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## REVIEW ARTICLE

### DISTRIBUTION OF *APHIS SPIRAECOLA* PATCH 1914 (APHIDINI: APHIDINAE: APHIDIDAE: HEMIPTERA) AND ITS FOOD PLANTS RECORDED IN INDIA

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#### ABSTRACT

*Aphis spiraecola* Patch is a polyphagous aphid and is a major pest of citrus apple and Mexican aster. The diversity of its host range in India includes plants belonging to 278 species/subspecies under 68 plant families. Plants belonging to following families are highly infested: Asteraceae, Cucurbitaceae, Fabaceae, Lamiaceae, Malvaceae, Polygonaceae, Rosaceae, Rutaceae and Solanaceae.

#### INTRODUCTION

In India, Lefroy and Howlett (1909) reported *Aphis spiraecola* Patch, 1914 (= *Aphis malvae* Koch, 1854) for the first time on *Abelmoschus esculentus* (L.) Moench (Malvaceae). Thereafter, Krishnamurthi (1931) reported it (as *Aphis bidentis* Theobald, 1929) on *Bidens pilosa* L. (Asteraceae). *Aphis spiraecola* is a tiny, soft-bodied, pear shaped aphid measuring about 1.8-2.30 mm long with 1.28-1.2 mm width and yellowish green or bright greenish-yellow to apple-green in colour. It has a brown head, mainly pale legs and antennae, but siphunculi and cauda that are dark-brown to black. Alatae have a dark-brown head and thorax, and a yellowish-green abdomen with dusky lateral patches on each segment (Blackman and Eastop, 2000). It is one of the most important polyphagous species found in India and rest of the world. It is commonly known as spiraea aphid or green citrus aphid. In USA and other apple growing countries, it has almost replaced apple aphid *Aphis pomi* De Geer, 1773. It is also considered as a major pest of citrus orchards worldwide. The biosystematics and bioecology of *Aphis spiraecola* were described by Singh *et al.* (2012) while host plant induced variations in its life-table statistics was dealt by Dubey and Singh (2008).

#### BIOLOGY AND LIFE CYCLE

*Aphis spiraecola* is an anholocyclic as well as holocyclic. Considering the vast geo-climatic variations within the states of India, it is expected that life cycle exhibited by this insect in India might show some interesting variations as photoperiod and temperature are known to influence the life cycle patterns of aphids. The spiraea aphid is known to feed generally on apple, citrus and spiraea. It is the main aphid pest of citrus worldwide, having made a shift to several tropical crops in the 1950's (Pfeiffer, 1991). It feeds on a variety of vegetable crops as well. For years it has been assumed that *Aphis spiraecola* used spiraea as its primary host, on which overwintering eggs are placed, and shifted to other hosts in the late spring. In 1983, it was shown to use citrus as a primary host for the first time, in Japan. It has also been shown in Virginia that spiraea aphid uses apple as a primary host, as well (Pfeiffer *et al.*, 1989). Life cycle of *Aphis spiraecola* is holocyclic in North America, where *Spiraea* is the primary host. In Japan (Komazaki *et al.*, 1979) both *Spiraea* and *Citrus* serve as primary hosts; for one type, and can be distinguished from another type which overwinters on *Spiraea* (Komazaki, 1983). The former attacks mainly citrus, and the latter attacks other fruit trees belonging to the family Rosaceae (Komazaki, 1990) differences indicative of either separate races or species occur between the two forms (Komazaki, 1991). In many parts of the world, life cycle is anholocyclic. Europe (and in North Africa), in contrast with other citrus fruit aphids, the green citrus aphid is active from spring until autumn, without a summer diapause.

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It is thus present at each period of vegetation, in the spring and autumn. It overwinters on shoots as parthenogenetic females.

*Aphis spiraecola* laid eggs mostly on the bark or on the buds in the fall by wingless females after they mate with the males. Warm periods during the winter, as well as cold rains near hatch, cause some natural mortality of eggs. Hatch occurs in the spring between the silver tip and half-inch green stages, especially around green-tip. The young nymphs develop into stem mothers which are wingless, pear-shaped females, bright green in color. Stem mothers require 12-20 days to reach maturity. Adults often appear around bloom. These give birth to a generation of green viviparous (producing live young) aphids, ranging from 40-80 young per female. About three-quarters of this generation develop into winged females; the rest remain wingless. The winged forms spread colonies to other parts of the tree or other trees and orchards. About one-half of the second generation and some of the later generations may develop wings and disperse. Wingless aphids produce more offspring than alates. Both species breed continuously during the summer. There are seven to 17 generations, depending on whether first or last young of each generation are considered. In August and during the autumn months, they are found almost exclusively on water sprouts or terminals of young trees that are still growing, and it is at such locations that the male and female sexual forms are produced, at about the fourteenth generation. Males mate throughout their activity period, but many oviparae fail to become fertilized because of the relative scarcity of males (males are less numerous than oviparae and do not live as long. Oviparae may deposit eggs from early October until early December. The developmental rate, fecundity, host specificity and also life cycle of *Aphis spiraecola* on different host plants and temperature were studied by Wang and Tsai (2000), Tsai and Wang (2001), Dubey and Singh (2008), Satar and Uygun (2008) and Agarwala and Das (2012).

### ECONOMIC IMPORTANCE

*Aphis spiraecola* is pestiferous particularly on species of citrus, but also infests a broad range of other crops such as brassicas, potato, peppers, tobacco, apple, *Spiraea* spp., and *Prunus* spp., and a variety of ornamental crops (Kranz *et al.* 1977; Trejo Loyo *et al.* 2004). In most of the western countries and USA, it has almost replaced *Aphis pomi* de Geer on apple. Both the nymphs and adults feed the plants by sucking the cell sap from the host plants. They suck the sap from leaves, stems, and inflorescence and from the developing buds. The damage of the crop is caused by both nymphs and adults (wingless and winged forms). Due to high population the whole plant devitalized, leaves acquire curly appearance and buds fail to convert into flowers. In addition to direct damage the aphids also excrete a large amount of honeydew, on which black fungus called sooty mould develops, which interfere in the normal functioning of photosynthetic activity of the plant. Chan *et al.* (1991) reported 17 plant viruses which are transmitted by *Aphis spiraecola* including plum pox virus, which affects peaches such as citrus tristeza virus (CTV) (Sasaki, 1974; Komazaki, 1984; Manjunath, 1985; Ahlawat and Raychaudhuri, 1988; Gurung *et al.*, 1993), papaya ring spots virus (Prasad and Sarkar, 1989; Chao and Chen, 1991), Sri Lankan passion fruit mottle virus (SLPFMV) (Dassanayake and Hicks, 1992), yellow leaf spot of spiraea (Lockhart and Geering, 2002), Plum pox virus (PPV) (Gildow *et al.*, 2004),

watermelon mosaic 2 potyvirus (WMV 2), zucchini yellow mosaic potyvirus (ZYMV) (Castle *et al.*, 1992), spiraea leafspot spherical virus (SLSSV), spiraea leafspot virus (SLSV) (Lockhart, and Geering, 2002), papaya ringspot (type W), potyvirus (PRSV-W), cucumber mosaic cucumovirus (CMV), zucchini yellow mosaic potyvirus (ZYMV) (Orozco *et al.*, 1994), maize dwarf mosaic virus (MDMV) (Carmen *et al.*, 1993), etc. In India *Aphis spiraecola* transmit citrus ringspot disease. Ringspot symptoms were widely distributed in most commercial citrus cultivars, e.g. Malta, Mosambi and Satgudi of sweet orange, Nagpur Orange and Kinnow Mandarin of mandarin and Kagzi Lime and Kagzi Kalan of lime. In Kinnow Mandarin the disease caused 20.5 to 98.4% yield losses (Byadgi and Ahlawat, 1995).

### GEOGRAPHIC DISTRIBUTION

*Aphis spiraecola* is probably of Far Eastern origin and is accidentally spread worldwide. It has been in North America since at least 1907, and was introduced more recently into the Mediterranean region (about 1939), Africa (1961), Australia (1926), New Zealand (1931) and Israel (1970) (Swirski *et al.*, 1991; Blackman and Eastop, 2000). At present, *Aphis spiraecola* is well distributed throughout the temperate and warm temperate parts of the world (Raychaudhuri, D.N., 1980; Blackman and Eastop, 2006). In India, it has been reported from Andaman and Nicobar Islands (CABI/EPPO, 2001), Assam (CABI/EPPO, 2001), Bihar (Ghosh, L.K., 1970; Prasad and Sarkar, 1989; Ahmad and Singh, 1997), Darjeeling (Basu, A.N., 1964), Eastern India (Ghosh, M.R. *et al.*, 1971), Himachal Pradesh (Behura, 1963; Bhalla, and Pawar, 1980), Jammu and Kashmir (CABI/EPPO, 2001), Karnataka (Naidu, 1980), Kerala (Naidu, 1980; Lyla *et al.*, 1987), Maharashtra (Chavan and Singh, 2005), Manipur (Singh, 1986), Orissa (Behura, 1965), Meghalaya (Stáry and Ghosh, 1979), Odissa (CABI/EPPO, 2001), Punjab (CABI/EPPO, 2001), Sikkim (Agarwala and Ghosh, 1984; Agarwala and Raychaudhuri, D.N., 1981a), Tripura (Ganguly and Ghosh, 1965; Ganguly and Agrawala, 1985; Agarwala and Ghosh, 2012), Uttar Pradesh (Rizvi and Khurana, 1970; Ahmad, 1993; Omkar and Bind, 1995; Singh *et al.*, 1999), West Bengal (Basu and Banerjee, 1958; Basu, A.N., 1961b; Ghosh, A.K., 1974).

Out side India, *Aphis spiraecola* is reported from most of the countries, viz., Australia (Eastop, 1966; Carver and Stary, 1974), Bangladesh (Das, 1994), Brazil (Carvalho *et al.*, 2002), Central America (Anderson *et al.*, 2009), China (Chiu and Liu, 1969; Chen *et al.*, 1993; Zhang *et al.*, 1997; Tai *et al.*, 2004), Costa Rica (Hill, 1975), Egypt (Aly *et al.*, 2003), France (Remaudière and Remaudière, 1997), Geneva (Eastop, 1977), Greece (Lykouressis, 1990; Kyriakopoulou *et al.*, 2000), Hungary (Ripka, 2001), Indonesia (CABI/EPPO, 2001), Iran (Hodjat and Eastop, 1983; Aghajanzdeh *et al.*, 1997), Israel (Bitton *et al.*, 1979; Zevahi and Rosen, 1987; Swirski *et al.*, 1991), Japan (Komazaki, 1991; Rasoolian *et al.*, 2001), Jordan (CABI/EPPO, 2001), Korea (Cho *et al.*, 1997), Laos (CABI/EPPO, 2001), Lebanon (Tremblay *et al.*, 1985), Malaysia (CABI/EPPO, 2001), Maldives (CABI/EPPO, 2001), Nepal (Tamrakar and Singh, 2000), Netherland (Piron and van Franken-huyzen, 1997), New Zealand (Carver and Stary, 1974), Nigeria (Owolabi *et al.*, 1998; Uyi and Aisagbonhi, 2009), North America (Denmark, 1990), Pakistan (Irshad, 2001), Philippines (Quimio and Calilung, 1993), Portugal

(Japoshvili and Abrantes, 2006), Singapore (CABI/EPPO, 2001), South Africa (Gilbert, 1994), South America (Hidalgo *et al.*, 1998; Koch *et al.*, 2006), Spain (Avinent *et al.*, 1994), Sri Lanka (Dassanayake and Perera, 2003; Edirisinghe and Wijerathna, 2006), Surinam (Van Hoof, 1962), Syria (Kaf, 2002), Taiwan (Chiu and Liu, 1969), Thailand (CABI/EPPO, 2001), Tunisia (Bouhachem *et al.*, 2007), Turkey (Uygun *et al.*, 1987), U.K. (Blackman, 1976; Martin, 1996), Venezuela (Sanchez *et al.*, 1993), Vietnam (Stáry and Zeleny, 1983), Virginia (Pfeiffer *et al.*, 1989) etc. (Blackman and Eastop, 2006; <http://www.cabi.org/isc/datasheet/6221>).

## SYNONYMY

In literature, there are several names assigned to this species as given below (Remaudière and Remaudière, 1997; Evans and Halbert, 2007; López Ciruelos *et al.*, 2016). The following records of food plants of *Aphis spiraeicola* are based on the survey of literature. In the most of the literature, names of the plants were erroneously mentioned even in the recent publications. In the present compilation, attempts were made to provide the valid scientific name of the plants following update taxonomic information provided by <http://www.ars-grin.gov> and <http://www.theplantlist.org>. At several places, their synonymy was also mentioned. Following is the list of family-wise and alphabet-wise food plants of *Aphis spiraeicola* recorded in India upto December, 2016.

- = *Anuraphis erratica* del Guercio, 1917: Redia, 12:221-233.
- = *Aphis bidentis* Theobald, 1929: Entomologist, 62: 177-181 and 196-201.
- = *Aphis citricola* auctt. nec van der Goot, 1912: Rec. Indian Mus., 13 : 175-183.
- = *Aphis croomia* Shinji, 1922 : Dobutsugaku Zasshi (Zool. Mag.) 34(406):731 ?
- = *Aphis deutziae* Shinji, 1922: Dobutsugaku Zasshi (Zool. Mag.) 34(406):731?
- = *Anuraphis erratica* (Del Guercio, 1917): Redia, 12(1-2): 221, 233
- = *Aphis eupatorii* Oestlund, 1886: Annu. Rep. Minn. State Geol. and Nat. Hist. Surv. 14:39.
- = *Aphis malvoides* van der Goot, 1917: Contrib. faun. Indes Néerland. 1(3):5.
- = *Aphis mitsubae* Shinji, 1922: Dobutsugaku Zasshi (Zool. Mag.) 34(406):731.
- = *Aphis nigricauda* van der Goot, 1917: Contrib. faun. Indes Néerland. 1(3):5.
- = *Aphis nostras* Hottes, 1930 : Proc. Biol. Soc. Wash., 43:180
- = *Aphis pirifoliae* Shinji, 1922: Dobutsugaku Zasshi (Zool. Mag.) 34(406):731.
- = *Aphis pseudopomi* Bertels, 1973: Bol. Técn. Inst. Pesq. Agropec. Sul, 84:1-64.
- = *Aphis pseudopomi* Blanchard, 1939: Physis, 17: 857-1003.
- = *Aphis viburnicolens* Swain, 1919: Univ. Calif. Pub. Tech. Bull., 3: 1-221.

## Misidentification of *Aphis spiraeicola* in Indian literature

- = *Aphis citricola* van der Goot, 1912: Jha, 1998; Singh *et al.*, 1999

- = *Aphis malvae* Koch, 1854: Lefroy and Howlett, 1909
- = *Aphis bidentis* Theobald, 1929: Krishnamurti, 1931; David, 1956; Behura, 1963
- = *Aphis pomi* De Geer, 1773: Krishnamurti, 1948
- = *Aphis malvoides* van der Goot, 1917: Basu, A.N., 1961b; David, 1958a,b; Behura, 1963, 1965; Ganguli and Ghosh, 1965; Rao, 1969
- = *Acyrtosiphon citricola* (van der Goot, 1912): Basu, A.N., 1961a; Behura, 1963

## FOOD PLANTS OF *APHIS SPIRAECOLA* IN INDIA - FAMILYWISE

*Aphis spiraeicola* is highly polyphagous, both holocyclic and anholocyclic, that vary with respect to their ability to reproduce and food preferences on different host plants. The diversity of its host range in India includes plants belonging to 278 species under 68 plant families. It infests especially Asteraceae, Brassicaceae, Cucurbitaceae, Euphorbiaceae, Fabaceae, Lamiaceae, Malvaceae, Polygonaceae, Rosaceae, Rubiaceae, Rutaceae, and Solanaceae. The following records of food plants of *Aphis spiraeicola* are based on the survey of literature. In the most of the literature published, names of the plants were erroneously mentioned even in the recent ones. Therefore, in the present compilation, attempts were made to provide the valid scientific name of the plants (<http://www.ars-grin.gov/> and <http://www.theplantlist.org/> accessed on December 15, 2016). At several places, their synonymies were also mentioned. Following is the list of food plants of *Aphis spiraeicola* recorded in India upto 2016.

1. **Acanthaceae:** *Justicia adhatoda* L. (= *Adhatoda vasica* Linn.) (Raychaudhuri, D., 1978); *Thunbergia coccinea* Wall. ex D. Don (Raychaudhuri, D.N., 1973).
2. **Adoxaceae:** *Viburnum foetidum* Wall., *Sambucus javanica* Reinw. ex Blume (Raychaudhuri, D.N., 1973).
3. **Amaranthaceae:** *Achyranthes* sp. (Raychaudhuri, D.N., 1973); *Amaranthus viridis* Desf. (Ghosh, L.K., 1977).
4. **Anacardiaceae:** *Anacardium occidentale* L. (Raychaudhuri, D.N., 1973).
5. **Annonaceae:** *Polyalthia longifolia* (Sonn.) Thwaites (David, 1958a).
6. **Apiaceae:** *Apium* sp. (Chakrabarti and Sarkar, 2001); *Oenanthe javanica* ssp. *stolonifera* (Wall ex DC.) Murata (= *Oenanthe stolonifera* Wall ex DC.) (Raychaudhuri, D.N., 1973).
7. **Apocyanaceae:** *Alstonia scholaris* (L.) R. Br. (Raychaudhuri, D.N., 1973); *Holarrhena pubescens* Wall. ex G. Don (= *Holarrhena antidysenterica* (G. Don) Wall. ex A. DC.) (Raha, 1979); *Ichnocarpus frutescens* (L.) R. Br. (Raha, 1979); *Nerium* sp. (Raychaudhuri, D.N., 1973); *Catharanthus roseus* (L.) G. Don (= *Vinca rosea* L.) (Agarwala, 1979; Raychaudhuri, D., 1978).
8. **Aquifoliaceae:** *Ilex* sp. (Raychaudhuri, D., 1978).
9. **Araceae:** *Colocasia esculenta* (L.) Schott. (= *Colocasia antiquorum* Schott.) (Bhalla, 1971).
10. **Araliaceae:** *Hedera helix* L. (Raychaudhuri, D.N., 1973).
11. **Asclepiadaceae:** *Zindet.* (Raychaudhuri, D.N. *et al.*, 1979).
12. **Asteraceae:** *Acmella paniculata* (Wall. ex DC.) Jansen (= *Spilanthes acmella* (L.) Murray) (Agarwala, 1979); *Ageratum conyzoides* L. (Agarwala, 1979; Ghosh, A.K.

- and Agarwala, 1980); *Ambrosia artemisiaefolia* L. (Raychaudhuri, D.N., 1973); *Anaphalis contorta* Hook. f. (Ghosh, L.K., 1977); *Artemisia caruifolia* Buch.-Ham. Ex Roxb. (Agarwala, 1979); *Artemisia* sp. (Agarwala, 1979); *Artemisia vulgaris* L. (Agarwala, 1979); *Aster amellus* L. (Joshi and Poorani, 2007); *Bidens bipinnata* L. (= *Bidens wallichii* DC.) (Ghosh, L.K., 1977; Raychaudhuri, D.N., 1973); *Bidens biternata* (Lour.) Merr. and Sherff (Banerjee *et al.*, 1969); *Bidens pilosa* L. (Agarwala, 1979; Banerjee *et al.*, 1969); *Bidens pilosa* L. var. *pinnata* (Maity *et al.*, 1980); *Calendula* sp. (Agarwal *et al.*, 2006); *Chromolaena odorata* (L.) R.M. King and H. Rob. (Joshi and Poorani, 2007; Agarwala and Das, 2012); *Chrysanthemum* sp. (Raychaudhuri, D.N., 1973; Raychaudhuri, D., 1978); *Cnicus* sp. (Raychaudhuri, D.N., 1973; Ghosh, A.K. and Agarwala, 1980); *Conyza angustifolia* Horst. Par. ex DC. (Chakrabarti, 1972); *Conyza japonica* (Thunb.) DC. (Raychaudhuri, D.N., 1973); *Cosmos bipinnatus* Cav. (Banerjee *et al.*, 1969; Chakrabarti, 1972); *Cosmos* sp. (Agarwala, 1979; Bhalla, 1971); *Cotonis* sp. (Chakrabarti, 1972); *Cotula hemispherica* (Roxb.) Wall. (Raychaudhuri, D.N., 1973); *Dahlia pinnata* Cav. (= *Dahlia variabilis* (Willd.) Desf.) (Ghosh, D. *et al.*, 1985); *Dahlia* sp. (Raychaudhuri, D.N., 1973); *Dichrocephala integrifolia* (L.f.) Kuntze (= *Dichrocephala latifolia* (Pers.) DC.) (Raychaudhuri, D.N., 1973); *Emilia sonchifolia* L. (David, 1958a); *Erechtites* sp. (Agarwala, 1979; Raychaudhuri, D.N., 1973); *Erechtites valerianaefolia* DC. (Dharmadhikari and Ramaseshiah, 1970); *Erigeron* sp. (Raychaudhuri, D.N., 1973); *Eupatorium adenophorum* Spreng. (Rao, 1969); *Eupatorium cannabinum* L. (Rao, 1969); *Eupatorium odoratum* L. (Agarwala, 1979; Dharmadhikari and Ramaseshiah, 1970); *Eupatorium riparium* Rigel. (Rao, 1969); *Eupatorium wallichii* DC. (Raychaudhuri, D.N., 1973); *Eupatorium* sp. (Raychaudhuri, D.N., 1973); *Gerbera* sp. (Agarwala, 1979); *Glebionis coronaria* (L.) Cass. ex Spach (= *Chrysanthemum coronarium* L.) (Agarwala, 1979); *Gynura crepidioides* Benth. (Rao, 1969); *Gynura cusimbua* (D. Don) S. Moore (= *Gynura angulosa* DC.) (Raychaudhuri, D., 1978); *Gynura nepalensis* DC. (Raychaudhuri, D.N., 1973); *Gynura* sp. (Ghosh, A.K. and Agarwala, 1980); *Helianthus annuus* L. (Raychaudhuri, D., 1978); *Helianthus* sp. (Agarwala, 1979; Raychaudhuri, D.N., 1973); *Helichrysum* sp. (Rao, 1969); *Hypochoeris radicata* L. (Raychaudhuri, D.N., 1973); *Inula cuspidata* C.B. Clarke (Bhalla, 1971; Raychaudhuri, D.N. *et al.*, 1979); *Lactuca sativa* L. (Raychaudhuri, D.N., 1973); *Launaea nudicaulis* (L.) Hook.f. (Mall *et al.*, 2010); *Mikania cordata* (Burn.f.) B.L. Rob. (Dharmadhikari and Ramaseshiah, 1970); *Mikania micrantha* (Linn.) Kunth. (Joshi and Poorani, 2007); *Mikania scandens* (L.) Willd. (Agarwala, 1979; Raychaudhuri, D.N., 1973); *Montanoa bipinnatifida* (Kunth) K. Koch (Raychaudhuri, D.N., 1973); *Myriactis nepalensis* Less. (= *Myriactis wallichii* Less.) (Chakrabarti, 1972); *Parthenium hysterophorus* L. (Joshi and Poorani, 2007); *Pseudognaphalium luteoalbum* (L.) Hill. and Burtt (= *Gnaphalium luteoalbum* L.) (Chakrabarti, 1972; Raychaudhuri, D.N., 1973); *Rudbeckia tagetes* James (= *Rudbeckia tageteiodes* (auct.) (Raha, 1979); *Senecio* sp. (Raychaudhuri, D.N., 1973); *Solidago canadensis* L. (Raychaudhuri, D.N., 1973); *Sonchus arvensis* L. (Agarwala, 1979; Raychaudhuri, D.N., 1973); *Sonchus asper* (L.) Hill. (Mall *et al.*, 2010); *Sonchus* sp. (Ghosh, D., *et al.*, 1985); *Synedrella nodiflora* (L.) Gaertn. (Raychaudhuri, D., 1978); *Tagetes erecta* L. (Mall *et al.*, 2010); *Tagetes patula* L. (Raychaudhuri, D., 1978; Raychaudhuri, D.N., 1973); *Tagetes* sp. (Chakrabarti, 1972); *Tridax procumbens* L. (Raychaudhuri, D.N., 1973); *Vernonia* sp. (Raychaudhuri, D., 1978); *Xanthium* sp. (Raychaudhuri, D.N., 1973); *Zinnia elegans* Jacq. (Raychaudhuri, D.N., 1973); *Zinnia* sp. (Raychaudhuri, D.N. *et al.*, 1979).
13. **Balsaminaceae:** *Impatiens balsamina* L. (Rao, 1969); *Impatiens falcifer* Hook.f. (Chakrabarti, 1972); *Impatiens* sp. (Raychaudhuri, D.N. *et al.*, 1979).
  14. **Berberidaceae:** *Berberis* sp. (Chakrabarti, 1972).
  15. **Betulaceae:** *Alnus nepalensis* D. Don (Agarwala, 1979).
  16. **Bignoniaceae:** *Jacaranda mimosifolia* D. Don (Dharmadhikari and Ramaseshiah, 1970).
  17. **Boraginaceae:** *Heliotropium indicum* L. (Raychaudhuri, D.N., 1973).
  18. **Brassicaceae:** *Eruca japonica* ? (Raychaudhuri, D.N., 1983) - error - no such species exists in literature); *Brassica napus* L. (Raychaudhuri, D., 1978); *Brassica oleracea* L. (Raychaudhuri, D.N., 1973); *Brassica oleracea* var. *capitata* L. (Agarwal *et al.*, 2006); *Iberis amara* L. (Agarwal *et al.*, 2006); *Raphanus sativus* L. (Bhalla, 1971); *Rorippa indica* (L.) Hiern (= *Nasturtium indicum* (L.) DC.) (Raychaudhuri, D.N., 1973).
  19. **Cannaceae:** *Canna* sp. (Agarwala, 1979).
  20. **Caprifoliaceae:** *Lonicera macrantha* (D. Don) Don Spreng. (Raychaudhuri, D.N., 1973).
  21. **Caryophylliaceae:** *Dianthus* sp. (Raychaudhuri, D.N., 1973).
  22. **Chenopodiaceae:** *Chenopodium album* L. (Raychaudhuri, D.N., 1973); *Chenopodium* sp. (Raychaudhuri, D., 1978); *Spinacia oleracea* L. (Raychaudhuri, D.N., 1973).
  23. **Combretaceae:** *Terminalia arjuna* (Roxb.) ex DC. Wight and Arn. (Raychaudhuri, D.N. *et al.*, 1981).
  24. **Commelinaceae:** *Commelina bengalensis* L. (Raychaudhuri, D.N., 1973); *Commelina* sp. (Raychaudhuri, D.N., 1973).
  25. **Convolvulaceae:** *Ipomoea carnea* ssp. *fistulosa* (Mart. Ex Choisy) D.F. Austin (= *Ipomoea fistulosa* Mart. Ex Choisy) (Ghosh, D. *et al.*, 1985); *Ipomoea hederacea* Jacq. (Raychaudhuri, D.N., 1973).
  26. **Crassulaceae:** *Kalanchoe* (= *Bryophyllum*) sp. (Raychaudhuri, D.N., 1973).
  27. **Cucurbitaceae:** *Cucumis sativus* L. (Raychaudhuri, D.N., 1973); *Cucurbita maxima* Duchesne (Raychaudhuri, D.N., 1973); *Lagenaria siceraria* (Molino) Standl. (= *Lagenaria leucantha* Duches.) (Bhalla, 1971; Raha, 1979); *Luffa* sp. (Raychaudhuri, D., 1978); *Momordica charantia* L. (Agarwala, 1979; Raychaudhuri, D.N., 1973); *Sechium edule* (Jacq.) Sw. (Raychaudhuri, D., 1978).
  28. **Ericaceae:** *Lyonia ovalifolia* (Wall.) Drude (= *Pieris ovalifolia* (Wall. D. Don)) (Raychaudhuri, D.N., 1973); *Rhododendron* sp. (David and Rajasingh, 1969).

29. **Euphorbiaceae:** *Bridelia* sp. (Raychaudhuri, D.N., et al., 1981); *Croton* sp. (Raychaudhuri, D.N., 1973); *Euphorbia hirta* L. (Raychaudhuri, D., 1978); *Euphorbia neriifolia* L. (Raychaudhuri, D.N., 1973); *Jatropha curcas* L. (Raychaudhuri, D., 1978); *Ricinus communis* L. (Raychaudhuri, D.N., 1973).
30. **Fabaceae:** *Bauhinia acuminata* L. (Raychaudhuri, D.N., 1973); *Bauhinia* sp. (Raychaudhuri, D.N., et al., 1981); *Cajanus cajan* (L.) Millsp. (Raha, 1979; Raychaudhuri, D., 1978); *Crotalaria pallida* Aiton (= *Crotalaria brownie* Bertero ex DC.) (Raychaudhuri, D.N., 1973); *Crotalaria* sp. (Ghosh, A.K. and Agarwala, 1980); *Pisum sativum* L. (Raha, 1979; Raychaudhuri, D.N., 1973); *Vicia faba* L. (Raychaudhuri, D., 1978; Raychaudhuri, D.N., 1973); *Vigna unguiculata* (L.) Walp. ssp. *cylindrica* (L.) Verdc. (= *Vigna catjang* (Burm.f.) Walp.) (Raychaudhuri, D.N., 1973).
31. **Hydrangeaceae:** *Hydrangea* sp. (Raychaudhuri, D.N., 1973).
32. **Hypericaceae:** *Hypericum* sp. (Raychaudhuri, D.N. et al., 1979).
33. **Lamiaceae:** *Clerodendrum infortunatum* L. (Ghosh, L.K., 1977; Raychaudhuri, D.N., 1973); *Clerodendrum* sp. (Agarwala, 1979; Raha, 1979); *Dracocephalum latifolium* ? error for *Dracocephalum lamiifolium* Desf. (syn. of *Lamium garganicum* subsp. *striatum* (Sm.) Hayek or *Dracocephalum lancifolium* Moench (syn. of *Physostegia virginiana* (L.) Benth.) (Dharmadhikari and Ramaseshiah, 1970); *Leucas aspera* (Willd.) Link (Raychaudhuri, D.N., 1973); *Leucas lavandulifolia* Sm. (= *Leucas linifolia* (Roth) Spreng.) (Raychaudhuri, D.N., 1973); *Leucas* sp. (Raychaudhuri, D.N., 1973, 1978); *Ocimum* sp. (Raychaudhuri, D.N., 1973); *Salvia coccinea* Buc'hoz ex Etl. (Raychaudhuri, D.N., et al., 1981); *Vitex* sp. (Agarwala, 1979).
34. **Lauraceae:** *Lindera* sp. (Raychaudhuri, D.N., 1973); *Litsea monopetala* (Roxb.) Pers. (= *Litsea polyantha* Juss.) (Raychaudhuri, D.N., 1973, 1978); *Litsea* sp. (Raychaudhuri, D.N., 1973).
35. **Lythraceae:** *Lagerstroemia indica* L. (Raychaudhuri, D.N., 1973); *Lawsonia inermis* L. (= *Lawsonia alba* Lam.) (Ghosh, D., et al., 1985); *Woodfordia fruticosa* (L.) Kurz (Raychaudhuri, D.N., 1973).
36. **Maesaceae:** *Maesa indica* (Roxb.) A. DC. (Agarwala, 1979); *Maesa* sp. (Agarwala, 1979).
37. **Magnoliaceae:** *Magnolia champaka* (L.) Baill. ex Pierre (= *Michelia champaka* L.) (Joshi and Poorani, 2007).
38. **Malvaceae:** *Abelmoschus esculentus* (L.) Moench (= *Hibiscus esculentus* L.) (Lefroy and Howlett, 1909; Raychaudhuri, D.N., 1973); *Abutilon indicum* (L.) Sweet (Malvaceae) (Mall et al., 2010); *Hibiscus rosa-sinensis* L. (Raha, 1979); *Hibiscus sabdariffa* L. (Raychaudhuri, D.N., 1973); *Hibiscus* sp. (Raychaudhuri, D.N., 1973, 1978); *Sida acuta* Burm.f. (Raychaudhuri, D.N., 1973, 1978); *Sida cordifolia* L. (Mall et al., 2010); *Sida rhombifolia* L. (Agarwala, 1979); *Sida* sp. (Ghosh, A.K. and Agarwala, 1980); *Bombax ceiba* L. (= *Bombax malabaricum* DC.) (Raha, 1979).
39. **Melastomaceae:** *Melastoma indica* ? (Agarwala, 1979) - error - no such species exists in literature; *Tibouchina semidecandra* (Schrank and Mart. Ex DC.) Cogn. (Raychaudhuri, D.N., 1973).
40. **Meliaceae:** *Azadirachta indica* A. Juss. (= *Melia azadirachta* L.) (Agarwala, 1979).
41. **Moraceae:** *Ficus* sp. (Raychaudhuri, D.N., 1973; Raychaudhuri, D.N. et al., 1979); *Morus alba* L. (Raychaudhuri, D.N., 1973); *Morus* sp. (Raychaudhuri, D.N. et al., 1979).
42. **Musaceae:** *Musa paradisiaca* L. (= *Musa sapientum* L.) (Raychaudhuri, D.N., 1973).
43. **Myrsinaceae:** *Ardisia* sp. (Raychaudhuri, D.N., 1972).
44. **Myrtaceae:** *Psidium guajava* L. (Raychaudhuri, D.N., 1973).
45. **Nyctaginaceae:** *Boerhavia hispida* ? (Raychaudhuri, D.N., 1973) - error - no such species exists in literature; *Boerhavia diffusa* L. (Agarwala, 1979); *Bougainvillea spectabilis* Willd. (Agarwala, 1979; Raha, 1979); *Mirabilis jalapa* L. (Raychaudhuri, D.N., 1973).
46. **Oleaceae:** *Jasminum* sp. (Raychaudhuri, D.N., 1973); *Nyctanthes arbor-tristis* L. (Mall et al., 2010).
47. **Onagraceae:** *Ludwigia suffruticosa* Wall. (Raha, 1979).
48. **Passifloraceae:** *Passiflora* sp. (Raychaudhuri, D.N., 1973); *Breynia retusa* (Dennst.) Alston (= *Melanthesa patens* auct. (= *Breynia patens* (Roxb.) Rolfe) (Dharmadhikari and Ramaseshiah, 1970); *Phyllanthus reticulatus* Poir. (Agarwala, 1979); *Phyllanthus* sp. (Raychaudhuri, D.N., 1973, 1978).
49. **Pinaceae:** *Cedrus deodara* (Roxb. ex D. Don) G. Don (Chakrabarti, 1972; Ghosh, L.K., 1977); *Pinus* sp. (Agarwala, 1979).
50. **Poaceae:** *Cynodon dactylon* (L.) Pers. (Agarwala, 1979); *Eleusine coracana* (L.) Gaertn. (Raha, 1979); *Zindet*. (Raychaudhuri, D.N. et al., 1979).
51. **Polygonaceae:** *Fagopyrum* sp. (Ghosh, A.K. and Agarwala, 1980; Raychaudhuri, D.N., 1973); *Persicaria barbata* (L.) H. Hara (= *Polygonum barbatum* L.) (Raychaudhuri, D.N., 1973); *Persicaria chinensis* (L.) H. Gross (= *Polygonum chinense* L.) (Raychaudhuri, D., 1978; Agarwala, 1979); *Persicaria hydropiper* (L.) Delarbre (= *Polygonum hydropiper* L.) (Raychaudhuri, D.N., 1973, 1978); *Polygonum alatum* Buch.-Ham. ex D. Don (Agarwala, 1979); *Polygonum flaccidum* Roxb. (= *Polygonum serrulatum* Lagasca) (Raychaudhuri, D.N., 1973); *Polygonum* sp. (Raychaudhuri, D., 1978; Ghosh, A.K. and Agarwala, 1980); *Rumex acetosella* L. (Bhalla, 1971); *Rumex nepalensis* Spreng. (Raychaudhuri, D.N., 1973); *Rumex* sp. (Chakrabarti and Sarkar, 2001).
52. **Punicaceae:** *Punica granatum* L. (David and Rajasingh, 1969; Raychaudhuri, D.N., 1973).
53. **Ranunculaceae:** *Anemone rivularis* DC. (Raychaudhuri, D.N., 1973).
54. **Rhamnaceae:** *Rhamnus napalensis* (Wall.) M.A. Lawson (Raychaudhuri, D.N., 1973).
55. **Rosaceae:** *Spiraea chanoidri* ? (Ghosh, L.K., 1977) - error - species not mentioned in taxonomic literature; *Malus domestica* Borkh. (= *Pyrus malus* L.) (Chakrabarti, 1972); *Malus sylvestris* (L.) Mill. (Raychaudhuri, D., 1978); *Photinia integrifolia* Lindl. (Basu, A.N., 1961a); *Photinia* sp. (Raychaudhuri, D.N., 1973); *Prunus cerasus* L. (Raychaudhuri, D.N., 1973); *Prunus domestica* L. (David and Rajasingh, 1969; Raychaudhuri, D.N., 1973); *Prunus dulcis* (Mill.) D.A.



- Webb. (= *Prunus amygdalus* Batsc) (Dharmadhikari and Ramaseshiah, 1970); *Prunus napaulensis* (Ser.) Steud. (Raychaudhuri, D.N., 1973) *Prunus persica* (L.) Batsc (David and Rajasingh, 1969; Agarwala, 1979); *Prunus* sp. (Agarwala, 1979; Raychaudhuri, D., 1978); *Prunus sylvestris* Habl. (Kar *et al.*, 1990); *Pyrus communis* L. (Agarwala, 1979; David and Rajasingh, 1969); *Pyrus pashia* Buch.-Ham. ex D. Don (= *Pyrus kumaoni* Decne.) (Bhalla, 1971; Chakrabarti, 1972); *Rosa canina* L. (Raychaudhuri, D.N., 1973); *Rosa* sp. (Agarwala, 1979); *Rubus ellipticus* Sm. (Raha, 1979); *Rubus antennifer* Hook f. (Bhagat, 2012); *Spiraea bella* Sims. (Agarwala, 1979; Raychaudhuri, D.N., 1973); *Spiraea callosa* Thunb. Ex Murr. (Raychaudhuri, D.N., 1973) *Spiraea cantoniensis* Lour. (Rao, 1969; Chakrabarti, 1972) *Spiraea corymbosa* Raf. (Agarwala, 1979); *Spiraea* sp. (Chakrabarti, 1972; Raychaudhuri, D.N. *et al.*, 1979).
56. **Rubiaceae:** *Cinchona* sp. (Raychaudhuri, D.N., 1973); *Galium* sp. (Raychaudhuri, D.N., 1973); *Gardenia* sp. (Raychaudhuri, D.N., 1973); *Luculia* sp. (Agarwala, 1979; Raychaudhuri, D.N., 1973); *Mussaenda* sp. (Raychaudhuri, D.N., 1973); *Ophiorrhiza* sp. (Raychaudhuri, D.N., 1973); *Paederia foetida* L. (Raychaudhuri, D.N., 1973); *Richardia pilosa* L. (Raychaudhuri, D.N., 1973); *Rubia cordifolia* L. (Agarwala, 1979); *Spermadictyon sauveolens* Roxb. (= *Hamiltonia sauveolens* auct. nonn.) (Raychaudhuri, D.N., 1973); *Wendlandia glabrata* DC. (Raychaudhuri, D., 1978); *Wendlandia* sp. (Raychaudhuri, D.N., 1973).
57. **Rutaceae:** *Glycosmis arborea* ? (Raychaudhuri, D.N., 1973) - error - species not mentioned in taxonomic literature; *Citrus aurantiifolia* (Christm.) Swingle (Raychaudhuri, D.N., 1973); *Citrus maxima* (Burm.) Merr. (= *Citrus grandis* Osbeck) (Konar and Paul, 2006); *Citrus reticulata* Blaneo (Basu, A.N., 1961a; Raychaudhuri, D.N., 1973); *Citrus* sp. (Rao, 1969; Agarwala, 1979); *Zanthoxylum armatum* DC. (= *Zanthoxylum alatum* Roxb., = *Zanthoxylum ornatum* auct. nonn.) (Raychaudhuri, D.N., 1973; Agarwala, 1979); *Zanthoxylum* sp. (Raychaudhuri, D.N., 1973).
58. **Scrophulariaceae:** *Cestrum nocturnum* L. (Kar *et al.*, 1990; Maity *et al.*, 1980).
59. **Smilacaceae:** *Smilax* sp. (Raychaudhuri, D.N. *et al.*, 1979).
60. **Solanaceae:** *Browallina* sp. (Maity *et al.*, 1980); *Capsicum annum* L. (Raha, 1979; Raychaudhuri, D., 1978); *Capsicum frutescens* L. (Agarwala and Raychaudhuri, D.N., 1981b); *Cestrum diurrrum* L. (Ghosh, D. *et al.*, 1985); *Cestrum fasciculatum* (Schltdl.) Miers (Raychaudhuri, D.N., 1973); *Cestrum* sp. (Raychaudhuri, D.N., 1973; Raychaudhuri, D.N. *et al.*, 1979); *Datura* sp., (Raychaudhuri, D.N., 1973); *Lycopersicon esculentum* Mill. (Raychaudhuri, D.N., 1973); *Nicotiana tabacum* L. (Agarwala, 1979); *Solanum betaceum* Cav. (= *Cyphomandra betacea* (Cav.) Sendtn.) (Agarwala, 1979); *Solanum clavatum* Rusby (Raychaudhuri, D.N., 1973); *Solanum melongena* L. (Raha, 1979), *Solanum nigrum* L. (Raha, 1979); *Solanum sisymbriifolium* Lam. (Raychaudhuri, D.N., 1973); *Solanum* sp. (Ghosh, A.K. and Agarwala, 1980); *Solanum torvum* Sw. (Raychaudhuri, D.N., 1973); *Solanum tuberosum* L. (Raychaudhuri, D., 1978).
61. **Sonneratiaceae:** *Duabanga grandiflora* (Roxb. ex DC.) Walp. (= *Duabanga sonneratioides* Buch.-Ham.) (Raychaudhuri, D.N., 1973).
62. **Symplocaceae:** *Symplocos cratigeoides* Buch.-Ham. ex D. Don (Rao, 1969; Raychaudhuri, D.N., 1973); *Symplocos* sp. (Raychaudhuri, D.N., 1973).
63. **Ternstroemiaceae:** *Eurya japonica* Thunb. (Raychaudhuri, D.N., 1973).
64. **Theaceae:** *Schima wallichii* (DC.) Korth. (Raychaudhuri, D., 1978).
65. **Umbelliferae:** *Coriandrum sativum* L. (Rao, 1969).
66. **Urticaceae:** *Boehmeria* sp. (Maity *et al.*, 1980); *Gonostegia hirta* (Hassk.) Miq. (= *Pouzolzia hirta* Blume ex Hassk.) (Ghosh, A.K. and Agarwala, 1980); *Urtica* sp. (Raychaudhuri, D.N. *et al.*, 1979).
67. **Valerianaceae:** *Valeriana wallichii* De Candolle (Raychaudhuri, D.N., 1973).
68. **Verbenaceae:** *Duranta erecta* L. (Raychaudhuri, D.N., 1973); *Holmskioldia sanguinea* Retz. (Raychaudhuri, D.N., 1973); *Lantana camara* L. (Raychaudhuri, D.N., 1973).

#### FOOD PLANTS OF APHIS SPIRAECOLA IN INDIA - ALPHABETWISE

1. *Abelmoschus esculentus* (Malvaceae)
2. *Abutilon indicum* (Malvaceae)
3. *Achyranthes* sp. (Amaranthaceae)
4. *Acmella paniculata* (Asteraceae)
5. *Ageratum conyzoides* (Asteraceae)
6. *Alnus nepalensis* (Betulaceae)
7. *Alstonia scholaris* (Apocyanaceae)
8. *Amaranthus viridis* (Amaranthaceae)
9. *Ambrosia artemisiaefolia* (Asteraceae)
10. *Anacardium occidentale* (Anacardiaceae)
11. *Anaphalis contorta* (Asteraceae)
12. *Anemone rivularis* (Ranunculaceae)
13. *Apium* sp. (Apiaceae)
14. *Ardisia* sp. (Myrsinaceae)
15. *Artemisia caruifolia* (Asteraceae)
16. *Artemisia* sp. (Asteraceae)
17. *Artemisia vulgaris* (Asteraceae)
18. *Aster amellus* (Asteraceae)
19. *Azadirachta indica* (Meliaceae)
20. *Bauhinia acuminata* (Fabaceae)
21. *Bauhinia* sp. (Fabaceae)
22. *Berberis* sp. (Berberidaceae)
23. *Bidens bipinnata* (Asteraceae)
24. *Bidens biternata* (Asteraceae)
25. *Bidens pilosa* (Asteraceae)
26. *Bidens pilosa* var. *pinnata* (Asteraceae)
27. *Boehmeria* sp. (Urticaceae)
28. *Boerhavia diffusa* (Nyctaginaceae)
29. *Boerhavia hispida* (Nyctaginaceae)
30. *Bombax ceiba* (Malvaceae)
31. *Bougainvillea spectabilis* (Nyctaginaceae)
32. *Brassica napus* (Brassicaceae)
33. *Brassica oleracea* (Brassicaceae)
34. *Brassica oleracea* var. *capitata* (Brassicaceae)
35. *Breynia retusa* (Phyllanthaceae)
36. *Bridelia* sp. (Euphorbiaceae)
37. *Browallina* sp. (Solanaceae)
38. *Cajanus cajan* (Fabaceae)

39. *Calendula* sp. (Asteraceae)
40. *Canna* sp. (Cannaceae)
41. *Capsicum annuum* (Solanaceae)
42. *Capsicum frutescens* (Solanaceae)
43. *Catharanthus roseus* (Apocynaceae)
44. *Cedrus deodara* (Pinaceae)
45. *Cestrum diurnum* (Solanaceae)
46. *Cestrum fasciculatum* (Solanaceae)
47. *Cestrum nocturnum* (Scrophulariaceae)
48. *Cestrum* sp. (Solanaceae)
49. *Chenopodium album* (Chenopodiaceae)
50. *Chenopodium* sp. (Chenopodiaceae)
51. *Chromolaena odorata* (Asteraceae)
52. *Chrysanthemum* sp. (Asteraceae)
53. *Cinchona* sp. (Rubiaceae)
54. *Citrus aurantiifolia* (Rutaceae)
55. *Citrus maxima* (Rutaceae)
56. *Citrus reticulata* (Rutaceae)
57. *Citrus* sp. (Rutaceae)
58. *Clerodendrum* sp. (Lamiaceae)
59. *Clerodendrum viscosum* (Lamiaceae)
60. *Cnicus* sp. (Asteraceae)
61. *Colocasia esculenta* (Araceae)
62. *Commelina bengalensis* (Commelinaceae)
63. *Commelina* sp. (Commelinaceae)
64. *Conyza angustifolia* (Asteraceae)
65. *Conyza japonica* (Asteraceae)
66. *Coriandrum sativum* (Apiaceae)
67. *Cosmos bipinnatus* (Asteraceae)
68. *Cosmos* sp. (Asteraceae)
69. *Cotonis* sp. (Asteraceae)
70. *Cotula hemispherica* (Asteraceae)
71. *Crotalaria pallida* (Fabaceae)
72. *Crotalaria* sp. (Fabaceae)
73. *Croton* sp. (Euphorbiaceae)
74. *Cucumis sativus* (Cucurbitaceae)
75. *Cucurbita maxima* (Cucurbitaceae)
76. *Cynodon dactylon* (Poaceae)
77. *Dahlia pinnata* (Asteraceae)
78. *Dahlia* sp. (Asteraceae)
79. *Datura* sp. (Solanaceae)
80. *Dianthus* sp. (Caryophyllaceae)
81. *Dichrocephala integrifolia* (Asteraceae)
82. *Dracocephalum latifolium* (Lamiaceae)
83. *Duabanga grandiflora* (Sonneratiaceae)
84. *Duranta erecta* (Verbenaceae)
85. *Eleusine coracana* (Poaceae)
86. *Emilia sonchifolia* (Asteraceae)
87. *Erechtites* sp. (Asteraceae)
88. *Erechtites valerianaefolia* (Asteraceae)
89. *Erigeron* sp. (Asteraceae)
90. *Eruca japonica* (Brassicaceae)
91. *Eupatorium adenophorum* (Asteraceae)
92. *Eupatorium cannabinum* (Asteraceae)
93. *Eupatorium odoratum* (Asteraceae)
94. *Eupatorium riparium* (Asteraceae)
95. *Eupatorium* sp. (Asteraceae)
96. *Eupatorium wallichii* (Asteraceae)
97. *Euphorbia hirta* (Euphorbiaceae)
98. *Euphorbia neriifolia* (Euphorbiaceae)
99. *Eurya japonica* (Ternstroemiaceae)
100. *Fagopyrum* sp. (Polygonaceae)
101. *Ficus* sp. (Moraceae)
102. *Galium* sp. (Rubiaceae)
103. *Gardenia* sp. (Rubiaceae)
104. *Gerbera* sp. (Asteraceae)
105. *Glebionis coronaria* (Asteraceae)
106. *Glycosmis arborea* (Rutaceae)
107. *Gonostegia hirta* (Urticaceae)
108. *Gynura crepidioides* (Asteraceae)
109. *Gynura cusimbua* (Asteraceae)
110. *Gynura nepalensis* (Asteraceae)
111. *Gynura* sp. (Asteraceae)
112. *Hedera helix* (Araliaceae)
113. *Helianthus annuus* (Asteraceae)
114. *Helianthus* sp. (Asteraceae)
115. *Helichrysum* sp. (Asteraceae)
116. *Heliotropium indicum* (Boraginaceae)
117. *Hibiscus rosa-sinensis* (Malvaceae)
118. *Hibiscus sabdariffa* (Malvaceae)
119. *Hibiscus* sp. (Malvaceae)
120. *Holarrhena pubescens* (Apocyanaceae)
121. *Holmskioldia sanguinea* (Verbenaceae)
122. *Hydrangea* sp. (Hydrangeaceae)
123. *Hypericum* sp. (Hypericaceae)
124. *Hypochaeris radicata* (Asteraceae)
125. *Iberis amara* (Brassicaceae)
126. *Ichnocarpus frutescens* (Apocyanaceae)
127. *Ilex* sp. (Aquifoliaceae)
128. *Impatiens balsamina* (Balsaminaceae)
129. *Impatiens falcifer* (Balsaminaceae)
130. *Impatiens* sp. (Balsaminaceae)
131. *Inula cuspidata* (Asteraceae)
132. *Ipomoea carnea* ssp. *fistulosa* (Convolvulaceae)
133. *Ipomoea hederacea* (Convolvulaceae)
134. *Jacaranda mimosifolia* (Bignoniaceae)
135. *Jasminum* sp. (Oleaceae)
136. *Jatropha curcas* (Euphorbiaceae)
137. *Justicia adhatoda* L. (Acanthaceae)
138. *Kalanchoe* sp. (Crassulaceae)
139. *Lactuca sativa* (Asteraceae)
140. *Lagenaria siceraria* (Cucurbitaceae)
141. *Lagerstroemia indica* (Lythraceae)
142. *Lantana camara* (Verbenaceae)
143. *Launaea nudicaulis* (Asteraceae)
144. *Lawsonia inermis* (Lythraceae)
145. *Leucas aspera* (Lamiaceae)
146. *Leucas lavandulifolia* Sm. (Lamiaceae)
147. *Leucas* sp. (Lamiaceae)
148. *Lindera* sp. (Lauraceae)
149. *Litsea monopetala* (Lauraceae)
150. *Litsea* sp. (Lauraceae)
151. *Lonicera macrantha* (Caprifoliaceae)
152. *Luculia* sp. (Rubiaceae)
153. *Ludwigia suffruticosa* (Onagraceae)
154. *Luffa* sp. (Cucurbitaceae)
155. *Lycopersicon esculentum* (Solanaceae)
156. *Lyonia ovalifolia* (Ericaceae)
157. *Maesa indica* (Maesaceae)
158. *Maesa* sp. (Maesaceae)
159. *Magnolia champaka* (Magnoliaceae)
160. *Malus domestica* (Rosaceae)
161. *Malus sylvestris* (Rosaceae)
162. *Melastoma indica* (Melastomaceae)
163. *Mikania cordata* (Asteraceae)
164. *Mikania micrantha* (Asteraceae)

165. *Mikania scandens* (Asteraceae)  
 166. *Mirabilis jalapa* (Nyctaginaceae)  
 167. *Momordica charantia* (Cucurbitaceae)  
 168. *Montanoa bipinnatifida* (Asteraceae)  
 169. *Morus alba* (Moraceae)  
 170. *Morus* sp. (Moraceae)  
 171. *Musa paradisiaca* (Musaceae)  
 172. *Mussaenda* sp. (Rubiaceae)  
 173. *Myriactis nepalensis* (Asteraceae)  
 174. *Nerium* sp. (Apocyanaceae)  
 175. *Nicotiana tabacum* (Solanaceae)  
 176. *Nyctanthes arbor-tristis* (Oleaceae)  
 177. *Ocimum* sp. (Lamiaceae)  
 178. *Oenanthe javanica* ssp. *stolonifera* (Apiaceae)  
 179. *Ophiorrhiza* sp. (Rubiaceae)  
 180. *Paederia foetida* (Rubiaceae)  
 181. *Parthenium hysterophorus* (Asteraceae)  
 182. *Passiflora* sp. (Passifloraceae)  
 183. *Persicaria barbata* (Polygonaceae)  
 184. *Persicaria chinensis* (Polygonaceae)  
 185. *Persicaria hydropiper* (Polygonaceae)  
 186. *Photinia integrifolia* (Rosaceae)  
 187. *Photinia* sp. (Rosaceae)  
 188. *Phyllanthus reticulatus* (Phyllanthaceae)  
 189. *Phyllanthus* sp. (Phyllanthaceae)  
 190. *Pinus* sp. (Pinaceae)  
 191. *Pisum sativum* (Fabaceae)  
 192. *Polyalthia longifolia* (Annonaceae)  
 193. *Polygonum alatum* (Polygonaceae)  
 194. *Polygonum flaccidum* (Polygonaceae)  
 195. *Polygonum* sp. (Polygonaceae)  
 196. *Prunus cerasus* (Rosaceae)  
 197. *Prunus domestica* (Rosaceae)  
 198. *Prunus dulcis* (Rosaceae)  
 199. *Prunus napaulensis* (Rosaceae)  
 200. *Prunus persica* (Rosaceae)  
 201. *Prunus* sp. (Rosaceae)  
 202. *Prunus sylvestris* (Rosaceae)  
 203. *Pseudognaphalium luteoalbum* (Asteraceae)  
 204. *Psidium guajava* (Myrtaceae)  
 205. *Punica granatum* (Punicaceae)  
 206. *Pyrus communis* (Rosaceae)  
 207. *Pyrus pashia* (Rosaceae)  
 208. *Raphanus sativus* (Brassicaceae)  
 209. *Rhamnus napalensis* (Rhamnaceae)  
 210. *Rhododendron* sp. (Ericaceae)  
 211. *Richardia pilosa* (Rubiaceae)  
 212. *Ricinus communis* (Euphorbiaceae)  
 213. *Rorippa indica* (Brassicaceae)  
 214. *Rosa canina* (Rosaceae)  
 215. *Rosa* sp. (Rosaceae)  
 216. *Rubia cordifolia* (Rubiaceae)  
 217. *Rubus antennifer* (Rosaceae)  
 218. *Rubus ellipticus* (Rubiaceae)  
 219. *Rudbeckia tagetes* (Asteraceae)  
 220. *Rumex acetosella* (Polygonaceae)  
 221. *Rumex nepalensis* (Polygonaceae)  
 222. *Rumex* sp. (Polygonaceae)  
 223. *Salvia coccinea* Buc'hoz ex Et (Lamiaceae)  
 224. *Sambucus javanica* (Adoxaceae)  
 225. *Schima wallichii* (Theaceae)  
 226. *Sechium edule* (Cucurbitaceae)  
 227. *Senecio* sp. (Asteraceae)  
 228. *Sida acuta* Burm. f. (Malvaceae)  
 229. *Sida cordifolia* (Malvaceae)  
 230. *Sida rhombifolia* (Malvaceae)  
 231. *Sida* sp. (Malvaceae)  
 232. *Smilax* sp. (Smilacaceae)  
 233. *Solanum betaceum* (Solanaceae)  
 234. *Solanum clavatum* (Solanaceae)  
 235. *Solanum melongena* (Solanaceae)  
 236. *Solanum nigrum* (Solanaceae)  
 237. *Solanum sisymbriifolium* (Solanaceae)  
 238. *Solanum* sp. (Solanaceae)  
 239. *Solanum torvum* (Solanaceae)  
 240. *Solanum tuberosum* (Solanaceae)  
 241. *Solidago canadensis* (Asteraceae)  
 242. *Sonchus arvensis* (Asteraceae)  
 243. *Sonchus asper* (Asteraceae)  
 244. *Sonchus* sp. (Asteraceae)  
 245. *Spermadictyon sauveolens* (Rubiaceae)  
 246. *Spinacia oleracea* (Chenopodiaceae)  
 247. *Spiraea bella* (Rosaceae)  
 248. *Spiraea callosa* (Rosaceae)  
 249. *Spiraea cantoniensis* (Rosaceae)  
 250. *Spiraea chanoidri* (Rosaceae)  
 251. *Spiraea corymbosa* (Rosaceae)  
 252. *Spiraea* sp. (Rosaceae)  
 253. *Symplocos cratigeoides* (Symplocaceae)  
 254. *Symplocos* sp. (Symplocaceae)  
 255. *Synedrella nodiflora* (Asteraceae)  
 256. *Tagetes erecta* (Asteraceae)  
 257. *Tagetes patula* (Asteraceae)  
 258. *Tagetes* sp. (Asteraceae)  
 259. *Tecomella undulata* (Bignoniaceae)  
 260. *Terminalia arjuna* (Combretaceae)  
 261. *Thunbergia coccinea* (Acanthaceae)  
 262. *Tibouchina semidecandra* (Melastomaceae)  
 263. *Tridax procumbens* (Asteraceae)  
 264. *Urtica* sp. (Urticaceae)  
 265. *Valeriana wallichii* (Valerianaceae)  
 266. *Vernonia* sp. (Asteraceae)  
 267. *Viburnum foetidum* (Adoxaceae)  
 268. *Vicia faba* (Fabaceae)  
 269. *Vigna unguiculata* (Fabaceae)  
 270. *Vitex* sp. (Lamiaceae)  
 271. *Wendlandia glabrata* (Rubiaceae)  
 272. *Wendlandia* sp. (Rubiaceae)  
 273. *Woodfordia fruticosa* (Lythraceae)  
 274. *Xanthium* sp. (Asteraceae)  
 275. *Zanthoxylum armatum* (Rutaceae)  
 276. *Zanthoxylum* sp. (Rutaceae)  
 277. *Zinnia elegans* (Asteraceae)  
 278. *Zinnia* sp. (Asteraceae)  
 279. Unidentified plants (Apocyanaceae, Asteraceae, Poaceae, Rosaceae, Urticaceae)

## REFERENCES

- Agarwal, R., Dube, S., Mall, N. 2006. Records of host plants of *Aphis spiraeicola* Patch, 1914 (Homoptera: Aphididae) from northeastern Uttar Pradesh. 9<sup>th</sup> National Symposium on Recent Advances in Aphidology (November 27-29, 2006) held at Banaras Hindu University, Varanasi. Abstract, pp. 29-30.



- Agarwala, B.K. 1979. Some aspects of aphid (Homoptera: Insecta) studies in Sikkim and Bhutan Ph D thesis, University of Calcutta, India pp. 383.
- Agarwala, B.K., Ghosh, A.K. 1984. A checklist of Aphididae of India. *Records of the Zoological Survey of India. Occasional Paper No. 50*: 1-71.
- Agarwala, B.K., Raychaudhuri, D.N. 1981a. Observations on the population trends of rose aphids and their hymenopteran parasites in Kalimpong, West Bengal. *Entomon*, 6: 211-214.
- Agarwala, B.K., Raychaudhuri, D.N. 1981b. An account of aphids (Homoptera: Aphididae) infesting the important economic plants in Sikkim. *Indian Agriculture*, 25: 101-107.
- Agarwala, B.K., Das, J. 2012. Weed host specificity of the aphid, *Aphis spiraecola*: Developmental and reproductive performance of aphids in relation to plant growth and leaf chemicals of the Siam weed, *Chromolaena odorata*. *Journal of Insect Science*, 12:24, available online: [insectscience.org/12.24](http://insectscience.org/12.24)
- Aghajanzdeh, S., Rasoulilian, G., Rezwani, N., Esmaili, M. 1997. Study on faunistic aspects of citrus aphids in west Mazandaran. *Applied Entomology and Phytopathology*, 65(1): 15-17.
- Ahlawat, R.S., Raychaudhuri, S.P. 1988. Status of citrus tristeza and dieback diseases in India and their detection. Proceedings of Sixth International Citrus Congress, *Tel Aviv*, pp. 871-879.
- Ahmad, M.E., Singh, R. 1997. Records of aphids and their food plants, parasitoids and hyperparasitoids from North Bihar. *Journal of Advanced Zoology*, 18: 54-61.
- Ahmad, M.E. 1993. Records of aphids, their parasitoids and hyperparasitoids in trees belt of northeastern Uttar Pradesh. *Ph.D. Thesis, Gorakhpur University, Gorakhpur*.
- Aly, M.H., Desuky, W.M.H., Attia, A.A., Youssef, A.A.A. 2003. Ecological studies on certain homopterous insects infesting some citrus trees in Egypt. *Egyptian Journal of Agricultural Research*, 81(2): 531-550.
- Anderson, P., Voegtlin, D., Villalobos, W., Rivera, C. 2009. Aphid-host plants of Central America. *International Journal of Tropical Biology and Conservation*, pp. 201-212.
- Avinent, L., Hermoso de Mendoza, A., Llacer, G., 1994. Transmission of plum pox potyvirus in Spain. *Bulletin of OEPP*, 24(3): 669-674.
- Banerjee, H., Ghosh, A.K., Raychaudhuri, D.N. 1969. On a collection of aphids (Homoptera: Aphididae) from Kullu valley, west Himalaya. *Oriental Insects*, 3: 255-264.
- Basu, A.N. 1961a. Some aphids new to India with description of a new subspecies. *Current Science*, 30 : 390-391.
- Basu, A.N. 1961b. Addition to the aphid of West Bengal. *Science and Culture*, 27: 456.
- Basu, A.N. 1964. New genera and species of aphids from the Darjeeling district, India (Homoptera: Aphididae. *Journal of Linnean Society of Zoology*, 45: 223-243.
- Basu, A.N., Banerjee, S.N. 1958. Aphids of economic plants of West Bengal. *Indian Agriculture*, 2: 89-112.
- Behura, B.K. 1963. Aphids of India. Survey of published information. *Recent Advances in Zoology, India*, 1961: 25-78.
- Behura, B.K. 1965. Supplement to aphids of India - a survey of published information. *Prakruti – Journal of Utkal University, Science*, 3: 40-65.
- Bhagat, R.C. 2012. Aphids (Insecta) of agricultural importance in JandK state, India: a checklist and biodiversity. *International Journal of Food, Agriculture and Veterinary Sciences*, 2(3): 116-125.
- Bhalla, O.P. 1971. Addition to the aphid fauna of Himachal Pradesh. *Himachal Journal of Agriculture Research*, 1: 51 - 52.
- Bhalla, O.P., Pawar, A.D. 1980. A survey of insect and non-insect pests of economic importance in Himachal Pradesh. Published by Department of Entomology and Zoology, College of Agriculture, Chambaghat, Solan (H.P.).
- Bitton, S., Kenneth, R.G., Ben-Ze'ev, I. 1979. Zygospor overwintering and sporulative germination in *Triplosporium fresenii* (Entomophthoraceae) attacking *Aphis spiraecola* on citrus in Israel. *Journal of Invertebrate Pathology*, 34 (3): 295-302.
- Blackman, R.L., Eastop, V.F. 2000. *Aphids on the World's Crops: An Identification and Information Guide*, Second Edition, John Wiley and Sons, Chichester, pp. 414.
- Blackman, R.L. 1976. *Aphids*, Ginn and Co., London, pp. 323.
- Blackman, R.L., Eastop, V.F. 2006. *Aphids on the World's Herbaceous Plants and Shrubs*, 2 Volume Set, Wiley-VCH Verlag GmbH and Co. KGaA pp. 1460.
- Bouhachem, S.B., Souissi, R., Turpeau, E., Jouan, J.R., Fahem, M., Brahim, N.B., Hulle, M. 2007. Aphid (Hemiptera: Aphidoidea) diversity in Tunisia in relation to seed potato production. *Annales de la Société Entomologique de France (n.s.)*, 43 (3) : 311-318.
- Byadgi, A.S., Ahlawat, Y.S., 1995. A new viral ringspot disease of citrus (*Citrus* species) in India. *Indian Journal of Agricultural Sciences*, 65(10): 763-770.
- CABI/EPPO, 2001. *Aphis spiraecola*. Distribution Maps of Plant Pests, Map No. 256. Wallingford, UK: CAB International.
- Carmen, S.M.del, Cermeli, M., Diaz, D., Romero, R. 1993. Aphid fauna (Homoptera: Aphididae) on *Phaseolus vulgaris* in Aragua State. *Boletín de Entomología Venezolana*, 8(1): 75-81.
- Carvalho, L. M. de, Bueno, V.H.P., Martinez, R.P. 2002. Alate aphids survey on vegetable crops in Lavras (MG). *Cien Agrotecnologia*, 26(3): 523-532.
- Carver, M., Sary, P. 1974. A preliminary review of the Aphidiidae (Hymenoptera: Ichneumonoidea) of Australia and New Zealand. *J. Aust. Ent. Soc.*, 13: 235-240.
- Castle, S.J., Perring, T.M.; Farrar, C.A., Kishaba, A.N. 1992. Field and laboratory transmission of watermelon mosaic virus 2 and zucchini yellow mosaic virus by various aphid species. *Phytopathology*, 82(2): 235-240.
- Chakrabarti, S. 1972. Aphids of north western India with special reference to Kumaon range Uttar Pradesh, Ph. D. thesis, University of Calcutta, India, pp. 435.
- Chakrabarti, S., Sarkar, A. 2001. A supplement to the food-plant catalogue of Indian Aphididae. *Journal of Aphidology*, 15: 9-62.
- Chan, C.K., Forbes, A.R., Raworth, D.A. 1991. Aphid-transmitted viruses and their vectors of the world. *Technical Bulletin of Research Branch of Agriculture, Canada*, 1991-3E, pp. 216.
- Chao, C.H., Chen, C.C. 1991. Transmission of papaya ringspot virus type-W by aphids. *Bulltin Taichung District, Agriculture Improvement Station*, (31): 55-61.

- Chavan V.M., Singh S.J. 2005. Population dynamics and management of aphid vectors of citrus tristeza virus in Maharashtra. *Agricultural Science Digest*, 25 (2): 85 – 89.
- Chen, D.M., Chen, W.M., Chen, J.S. 1993. The succession of the predominant citrus aphids and the control of pesticides. *Acta Agriculturae Zhejiangensis*, 5(1):42-45.
- Chiu, S.C., Liu, C.S. 1969. Hymenopterous parasites of citrus, tobacco and vegetables in Taiwan. *Project Report USDA PL-480* (Spl. Pub.No. 9): 1-14.
- Cho, J.R., Hong, K.J., Yoo, J.K., Bang, J.R., Lee, J.O. 1997. Comparative toxicity of selected insecticides to *Aphis citricola*, *Myzus malisuctus* (Homoptera: Aphididae), and the predator *Harmonia axyridis* (Coleoptera: Coccinellidae). *Journal of Economic Entomology*, 90(1):11-14.
- Das, B.C. 1994. Aphids (Hymenoptera:Aphididae) and their natural enemies in Bangladesh. *Environmental Ecology*, 12: 795-801.
- Dassanayake, E.M., Hicks, R.G.T. 1992. Sri Lankan passion fruit mottle virus, a potyvirus infecting golden passion fruit in Sri Lanka. *Annals of Applied Biology*, 120(3): 459-469.
- Dassanayake, E.M., Perera, W.G.S. 2003. Spread of Sri Lankan passionfruit mottle virus in yellow passionfruit (*Passiflora edulis* f. *flavicarpa*) in the low country wet zone of Sri Lanka. *Annals of Sri Lanka Department of Agriculture*, 5: 43-55.
- David, S.K. 1956. Taxonomic notes on six species of Mysore aphids described as new by Theobald in 1929. *Indian Journal of Entomology*, 18: 141-145.
- David, S.K. 1958a. Some rare Indian Aphids. *Journal of Bombay Natural History Society*, 55: 110-116.
- David, S.K. 1958b. Aphids capable of infesting potato in India and their relationship to the crop in South India. *Journal of South Indian Horticulture*, 6: 67-74.
- David, S.K., Rajasingh, S.G. 1969. New records of aphids (Insecta: Homoptera) from Assam, India. *Proceedings of zoological Society of Calcutta*, 22: 151-157.
- Dharmadhikari, P.R., Ramaseshiah, G. 1970. Recent records of aphidiids (Hym.: Aphidiidae) in India. *CIBC Technical Bulletin No.*, 13: 83-89.
- Dubey, S., Singh, R. 2008. Host plant induced variations in life-table statistics of *Aphis spiraecola* Patch (Homoptera : Aphididae). *Journal of Aphidology*, 23: 53-60.
- Eastop, V.F. 1966. A taxonomic study of Australian Aphidoidea (Homoptera). *Australian Journal of Zoology*, 14: 399-592.
- Eastop, V.F. 1977. Worldwide importance of aphids as virus vectors. In *Aphids as Virus Vectors* (Eds. Harris, K.F., Maramorosch, K., Academic Press, New York, pp. 3-62.
- Evans, G.A., Halbert, S.E. 2007. A checklist of the aphids of Honduras (Hemiptera: Aphididae). *Florida Entomologist*, 90(3): 518-523.
- Ganguli, R.N., Agrawala, B.K. 1985. Aphid association of agricultural crops in Tripura, North East India. *Indian Agriculture*, 29: 282-287.
- Ganguli, R.N., Ghosh, M.R. 1965. A note on the aphids of economically important crops in Tripura. *Science and Culture*, 31: 541-542.
- Ghosh, A.K. 1974. A list of aphids (Homoptera: Aphididae) from India and adjacent countries. *Journal of Bombay Natural History Society*, 71: 201-225.
- Ghosh, A.K., Agarwala, B.K. 1980. Weed hosts of major aphid (Homoptera : Insecta ) pests in India region. *Indian Agriculture*, 24: 101-107.
- Ghosh, D., Debnath, N., Chakrabarti, S. 1985. Predators and parasites of aphids (Homoptera: Aphididae) from northwest Himalaya: Ten species of syrphids (Diptera: Syrphidae) from Garhwal range. *Entomol*, 10: 301-303.
- Ghosh, L.K. 1970. A note on the preliminary survey of aphids (Homoptera) from Bihar, India. *Science Culture*, 36: 419-420.
- Ghosh, L.K. 1977. A study on the aphids (Homoptera: Aphididae) of Himachal Pradesh in North-West Himalaya, India, Ph. D. thesis, University of Calcutta, India, 360 pp.
- Ghosh, M.R., Ghosh, A.K., Raychaudhuri, D.N. 1971. Studies on aphids (Homoptera: Aphididae) from eastern India. *Proceedings of Zoological Society of Calcutta*, 24: 163-168.
- Gilbert, M.J. 1994. The first record of the spirea aphid, *Aphis spiraecola* Patch (Homoptera: Aphidoidea), on citrus in South Africa. *Citrus Journal*, 4(4): 23.
- Gildow, F.E., Levy, L., Damsteegt, V.D., Stone, A.L., Schneider, W.L., Luster, D.G. 2004. Transmission of three North American isolates of Plum pox virus: identification of aphid vectors and species-specific transmission from infected stone fruits. *Acta Horticulturae*, 657: 207-211.
- Gurung, A., Sarkar, T.K., Mukhopadhyay, S., Ghosh, M.R. 1993. Incidence of the vectors of tristeza virus in Darjeeling hills. *Journal of Entomological Research*, 17(2): 129-136.
- Hidalgo, N.P., Bartholdy, L.M., Nafria, J.M.N. 1998. Two new aphid records for South America and a list of aphids from Rio Grande do Sul State and Brazil. *Aphids in natural and managed ecosystems. Proc. V International Symposium on Aphids, Leon, Spain*, 15-19- September, 1997. 407-415.
- Hill, D.S. 1975. *Agricultural Insect Pests of the Tropics and Their Control*. Cambridge Univ. Press, pp. 520.
- Hodjat, S.H., Eastop, V.F. 1983. *Aphis citricola* van der Goot, a new aphid pest of citrus in Iran. *Entomologie et Phytopathologie Appliquees*, 50(1/2): 57-66.
- Irshad, M. 2001. Aphids and their biological control in Pakistan. *Pakistan Journal of Biological Sciences*, 4 : 537-541.
- Japoshvili, G., Abrantes, I. 2006. *Aphelinus* species (Hymenoptera : Aphelinidae) from the Iberian Peninsula, with the description of one new species from Portugal. *Journal of Natural History*, 40(13): 855-862.
- Jha, Y.G. 1998. Host plant of aphids (Homoptera : Aphididae) from Ranchi district of Chotanagpur plateau (Bihar). In *10<sup>th</sup> All India Congress of Zoology, October 14-18, 1998* (Eds. B.N. Pandey and B.K. Singh), Daya Publishing House, pp. 90-94.
- Joshi, S., Poorani, J. 2007. Aphids of Karnataka. URL: <http://www.aphidweb.com>.
- Kaf, N.A. 2002. Population dynamics of aphids (Aphididae: Homoptera) on some citrus cultivar in coastal region of Syria. *Arab Journal of Plant Protection*, 20(2): 99-105.
- Kar, I., Basu, G., Khuda-Bukhsh, A.R. 1990. A Check-list of Chromosomes in aphids (Homoptera : Aphididae) worked out in India along with the names and families of their host plants. *Environmental Ecology*, 8(1): 414-428.
- Koch, R.L., Venette, R.C., Hutchison, W.D. 2006. Invasions by *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae) in the Western Hemisphere: Implications for South America. *Neotropical Entomology*, 35(4): 421-434.
- Komazaki, S. 1983. Overwintering of the spirea aphid, *Aphis citricola* van der Goot (Homoptera: Aphididae) on citrus

- and spirea plants. *Applied Entomology and Zoology*, 18: 301-307.
- Komazaki, S. 1990. Variation in hatch timing of the overwintering egg among populations of *Aphis spiraeicola* Patch (Homoptera: Aphididae) collected from different host plants and localities in Japan. *Applied Entomology and Zoology*, 25(1): 27-34.
- Komazaki, S. 1991. Studies on the biology of the spirea aphid, *Aphis spiraeicola* Patch, with special reference to biotypic differences. *Bulletin of the Fruit Tree Research Station, Extra No. 2*: 60 pp.
- Komazaki, S. 1984. Rearing of the brown citrus aphid, *Toxoptera citricidus* (Kirkaldy), (Homoptera: Aphididae), on a synthetic diet with special reference to pH and sucrose concentration of diet and rearing density. *Applied Entomology and Zoology*, 19: 114-117.
- Komazaki, S., Sakagami, Y., Korenaga, R. 1979. Overwintering of aphids on citrus trees. *Japan Journal of Applied Entomology and Zoology*, 23: 246-250.
- Konar, A., Paul, S. 2006. Studies on pattern of some aphid species on *Citrus grandis* L. in plains of West Bengal. *9th National Symposium on Recent Advances in Aphidology* (November 27-29, 2006) held at Banaras Hindu University, Varanasi. Abstract, p. 54-56.
- Kranz, J., Schmutterer, H., Koch, W. 1977. *Diseases, Pests and Weeds in Tropical Crops*. Paul Parey, Berlin and Hamburg, pp. 666.
- Krishnamurthi, B. 1931. Aphididae of Mysore. II. *Journal of Bombay Natural History Society*, 34: 411-419.
- Krishnamurthi, B. 1948. Aphididae of Mysore. III. *Indian Journal of Entomology*, 10: 51-53.
- Kyriakopoulou, P.E., Perdikis, D.C., Sclavounos, A.P., Giris, S.M., Lykouressis, D.P., Tsitsipis, J.A., Christakis, P.A. 2000. Cucumber mosaic cucumovirus incidence in open-field tomato in the Olympia area and trap captures of alate aphids. *Bulletin OEPP*, 30(2): 305-315.
- Lefroy, H.M and Howlett, F.M. 1909. *Indian Insect Life. A manual of the insects of the plains* (Tropical India. W. Thacker and Co., London, pp. 743- 748.
- López Ciruelos, S.I., Mier Durante, M.P., Ortego, J., Garcia-Tejero, A., Nieto Nafria, J.M. 2016. Three new South American species of genus *Aphis* (Hemiptera: Aphididae) living on species of *Euphorbia* (Euphorbiaceae). *Zootaxa*, 4085(1): 103-118.
- Lykouressis, D.P. 1990. First record of *Aphis citricola* van der Goot (Homoptera: Aphididae) on citrus in southern Greece. *Entomologia Hellenica*, 8: 65-66.
- Lyla, K.R., Joy, P.J., Abraham, C.C. 1987. Insect pests of *Chromolaena odorata* (= *Eupatorium odoratum*). *Agricultural Research Journal of Kerala*, 25(2): 302-304.
- Maity, S.P., Bhattacharya, D.K., Chakrabarti, S. 1980. Aphids (Homoptera : Aphididae) of Northwest India.V: New records of aphids from Garhwal Himalaya. *Science and Culture*, 46: 311-312.
- Mall, N., Srivastava, P.N., Singh, R. 2010. First record of host plants of aphids (Homoptera : Aphididae) from India. *Journal of Aphidology*, 24: 85-86.
- Manjunath, K.L. 1985. Studies on the distribution, transmission, strains and strain interaction of citrus tristeza virus. *Z. Pfl. Pflanzen.*, 92: 502-508.
- Martin, J.H. 1996. *Aphis spiraeicola* Patch (Homoptera: Aphididae), an aphid pest of woody hosts now occurring on Cotoneaster in Britain. *Entomologist's Gazette*, 47(1): 51-52.
- Naidu R, 1980. *Aphis citricola* van der Goot - a new vector of citrus tristeza virus in India. *Current Science*, 49(17): 668-669.
- Omkar, Bind, R.B. 1995. Records of aphid-natural enemies complex of Uttar Pradesh. 1. The aphids. *Indian Journal of Agricultural Research*, 29(4): 215-218.
- Orozco, S.M., Perez, Z.O., Lopez, A.O. 1994. First report of zucchini yellow mosaic virus in *Cucumis melo* in Colima, Mexico. *Plant Disease*, 78(11): 1123.
- Owolabi, T.A., Taiwo, M.A., Thottappilly, G.A., Shoyinka, S.A., Proll, E., Rabenstein, F. 1998. Properties of a virus causing mosaic and leaf curl disease of *Celosia argentea* L. in Nigeria. *Acta Virologica*, 42(3): 133-139.
- Pfeiffer, D.G. 1991. Biology and management of aphids on apple. In: *New Directions in Tree Fruit Pest Management*. (Ed. K. Williams). Good Fruit Grower, Yakima. pp. 169-183.
- Pfeiffer, D.G., Brown, M.W., Varn, M.W. 1989. Incidence of spirea aphid (Homoptera: Aphididae) in apple orchards in Virginia, West Virginia and Maryland. *Journal of Entomological Science*, 24: 145-149.
- Piron, P.G.M., van Franken-huyzen, A. 1997. Some recent observations on two rare aphid species in the Netherlands: *Rhopalosiphum rufulum* and *Aphis citricola* (Homoptera: Aphididae). *Entomologische Berichten*, 57: 142-144.
- Prasad, S.M., Sarkar, D.P. 1989. Some ecological studies on papaya ringspot virus in Ranchi. *Indian Journal of Virology*, 5(1-2):118-122.
- Quimio, G.M., Calilung, V.J. 1993. Survey of flying viruliferous aphid species and population build-up of *Aphis glycines* Matsumura in soybean fields. *Philippine Entomologist*, 9(1): 52-100.
- Raha, S.K. 1979. Studies on the aphids (Homoptera: Insecta) of Nagaland, Ph. D. thesis, University of Calcutta, India, pp. 212.
- Rao, V.P. 1969. Survey for natural enemies in India. CIBC. *Indian Station, U.S. PL 480 Project, Final Tech. Rep.*, pp. 1-93.
- Rasoolian, G., Zadeh, S.A.J., Rahimian, H., Mosahebi, G. 2001. Study on transmission of citrus tristeza virus by major citrus aphids in Mazandaran. *Iranian Journal of Agricultural Science*, 32(3): 585-590.
- Raychaudhuri, D. 1978. Taxonomy and biology of aphids (Homoptera: Aphididae) of Manipur. *Ph.D. thesis, University of Calcutta, India*, pp. 308.
- Raychaudhuri, D.N. 1972. On two species of *Greenideoida* including one new species from the Philippine Islands in the collection of the British Museum (Nat. Hist.) London. *Kontyu*, 40: 33 – 36.
- Raychaudhuri, D.N. 1973. Taxonomy of the aphids of the Eastern Himalayas. US PI 480 Project Tech. Report, pp. 107.
- Raychaudhuri, D.N. 1980 (ed.). *Aphids of North-East India and Bhutan*. Zoological Society, Calcutta, pp. 521.
- Raychaudhuri, D.N. 1983 (ed.). *Food Plant Catalogue of Indian Aphididae*. Graphic Printall, Culcutta (India). pp. 204.
- Raychaudhuri, D.N., Dutta, S., Agarwala, B.K., Raha, S.K., Raychaudhuri, D. 1979. Some parasites and predators of

- aphids from northeast India and Bhutan. II. *Entomon*, 4: 163-166.
- Raychaudhuri, D.N., Ghosh, D., Raychaudhuri, D., Agarwala, B.K. 1981. Studies on the aphids (Homoptera : Aphididae) from south India. I. *Insecta Matsumurana, New Series*, 23: 1-20.
- Remaudiere, G., Remaudiere, M. 1997. *Catalogue of the Worlds Aphididae (Homoptera: Aphidoidea)*, INRA Paris, pp. 313.
- Ripka, G, 2001. New data to the knowledge of the aphid fauna of Hungary (Homoptera: Aphidoidea. *Acta Phytopathologica et Entomologica Hungarica*, 36: 81-87.
- Rizvi, S.M.A., Paul Khurana, S.M. 1970. Aphid fauna of economic crop plants in Gorakhpur. *Science and Culture*, 36: 49.
- Sanchez, M. del C., Cermeli, M., Diaz, D., Romero, R. 1993. Afidos (Hemiptera: Aphididae) capturados en trampas amarillas con agua en los campos de cana de azucar *Saccharum officinarum* L. de Maracay en 1988 y 1989. *Agronomia Tropical Maracay*, 43(5-6): 217-226.
- Sasaki, A. 1974. *Studies on Hassaku Dwarf. Special Bulletin of Fruit Tree Experimental Station of Hiroshima Prefecture*, 2, pp. 106.
- Satar, S., Uygun, N. 2008. Life cycle of *Aphis spiraecola* Patch (Homoptera: Aphididae) in East Mediterranean Region of Turkey and its development on some important host plants. *Control in Citrus Fruit Crops, IOBC/wprs Bulletin*, 38: 216-224.
- Singh, R., Upadhyay, B.S., Singh, D., Chaudhary, H.C. 1999. Aphids (Homoptera: Aphididae) and their parasitoids in North-Eastern Uttar Pradesh. *Journal of Aphidology*, 13: 49-62.
- Singh, T.K. 1986. Biosystematics of the aphids and their natural enemy complex of Manipur. *Technical Report, Science and Technology, Government of Manipur*, pp. 51.
- Singh, V.K., Dubey, S., Singh, R. 2012. *Biosystematics and Bioecology of Aphis spiraecola* Patch. LAP Lambert Academic Publishing, Germany, pp. 152.
- Stáry, P., Ghosh, A.K. 1979. Redescription of *Trioxys nepalensis* (Takada) and new host records of some aphid parasitoids (Hymenoptera: Aphidiidae) from Meghalaya, India. *Oriental Insects*, 13(1/2):41-45
- Stáry P, Zeleny J, 1983. Aphid parasitoids from Vietnam (Hymenoptera, Aphidiidae. *Acta Entomologica Bohemoslovaca*, 80(3):190-195.
- Swirski, E., Izhar, Y., Wysoki, M. 1991. Appearance of *Aphis gossypii* Glover and *Aphis spiraecola* Patch (Rhynchota: Aphidoidea) on avocado, persimmon and macadamia. *Alon Hanotea*, 45(5):416.
- Tai, Y.M., Fu, Y., Yang, B.L., Chen, G.H., Tao, M. 2004. Studies on the quantity dynamic of pear aphids and their natural enemy in Kunming region. *Southwest China Journal of Agricultural Sciences*, 17(3): 337-339.
- Tamrakar, A.S., Singh, R. 2000. Records of aphid parasitoids from Madhyanchal of Nepal. *Journal of Aphidology*, 14: 129-132.
- Trejo Loyo, A.G., Pena Martinez, R., Marin Jarillo, A. 2004. Notes on the biology and ecology of *Aphis spiraecola* Patch in Northern Morelos, Mexico. Aphids in a new millennium. *Proceedings of the Sixth International Symposium on Aphids, September 2001, Rennes, France*, pp. 87-91.
- Tremblay, E., Kawar, N., Barbagallo, S. 1985. Aphids (Homoptera Aphidoidea) and aphidiines (Hymenoptera Braconidae) of Lebanon. *Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri"*, 42: 19-32.
- Tsai, J.H., Wang, J.J. 2001. Effects of host plants on biology and life table parameters of *Aphis spiraecola* (Homoptera: Aphididae. *Environmental Entomology*, 30(1): 44-50.
- Uygun, N., Sekeroglu, E., Karaca, I. 1987. Studies on integrated control in a newly established citrus orchard in Cukurova. *Turkiye I. Entomoloji Kongresi Bildirileri*, 13-16 Ekim 1987, Ege Universitesi, Bornova, Izmir Bornova/Izmir, Turkey; Ege Universitesi Ataturk Kultur Merkezi, pp. 459-469.
- Uyi, U.O., Aisagbonhi, C.I. 2009. Abundance of *Aphis spiraecola* Patch on *Chromolaena odorata* (L.) in a Palm. *International Journal of Pure and Applied Sciences*, 3(2):14-19.
- Van Hoof, H.A. 1962. Observations on aphid flights in Surinam. *Entomologia Experimentalis et Applicata*, 5(4): 239-243.
- Wang, J.J., Tsai, J.H. 2000. Effect of temperature on the biology of *Aphis spiraecola* (Homoptera: Aphididae. *Annals of the Entomological Society of America*, 93(4): 874-883.
- Zhang, Y.M., Li, D.X., Chen, G.Q., Zhang, G.H. 1997. Studies on the population dynamics of spirea aphid in apple orchards. *Acta Agriculturae Universitatis Henanensis*, 31(2): 197-200.

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