nagar district Hqs., Madhya Pradesh, India; 07.vii.2022; by 2nd author (AKD).

1 example (on *Senna tora*, the *Tora* plant), Piprai, 19 km from Mungaoli and 27 km from Ashoknagar district Hqs., Madhya Pradesh, India; 20.viii.2022; by 2nd author (AKD).

Classificaion: Class Insecta, order Orthoptera, superfamily Pyrgomorphoidea, family Pyrgomorphidae, subfamily Pyrgomophinae, tribe Poikilocerini, genus *Poikilocerus* Serville, 1831.

Diagnostic Features:

Morphology: Body moderate, sub-fusiform and robust with finely rugose integument; head convex, sub-conical; antennae filiform, near eyes, stout, basal segments as long as broad and inserted below ocelli; eyes small; head and pronotum faintly carinated above; lateral carinae of pronotum obsolete; pronotum gradually widened behind, sulci well marked, hind sulcus placed about middle, hinder lobe raised and rounded behind; deflexed lobes narrowed below; posterior lobe of pronotum at level of anterior lobe; anterior margin of pro-sternum neither reflexed nor dilated; tegmen and wings well developed, opaque; tegmina and hind-wing about as long as abdomen; abdomen without callosities or slightly carinated above; legs rather stout, four front tibiae spined beneath at extremity, hind femora slender and nearly as long as abdomen and unarmed; hind tibia with eight each external and internal spies, including apical one, external apical spine very small; sub-genital plate in female with an acute point.

Colouration: Body bluish-green with yellow markings; wings pale reddish with fine yellow transverse markings towards tips and rest of wing greenish with yellow transverse markings; antennae bluish-black at base, rest part (beyond basal third of their length) black with pale yellow narrow and broad rings; head and pronotum with a slight median carina; head with a broad yellow band within each eye, running back on pronotum to middle sulcus behind with two broad sub-interrupted transverse yellow bands; upper part of frontal ridge also yellow and with broad yellow diverging bands on each side; also a broad yellow band below each eye, extending over lower part of deflexed lobes of pronotum; pronotum impress-punctate, rounded behind; tegmina green or olive with longitudinal and transverse nervures yellow and apex often reddish; wings brick-red with red nervures, more or less sub-hyaline towards tip; abdomen yellow with transverse bluish-green bands (with red spots, syn. *Poecilocerus tessellates*);

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.219

legs yellow, femora longitudinally striped with bluish-green and on inner side nearly to extremity; four front tibiae blotched with dark blue (Kirby, 1914; Hazra et al., 1993; Shishodia, 1997, 2000; Mandal & Yadav, 2007; Srinivasan & Prabhakar, 2013; Thiruvengadam, 2021; indiabiodiversity.org).

Nymphs: Brightly coloured and display spots of varied colours from yellow, orange to blue and green; the bright and warning colour in nymphs as well as adults is explained due to the presence of toxic alkaloids present in *Calotropis* spp they feed on (Sharma, 2013; Srinivasan & Prabhakar, 2013; whatsthatbug.com).

Size: Length 43-61 mm, expanse of tegmina 68-100 mm (Kirby, 1914); length (female nymph), 44 mm, pronotum 21.5 mm, hind femur 20 mm (syn. *Poecilocerus tessellates*, Kirby, 1914); body length male 50-52, female 50-62; head length male 5.0-5.5, female 5-7; pronotum male 11.5-13.0, female 15.0-16.0; tegmen male 34.5-37.5, female 36.0-37.5; hind femur male 20.5-23.0, female 26.0; hind tibia male 20.5-23.0, female 24.5-26.0 mm (Shishodia, 2000); 60 mm (Srinivasan & Prabhakar, 2013; whatsthatbug.com); 43-61, tegmina expanse 38-100 mm (indiabiodiversity.org).

Distribution:

Madhya Pradesh: Gwalior (Bindra, 1958); Ujjain (texasento.net); Piprai, Ashoknagar district (new record).

Rest of India: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Lakshdweep, Maharashtra, Manipur, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttarakhand, Uttar Pradesh and West Bengal (Kirby, 1914; Pruthi & Nigam, 1939; Parihar, 1974; Hazra et al., 1993; Shishodia, 1997, 2000; Shishodia & Kulkarni, 2001; Mandal & Yadav, 2007; Shishodia et al., 2010; Chandra & Gupta, 2011, 2012; Prabhakar & Chandra, 2013; Sharma, 2013; Prakash et al., 2016; Yadav & Kumar, 2017; Gupta & Chandra, 2018; Bhatnagar, 2021; en.wikipedia.org; indiabiodiversity.org; whatsthatbug.com).

Elsewhere: Afghanistan, Africa, Bangladesh, Bhutan, Egypt, Ethiopia, Malawi, Maldives, Nepal, Nigeria, Pakistan, Sri Lanka and Yemen (Kirby, 1914; Ghouri, 1975; Sheri, 1976; Riazuddin et al, 1977; Wagan & Mugal, 1992; Hazra et al., 1993; Shishodia, 1997, 2000; Shishodia & Kulkarni, 2001; Moizuddin, 2002, 2003; Shishodia et al., 2010; Chandra & Gupta, 2011; Sharma, 2013; Srinivasan & Prabhakar, 2013; Soomro et al., 2014; Riffat et al., 2015a,b,c, 2017; Thiruvengadam, 2021; indiabiodiversity.org).

Habitat: Mostly drier parts with host plants (Shishodia, 1997).

Food & Feeding: Feeds on host plants, particularly *Calotropis* spp.

Life Cycle: Its breeding/life history and development have been studied by various workers (Pruthi & Nigam, 1939; Parihar, 1971, 1974, 1984a, b; Sheri, 1976; Riazuddin et al., 1977; Moizuddin, 2002, 2003; Umerani et al., 2007; Srinivasan & Prabhakar, 2013; Soomro et al., 2014; Riffat et al., 2015b, c, 2017).

Breeds once in a year during monsoon months (June-August) when female lays eggs in pods on *Calotropis* sp., each pod containing 60-216 eggs; nymphs hatch out around September and remain around the host plant for feeding; by October adults found feeding specifically on host plants; at some places it breeds during September-November when lays eggs which hatch out in April-May, the longer period due to prevailing climatic conditions; nymphs brightly coloured and display spots of varied colours from yellow, orange to blue and green. Number eggs in each egg pot varied 60-140 (Pruthi & Nigam, 1939), 106-216 (Sheri, 1976), 66-136 (Riazuddin et al, 1977), 80-103 (Riffat et al., 2017) and 70-200 (Moizuddin, 2002;

International Journal of Global Science Research **ISSN: 2348-8344 (Online)**
Vol. 9, Issue. 2, October 2022, pp. 1892-1901 **DOI: 10.26540/ijgsr.v9.i2.2022.219**
***Available Online* at www.ijgsr.com**

whatsthatbug.com) and 90-210 (Moizuddin, 2003).

Self-defence: On disturbing or picking up, the nymphs, juveniles or semi-grown immature forms eject a sharp and sudden jet of pale, milky, viscous and bad-tasting liquid containing Cardiac glycosides to some distance from a dorsal opening between their 1st and 2nd abdominal segments which may be repeated several times and acts as chemical defence. In adults the discharge occurring under tegmina makes a viscous bubbly heap on sides of body (Hingston, 2009; Mathen & Hardikar, 2010)

HOST PLANTS: (vide Ghouri, 1975; Hazra et al., 1993; Sayed et al., 1994; Shishodia, 1997, 2000; Mandal & Yadav, 2007; Hingston, 2009; Srivastava et al., 2009; Mathen & Hardikar, 2010; Sawant, 2010; Sharma, 2013; Srinivasan & Prabhakar, 2013; Riffat et al., 2015a; Prakash et al., 2016; Riffat et al., 2017; Thiruvengadam, 2021; Yadav & Kumar, 2017; whatsthatbug.com; texasento.net; present records).

Mangifera indica, the Mango (Anacardiaceae).

Calotropis gigantea, the Crown Flower or Giant Milkweed and *Calotropis procera*, the Rubber Bush, *Aak* or *Madar*; *Nerium oleander*, the Oleander or *Kaner*; *Plumeria rubra*, the Commom White Frangipani or *Champa* or Red Jasmine (Apocynaceae).

Dracaena fragrans, the Corn (Asparagaceae).

Carica papaya, the Papaya (Caricaceae).

Cucumis melo, the Melon (Cucurbitaceae).

Euphorbia sp., *Jatropha* sp., the Physic nut or Nettle spurge; *Manihot esculenta*, the Cassava; *Ricinus communis*, the Castor Bean (Euphorbiaceae).

Medicago sativa, the Alfalfa; *Senna tora* (syn. *Cassia tora*) (present new record), the Stinking Cassia or *Tora* plant; *Vigna unguiculata*, the cow-pea (Fabaceae).

Punica granatum, the Pomegranate or *Anaar* (Lythraceae).

Abelmoschus esculentus, the Okra; *Gossypium arboreum*, the Cotton; *Hibiscus rosa-sinensis*, the Gurhal or Shoe-flower (Malvaceae).

Syzygium cumini, the *Jaman*/*Jamun*/ (Myrtaceae).

Sesamum indicum, the Sesame (Pedalilaceae).

Piper betle, the Betal creeper (Piperaceae).

Saccharum officinarum, the Sugarcae; *Triticum aestivum*, the Wheat; *Zea mays*, the Maize (Poaceae).

Rosa spp., the Rose (Rosaceae).

Citrus limon, the Citrus (Rutaceae).

Capsicum annuum, the Chilli; *Solanum lycopersicum*, the Tomato; *Solanum melongena*, the Brinjal (Solanaceae).

During the present study, this grasshopper (*P. pictus*) was also found on *Senna tora* (syn. *Cassia tora*), the Stinking Cassia or *Tora* plant, besides *Calotopis procera*, the Aak plant, at Piprai (Ashoknagar district, M. P.) which is a new host record for the species.

CONTROL MEASURES: It is usually present in small numbers but sometimes its population increases suddenly to the extent of an outbreak causing maximum damage (Khan & Sharma, 1971; Riazuddin et al., 1977; Parihar, 1984b; Wagan & Mugal, 1992). Ghouri (1975) highlighted heavy damage to *Calotropis procera* (Aak), *Gossypium arboreum* (Cotton), *Capsicum* sp (Chilli), *Saccharum officinerum* (Sugarcane) and Cucurbits and in Pakistan. Thiruvengadam (2021) suggested stringent management measures. Srinivasan & Prabhakar (2013) found groups of nymphs and adults occasionally causing considerable damage by feeding on young plants. Prakash et al. (2016) recorded severe attack of this pest on *Calotropis gigantea*, *Hibiscus* and *Sesamum* in Bhubaneshwar (Odisha). Ramanujam et al. (2021) tested two indigenous entomo-fungal strains, *Beauveria bassiana* and *Metarhizium anisopliae* for their

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.219

pathogenic effect on this grasshopper and its eggs under laboratory conditions and found *M. anisopliae* more promising than *B. bassiana* as regards their control.

CONSERVATION STATUS: IUCN Red List- Least Concern (en.wikipedia.org).

Acknowledgements:
The authors are especially grateful to Dr. Dhriti Banerjee, Director, Zoological Survey of India, M-Block, New Alipore, Kolkata (West Bengal), for encouragement.
Thanks are due to Prof. Surendra Singh, (Dept. of Higher Education & ITS Institute), Apptt. No. I-208, KW Shristy, Rajnagar Extension, Ghaziabad (Uttar Pradesh), for help in identification of some plants and Dr. S. S. Talmale, Scientist-B, Western Regional Centre, Zoological Survey of India, Rawet Road, Pune (Maharashtra) for help in some literature.
The first author (AH) is also thankful to Dr. Gaurav Sharma, Officer-in-Charge, Northern Regional Centre, ZSI, Dehra Dun (Uttarakhand), for library facility.

References:

Bindra O. S. (1958) Food preference of *Poekilocerus pictus* Fab.- a pest of some horticultural plants at Gwalior. Indian Journal of Horticulture, 15, 80-86.
Roonwal M. L. (1981) Field bioecology and morphometry of some Central Indian grasshoppers (Acridoidea), with notes on a swimming species (Tetrigoidea). Proc. Zool. Soc. Calcutta, 32, 97-106.
Tandon S. K., Shishodia M. S. and Dey A., (1976) On a collection of Orthoptera (Insecta) from Kanha National Park, Mandla, Madhya Pradesh, India. Newsl. zool. Surv. India, 2 (4), 167-170.
Tandon S. K., Shishodia M. S. and Dey A. (1995) Insecta: Orthoptera. In: Fauna of Kanha Tiger Reserve, Madhya Pradesh. Fauna of Conservation Areas, 7, 19-25.
Shishodia M. S. (1995) Insecta: Orthoptera. In: Fauna of Indravati Tiger Reserve, Madhya Pradesh. Fauna of Conservation Areas, 6, 11-17.
Shishodia M. S. (1999) Orthoptera fauna of Patalkot, Chhindwara, Madhya Pradesh, India. Rec. zool Surv. India, 97 (4), 33-43.
Shishodia M. S. (2006) On a collection of grasshoppers by Dr. M. L. Roonwal from erstwhile Rewa estate, Madhya Pradesh, Bionotes, 8 (1), 11-12.
Shishodia M. S. (2008) Insecta: Orthoptera. In: *Faunal diversity of Jabalpur district, Madhya Pradesh*: 93-103.
Chandra K. (2003) *Insect biodiversity in Madhya Pradesh and Chhattisgarh. Advancement in Insect Biodiversity*: 37-52. Agrobios (India), Jodhpur.
Joshi K. C., Kulkarni N., Roychoudhury N., Chandra S. and Barve S. (2004) A study of insects from Kanha National Park. Journal of Tropical Forestry, 20 (3-4), 58-74.
Chandra K., Gupta S. K. and Shishodia M. S. (2007) A check-list of Orthoptera of Madhya Pradesh and Chhattisgarh. Zoos' Print Journal, 22 (5), 2683-2687.
Chandra K. and Gupta S. K. (2009) On a collection of Orthoptera fauna of Veerangna Durgavati Wildlife Sanctuary, Damoh (Madhya Pradesh). Biological Forum- An International Journal, 1 (1), 77-82.
Gupta S. K. (2008) New records of two short-horned grasshoppers from Central India. Bionotes, 10 (3) 89.
Gupta S. K. (2009a) New records of some Orthoptera from Central India. Bionotes, 11 (1), 28.
Gupta S. K. (2009b) New records of some grasshoppers and crickets from Central India. 11 Bionotes, (3), 97-98.
Gupta S. K. (2009c) Insecta: Orthoptera. In: Fauna of Bandhavgarh Tiger Reserve (Madhya Pradesh). Conservation Area Series, 40, 39-57.

Gupta S. K. and Chandra K. (2008) On a collection of Orthoptera from Panna National Park, Madhya Pradesh, India. Indian J. Tropical Biodiversity, 1 (1), 173-177.

Gupta S. K. and Chandra K. (2009) Orthoptera of Madhav National Park, Shivpuri, Madhya Pradesh. Uttar Pradesh Journal of Zoology, 29 (1), 79-89.

Gupta S. K. and Chandra K. (2011) Orthoptera of Van Vihar National Park, Madhya Pradesh (India). Rec. zool. Surv. India, 111 (1), 71-76.

Gupta S. K. and Shishodia M. S. (2009) Insecta: Orthoptera. In: Fauna of Pachmarhi Biosphere Reserve (Madhya Pradesh). Fauna of Conservation Area series, 39, 213-246.

Chandra K. and Gupta S. K. (2011) Orthoptera. In: Fauna of Madhya Pradesh (including Chhattisgarh). State Fauna Series, 15 (3), 105-150.

Chandra K. and Gupta S. K. (2012) Insecta: Orthoptera. In: Fauna of Maharashtra. State Fauna Series, 20 (2), 429-436.

Prabhakar D. and Chandra K. (2013) Insecta: Orthoptera. In: Fauna of Karnataka. State Fauna Series, 21, 87-96.

Chandra K., Gupta S. K. and Dube K. K. (2009) Study on the species composition and diversity in Pench Tiger Reserve, Madhya Pradesh. Natl. J. Life Sci., 6 (1), 81-86.

Shishodia M. S. and Kulkarni P. P. (2001) Insecta: Orthoptera. In: Fauna of Nilgiri Biosphere Reserve. Fauna of Conservation Area Series, 11, 59-63.

Shishodia M. S., Chandra K. and Gupta S. K. (2010) An annotated checklist of Orthoptera (Insecta) from India. Rec. zool. Surv. India, Occ. Paper No. 314, 1-366.

Sharma N. (2013) New records of Acridoidea (Insecta : Orthoptera) from Uttarakhand. Rec. Zool. Surv. India, 113 (Part-2), 193-195.

Srinivasan G. and Prabhakar D. (2013) *A pictorial handbook on grasshoppers of Western Himalayas*: 1-75. Zoological Survey of India Publication.

Shishodia M. S. (2000) Short and long-horned grasshoppers and crickets of Bastar district, Madhya Pradesh, India. Rec. zool. Surv. India, 98 (1), 27-80.

Kirby W. F. (1914) The *Fauna of British India, including Ceylon and Burma*. Orthoptera (Acrididae): ix + 276 pp. Taylor and Francis, London.

Hazra A. K., Tandon S. K. Shishodia M. S., Dey A. and Mondal S. K. (1993) Orthoptera: Acridoidea. In: Fauna of West Bengal. State Fauna Series, 3 (4), 287-354.

Srivastava S. K., Babu N. and Pandey H., (2009) Traditional insect bioprospecting-As human food and medicine. Indian Journal of Traditional Knowledge, 8, 485-494.

Sayed T. S., Awan M. S. and Abro G. S. (1994) Effect of food plants on the biology of *Poekilocerus pictus* Fab. Foof consumption and rate o development. Pakistan Journal of Zoology, 26 (2), 105-108.

Shishodia M. S. (1997) Orthoptera. In: Fauna of Delhi. *State Fauna Series*, 6: 173-196.

Mandal S. K. and Yadav K. (2007) Orthoptera: Acridoidea. In. Fauna of Andhra Pradesh, State Fauna Series, 5 (3), 183-222.

Thiruvengadam V. (2021) Seasonal occurrence of Akk Grasshopper *Poekilocerus pictus*, (Pyrgomorphidae: Orthoptera) Mangochi, Malawi. Acta Scientific Microbiology, 4 (4), 71-73.

Website: https://indiabiodiversity.org/species/show/277826

Website: https://www.whatsthatbug.com/grasshopper-from-india/

Gupta S. K. and Chandra K. (2018) Insecta: Orthoptera: In: Chandra et al. (Eds.). Faunal diversity of Indian Himalaya: 241-252, fig. 1.

Bhatnagar P. S. (2021) Insecta: Orthiotera: Acrididae. In: Chandra, K., Jaiswal, D., Raghunathan G., Jadhav, S. S. & Karuthapandi, M. (Eds.). Current status of faunal diversity in Telangana. 140-146, 5 fig.

Parihar D. R. (1974) Some observations on life history of Ak-grasshopper, *Poekilocerus pictus* (Acridoidea: Pyrgomorphidae) of Jodhpur, Rajasthan, India. J. Zool. Soc. India, 26 (1-2), 99-129, 3 pls.

Ghouri A. S. K. (1975) *Peokilocerus* [Sic] *pictus* in the Punjab. *Pl. Prot. Bull. F.A.O.*, 23, 52-53.

Sheri A. M. (1976) Reproduction of common grasshopper *Poekilocerus pictus* (Fab.). Pakistan Journal of Agriculture Science, 13, 37-40.

Riazuddin T. R., Khan T. R. and Singh S. B. (1977) Observation on the sexual behaviour and oviposition in the female grasshopper *Poekilocerus pictus* (Fab.) (Acridoidea : Pyrgomorphidae). Zoological Anz., 198, 63-67.

Wagan M. S. and Mugal M. (1992) Family Pyrgomorphidae (Acridoidea : Orthoptera) of Sindh. Sindh Univ. Res. Jour. (Sci. Sr.), 24 (1-2), 27-31.

Moizuddin M. (2002) Studies on habitat and life cycle of *Poekilocerus pictus* (Fabricius) (Orthoptera : Acridoidea) in laboratory conditions. Proceedings of Pakistan Congress of Zoology, 22, 37-42.

Moizuddin M. (2003) Studies on habitat and life cycle of *Poekilocerus pictus* (Fabricius) (Orthoptera : Acridoidea) in the desert area of Lasbella, Balochistan. Proceedings of Pakistan Congress of Zoology, 23, 151-156.

Soomro I., Riffat S., Wagan M. S., Kumar S. and Solangi F. H. (2014) Mating strategies of *Poekilocerus pictus* (Fabricius, 1775) (Pyrgomorphidae : Acridoidea : Orthoptera). Pak. J. Entomol., 29 (1), 21-25.

Riffat S., Imran K., Bughio A. A. Panhwar W. A., Kumar S. and Soomro I. (2015a) Studies on the importance of common *Calotropis procera* (Asclepiadaceae) and close association of *Poekilocerus pictus* (Fabricius, 1775). Pakistan Journal of Entomology, 30 (2), 161-164.

Riffat S., Soomro I., Wagan M. S. and Panhwar W. A. (2015b) Studies on the reproductive activity of *Poekilocerus pictus* (Fabricius, 1775) (Pyrgomorphidae : Acridoidea : Orthoptera). Pakistan Journal of Zoology, 47 (3), 739-743.

Riffat S., Soomro I., Khan I. and Wagan M. S. (2015c) Study on immature stages of *Poekilocerus pictus* (Fabricius, 1775) (Orthoptera : Acridoidea : Pyrgomorphidae). *Pakistan Entomologist*, 37 (2), 147-150.

Pruthi H. S. and Nigam L. N. (1939) The bionomics, life history, and control of Ak Grasshopper, *Poekilocerus pictus* Faber, a new pest of cultivated crops in North India. Indian J. Agric. Sci., 9 (4), 629-641.

Parihar D. R. (1971) Water-balance in developing eggs of the Aak Grasshopper, *Poekilocerus pictus* ((Acridoidea: Pyrgomorphidae). *Zeitschrift fur Angewandte Entomologie*, 67 (1-4), 9-19.

Parihar D. R. (1984a) The egg coverings of Aak Grasshopper, of *Poekilocerus pictus* Fabricius (Acridoidea : Pyrgomorphidae). Annals of arid zone, 23 (1), 89-94.

Parihar D. R. (1984b) Structure of egg pods and eggs in a grasshopper *Poekilocerus pictus* (Fab.) (Acridoidea: Pyrgomorphidae). J. An. Morph. Physio., 31, 79-88.

Umerani J., Syed T., Kanher N., Kanher F. and Tunio S. (2007) Egg laying preference of *Poekilocerus pictus* Fab. (Pyrgomorphidae : Orthoptera) in different type of soil. Journal of Agriculture, 23 (4), 211-217.

Hingston M. R. W. G., (2009) The liquid squirting habit of oriental grasshoppers. Transactions of the Royal Entomological Society of London, 75, 65-68.

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.219

Mathen C. and Hardikar B. (2010) Cytotoxic compounds from *Poekilocerus pictus* feeding on *Calotropis gigantea*. Journal of Experimental Threrapeutics & Oncology. 8 (3), 177-185.

Sawant M. (2010) Study of juvenile and adult growth, and behavioural characterisctics of *Poekilocerus pictus* (Fabricius) feeding on *Calotropis gigantea* under laboratory conditions. J. Bombay nat. Hist. Soc., 107 (2), 122-129.

Prakash A., Rao J., Singh N. K. and Chand D. S. (2016) Severe incidences of Aak Grasshopper, *Poekilocerus pictus* (Fabricius) (Orthoptera : Pyrgomorphidae) in and around Bhubaneshwar, Odisha. Journal of Applied Zoological Research, 27 (2), 191-192.

Ramanujam B., Kandan A., Poornesha B., Shylesha A. N., Gandhi G. and Mohan M. (2021) Pathogenicity of *Beauveria bassiana* and *Metarhizium anisopliae* on Aak Grasshopper, *Poekilocerus pictus* Fabr. (Orthoptera: Acrididea). International Journal of Tropical Insect Science, 42 (4), 4 pp.

Riffat S., Kumar S. and Soomro I. A. (2017) Study on morphology and development of egg-pod and eggs of *Poekilocerus pictus* (Orthoptera: Pyrgomorphidae). Journal of Entomology and Zoology Studies, 5 (3), 537-540.

Yadav R. S. and Kumar D. (2017) Biodiversity of pyrgomorphid grasshoppers from eastern Uttar Pradesh. J. Exp. Zool. India, 20 (Supplement 1), 1467-1470.

Website: http://texasento.net/pictus.htm.

Khan R. M. and Sharma M. L. (1971) Unsual population of Aak Grasshopper. Ent. Newsl., 1, 64-69.

Website:https://en.wikipedia.org/wiki/Poekilocerus_pictus

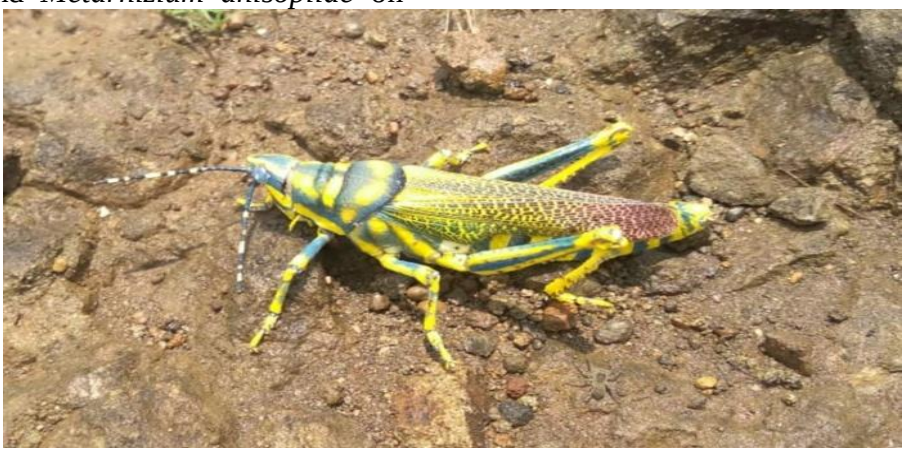

Figure 1. *Poekilocerus pictus,* on moist ground

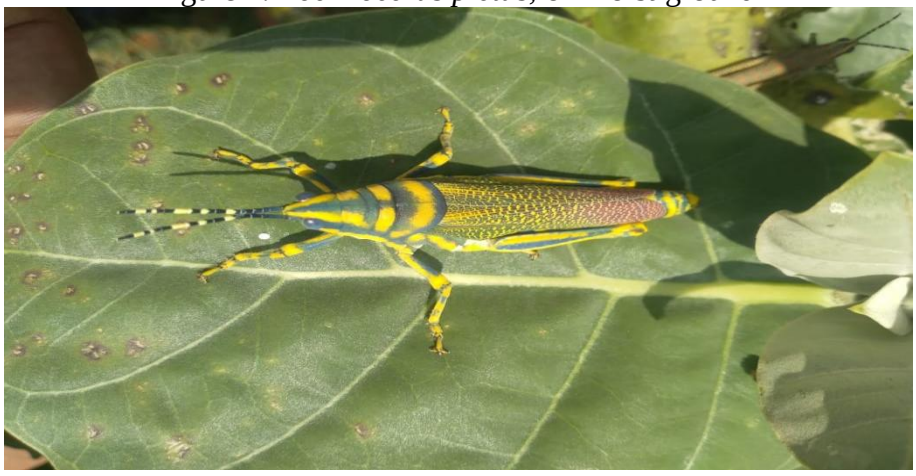

Figure 2. *Poekilocerus pictus,* on *Calotropis procera*, the Aak plant, with eaten leaf

International Journal of Global Science Research
Vol. 9, Issue. 2, October 2022, pp. 1892-1901
***Available Online* at www.ijgsr.com**

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v9.i2.2022.219

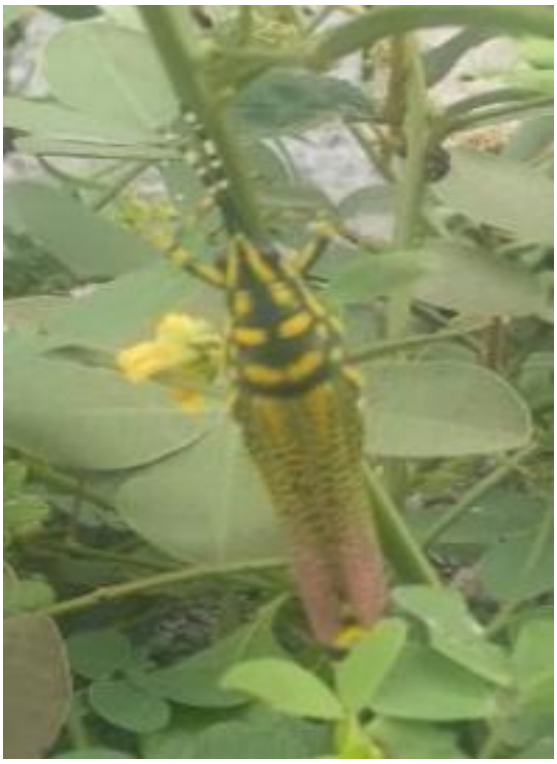

Figure 3. *Poekilocerus pictus*, on *Senna tora*, the *Tora* plant, with eaten leaves

Figure 4. *Senna tora*, the *Tora* plant with *Poekilocerus pictus*

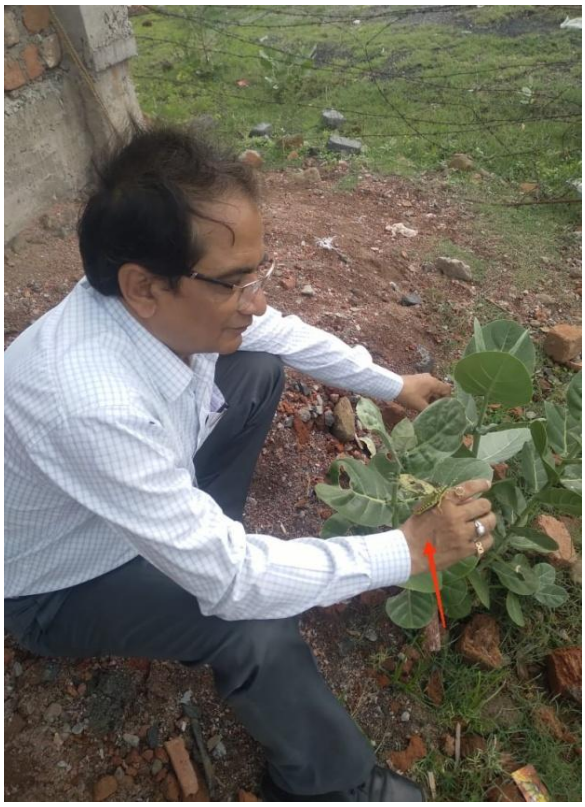

Figure 5. *Poekilocerus pictus*, examining damage caused on Aak plant (by AKD)