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STUDIES ON THE DIPTERAN POLLINATORS OF MEDICINAL PLANTS IN INDIA

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INTRODUCTION

In the recent past, medicinal plants constitute a group of industrially crops, which are of great value for domestic use and for export. As such there is no information on insect pollinators of medicinal plants in the literature particularly on flies. Interesting to know that, great varieties of methods and habits of pollination are found among Diptera. Flies may be important pollinators under certain climatic conditions; because they are present at all times of the year unlike the strictly periodic & more demanding bumble bees & honey bees. Though the study of dipteran pollinators of medicinal plants are recent one, but some preliminary reports made by Mitra & Parui (2002), Mitra *et al.* (2002), Mitra *et al.* (2003) & Mukherjee *et al.* (2002) from India.

The present communication is the first attempt to make a preliminary report on dipteran pollinators of medicinal plants along with their visited plant species and the localities where from it is collected. Moreover, the diagnostic characters of the pollinator species and their distribution in India are also dealt herewith. Present investigation reveals the presence of 38 dipteran pollinator species of medicinal plants belonging to 26 genera of 6 families in India.

Family STRATIOMYIDAE

1. *Microchrysa flaviventris* (Wiedemann)

1824. *Sargus flaviventris* Wiedemann, *Analecta Ent.*, : 31.

Diagnosis : This species is a small green metallic species with upper facets much larger than lower one; legs pale yellow, hind femora with a broad median band and hind tibia with a broad apical band.

Visiting plant species : *Tagetes patula* Linnaeus (West Bengal).

Distribution : West Bengal.

2. *Oplodontha rubrithorax* (Macquart)

1838. *Odontomyia rubrithorax* Macquart, *Mém. Soc. Agric. Lille.*, : 189.

Diagnosis : The fly is small in size, with black thorax and yellowish abdomen; legs orange yellow with a brown ring on fore femora and brown streak on underside of middle femur.

Visiting plant species : *Tagetes patula* Linnaeus (West Bengal).

Distribution : Uttar Pradesh, West Bengal.

3. *Adoxomyia heminopla* (Wiedemann)

1819. *Clitellaria heminopla* Wiedmann, *Zool. Mag.*, 1(3) : 30.

Diagnosis : Medium, black fly with reddish brown to yellow third antennal segment; all femora and tibiae anteriorly and posteriorly brownish orange, rest black; wings grey, yellowish brown at centre.

Visiting plant species : *Zizyphus* sp. & *Nerium indicum* Mill. (Gujarat).

Distribution : Bihar, Gujarat, Madhya Pradesh, Punjab, Tamil Nadu, Uttar Pradesh.

Family TABANIDAE

4. *Hybomitra hirta* (Walker)

1850. *Tabanus hirta* Walker, *Insecta Saundersiana*, 1 : 2.

Diagnosis : A robust species with black abdomen largely yellowish at sides; frontal callus triangular with its apex continues in a spindle shaped line; thorax with 3 grayish or yellowish stripes; legs blackish with all tibiae at base dull reddish.

Visiting plant species : *Anacardium occidentale* Linnaeus, *Coriandrum sativum* Linnaeus, (Himachal Pradesh).

Distribution : Throughout India.

Family BOMBYLIIDAE

5. *Petrorossia nigrofemorata* (Brunetti)

1909. *Argyramoeba nigrofemorata* Brunetti, *Rec. Indian Mus.*, 3 : 219.

Diagnosis : A small blackish grey species with their soft white hairs; thorax with a long and a short spiny yellow bristles in front of each wing; femora black with base and apex reddish yellow, tibiae uniformly reddish yellow.

Visiting plant species : *Coriandrum sativum* Linnaeus (Gujarat).

Distribution : Gujarat, Uttar Pradesh.

6. *Argyramoeba duvaucelii* (Macquart)

1840. *Anthrax duvaucelii* Macquart, *Dipt.exot.*, 2(1) : 63.

Diagnosis : A medium sized blackish species; anterior part of thorax with a dense fringe of narrow long grayish white scales; legs black with coxae long silky white haired; wing almost clear with small suffusion at base of second vein, at fork of third vein, on outer cross vein and at inner side of discal cell.

Visiting plant species : *Cassia tora* Linnaeus (Gujarat).

Distribution : Gujarat, Himachal Pradesh, Uttar Pradesh, West Bengal.

7. *Villa panisca* Rossi

1790. *Bibio paniscus* Rossi, *Fauna Etrusca*, 2 : 256.

Diagnosis : A large black species; face with long yellow or orange setae; first four segments of abdomen densely covered with reddish scales, and seventh segment with snow—white scales.

Visiting plant species : *Tagetes patula* Linnaeus (Arunachal Pradesh).

Distribution : Arunachal Pradesh, Uttaranchal.

8. *Thyridanthrax (Exhyalanthrax) absalon* (Wiedemann)

1828. *Anthrax absalon* Wiedemann, *Analecta Ent.* : 24.

Diagnosis : A medium sized species with porrect antennae, second antennal joint cup shaped, third segment onion-shaped; thorax quadrate; abdomen flat, oblong; wings brown with hyaline spots.

Visiting plant species : *Cassia tora* Linnaeus (Gujarat).

Distribution : Maharashtra, Orissa and Tamil Nadu.

9. *Exoprosopa (Exoprosopa) insulata* (Walker)

1852. *Anthrax insulata* Walker, *Insecta Saundersiana*, 1 : 72.

Diagnosis : A medium sized blackish species; lateral portion of thorax with long black bristly hairs but dorsum with short black pubescence and minute yellow scales; with a broad oblique dark brown band extending from costa to middle of axillary cell embracing basal third of discal cell.

Visiting plant species : *Cassia tora* Linnaeus (Gujarat).

Distribution : Assam, Bihar, Gujarat, Himachal Pradesh, Madhya Pradesh, Karnataka, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

Family SYRPHIDAE

10. *Asarkina (Asarkina) ericetorum* (Fabricius)

1781. *Syrphus ericetorum* Fabricius, *Spec. Insekt.*, 2 : 425.

Diagnosis : A medium sized yellowish species; frons yellow, vertex black but both with black pubescence; thorax and scutellum covered with bright yellow pubescence; abdomen orange yellow with all the segments black banded at posterior margin; legs yellow.

Visiting plant species : *Cassia tora* Linnaeus (Gujarat), *Solanum nigrum* Linnaeus and *Amaranthus spinosa* Linnaeus (Jammu and Kashmir).

Distribution : Arunachal Pradesh, Assam, Gujarat, Jammu and Kashmir, Meghalaya, Sikkim, Tamil Nadu, Tripura and West Bengal.

11. *Episyrphus balteatus* (De Geer)

1776. *Musca balteata* De Geer, *Mem pour Serv. Hist. Ins.*, 6 : 116.

Diagnosis : A medium sized yellowish species; antennal prominence yellowish with a small black dot above base of antennae; thorax blackish with 2 greyish stripes on fore part; scutellum covered with partly yellow & partly black pubescence. Abdomen wholly orange with second to fifth segment indistinctly median spotted or black banded.

Visiting plant species : *Solanum nigrum* Linnaeus, *Foeniculum vulgare* Gaertn., *Cannabis sativa* Linnaeus, *Nicotiana plumbaginifolia* Viv. (Jammu and Kashmir).

Distribution : Assam, Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Manipur, Meghalaya, Orissa, Sikkim, Tamil Nadu and West Bengal.

12. *Ischiodon scutellaris* (Fabricius)

1805. *Scaeva scutellaris* Fabricius, *Syst. Antliat.* : 252.

Diagnosis : A medium sized blackish species with frons and face bright sulphur yellow; thorax shining black, side margins bright yellow from anterior margin of wing; abdomen black with a pair of yellow spots on second segment, and one yellow band on third & fourth; fifth segment mostly orange; legs yellow with a broad subapical black ring on hind femora.

Visiting plant species : *Cassia tora* Linnaeus (Gujarat).

Distribution : Andhra Pradesh, Assam, Delhi, Gujarat, Meghalaya, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Manipur, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura and West Bengal.

13. *Metasyrphus (Metasyrphus) latifasciatus* (Macquart)

1829. *Syrphus latifasciatus* Macquart, *Ins. Dipt. N. Fr.*, 4 : 94(242).

Diagnosis : A medium sized black species; face yellow with black pubescence; antenna reddish brown; thorax black with sides and lateral regions yellow; legs orange yellow with all femora blackish at base; abdomen black, second segment with a pair of yellow spots, third and fourth segment with a yellow band behind anterior margin, fifth segment orange with an oval black spot at middle.

Visiting plant species : *Cannabis sativa* Linnaeus (Jammu and Kashmir).

Distribution : Himachal Pradesh, Jammu and Kashmir.

14. *Scaeva latimaculata* Brunetti

1923. *Lasiopticus latimaculata* Brunetti, *Fauna, Brit. India, Dipt.* 3 : 68.

Diagnosis : A medium blackish species; thorax black with yellow side margins entirely; abdomen black with 3 pairs of subequal orange spots on second to fifth segment; legs orange yellow with anterior and hind femora black on basal half.

Visiting plant species : *Melilotus officinalis* Linnaeus (Himachal Pradesh).

Distribution : Himachal Pradesh, Punjab, Rajasthan and Uttar Pradesh.

15. *Sphaerophoria scripta* (Linnaeus)

1758. *Musca scripta* Linnaeus, *Syst. Nat. Ed.*, 10 : 594.

Diagnosis : A small linear black and yellow species; face with antennae yellowish; thoracic dorsum black with lateral sides yellow, striped; scutellum yellow; abdomen black with yellow transverse bands; legs yellow with dark tarsi.

Visiting plant species : *Solanum nigrum* Linnaeus, *Foeniculum vulgare* Gaertn., *Chrysanthemum* sp., *Cannabis sativa* Linnaeus, *Nicotiana plumbaginifolia* Viv., *Chenopodium ambrosioides* Linnaeus (Jammu and Kashmir).

Distribution : Jammu and Kashmir.

16. *Melanostoma orientale* (Wiedemann)

1824. *Syrphus orientalis* Wiedemann, *Analecta Ent.* : 36.

Diagnosis : A small blackish species; face with central bump and moderately produced upper mouth edge; thorax and scutellum blackish with soft yellowish to brownish pubescence; second to fourth abdominal segments each with a pair of orange yellow spots of varying shape; basal half of

anterior and posterior femora wholly black, rest yellow, hind tibia with a broad black median band, rest of all tibiae orange.

Visiting plant species : *Solanum nigrum* Linnaeus, *Rubus* sp. (Jammu and Kashmir), *Digitalis purpurea* Linnaeus (Himachal Pradesh).

Distribution : Arunachal Pradesh, Assam, Himachal Pradesh, Jammu and Kashmir, Karnataka, Meghalaya, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

17. *Chrysotoxum baphyrus* Walker

1849. *Chrysotoxum baphyrus* Walker, *List Dipt. Colln. Br. Mus.*, 3 : 542.

Diagnosis : A robust black and yellow species; first and second antennal joints orange brown, third black; thoracic dorsum black with two yellowish grey median stripes, abdomen yellowish with some black pattern; legs mainly yellowish.

Visiting plant species : *Ipomea* sp. (Jammu and Kashmir).

Distribution : Arunachal Pradesh, Maghalaya, Himachal Pradesh, Jammu and Kashmir, Tamil Nadu, Uttar Pradesh and West Bengal.

18. *Paragus (Paragus) serratus* (Fabricius)

1805. *Mulio serratus* Fabricius, *Syst. Antliat* : 186.

Diagnosis : A small black species; eyes with three longitudinal stripes of white pubescence; thorax blue black with a pair of longitudinal grey stripes; scutellum black with serrated hind margin; abdominal segments reddish brown and black patterned; legs black & brown.

Visiting plant species : *Solanum nigrum* (Jammu and Kashmir).

Distribution : Assam, Bihar, Delhi, Goa, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Punjab, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

19. *Paragus (Pandasyophthalmus) atratus* de Meijere

1906. *Paragus atratus* de Meijere, *Nova Guinea* 1 : 85

Diagnosis : A small black species with eyes sparsely hairy in male, bare in female; thorax, scutellum and abdomen shining black; legs yellow with basal half of anterior and hind femora black, hind metatarsi distinctly incrassated.

Visiting plant species : *Solanum nigrum* Linnaeus (Jammu and Kashmir).

Distribution : Jammu and Kashmir, Uttar Pradesh, West Bengal.

20. *Paragus (Pandasyophthalmus) rufiventris* Brunetti

1913. *Paragus rufiventris* Brunetti, *Rec. Indian Mus.*, 8 : 157.

Diagnosis : A small black species; hind orbit of eye bears a fringe of white hairs; thorax and scutellum shining black with fine black pubescence; basal half of abdomen blue-black, rest reddish brown; femora black on basal half, rest brownish yellow.

Visiting plant species : *Solanum nigrum* Linnaeus (Jammu and Kashmir).

Distribution : Assam, Bihar, Jammu and Kashmir, Sikkim, Tripura, Uttar Pradesh, West Bengal.

21. *Paragus (Pandasyophthalmus) tibialis* (Fallen)

1817. *Pipizia tibialis* Fallen, *Syrphici Sveciae* : 60.

Diagnosis : A small black species with yellow face and a black line on it; thorax black, covered with long pale yellow pubescence; abdomen shining black; basal half of anterior and little more of hind tibia black, rest bright orange.

Visiting plant species : *Solanum nigrum* Linnaeus, *Amaranthus spinosa* Linnaeus (Jammu and Kashmir).

Distribution : Assam, Bihar, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Meghalaya, Punjab, Sikkim, Tripura, Uttar Pradesh and West Bengal.

22. *Eristalinus aenus v. taphicus* (Wiedemann)

1830. *Eristalis taphicus* Wiedemann, *Aussereurop. zweiffl. Insekt.*, 2 : 191.

Diagnosis : A medium blackish species; face bears inconspicuous white hairs; third antennal segment reddish brown, rest black; thorax with four longitudinal black stripes; scutellum with dense yellowish brown pubescence; abdomen with dense brown pubescence but whitish on sides; all femora black with orange brown tips.

Visiting plant species : *Tagetes patula* Linnaeus (Jammu and Kashmir).

Distribution : Jammu and Kashmir, Maharashtra, Uttar Pradesh.

23. *Eristalinus (Eristalinus) arvorum* (Fabricius)

1787. *Syrphus arvorum* Fabricius, *Mantissa Insect.*, 2 : 336.

Diagnosis : A large yellow and black species; frons covered with black pubescence and face with pale yellow pubescence; thorax with four longitudinal black stripes, whole thorax and scutellum covered with pale yellow pubescence; abdomen black, second and third segments with a pair of yellow spots; all tibiae black basally to a varying extent.

Visiting plant species : *Tagetes patula* Linnaeus (West Bengal).

Distribution : Arunachal Pradesh, Jammu and Kashmir, Meghalaya, Orissa, Sikkim, Tripura and West Bengal.

24. *Eristalinus (Eristalinus) laetus* (Wiedemann)

1830. *Eristalis laetus* Wiedemann, *Aussereurop. zweiffl. Insekt.*, 2 : 191.

Diagnosis : A small blackish species; face black with whitish grey pubescence; thorax and scutellum black with brownish grey pubescence; abdomen black with brownish grey pubescence on dorsum, whitish towards margin.

Visiting plant species : *Tagetes patula* Linnaeus (West Bengal).

Distribution : Andhra Pradesh, Maharashtra, Meghalaya, Bihar, Jammu and Kashmir, Karnataka, Rajasthan, Tamil Nadu and West Bengal.

25. *Eristalinus (Eristalinus) obscuritarsis* de Meijere

1908. *Eristalis obscuritarsis* de Meijere, *Tijdschr. Ent.*, 52 : 250.

Diagnosis : A medium black species with reddish antennae; thorax black with 3 yellow longitudinal stripes; scutellum yellowish; third abdominal segment with a pair of quadrate yellowish spot on each side; tip of all femora yellow, front, mid and hind tibiae at base yellow, rest black.

Visiting plant species : *Tagetes patula* Linnaeus, *Aegle marmelos* Linnaeus (West Bengal).

Distribution : Gujarat, Jammu and Kashmir, Karnataka, Kerala, Maharashtra, Orissa, Sikkim and West Bengal.

26. *Eristalinus (Eristalinus) quinquestriatus* (Fabricius)

1794. *Syrphus quinquestratus* Fabricius, *Ent. Syst.*, 4 : 289.

Diagnosis : A medium sized yellow and black species; frons and face with yellowish grey pubescence, antenna and arista brownish orange, thoracic dorsum with four black longitudinal stripes; scutellum yellowish; abdominal segments yellow and black patterned; all femora black except tip of fore and hind femora orange or yellow.

Visiting plant species : *Tagetes patula* Linnaeus (West Bengal).

Distribution : Assam, Meghalaya, Bihar, Karnataka, Kerala, Madhya Pradesh, Orissa, Uttar Pradesh and West Bengal.

27. *Eristalinus (Eristalodes) paria* (Bigot)

1880. *Eristalomyia paria* Bigot, *Anns Soc. Ent. Fr.*, (5)10 : 218.

Diagnosis : A large yellow and black species; eyes with 6 narrow more or less parallel longitudinal dark stripes and dark brown pubescent on front part; dorsum of thorax with 4 black longitudinal stripes; abdomen black and yellow patterned; legs mainly blackish.

Visiting plant species : *Helianthus* sp. (Jammu and Kashmir).

Distribution : Himachal Pradesh, Jammu and Kashmir, Karnataka, Meghalaya, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

28. *Eristalis (Eristalis) tenax* (Linnaeus)

1758. *Musca tenax* Linnaeus, *Syst. Nat. Ed.*, 10 : 591.

Diagnosis : A large black and yellow species; eyes with 2 longitudinal stripes of dense brown hairs; thorax brownish black with a tuft of pale hairs on post alar calli; first abdominal segment black, second and third segments brownish orange; legs black with basal third of fore and basal half of middle tibiae yellow, a small quadrate dark brown spot below tip of axillary vein.

Visiting plant species : *Helianthus* sp., *Tagetes patula* Linnaeus, *Chrysanthemum* sp. (Jammu and Kashmir).

Distribution : Nearly cosmopolitan.

29. *Eristalis (Eoseristalis) arbustorum* (Linnaeus)

1758. *Musca arbustorum* Linnaeus, *Syst. Nat. Ed.*, 10 : 591.

Diagnosis : A medium black and yellowish species; antennae black with orange arista; thorax and scutellum covered with brownish yellow pubescence; abdomen orange yellow with black pattern; tips of femora, basal $\frac{2}{3}$ rd. Anterior tibiae & basal half of hind tibiae orange; rest of legs black.

Visiting plant species : *Chrysanthemum* sp. *Tagetes patula* Linnaeus (Jammu and Kashmir).

Distribution : Meghalaya, Jammu and Kashmir, Sikkim and West Bengal.

30. *Eristalis (Eoseristalis) cerealis* Fabricius

1805. *Eristalis cerealis* Fabricius, *Syst. Antliat.* : 232.

Diagnosis : A large blackish species; frons black with blackish-brown pubescence; thorax with a broad transverse stripe along suture; second abdominal segment with a pair of triangular yellow spots; legs shining black, tips of all femora and basal half of all tibiae yellow.

Visiting plant species : *Xanthium strumarium* Linnaeus, *Chrysanthemum* sp., *Tagetes patula* Linnaeus, (Jammu and Kashmir), *Melilotus officinalis* Linnaeus (Himachal Pradesh).

Distribution : Assam, Arunachal Pradesh, Himachal Pradesh, Jammu and Kashmir, Meghalaya, Mizoram, Nagaland, Sikkim and West Bengal.

31. *Mesembrius quadrivittatus* (Wiedemann)

1819. *Eristalis quadrivittatus* Wiedemann, *Zool. Mag.*, 1 : 17.

Diagnosis : A large yellow and black species; eyes not touching at any point; thorax yellow with three longitudinal black stripes; abdomen orange with black patterns; femora black with tip brownish tinge, anterior and middle tibiae orange yellow on basal half.

Visiting plant species : *Rauwolfia serpentina* Benth., *Aegle marmelos* Linnaeus (West Bengal).

Distribution : Assam, Bihar, Gujarat, Karnataka, Madhya Pradesh, Tamil Nadu and West Bengal.

32. *Syritta orientalis* Macquart

1824. *Syritta orientalis* Macquart, *Dipt. Exot.*, 2(2) : 76(136).

Diagnosis : A medium blackish species; antennae orange with black arista; thorax black with humeri, lateral sides and pleura wholly yellow or whitish grey; second and third abdominal segments wholly with complete yellow bands; hind femora normally wholly yellow.

Visiting plant species : *Ephedra geardiana* Wall. (Himachal Pradesh).

Distribution : Bihar, Himachal Pradesh, Pondicheij, Tamil Nadu and West Bengal.

33. *Syritta pipiens* (Linnaeus)

1758. *Syritta pipiens* Linnaeus, *Syst. Nat. Ed.*, 10 : 594.

Diagnosis : A medium blackish species with humeri and pleura yellowish to whitish grey; second and third abdominal segments with a pair of yellowish spots.

Visiting plant species : *Solanum nigrum* Linnaeus, *Amaranthus spinosus* Linnaeus, *Nicotiana plumbaginifolia* Viv., *Cannabis sativa* Linnaeus (Jammu and Kashmir).

Distribution : Himachal Pradesh, Jammu and Kashmir.

Family MUSCIDAE

34. *Orthellia timorensis* (Robineau-Desvoidy)

1830. *Orthellia timorensis* Robineau-desvoidy, *Mem. Pres. Div. Sav. Acad. Sci. Inst. Fr.*, 2 : 460.

Diagnosis : A medium metallic colored species; in male inner facets of eye markedly enlarged; thorax with 2 pairs of presutural dorsocentrals; mid tibia with an ad seta only; discal cell of wing with a bare longitudinal stripe, close to $M_3 + Cu_1$.

Visiting plant species : *Scaevola sericea* Vahl (West Bengal).

Distribution : Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Kerala, Orissa, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.

35. *Orthellia viridis* (Wiedemann)

1824. *Idia viridis* Wiedemann, *Analecta Ent.*,: 50.

Diagnosis : A medium metallic green, blue-green or brassy-green; eyes rather densely short haired; thorax shining, the thin grayish dust becoming evident only in a tangential view; 4th abdominal segment more brassy or bronze, wings with light brown veins and wholly hairy membrane; coxae and femora with slight metallic green reflections.

Visiting plant species : *Aesculus indica* Colebr.ex Comb., *Castanea sativa* Mill. (Himachal Pradesh).

Distribution : Chandigarh, Himachal Pradesh, Jammu and Kashmir, Punjab, Sikkim, Tripura, Uttar Pradesh and West Bengal.

Family CALLIPHORIDAE

36. *Lucilia porphyrina* (Walker)

1856. *Musca porphyrina* Walker, *J. Proc. Linn. Soc. Lond., Zool.*, 1 : 24.

Diagnosis : A small green to purple coloured fly; third antennal segment 5 times of 2nd; wing tinged brown, subcostal sclerite with stiff black hairs; squama dark brown.

Visiting plant species : *Scaevola sericea* Vahl (West Bengal).

Distribution : Arunachal Pradesh, Assam, Jammu and Kashmir, Himachal Pradesh, Sikkim and West Bengal.

37. *Chrysomya megacephala* (Fabricius)

1794. *Musca megacephala* Fabricius, *Syst. Ent.*, 4 : 317.

Diagnosis : A medium blue or green coloured fly with upper eye facets greatly enlarged than lower third in male; wing hyaline, slightly dark at base; legs black.

Visiting plant species : *Holarrhena antidysenterica* Wall. (Gujarat).

Distribution : Throughout India.

38. *Stomorhina discolor* (Fabricius)

1794. *Musca discolor* Fabricius, *Ent. Syst.*, 4 : 320.

Diagnosis : A small species with green coloured thorax and blackish abdomen; face, epistome and anterior half of gena shining black; anterior and middle femora black, rest of legs otherwise coloured.

Visiting plant species : *Zizyphus* sp. (Gujarat), *Syzygium jambos* Alston, *Callistemon citrinus* (Curtis), *Tagetes patula* Linnaeus (West Bengal), *Taraxacum officinale* Wigg. (Himachal Pradesh).

Distribution : Arunachal Pradesh, Assam, Bihar, Kerala, Manipur, Meghalaya, Tripura, Uttar Pradesh and West Bengal.

SUMMARY

Altogether 38 species of 26 genera under 6 families of Diptera are reported here as pollinator of medicinal plants. Of them the family Syrphidae shares maximum number of species (24 species), followed by Bombyliidae (5 species), Stratiomyidae (3 species), Calliphoridae (3 species), Muscidae (2 species) and Tabanidae (1 species) (Table 1). These pollinator species were found to visit 28 species of medicinal plants. Of them maximum number of pollinator species were found in *Tagetes patula* (12 species), *Solanum nigrum* (9 species), *Cassia tora* (5 species), *Chrysanthemum* sp. (4 species) and *Cannabis sativa* (4 species) (Table 2).

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REFERENCES

- Bhattacharjee, S. K. 2000. Hand Book of Medicinal Plants, pp. 1-474, Pointer publishers, Jaipur.
- Chauhan, N. S. 2000. Medicinal & Aromatic plants of Himachal Pradesh. Indus Pub. Co., New Delhi, 1-449.
- Mitra, B. and Parui, P. 2002. Dipteran flower visitors (Diptera) in Jessore Sloth Bear and Balaram-Ambaji Wildlife Sanctuaries, North Gujarat. *BIONOTES*, 4(2) : 45.
- Mitra, B., Bhattacharjee, K., Parui, P. and Mukherjee, M. 2002. Insect pollinators of Sarpagandha plant from South 24 Parganas, West Bengal. *BIONOTES*, 4(3) : 67.
- Mukherjee, S., Chowdhury, R., Ghosh, A. and Mitra, B. 2002. Notes on flower flies (Syrphidae : Diptera) visiting Compositae. *Insect Environment*, 8(1) : 27-28.
- Mukherjee, S., Chowdhury, R., Ghosh, A. and Mitra, B. 2002. A list of "Hover flies" (Syrphidae : Diptera) on *Solanum nigrum* L. *Insect Environment*, 8(1) : 35-36.
- Mitra, B., Bhattacharjee, K., Parui, P. and Ghosh, A. 2003. Insect pollinators of *Scaevola sericea* Vahl. (Fan flower) from South 24 Parganas, West Bengal. *BIONOTES*, 5(4) : 90.
- Mitra, B., Bhattacharjee, K., Mukherjee, M. and Parui, P. 2003. On a collection of flies from Yellow Genda. *Insect Environment*, 9(1) : 15-16.

Table 1. : List of Insect Pollinators with their visited plant species.

Species	Family	Plant species	Family	Color of the flower	Medicinal use
1	STRATIOMYIDAE	<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
2		<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
3		<i>Zizyphus sp.</i>	RHAMNACEAE	Greenish-Yellow	Sore throat, dysentery
		<i>Nerium indicum</i>	APOCYNACEAE	Red-rose	Skin disease, ophthalmic
4	TABANIDAE	<i>Anacardium occidentale</i>	ANACARDIACEAE	White	Intermittent fever, skin disease
		<i>Coriandrum sativum</i>	UMBELLIFERAE	White	Abdominal pain for indigestion
5	BOMBYLIIDAE	<i>Coriandrum sativum</i>	UMBELLIFERAE	White	Abdominal pain for indigestion
6		<i>Cassia tora</i>	FABACEAE	Yellow	Ring worm, itch
7		<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
8		<i>Cassia tora</i>	FABACEAE	Yellow	Ring worm, itch
9		<i>Cassia tora</i>	FABACEAE	Yellow	Ring worm, itch
10	SYRPHIDAE	<i>Cassia tora</i>	FABACEAE	Yellow	Ring worm, itch
		<i>Solanum nigrum</i>	SOLANACEAE	White	Ulcers and skin diseases
		<i>Amaranthus spinosa</i>	AMARANTHACEAE	Greenish	Colic pain, leucorrhoea
11		<i>Solanum nigrum</i>	SOLANACEAE	White	Ulcers and skin diseases
		<i>Foeniculum vulgare</i>	UMBELLIFERAE	Yellow	Stomachic, purgative
		<i>Cannabis sativa</i>	CANNABIACEAE	Yellow-green	Depression, gonorrhoea
		<i>Nicotiana plumbaginifolia</i>	SOLANACEAE	Rose	Scabies, hernia, constipation
12		<i>Cassia tora</i>	FABACEAE	Yellow	Ring worm, itch
13		<i>Cannabis sativa</i>	CANNABIACEAE	Yellow-green	Depression, gonorrhoea
14	SYRPHIDAE	<i>Melilotus officinalis</i>	LEGUMINOSAE	Yellow	Externally, windy colic
15		<i>Solanum nigrum</i>	SOLANACEAE	White	Ulcers and skin diseases
		<i>Foeniculum vulgare</i>	UMBELLIFERAE	Yellow	Stomachic, purgative
		<i>Cannabis sativa</i>	CANNABIACEAE	Yellow-green	Depression, gonorrhoea

Table 1. : (Contd.).

Species	Family	Plant species	Family	Color of the flower	Medicinal use
15		<i>Nicotiana plumbaginifolia</i>	SOLANACEAE	Rose	Scabies, hernia, constipation
		<i>Chrysanthemum</i> sp.	ASTERACEAE	White/ yellow	Indigestion, bad colds
		<i>Chenopodium ambrosioides</i>	CHENOPODIACEAE	Greenish	Gynecology problems
16		<i>Solanum nigrum</i>	SOLANACEAE	White	Ulcers and skin diseases
		<i>Rubus</i> sp.	ROASACEAE	White	Dysentery
		<i>Digitalis purpurea</i>	SCROPHULARIACEAE	Rosy-purple	Healing wounds and burns
17		<i>Ipomoea</i> sp.	CONVOLVULACEAE	Purple	Purgative
18		<i>Solanum nigrum</i>	SOLANACEAE	White	Ulcers and skin diseases
19		<i>Solanum nigrum</i>	SOLANACEAE	White	Ulcers and skin diseases
20		<i>Solanum nigrum</i>	SOLANACEAE	White	Ulcers and skin diseases
21		<i>Solanum nigrum</i>	SOLANACEAE	White	Ulcers and skin diseases
		<i>Amaranthus spinosa</i>	AMARANTHACEAE	Greenish	Colic pain, leucorrhoea
22		<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
23		<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
24		<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
25	SYRPHIDAE	<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
		<i>Aegle marmelos</i>	RUTACEAE	Greenish-white	Antibiotic properties, dysentery
26		<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
27		<i>Helianthus</i> sp.	ASTERACEAE	Yellow	Diabetic disease
28		<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
		<i>Helianthus</i> sp.	ASTERACEAE	Yellow	Diabetic disease
		<i>Chrysanthemum</i> sp.	ASTERACEAE	White/ yellow	Indigestion, bad colds

Table 1. : (Contd.).

Species	Family	Plant species	Family	Color of the flower	Medicinal use
29		<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
		<i>Chrysanthemum</i> sp.	ASTERACEAE	White / yellow	Indigestion, bad colds
30		<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
		<i>Chrysanthemum</i> sp.	ASTERACEAE	White / yellow	Indigestion, bad colds
		<i>Xanthium strumarium</i>	ASTERACEAE	Greenish	Skin, bladder infection, bleeding
		<i>Melilotus officinalis</i>	LEGUMINOSAE	Yellow	Externally, windy colic
31		<i>Rauvolfia serpentina</i>	APOCYANACEAE	Reddish-white	Insanity & high blood pressure
		<i>Aegle marmelos</i>	RUTACEAE	Greenish-white	Antibiotic properties, dysentery
32		<i>Ephedra geardiana</i>	EPHEDRACEAE		Epilepsy, asthma
33		<i>Solanum nigrum</i>	SOLANACEAE	White	Ulcers and Skin diseases
		<i>Cannabis sativa</i>	CANNABINACEAE	Yellow-green	Depression, gonorrhoea
		<i>Nicotiana plumbaginifolia</i>	SOLANACEAE	Rose	Scabies, hernia, constipation
		<i>Amaranthus spinosa</i>	AMARANTHACEAE	Greenish	Colic pain, leucorrhoea
34	MUSCIDA	<i>Scaevola sericea</i>	GOODENIACEAE	White	Heal fractures, breathing problem
35		<i>Aesculus indica</i>	HIPPOCASTANACEAE	White	Rheumatic, gouty
		<i>Castania sativa</i>	FAGACEAE		Lumbago in Homeopathy
36	CALLIPHORIDAE	<i>Scaevola sericea</i>	GOODENIACEAE	White	Heal fractures, breathing problem
37		<i>Holarrhena antidysenterica</i>	APOCYANACEAE	White	Dysentery, vaginitis
38		<i>Zizyphus</i> sp.	RHAMNACEAE	Greenish-yellow	Sore throat, dysentery
		<i>Syzygium jambos</i>	MYRTACEAE	Greenish	Sore throat, ulcers, diabetic
		<i>Callistemon citrinus</i>	MYRTACEAE	Red	Essential oil
		<i>Tagetes patula</i>	ASTERACEAE	Yellow	Wound healing, bleeding
		<i>Taraxacum officinale</i>	ASTERACEAE	Yellow	Liver disease, hepatic disease

Table 2. : Medicinal plant species and their Dipteran Pollinators. -

<i>Aegle marmelos</i>	<i>Eristalinus (Eristalinus) obscuritarsis, Mesembrius quadrivittatus</i>
<i>Aesculus indica</i>	<i>Orthellia viridis</i>
<i>Amaranthus spinosa</i>	<i>Asarkina (Asarkina) ericetorum, Paragus (Pandasyophthalmus) tibialis, Syrirta pipiens</i>
<i>Anacardium occidentale</i>	<i>Hybomitra hirta</i>
<i>Callistemon citrinus</i>	<i>Stomorphina discolor</i>
<i>Cannabis sp.</i>	<i>Episyrphus balteatus, Metasyrphus (Metasyrphus) latifastictus, Sphaerophoria scripta, Syrirta pipiens</i>
<i>Castania sativa</i>	<i>Orthellia viridis</i>
<i>Cassia tora</i>	<i>Argyramoeba duvaucelli, Thyridanthrax (Exhyalanthrax) absalon, Exoprosopa (Exoprosopa) insulata, Asarkina (Asarkina) ericetorum, Ischiodon scutellaris</i>
<i>Chenopodium ambrosoides</i>	<i>Sphaerophoria scripta</i>
<i>Chrysanthemum sp.</i>	<i>Sphaerophoria scripta, Eristalis (Eristalis) tenax, Eristalis (Eoseristalis) arbustorum, Eristalis (Eoseristalis) cerealis</i>
<i>Coriandrum sativum</i>	<i>Hybomitra hirta, Petrorossia nigrofemorata</i>
<i>Digitalis purpurea</i>	<i>Melanostoma orientale, Ephedra geardiana, Syrirta orientalis</i>
<i>Foeniculum vulgare</i>	<i>Episyrphus balteatus, Sphaerophoria scripta</i>
<i>Helianthus sp.</i>	<i>Eristalinus (Eristalodes) paria, Eristalis (Eristalis) tenax</i>
<i>Holarrhena antidysenterica</i>	<i>Chrysomya megacephala</i>
<i>Ipomoea sp.</i>	<i>Chrytoxum baphyrus</i>
<i>Nerium indicum</i>	<i>Adoxomyia heminopla</i>
<i>Nicotiana plumbaginifolia</i>	<i>Episyrphus balteatus, Sphaerophoria scripta, Syrirta pipiens</i>
<i>Meliolotus officinalis</i>	<i>Scaeva latimaculata, Eristalis (Eoseristalis) cerealis</i>
<i>Meliolotus alba</i>	<i>Eristalis (Eoseristalis) cerealis</i>
<i>Rauvolfia serpentina</i>	<i>Mesembrius quadrivittatus</i>
<i>Rubus sp.</i>	<i>Melanostoma orientale</i>
<i>Scaevola sericea</i>	<i>Orthellia timorensis, Lucilia porphyrina</i>

Table 2. : (Contd.).

<i>Solanum nigrum</i>	<i>Syrirta pipiens</i> , <i>Paragus (Pandasyophthalmus) tibialis</i> , <i>Paragus (Pandasyophthalmus) rufiventris</i> , <i>Paragus (Paragus) atratus</i> , <i>Paragus (Paragus) serratus</i> , <i>Melanostoma orientale</i> , <i>Sphaerophoria scripta</i> , <i>Episyrphus balteatus</i> , <i>Asarkina (Asarkina) ericetorum</i>
<i>Syzygium jambos</i>	<i>Stomorphina discolor</i>
<i>Taraxacum officinale</i>	<i>Stomorphina discolor</i>
<i>Tagetes patula</i>	<i>Microchrysa flaviventris</i> , <i>Oplodontha rubrithorax</i> , <i>Villa panisca</i> , <i>Eristalinus aenus v. taphicus</i> , <i>Eristalinus (Eristalinus) arvorum</i> , <i>Eristalinus (Eristalinus) laetus</i> , <i>Eristalinus (Eristalinus) obscuritarsis</i> , <i>Eristalinus (Eristalinus) quinquestriatus</i> , <i>Eristalis (Eristalis) tenax</i> , <i>Eristalis (Eoseristalis) arbustorum</i> , <i>Eristalis (Eoseristalis) cerealis</i> , <i>Stomorphina discolor</i>
<i>Xanthium strumarium</i>	<i>Eristalis (Eoseristalis) cerealis</i>
<i>Zizyphus sp.</i>	<i>Adoxomyia heminopla</i> , <i>Stomorphina discolor</i>