ISSN : 2350-0743

www.ijramr.com

International Journal of Recent Advances in Multidisciplinary Research
Vol. 04, Issue 02, pp.2274-2286, February, 2017

RESEARCH ARTICLE

DISTRIBUTION AND ECONOMIC IMPORTANCE OF *APHIS (APHIS) CRACCIVORA* KOCH, 1854 (APHIDINI: APHIDINAE: APHIDIDAE: HEMIPTERA) AND ITS FOOD PLANTS IN INDIA

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ARTICLE INFO

Article History:
Received 09th November, 2016
Received in revised form
05th December, 2016
Accepted 16th January, 2017
Published online 28th February, 2017

Keywords:

Aphis Craccivora,
Distribution,
Economic Importance,
Host Plant,
Cowpea Aphid,
Bean Aphid.

ABSTRACT

Aphis (Aphis) cracciovora Koch is a polyphagous aphid and is a major pest of legume crops. The diversity of its host range in India includes plants belonging to over 200 species/subspecies under 46 plant families. Plants belonging to following families are highly infested: Asteraceae, Cucurbitaceae, Fabaceae and Solanaceae.

INTRODUCTION

The black bean aphid, Aphis craccivora was described by Koch in 1854 from Germany. Recently, the genus Aphis Linnaeus, 1758 is subdivided into 6 subgenera : Aphis (s.s.), Bursaphis Baker, 1934, Iowana Hottes, 1954, Maculaphis Zhang and Zhang, 2002, Pseudoprotaphis Kadyrbekov, 2001, Toxoptera Koch, 1856 and Zyxaphis Knowlton, 1947 (Favret, 2016). Aphis craccivora is kept under subgenus Aphis. In India, Lefroy and Howlett (1909) reported it for the first time on Vigna unguiculata ssp. cylindrica (L.) Verdc. (=Vigna catjang (Burm.f.) Walp.; = Dolichos biflorus L.). Thereafter, it was recorded from different parts of the country on several food plants (Panda and Raju, 1972; Chhabra *et al*., 1983, 1986; Ganguli and Raychaudhuri, 1984; Barar and Rataul, 1986; Srikanth and Lakkundi, 1988; Lal *et al*., 1989; Gaffar *et al*., 1990). Aphis craccivora is a remarkable species in terms of geographical and host plant range. It is one of the most widespread species of aphids, and displays a large range of host-plants, covering very different families. It is extremely polyphagous infesting over 400 plant species in the world (Blackman and Eastop, 2000) and is a major pest of numerous crops particularly pulse crops (Chhabra *et al*., 1983).

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The aphid has become a serious pest of field and glasshouse crops, especially Cajanus cajan (L.) Millsp., Cicer arietinum L., Glycine max (L.) Merr, Hibiscus rosa-sinensis L., Lablab purpureus (L.) Sweet ssp. purpureus (=Dolichos lablab L.), Lens culinaris Medik., Lens culinaris ssp. culinaris Medik (=Lens esculenta Moench.), Phaseolus sinensis Hort. ex Schur, Pisum sativum L., Vicia faba L., Vigna mungo (L.) Hepper (=Phaseolus roxburghii Wight and Arn.), Vigna mungo (L.) Hepper var. mungo (=Phaseolus mungo L.), Vigna radiata (L.) R. Wiczek var. radiata (=Phaseolus radiatus L.; Phaseolus aureus Roxb.), Vigna unguiculata ssp. cylindrica (L.) Verdc. (=Vigna catjang (Burm.f.) Walp.; Dolichos biflorus L.), Vigna unguiculata ssp. sensquipedalis (L.) Walp. (=Vigna sensquipedalis (L.) Fruwirh), Vigna unguiculata ssp. unguiculata (L.) Walp. (= Vigna sinensis (L.) Savi ex Hassk.) (Chhabra *et al*., 1983; Raychaudhuri, 1983; Das, 2002; Singh *et al*., 200). The adults are always shiny black, immatures lightly dusted with wax and light brownish; nymphs collected on Cajanus cajan Millsp. are light reddish brown (Plates 1-4).

Economic significance

Aphis craccivora is one of the notorious insect pests of the world, particularly ruing the crops particularly grain legumes. It feeds by sucking sap from their host plants. The undersides of leaves are preferred, other leaf surfaces and flower buds are its next choice, but the entire host may be covered when populations are large.

Infested leaves often become cupped downwards and may appear wrinklEd. Heavy infestations on some hosts may result in wilting. Young plants may have reduced or stunted growth. Aphis craccivora can curl, yellow, or stunt leaves and can reduce flower production and stem growth. Like other aphids, Aphis craccivora produces copious amounts of honeydew, a sweet and watery anal excrement that serves as a medium on which sooty mould grows. Sooty mould blackens the leaf and decreases photosynthetic activity (Elmer and Brawner, 1975). When found on the fruits, honeydew and sooty mould reduces their marketability. Growers respond by washing vegetable beans before marketing them. However, unfortunately, the vegetable often becomes unmarketable or of a lower grade because the fungus is difficult to wash off. Aphis craccivora (both apterous and alate morphs) vector many plant diseases which cause substantially greater losses than damage caused by direct feeding injury. This is often the most damaging feature of an aphid infestation. Out of 620 plant viruses known in the bioscience, about one-third are arthropod-borne and more than 80 per cent are transmitted by aphids (Eastop, 1977; Behura, 1986). Aphis craccivora alone transmit several plant viruses such as : Bean Yellow Mosaic Potyvirus (BYMV) (Zhang and Xu,1993; Berlandier *et al*., 1997), Blackeye Cowpea Mosaic Potyvirus (BCMV) (Prasad *et al*., 2007), Brinjal Mosaic Virus, Broad Bean Stain Comovirus, Broad Bean Wilt Fabavirus, Cucumber Mosaic Cucumovirus (CMV) (Berlandier *et al*., 1997), Cucumber Mosaic Virus (CMV) (Bwye *et al*., 1995, 1997; Thackray *et al*., 2000), Faba Bean Necrotic Yellows Virus (FBNYV), Groundnut Rosette Virus-Chlorotic (GRV-C) (Alegbejo, 1999), Groundnut Rosette Virus-Green (GRV-G) (Alegbejo, 1999), Peanut Stunt Cucumovirus (PSV) (Zhang *et al*., 1998), Safflower Mosaic Virus (Ravinder *et al*., 1990), Senna Mosaic Virus (SeMV) (Owolabi and Proll, 2001), Sesame Mosaic Potyvirus (SMPV), Soyabean Mosaic Virus (SMV) (Quimio and Calilung, 1993), Tobacco Etch Virus (TEV) (McDonald *et al*., 2003), Urdbean Leaf Crinkle Virus (Dhingra, 1975; Bhardwaj, 1981), Watermelon Mosaic Virus (WMV) (Hander *et al*., 1993), etc.

Distribution

Aphis craccivora is a cosmopolitan and polyphagous species widely distributed in tropical, subtropical, and temperate regions of the world infesting legume crops as well as other vegetable crops (Raychaudhuri, D.N., 1980; Chhabra *et al*., 1983; Blackman and Eastop, 2000, 2006; Edirisinghe and Wijerathna, 2006). In India, it has been reported from all states where cowpea is cultivated: Andhra Pradesh (Venkateswarlu *et al*., 2003; War *et al*., 2013); Arunachal Pradesh (Ballal *et al*., 2006; Thakur *et al*., 2012); Assam (Ghosh, A.K. and Raychaudhuri, D.N., 1962a; Ghosh, A.K. and Raychaudhuri, D.N., 1963); Bihar (Ahmed and Singh, 1996a; Ahmad and Kumar, 2006; Jha, 1998); Chhatisgarh (Oudhia, 2001); Delhi (Ghulam-Ullah, 1940); Gujarat (Patel and Patel, 1971); Goa (Ramesh *et al*., 2016); Haryana (Verma *et al*., 1975); Himachal Pradesh (Bhalla and Pawar, 1977; Ghosh, L.K., 1977; Sharma and Bhalla, 1964); Jammu and Kashmir (Verma, 1971; Bhagat, 1982); Karnataka (Krishnamurthi, 1929; Krishnamurthi and Usman, 1954; Joshi and Poorani, 2007); Kerala (George, 1927); Madhya Pradesh (Anonymus, 2005; Chandra and Kushwaha, 2013); Maharstra (Rao and Kulkarni, 1972); Manipur (Agarwala, *et al*., 1980; Chatterjee *et al*., 1961; Raychaudhuri, D., 1978); Mizorum (Singh, O.L. and Singh, 1986); Nagaland (Raha, 1979; Raha *et al*., 1977); Orissa (Sengupta *et al*., 1962); Punjab (Batra and Wadhi, 1962); Rajasthan (Ghosh, A.K. and Raychaudhuri, D.N., 1962b; Joshi and Mathur, 1967; Raychaudhuri, D.N. and Ghosh, A.K., 1959; Vir and Singh, 2004); Sikkim (Agarwala, 1979; Agarwala and Raychaudhuri, 1981); Tamil Nadu (Basheer, 1958; David, 1956); Telangana (War *et al*., 2016); Tripura (Ganguli and Ghosh, 1965); Uttar Pradesh (Rizvi and Paul Khurana, 1970; Ahmed and Singh, 1996b; Singh *et al*., 1999; Agrawal and Singh, 2005); Uttarakhand (Chakrabarti, 1972; Maity and Chakrabarti, 1979); West Bengal (Agarwala *et al*., 1982; Banerjee and Basu, 1955; Basu *et al*., 1969). Elsewhere, Aphis craccivora is reported from most of the countries, viz., Australia, Bangladesh, Brazil, Central America, China, Costa Rica, Egypt, El Salvador, France, Geneva, Greece, Indonesia, Iran, Israel, Japan, Malasia, Mexico, Nepal, New Zealand, Nigeria, North America, Pakistan, Portugal, South and tropical Africa, South America, Spain, Sri Lanka, Surinam, Russia Federation; Thailand, Tunisia, U.K., Venezuela, Vietnam, Virginia etc. (Mamedova, 1957; Alimdzhanov and Zhuravleva, 1963; Saleh *et al*., 1972; Bohlen, 1973; Narzikulov and Shomirsaidov, 1975; Ivanovskaya, 1976; Hamid *et al*. 1977; Zhang and Zhong, 1981; Belikova, 1983; Waterhouse, 1993; Halima Kamel and Hamouda, 1998; Tamrakar, 2001; Moore and Miller, 2002; McDonald *et al*., 2003; Blackman and Eastop, 2006; Edirisinghe and Wijerathna, 2006; Ortiz *et al*., 2006; Tsuchida *et al*. 2006; Evans and Halbert, 2007; Gómez Souza *et al*., 2007; Kuroli and Lantos, 2008; Laamari *et al*. 2009; Akyürek *et al*., 2011; Mehrparvar *et al*., 2012; Ali *et al*. 2013; Brady and White, 2013; Durante *et al*., 2016). Figure illustrates the distribution of Aphis cracivora in the world map.

Phenotypic plasticity

The great success with which Aphis craccivora has exploited a wide diversity of ecosystems may be accredited to its phenotypic plasticity and complex life-cycle. The life-cycle of an aphid potentially consists of several clones which are endowed with a remarkable ability to adapt to a heterogeneous environment accompanied by phenotypic changes (Agarwala, 2007; Agarwala *et al*., 2007). Each clone goes through a seasonal life-cycle made of a sequence of morphs or phenotypes that differ in their morphology, behaviour and physiology, but have identical genotype. The different phenotypes of a genotype provide the species ample scope to seek and exploit food resources under wide conditions (Agarwala, 2007). Morphometrical variations in body parts are common occurrence in aphids feeding on different food plants (Trivedi and Singh, 2014). Biotypes of Aphis craccivora are assumed to exist since there has been a significant and obvious change in the temperature tolerance (Takallouzadeh, 2003) and preference of host plants (Srikanth and Lakkundi, 1988; Hafiz, 2006; Mesfin *et al*., 2008; Obopile and Ositile, 2010) of this aphid species. These changes have been accompanied by an increase in the distribution and severity of this aphid as a pest. With this evidence supporting the existence of biotypes, it is strongly recommended that cultivars be tested using aphid populations collected in areas where the cultivar will be grown (Summers, 2000).

Common names and synonymy

Aphis craccivora is commonly known as African bean aphid, bean aphid, black bean aphid, black legume aphid, black

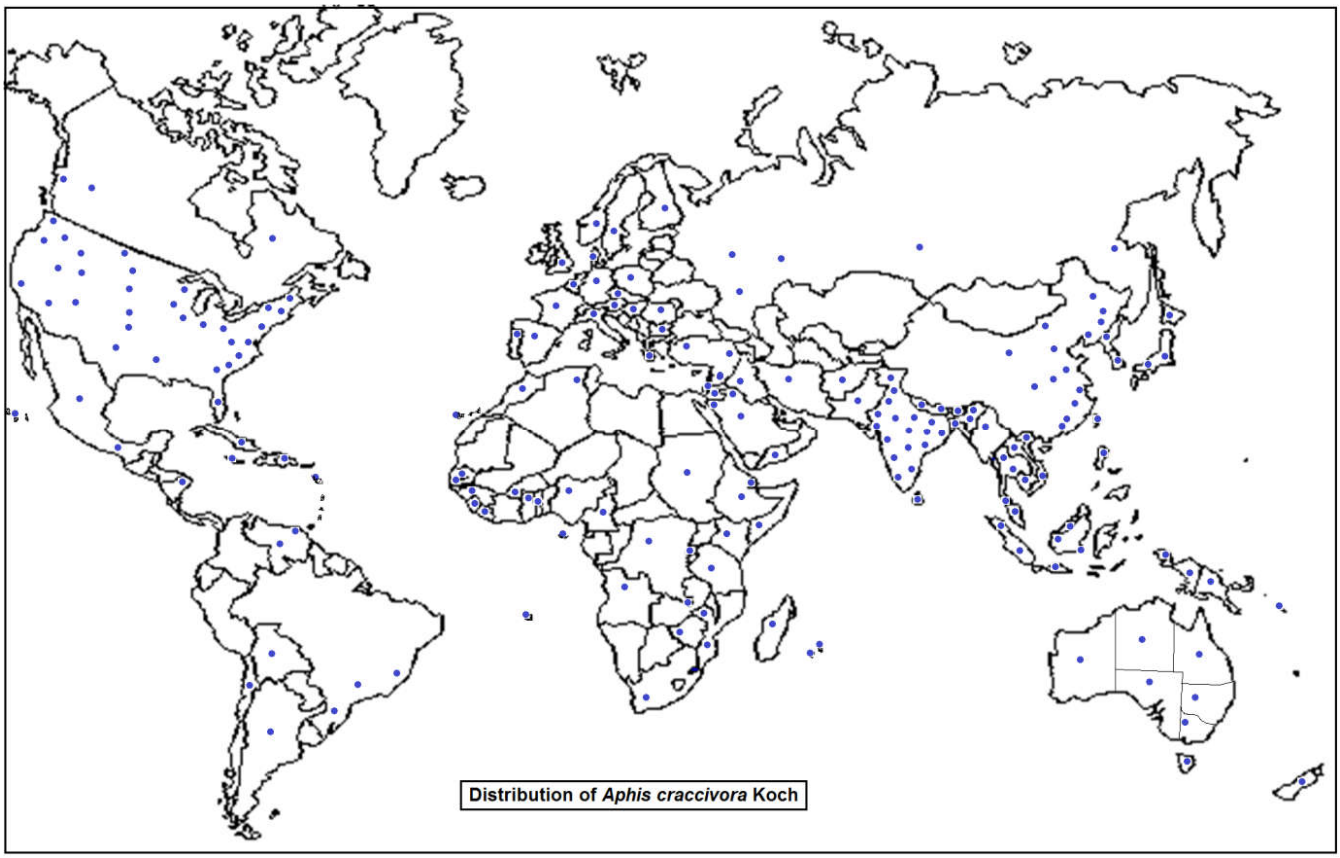

Figure 1. Distribution of Aphis craccivora Koch

lucerne aphid, cowpea aphid, groundnut aphid, lucerne aphid, and oriental pea aphid. 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): Anuraphis (Macchiatiella) medicaginea del Guercio, 1930; Aphis atrata Zhang, 1981; Aphis atronitens Cockerell, 1903; Aphis beccarii del Guercio, 1917; Aphis cistiella Theobald, 1923; Aphis citricola del Guercio, 1917 nec v. d. Goot, 1912; Aphis craccivora subsp. usuana Zhang, 1981; Aphis dolichi Montrouzier, 1861; Aphis funesta Hottes and Frison, 1931; Aphis hordei del Guercio, 1913; Aphis isabellina del Guercio, 1917; Aphis kyberi Hottes, 1930; Aphis leguminosae Theobald, 1915; Aphis loti Kaltenbach, 1862; Aphis medicaginis auctt. prior 1950 nec Koch, 1854; Aphis meliloti (Börner, 1939); Aphis mimosae Ferrari, 1872; Aphis onobrychidis Goureau, 1863; Aphis oxalina Theobald, 1925; Aphis papilionacearum van der Goot, 1918; Aphis robiniae Macchiati, 1885; Aphis robiniae subsp. canavaliae Zhang, 1981; Doralida loti (Kaltenbach, 1862); Doralina medicaginis (Koch, 1854); Doralina salsolae Börner, 1940; Doralis meliloti Börner, 1939; Doralis robiniae (Macchiati, 1885); Pergandeida (Doralida) loti subsp. gollmicki Borner, 1952; Pergandeida loti (Kaltenbach, 1862); Pergandeida medicaginis auct. nec. Koch, 1854; Pergandeida robiniae (Macchiati, 1885).

Familywise food plants

In India, it was reported on over 200 plant species belonging to 46 plant families given below. It infests especially Asteraceae, Brassicaceae, Fabaceae, Malvaceae, Rosaceae, Rutaceae, and Solanaceae. The following records of food plants of Aphis craccivora 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 informations 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 craccivora recorded in India upto December, 2016.

Family-wise food plants

- **Amaranthaceae:** *Achyranthes aspera* L. (David, 1956; Behura, 1963); *Amaranthus spinosus* L. (Sengupta *et al.*, 1962; Behura, 1965; Singh, R. *et al.*, 1999; Agarwal *et al.*, 2006); *Amaranthus tricolor* L. (= *Amaranthus gangeticus* L.; *Amaranthus gangeticus* var. *oleracea* L.; *Amaranthus gangeticus* var. *tristis* (L.) Thell) (David, 1956; Sengupta *et al.*, 1962; Behura, 1963; Behura, 1965); *Amaranthus viridis* Desf. (= *Amaranthus gracilis* Desf.) (David, 1956; Behura, 1963; Rao, 1969; Raychaudhuri, D.N., 1973; Ghosh L.K., 1990); *Gomphrena globosa* L. (Mall *et al*., 2012).
- **Anacardiaceae:** *Mangifera indica* L. (Verma *et al.*, 1975; Ahmad and Kumar, 2006)
- **Apiaceae (=Umbelliferae):** *Coriandrum sativum* L. (Rao, 1969); *Oenanthe javanica* ssp. *stolonifera* (Wall ex DC.) Murata (=*Oenanthe stolonifera* Wall ex C.) (Raychaudhuri, D.N., 1973).
- **Apocyanaceae (=Asclepiadaceae):** *Alstonia scholaris* (L.) R. Br. (Raychaudhuri, D.N., 1973); *Calotropis procera* (Aiton) W.T. Aiton (Kar *et al.*, 1990);

Calotropis gigantea (L.) W.T. Aiton (Behura, 1963; Raychaudhuri, D.N. and Ghosh, A.K. 1959; Sengupta *et al.*, 1962); *Carissa* sp. (Behura, 1965); *Nerium oleander* L. (=*Nerium odorum* Aiton; *Nerium indicum* Mil (L.)) (Ahmad and Kumar, 2006).

- **Araceae:** *Colocasia esculenta* (L.) Schott. (=*Colocasia antiquorum* Schott.) (Raha, 1979); *Colocasia* sp. (Raha *et al.*, 1977).
- **Asteraceae:** *Ageratum conyzoides* L. (Nayak *et al.*, 1982; Singh, R. *et al.*, 1999; Ahmad and Kumar, 2006); *Astragalus nuttallii* (Torr. and Gray) Howell (=*Erigeron asteroides* Roxb.) (Behura, 1963; David, 1956); *Bidens biternata* (Lour.) Merr. and Sherff (Rao, 1969; Ghosh L.K., 1990); *Bidens pilosa* L. (Agarwala, 1979); *Carthamus tinctorius* L. (Behura, 1965; Patel and Patel, 1971); *Chrysanthemum indicum* L. (Patel and Patel, 1971); *Chrysanthemum* sp. (Agarwala, 1979); *Cnicus* sp. (Agarwala *et al.*, 1980); *Cnicus wallichii* Hook.f. (Agarwala *et al.*, 1980); *Cosmos* sp. (Ganguli and Ghosh, 1965); *Dahlia pinnata* Cav. (Mall *et al.*, 2010); *Eupatorium odoratum* L. (Raychaudhuri, D.N., 1973; Ghosh, A.K. and Agarwala, 1980); *Eupatorium* sp. (Nayak *et al.*, 1982); *Guizotia abyssinica* (L.f.) Cass. (Behura, 1965); *Helianthus annuus* L. (Chatterjee *et al.*, 1961; Ahmed and Singh, 1996b; Singh, R. *et al.*, 1999; Agarwal *et al.*, 2006); *Helianthus* sp. (Ahmed and Singh, 1996b); *Launaea nudicaulis* (Linn.) Hook. f. (Mall *et al.*, 2010); *Sonchus asper* (L.) Hill. (Mall *et al.*, 2010); *Sonchus* sp. (Singh, R. *et al.*, 1999; Ahmad and Kumar, 2006); *Tagetes erecta* L. (Singh, R. *et al.*, 1999; Agarwal *et al.*, 2006); *Tagetes* sp. (Raychaudhuri, D.N., 1973; Singh, R. *et al.*, 1999); *Vernonia cinerea* (L.) Less. (David, 1956; Behura, 1963; Basheer, 1985); Unidentified plants (Chatterjee *et al.*, 1961).
- **Bignoniaceae:** *Tecomella undulate* (Sm.) Seem. (Vir and Singh, 2004).
- **Boraginaceae:** *Heliotropium indicum* L. (Behura, 1963; Shuja Uddin, 1974).
- **Brassicaceae:** *Raphanus sativus* L. (Agarwala, 1979; Ahmad and Kumar, 2006); *Brassica oleracea* var. *botrytis* L. (Ahmad and Kumar, 2006); *Brassica rapa* ssp. *campestris* (L.) A.R. Clapham (= *Brassica campestris* (L.)) (Ahmad and Kumar, 2006).
- **Caricaceae:** *Carica papaya* L. (David, 1958; Behura, 1963; Singh, R. *et al.*, 1999; Agarwal *et al.*, 2006).
- **Chenopodiaceae:** *Beta vulgaris* L. (Agarwala, 1979; Agrawal and Singh, 2005; Bhatt *et al.*, 2006); *Chenopodium album* L. (Verma *et al.*, 1975); *Chenopodium ravely* – error, no species of this name exists in literature) (Behura, 1963); *Kochia* sp. (Behura, 1963; David, 1957).
- **Cleomaceae:** *Cleome chelidonii* L.f. (Behura, 1965); *Cleome gyandra* L. (=*Cleome pentaphylla* (L.)) (David, 1957; Behura, 1963).
- **Convolvulaceae:** *Cuscuta reflexa* Roxb. (Chakrabarti and Sarkar, 2001); *Ipomoea* sp. (Raychaudhuri, D.N. *et al.*, 1981).
- **Cucurbitaceae:** *Benincasa hispida* (Thumb.) Cogn. (Raychaudhuri, D.N., 1973; Raychaudhuri, D.N. 1980; Singh, R. *et al.*, 1999; Bhatt *et al.*, 2006); *Coccinia grandis* (L.) Voigt. (=*Coccinia cordifolia* (L.) Cogn; *Coccinia indica* Wight and Arn.) (Patel and Patel, 1971; Ghosh L.K., 1990); *Cucumis melo* L. (Ahmad and Kumar, 2006); *Cucumis sativus* L. (Raychaudhuri, D.N., 1973); *Cucurbita maxima* Duchesne (Singh, R. *et al.*, 1999; Agarwal *et al.*, 2006); *Lagenaria siceraria* (Molino) Standl. (=*Lagenaria leucantha* Duches., *Lagenaria vulgaris* Ser.) (Rao and Kulkarni, 1972; Nayak *et al.*, 1982; Agarwal *et al.*, 2006; Ahmad and Kumar, 2006); *Luffa aegyptiaca* Mill. (=*Luffa cylindrica* M. Roem.) (Raychaudhuri, D.N., 1973; Singh, R. *et al.*, 1999; Bhatt *et al.*, 2006; Ahmad and Kumar, 2006); *Momordica charantia* L. (Mall *et al.*, 2010); Unidentified plants (Raychaudhuri, D.N. and Ghosh, A.K. 1958; Ghosh, A.K. and Raychaudhuri D.N., 1959; Raychaudhuri, D.N. and Ghosh, A.K. 1959; Behura, 1963).
- **Ericaceae:** *Lyonia ovalifolia* (Wall.) Drude (Raychaudhuri, D.N., 1973).
- **Euphorbiaceae:** *Acalypha* sp. (Behura, 1965); *Euphorbia* sp. (Agarwala, 1979); *Mallotus indica* error, no species of this name exists in literature) (Chakrabarti and Sarkar, 2001); *Manihot esculanta* Crantz. (Raychaudhuri, D.N. and Raychaudhuri, D. 1978); Unidentified plants (Ghosh, A.K. and Raychaudhuri D.N., 1962a; Ghosh, A.K. and Raychaudhuri D.N., 1963; Behura, 1965).
- **Fabaceae:** *Abrus* sp. (Joshi and Poorani, 2007); *Aeschynomene americana* Linn. (Jha, 1998); *Aeschynomene* sp. (Nayak *et al.*, 1982); *Alhagi camelorum* Fisch. (Behura, 1963); *Alhagi pseudoalhagi* (M. Bieb) Desv. (Ghosh L.K., 1990); *Alysicarpus glumaceus* (Vahl.) DC. (Ghosh L.K., 1990); *Alysicarpus rugosus* (Wild.) DC. (David, 1957; Behura, 1963); *Arachis hypogaea* L. (Basu, A.N. and Banerjee, 1958; Sengupta *et al.*, 1962; Chakrabarti, 1972; Bhalla and Pawar, 1977); *Cajanus cajan* (L.) Millsp. (Basu, A.N. and Banerjee, 1958; Ahmed and Singh, 1996a; Ahmad and Kumar, 2006); *Cajanus* sp. (Banerjee and Basu, A.N., 1955; *Canavalia ensiformis* (L.) DC. (Raychaudhuri, D., 1978); *Cassia fistula* L. (Singh, R. *et al.*, 1999; Bhatt *et al.*, 2006); *Cassia javanica* L. (Raychaudhuri, D., 1978; Raha, 1979); *Cassia* sp. (Banerjee and Basu, A.N., 1955; Basu, A.N. and Banerjee, 1958; Ghosh, A.K. and Agarwala, 1980); *Cicer arietinum* L. (Banerjee and Basu, A.N., 1955; Rao, 1969; Singh, R. *et al.*, 1999; Ahmad and Kumar, 2006); *Cicer* sp. (George, 1927); *Crotalaria juncea* L. (David, 1957; Behura, 1963; Ghosh, M.R. *et al.*, 1971; Raychaudhuri, D.N., 1973); *Crotalaria pallida* Aiton (Jha, 1998; Joshi and Poorani, 2007); *Crotalaria* sp. (Krishnamurthi, 1929; Raychaudhuri, D.N., 1973; Ghosh, A.K. and Agarwala, 1980); *Cyamopsis tetragonoloba* (L.) Taub. (Krishnamurthi, 1948; David, 1957; Behura, 1963; Patel and Patel, 1971); *Dalbergia sissoo* Roxb. ex DC. (Ghosh, L.K. (1969a; Singh, R. *et al.*, 1999; Agarwal *et al.*, 2006); *Dalbergia* sp. (Raychaudhuri, D.N., 1973); *Desmodium* sp. (Raychaudhuri, D.N., 1973); *Dolichos* sp. (Maity and Chakrabarti, 1979); *Flemingia macrophylla* (Willd.) Merr. (=*Moghania macrophylla* (Willd.) Kuntz.) (Sen *et al.*, 1987); *Gliricidia maculata* (Kunth) Kunth ex Walp. (David, 1957; Rao, 1969; Patel and Patel, 1971; Basheer, 1958); *Glycine max* (L.) Merr. (Sengupta *et al.*, 1962; Raychaudhuri, D.N., 1973; Bhalla and Pawar,

1977; Agarwal *et al.*, 2006); *Indigofera linnaei* Ali (=*Indigofera enneaphylla* (L.)) (David, 1957; Behura, 1963); *Indigofera nigrescens* Kurz ex King and Prain (=*Indigofera nigra* Kurz) (David, 1957; Behura, 1963); *Indigofera oblongifolia* Forssk. (David, 1956; Behura, 1963); *Indigofera purpurea* Steud. (Ghosh L.K., 1990); *Indigofera* sp. (George, 1927; David, 1957; Raychaudhuri, D.N., 1973; Ghosh, A.K. and Agarwala, 1980); *Indigofera tinctoria* L. (Behura, 1963); *Indigofera trita* L.f. (=*Tephrosia trita* misident.) (David, 1957; Behura, 1963); *Lablab purpureus* (L.) Sweet ssp. *purpureus* (=*Dolichos lablab* (L.) (Banerjee and Basu, A.N., 1955; Ganguli and Ghosh, 1965; Singh, R. *et al.*, 1999); *Lablab speciosa* error, no species of this name exists in literature) (Kar *et al.*, 1990); *Lathyrus aphaca* L. (Verma *et al.*, 1975; Ahmad and Kumar, 2006); *Lathyrus sativus* L. (Ghulam-Ullah, 1940; Banerjee and Basu, A.N., 1955; Agarwal *et al.*, 2006); *Lens culinaris* Medik. (Ahmed and Singh, 1996b; Singh, R. *et al.*, 1999; Agarwal *et al.*, 2006; Ahmad and Kumar, 2006); *Lens culinaris* ssp. *culinaris* Medik (=*Lens esculenta* Moench.) (Ghulam-Ullah, 1940; Verma *et al.*, 1975; Behura, 1963; Chhabra *et al.*, 1983); *Leucaena leucocephala* (Lam.) de Wit. (Sath and Jadhav, 2008); *Medicago lupulina* L. (Ghulam-Ullah, 1940; Behura, 1963); *Medicago polymorpha* var. *vulgaris* (Benth.) Shinners (=*Medicago denticulata* Willd.) (Behura, 1963; Ghulam-Ullah, 1940; *Medicago sativa* L. (Behura, 1963; David, 1957; George, 1927; Patel and Patel, 1971); *Melilotus albus* Medik (Ahmad and Kumar, 2006); *Melilotus indicus* (L.) All. (Rao, 1969); *Melilotus indicus* (L.) var. *indicus* (=*Melilotus parviflorus* Dest.) (Behura, 1963); *Mimosa pudica* L. (Raychaudhuri, D.N., 1973; Raychaudhuri, D.N. 1980; Singh, R. *et al.*, 1999; Agarwal *et al.*, 2006); *Mimosa* sp. (Raychaudhuri, D.N. *et al.*, 1981); *Mucuna* sp. (Singh, O.L. and Singh, 1986); ***Phaseolus coccineus* L. (Bhagat, 2012);** *Phaseolus sinensis* Hort. ex Schur (Ahmed and Singh, 1996a, b; Singh, R. *et al.*, 1999; Ahmad and Kumar, 2006); *Phaseolus* sp. (Ghosh, L.K. (1977); *Phaseolus vulgaris* L. (Raychaudhuri, D., 1978); *Pisum sativum* L. (Ganguli and Ghosh, 1965; Singh, R. *et al.*, 1999; Ahmad and Kumar, 2006); *Psophocarpus tetragonolobus* (L.) DC. (Behura, 1965); *Robinia pseudoacacia* L. (Stary and Raychaudhuri, 1982; Bhagat, 1984); *Senna alata* (L.) Roxb. (=*Cassia alata* (L.)) (Poddar and Ghosh, 1984); *Senna auriculata* (L.) Roxb. (=*Cassia auriculata* (L.)) (Krishnamurthi, 1948; Behura, 1963; Patel and Patel, 1971); *Senna hirsuta* (L.) H. S. Irwin and Barneby var. *hirsuta* (=*Cassia hirsuta* (L.) (Raychaudhuri, D., 1978); *Senna sophera* (L.) Roxb. (=*Cassia sophera* (L.)) (Rao, 1969; Raychaudhuri, D.N., 1973; Raychaudhuri, D., 1978; Poddar and Ghosh, 1984); *Senna tora* (L.) Roxb. (=*Cassia tora* (L.)) (Behura, 1965; Verma *et al.*, 1965; Patel and Patel, 1971; Poddar and Ghosh, 1984); *Sesbania bispinosa* (Jacq.) W. Wight (Sengupta *et al.*, 1962; Behura, 1963); *Sesbania cannabina* (Retz.) Pers. (Behura, 1963); *Sesbania grandiflora* (L.) Pers. (George, 1927; Krishnamurthi, 1948; David, 1957; Behura, 1963); *Sesbania speciosa* Taub. (David, 1957; Sengupta *et al.*, 1962; Behura, 1963); *Smithia sensitiva* Aiton (Raychaudhuri, D., 1978); *Tephrosia candida* DC. (Ghosh, M.R. *et al.*, 1971; Raychaudhuri, D.N., 1973; Agarwala, 1979;); *Tephrosia purpurea* (L.) Pers. (David, 1957; Behura, 1963); *Trifolium alexandrinum* L. (Ghulam-Ullah, 1940; David, 1957; Behura, 1963); *Trifolium praetutianum* Guss. (=*Trifolium prutentianum* auct. nonn.) (Chakrabarti, 1972); *Trifolium repens* L. (Ghosh, A.K. and Raychaudhuri D.N., 1962b; Behura, 1965); *Trigonella foenum-graecum* L. (Behura, 1963; Joshi and Mathur, 1967; Verma *et al.*, 1975; Ahmad and Kumar, 2006); *Trigonella polycerata* L. (Ahmed and Singh, 1996b; Singh, R. *et al.*, 1999); *Vicia faba* L. (Chatterjee *et al.*, 1961; Behura, 1963; Singh, R. *et al.*, 1999; Ahmad and Kumar, 2006); *Vicia sativa* L. (Mall, 2012); *Vigna mungo* (L.) Hepper (=*Phaseolus roxburghii* Wight and Arn.) (Raychaudhuri, D., 1978; Agarwala, 1979; Chhabra *et al.*, 1983); *Vigna mungo* (L.) Hepper var. *mungo* (=*Phaseolus mungo* (L.) (Banerjee and Basu, A.N., 1955; David, 1957; Agrawal and Singh, 2005; Ahmad and Kumar, 2006); *Vigna radiata* (L.) R. Wiczek var. *radiata (=Phaseolus radiatus* (L.; *Phaseolus aureus* Roxb.) (David, 1957; Sengupta *et al.*, 1962; Verma *et al.*, 1975; Ahmad and Kumar, 2006); *Vigna sativa* (Fabr.) (Ahmad and Kumar, 2006); *Vigna* sp. (Ahmad and Kumar, 2006); *Vigna trilobata* (L.) Verdc. (=*Phaseolus trilobus* sensu auct.) (David, 1957; Behura, 1963); *Vigna unguiculata* ssp. *cylindrica* (L.) Verdc. (=*Vigna catjang* Burm.f.) Walp.; *Dolichos iflorus* (L.)) (Ghulam-Ullah, 1940; Behura, 1963; Bhalla and Pawar, 1977; Kar *et al.*, 1990); *Vigna unguiculata* ssp. *sensquipedalis* (L.) Walp. (=*Vigna sensquipedalis* (L.) Fruwirh) (Rao, 1969); *Vigna unguiculata* ssp. *unguiculata* (L.) Walp. (= *Vigna sinensis* (L.) Savi ex Hassk.) (Kar *et al.*, 1990; Agrawal and Singh, 2005; Agarwal *et al.*, 2006); Unidentified plants (Ghosh, A.K. and Raychaudhuri D.N., 1959; Nayak *et al.*, 1982).

- **Geraniaceae:** *Geranium* sp. (Bhalla and Pawar, 1977; Sharma and Bhalla, 1964).
- **Lamiaceae:** *Clerodendrum splendens* G. Don. (Ahmad and Kumar, 2006; *Ocimum tenuiflorum* L. (=*Ocimum sanctum* L.) (Katari and Kumar, 2012); Unidentified plants (Raychaudhuri, D.N. and Ghosh, A.K. 1958; Ghosh, A.K. and Raychaudhuri D.N., 1959; Behura, 1963).
- **Lythraceae:** *Lagerstroemia speciosa* (L.) Pers. (=*Lagerstroemia flos-reginae* Retz.) (Raychaudhuri, D.N., 1973).
- **Malvaceae:** *Abelmoschus esculentus* (L.) Moench (=*Hibiscus esculentus* (L.)) (Ganguli and Ghosh, 1965; Singh, R. *et al.*, 1999; Ahmad and Kumar, 2006); *Hibiscus rosa-sinensis* L. (Behura, 1965; Raychaudhuri, D.N., 1973; Singh, R. *et al.*, 1999; Ahmad and Kumar, 2006); *Hibiscus sabdariffa* L. (Ganguli and Ghosh, 1965; Ghosh, L.K. 1970; Ahmad and Kumar, 2006).
- **Menispermaceae:** *Tinospora cordifolia* (Willd.) Hook.f. and Thoms. (Basu, R.C. *et al.*, 1968; Raychaudhuri, D.N., 1973; Basu, R.C. and Raychaudhuri, D.N., 1980; Ghosh, A.K. and Agarwala, 1980).
- **Moraceae:** *Ficus heterophylla* L.f. (Ghosh, A.K. and Raychaudhuri D.N., 1962a; Ghosh, A.K. and Raychaudhuri D.N., 1963; Behura, 1965).

- **Moringiaceae:** *Moringa oleifera* Lam. (Ahmad and Kumar, 2006; Joshi and Poorani, 2007; Devi *et al.*, 2010;
- **Myrtaceae:** *Psidium guajava* L. =*Syzygium guajava* auct. nonn.) (Ahmed and Singh, 1996b; Singh, R. *et al.*, 1999).
- **Nyctaginaceae:** *Boerhavia diffusa* L. (David, 1957; Behura, 1963; Raychaudhuri, D.N. *et al.*, 1981); *Bougainvillea spectabilis* Willd. (Raychaudhuri, D.N., 1973; Raha, 1979; Singh, R. *et al.*, 1999); *Bougainvillea* sp. (Behura, 1963; Raha *et al.*, 1977); *Mirabilis jalapa* L. (David, 1957; Behura, 1963; Ahmad and Kumar, 2006); Unidentified plants (Raychaudhuri, D.N. and Ghosh, A.K. 1958; Ghosh, A.K. and Raychaudhuri D.N., 1959).
- **Pedaliaceae:** *Sesamum indicum* L. (Banerjee and Basu, A.N., 1955; Basu, A.N. and Banerjee, 1958; Behura, 1963).
- **Phyllanthaceae:** *Phyllanthus emblica* L. (Mall *et al.*, 2010); *Phyllanthus niruri* L. (David, 1957; Behura, 1963).
- **Plumbaginaceae:** *Plumbago zeylanica* L. (Behura, 1963; Sengupta *et al.*, 1962).
- **Poaceae:** *Setaria italica* (L.) P. Beauv. (Jha, 1998); *Triticum aestivum* L. (Bisht *et al.*, 2006); *Zea mays* L. (Agarwala, 1979).
- **Polygonaceae:** *Antigonon leptopus* Hook. and Arn. (David, 1957; Behura, 1963); *Polygonum* sp. (Raychaudhuri, D.N., 1973; Ghosh, A.K. and Agarwala, 1980); *Rumex acetosa* L. (Bhagat, 2012); *Rumex acetosella* L. (Stary and Raychaudhuri, 1982); *Rumex nepalensis* Spreng. (Raychaudhuri, D.N., 1973; Stary and Raychaudhuri, 1982).
- **Portulacaceae:** *Portulaca oleracea* L. (Patel and Patel, 1971).
- **Ranunculaceae:** *Trollius phamaceiodies* error, no species of this name exists in literature) (David, 1957; Behura, 1963).
- **Rosaceae:** *Malus sieversii* (Ledeb.) M. Roem. (Chakrabarti and Sarkar, 2001); *Prunus dulcis* (Mil(L.) D.A. Webb. (=*Prunus amygdalus* Batsc) (Ahmed and Singh, 1996b; Singh, R. *et al.*, 1999).
- **Rubiaceae:** *Coffea arabica* L. (Behura, 1965; *Mussaenda* sp. (Ahmed and Singh, 1996b; Singh, R. *et al.*, 1999); *Spermacoce hispida* L. (Patel and Patel, 1971).
- **Rutaceae:** *Citrus aurantiifolia* (Christm.) Swingle (Agrawal and Singh, 2005; Agarwal *et al.*, 2006); *Citrus limon* (L.) Burm.f. (=*Citrus limonum* Risso) (Behura, 1965; Verma *et al.*, 1965; Ahmad and Kumar, 2006); *Citrus madurensis* Lour. (Behura, 1965); *Citrus maxima* (Burm.) Merr. (=*Citrus grandis* Osbeck) (Konar and Paul, 2006); *Citrus paradise* Macfad. (Behura, 1965); *Citrus reticulata* Blaneo (Basu, A.C. *et al.*, 1969); *Citrus sinensis* Osbeck (Behura, 1965; Verma *et al.*, 1965).
- ***Saliaceae (=Flacourtiaceae):*** *Casearia sp. (Chakrabarti and Sarkar, 2001).*
- **Sapindaceae:** *Litchi chinensis* Sonn. (Ganguli and Ghosh, 1965).
- **Scitaminaceae:** Unidentified plants (Raychaudhuri, D.N. and Ghosh, A.K. 1958; Ghosh, A.K. and Raychaudhuri D.N., 1959; Behura, 1963).
- **Solanaceae:** *Cestrum nocturnum* L. (Rao, 1969; Agrawal and Singh, 2005; Agarwal *et al.*, 2006); *Cestrum* sp. (Raychaudhuri, D.N., 1973); *Lycopersicon esculentum* Mill. (Verma *et al.*, 1975; Singh, R. *et al.*, 1999; Agarwal *et al.*, 2006; Ahmad and Kumar, 2006); *Lycopersicon* sp. (Agarwala, 1979); *Nicotiana tabacum* L. (Raychaudhuri, D.N., 1973); *Petunia alba* Hort. Ex Ferg. and Ottl. (Ghosh, A.K. and Raychaudhuri D.N., 1962b; Behura, 1965; Raychaudhuri, D.N., 1973); *Petunia integifolia* (Hook) Schinz and Thell. (=*Petunia violacea* Lindl.) (Chakrabarti, 1972); *Solanum clavatum* Rusby (Raychaudhuri, D.N., 1973); *Solanum melongena* L. (David, 1956; Ganguli and Ghosh, 1965; Singh, R. *et al.*, 1999; Agarwal *et al.*, 2006);. *Solanum nigrum* L. (George, 1927; Verma, 1971; Raychaudhuri, D.N., 1973;Agarwal *et al.*, 2006); *Solanum tuberosum* L. (Behura, 1963; Verma *et al.*, 1975; Ahmad and Kumar, 2006); *Solanum virginianum* L. (=*Solanum xanthocarpum* Schrad.; *Solanum surattense* Burm. f.) (Ahmad and Kumar, 2006); *Solanum* sp. (Chatterjee *et al.*, 1961; Raychaudhuri, D.N., 1973).
- **Theaceae:** *Camellia sinensis* var. *assamica* (J.W. Mast.) Kitam. (= *Camellia theifera* Griff.) (Behura, 1965).
- ***Thymelacaceae:*** *Daphne cannabina Lour. ex Wall. (Chakrabarti and Sarkar, 2001).*
- **Ulmaceae:** *Holoptelea integrifolia* (Roxb.) Planch. (Raychaudhuri, D.N. *et al.*, 1981).
- **Urticaceae:** Unidentified plants (Behura, 1963).
- **Verbenaceae:** *Lantana* sp. (Behura, 1963; Krishnamurthi, 1948).
- **Zygophylaceae:** *Tribulus terrestris* L. (Ghulam-Ullah, 1940; Behura, 1963).

Species-wise food plants

- *Abelmoschus esculentus* (L.) Moench (=*Hibiscus esculentus* (L.)) (Malvaceae)
- *Abrus* sp. (Fabaceae)
- *Acalypha* sp. (Euphorbiaceae)
- *Achyranthes aspera* L. (Amaranthaceae)
- *Aeschynomene americana* Linn. (Fabaceae)
- *Aeschynomene* sp. (Fabaceae)
- *Ageratum conyzoides* L. (Asteraceae)
- *Alhagi camelorum* Fisch. (Fabaceae)
- *Alhagi pseudoalhagi* (M. Bieb) Desv. (Fabaceae)
- *Alstonia scholaris* (L.) R. Br. (Apocyanaceae)
- *Alysicarpus glumaceus* (Vahl.) DC. (Fabaceae)
- *Alysicarpus rugosus* (Wild.) DC. (Fabaceae)
- *Amaranthus spinosus* L. (Amaranthaceae)
- *Amaranthus tricolor* L. (= *Amaranthus gangeticus* L.; *Amaranthus gangeticus* var. *oleracea* L.; *Amaranthus gangeticus* var. *tristis* (L.) Thell) (Amaranthaceae)
- *Amaranthus viridis* Desf. (= *Amaranthus gracilis* Desf.) (Amaranthaceae)
- *Antigonon leptopus* Hook. and Arn. (Polygonaceae)
- *Arachis hypogaea* L. (Fabaceae)

- *Astragalus nuttallii* (Torr. and A. Gray) J.T. Howell (=*Erigeron asteroides* Roxb.) (Asteraceae)
- *Benincasa hispida* (Thumb.) Cogn. (Cucurbitaceae)
- *Beta vulgaris* L. (Chenopodiaceae)
- *Bidens biternata* (Lour.) Merr. and Sherff (Asteraceae)
- *Bidens pilosa* L. (Asteraceae)
- *Boerhavia diffusa* L. (Nyctaginaceae)
- *Bougainvillea* sp. (Nyctaginaceae)
- *Bougainvillea spectabilis* Willd. (Nyctaginaceae)
- *Brassica oleracea* var. *botrytis* L. (Brassicaceae)
- *Brassica rapa* ssp. *campestris* (L.) A.R. Clapham (= *Brassica campestris* (L.)) (Brassicaceae)
- *Cajanus cajan* (L.) Millsp. (Fabaceae)
- *Cajanus* sp. (Fabaceae)
- *Calotropis gigantea* (L.) W.T. Aiton (Apocynaceae, =Asclepiadaceae)
- *Calotropis procera* (Aiton) W.T. Aiton (Apocynaceae)
- *Camellia sinensis* var. *assamica* (J.W. Mast.) Kitam. (= *Camellia theifera* Griff.) (Theaceae)
- *Canavalia ensiformis* (L.) DC. (Fabaceae)
- *Carica papaya* L. (Caricaceae)
- *Carissa* sp. (Apocyanaceae)
- *Carthamus tinctorius* L. (Asteraceae)
- *Casearia sp. (Saliaceae, =Flacourtiaceae)*
- *Cassia fistula* L. (Fabaceae)
- *Cassia javanica* L. (Fabaceae)
- *Cassia* sp. (Fabaceae)
- *Cestrum nocturnum* L. (Solanaceae)
- *Cestrum* sp. (Solanaceae)
- *Chenopodium album* L. (Chenopodiaceae)
- *Chenopodium ravely* – error, no species of this name exists in literature) (Chenopodiaceae)
- *Chrysanthemum indicum* L. (Asteraceae)
- *Chrysanthemum* sp. (Asteraceae)
- *Cicer arietinum* L. (Fabaceae)
- *Cicer* sp. (Fabaceae)
- *Citrus aurantiifolia* (Christm.) Swingle (Rutaceae)
- *Citrus limon* (L.) Burm.f. (=*Citrus limonum* Risso) (Rutaceae)
- *Citrus madurensis* Lour. (Rutaceae)
- *Citrus maxima* (Burm.) Merr. (=*Citrus grandis* Osbeck) (Rutaceae)
- *Citrus paradise* Macfad. (Rutaceae)
- *Citrus reticulata* Blaneo (Rutaceae)
- *Citrus sinensis* Osbeck (Rutaceae)
- *Cleome chelidonii* L.f. (Cleomaceae)
- *Cleome gyandra* L. (=*Cleome pentaphylla* (L.)) (Cleomaceae)
- *Clerodendrum splendens* G. Don. (Lamiaceae)
- *Cnicus* sp. (Asteraceae)
- *Cnicus wallichii* Hook.f. (Asteraceae)
- *Coccinia grandis* (L.) Voigt. (=*Coccinia cordifolia* (L.) Cogn; *Coccinia indica* Wight and Arn.) (Cucurbitaceae)
- *Coffea arabica* L. (Rubiaceae)
- *Colocasia esculenta* (L.) Schott. (=*Colocasia antiquorum* Schott.) (Araceae)
- *Colocasia* sp. (Araceae)
- *Coriandrum sativum* L. (Apiaceae)
- *Cosmos* sp. (Asteraceae)
- *Crotalaria juncea* L. (Fabaceae)
- *Crotalaria pallida* Aiton (Fabaceae)
- *Crotalaria* sp. (Fabaceae)
- *Cucumis melo* L. (Cucurbitaceae)
- *Cucumis sativus* L. (Cucurbitaceae)
- *Cucurbita maxima* Duchesne (Cucurbitaceae)
- *Cuscuta reflexa* Roxb. (Convolvulaceae)
- *Cyamopsis tetragonoloba* (L.) Taub. (Fabaceae)
- *Dahlia pinnata* Cav. (Asteraceae)
- *Dalbergia sissoo* Roxb. ex DC. (Fabaceae)
- *Dalbergia* sp. (Fabaceae)
- *Daphne cannabina Lour ex Wall. (Thymelacaceae)*
- *Desmodium* sp. (Fabaceae)
- *Dolichos* sp. (Fabaceae)
- *Eupatorium odoratum* L. (Asteraceae)
- *Eupatorium* sp. (Asteraceae)
- *Euphorbia* sp. (Euphorbiaceae)
- *Ficus heterophylla* L.f. (Moraceae)
- *Flemingia macrophylla* (Willd.) Merr. (=*Moghania macrophylla* (Willd.) Kuntz.) (Fabaceae)
- *Geranium* sp. (Geraniaceae)
- *Gliricidia maculata* (Kunth) Kunth ex Walp. (Fabaceae)
- *Glycine max* (L.) Merr. (Fabaceae)
- *Gomphrena globosa* L. (Amaranthaceae)
- *Guizotia abyssinica* (L.f.) Cass. (Asteraceae)
- *Helianthus annuus* L. (Asteraceae)
- *Helianthus* sp. (Asteraceae)
- *Heliotropium indicum* L. (Boraginaceae)
- *Hibiscus rosa-sinensis* L. (Malvaceae)
- *Hibiscus sabdariffa* L. (Malvaceae)
- *Holoptelea integrifolia* (Roxb.) Planch. (Ulmaceae)
- *Indigofera linnaei* Ali (=*Indigofera enneaphylla* (L.)) (Fabaceae)
- *Indigofera nigrescens* Kurz ex King and Prain (=*Indigofera nigra* Kurz) (Fabaceae)
- *Indigofera oblongifolia* Forssk. (Fabaceae)
- *Indigofera purpurea* Steud. (Fabaceae)
- *Indigofera* sp. (Fabaceae)
- *Indigofera tinctoria* L. (Fabaceae)
- *Indigofera trita* L.f. (=*Tephrosia trita* misident.) (Fabaceae)
- *Ipomoea* sp. (Convolvulaceae)
- *Kochia* sp. (Chenopodiaceae)
- *Lablab purpureus* (L.) Sweet ssp. *purpureus* (=*Dolichos lablab* (L.) (Fabaceae)
- *Lablab speciosa* error, no species of this name exists in literature) (Fabaceae)
- *Lagenaria siceraria* (Molino) Standl. (=*Lagenaria leucantha* Duches., *Lagenaria vulgaris* Ser.) (Cucurbitaceae)
- *Lagerstroemia speciosa* (L.) Pers. (=*Lagerstroemia flos-reginae* Retz.) (Lythraceae)
- *Lantana* sp. (Verbenaceae)
- *Lathyrus aphaca* L. (Fabaceae)
- *Lathyrus sativus* L. (Fabaceae)
- *Launaea nudicaulis* (Linn.) Hook. f. (Asteraceae)
- *Lens culinaris* Medik. (Fabaceae)
- *Lens culinaris* ssp. *culinaris* Medik (=*Lens esculenta* Moench.) (Fabaceae)
- *Leucaena leucocephala* (Lam.) de Wit. (Fabaceae)
- *Litchi chinensis* Sonn. (Sapindaceae)

- *Luffa aegyptiaca* Mill. (=*Luffa cylindrica* M. Roem.) (Cucurbitaceae)
- *Lycopersicon esculentum* Mill. (Solanaceae)
- *Lycopersicon* sp. (Solanaceae)
- *Lyonia ovalifolia* (Wall.) Drude (Ericaceae)
- *Mallotus indica* error, no species of this name exists in literature) (Euphorbiaceae)
- *Malus sieversii* (Ledeb.) M. Roem. (Rosaceae)
- *Mangifera indica* L. (Anacardiaceae)
- *Manihot esculanta* Crantz. (Euphorbiaceae)
- *Medicago lupulina* L. (Fabaceae)
- *Medicago polymorpha* var. *vulgaris* (Benth.) Shinners (=*Medicago denticulata* Willd.) (Fabaceae)
- *Medicago sativa* L. (Fabaceae)
- *Melilotus albus* Medik (Fabaceae)
- *Melilotus indicus* (L.) All. (Fabaceae)
- *Melilotus indicus* (L.) var. *indicus* (=*Melilotus parviflorus* Dest.) (Fabaceae)
- *Mimosa pudica* L. (Fabaceae)
- *Mimosa* sp. (Fabaceae)
- *Mirabilis jalapa* L. (Nyctaginaceae)
- *Momordica charantia* L. (Cucurbitaceae)
- *Moringa oleifera* Lam. (Moringiaceae)
- *Mucuna* sp. (Fabaceae)
- *Mussaenda* sp. (Rubiaceae)
- *Nerium oleander* L. (=*Nerium odorum* Aiton; *Nerium indicum* Mil (L.)) (Apocyanaceae)
- *Nicotiana tabacum* L. (Solanaceae)
- *Ocimum tenuiflorum* L. (=*Ocimum sanctum* L.) (Lamiaceae)
- *Oenanthe javanica* ssp. *stolonifera* (Wall ex DC.) Murata (=*Oenanthe stolonifera* Wall ex C.) (Apiaceae, =Umbelliferae)
- *Petunia alba* Hort. Ex Ferg. and Ottl. (Solanaceae)
- *Petunia integifolia* (Hook) Schinz and Thell. (=*Petunia violacea* Lindl.) (Solanaceae)
- *Phaseolus coccineus* L. (Fabaceae)
- *Phaseolus sinensis* Hort. ex Schur (Fabaceae)
- *Phaseolus vulgaris* L. (Fabaceae)
- *Phaseolus* sp. (Fabaceae)
- *Phyllanthus emblica* L. (Phyllanthaceae)
- *Phyllanthus niruri* L. (Phyllanthaceae, =Euphorbiaceae)
- *Pisum sativum* L. (Fabaceae)
- *Plumbago zeylanica* L. (Plumbaginaceae)
- *Polygonum* sp. (Polygonaceae)
- *Portulaca oleracea* L. (Portulacaceae)
- *Prunus dulcis* (Mil(L.) D.A. Webb. (=*Prunus amygdalus* Batsc) (Rosaceae)
- *Psidium guajava* L. =*Syzygium guajava* auct. nonn.) (Myrtaceae)
- *Psophocarpus tetragonolobus* (L.) DC. (Fabaceae)
- *Raphanus sativus* L. (Brassicaceae)
- *Robinia pseudoacacia* L. (Fabaceae)
- *Rumex acetosa* L. (Polygonaceae)
- *Rumex acetosella* L. (Polygonaceae)
- *Rumex nepalensis* Spreng. (Polygonaceae)
- *Senna alata* (L.) Roxb. (=*Cassia alata* (L.)) (Fabaceae)
- *Senna auriculata* (L.) Roxb. (=*Cassia auriculata* (L.)) (Fabaceae)
- *Senna hirsuta* (L.) H. S. Irwin and Barneby var. *hirsuta* (=*Cassia hirsuta* (L.) (Fabaceae)
- *Senna sophera* (L.) Roxb. (=*Cassia sophera* (L.)) (Fabaceae)
- *Senna tora* (L.) Roxb. (=*Cassia tora* (L.)) (Fabaceae)
- *Sesamum indicum* L. (Pedaliaceae)
- *Sesbania bispinosa* (Jacq.) W. Wight (Fabaceae)
- *Sesbania cannabina* (Retz.) Pers. (Fabaceae)
- *Sesbania grandiflora* (L.) Pers. (Fabaceae)
- *Sesbania speciosa* Taub. (Fabaceae)
- *Setaria italica* (L.) P. Beauv. (Poaceae)
- *Smithia sensitiva* Aiton (Fabaceae)
- *Solanum clavatum* Rusby (Solanaceae)
- *Solanum melongena* L. (Solanaceae)
- *Solanum nigrum* L. (Solanaceae)
- *Solanum* sp. (Solanaceae)
- *Solanum tuberosum* L. (Solanaceae)
- *Solanum virginianum* L. (=*Solanum xanthocarpum* Schrad.; *Solanum surattense* Burm. f.) (Solanaceae)
- *Sonchus asper* (L.) Hill. (Asteraceae)
- *Sonchus* sp. (Asteraceae)
- *Spermacoce hispida* L. (Rubiaceae)
- *Tagetes erecta* L. (Asteraceae)
- *Tagetes* sp. (Asteraceae)
- *Tecomella undulate* (Sm.) Seem. (Bignoniaceae)
- *Tephrosia candida* DC. (Fabaceae)
- *Tephrosia purpurea* (L.) Pers. (Fabaceae)
- *Tinospora cordifolia* (Willd.) Hook.f. and Thoms. (Menispermaceae)
- *Tribulus terrestris* L. (Zygophylaceae)
- *Trifolium alexandrinum* L. (Fabaceae)
- *Trifolium praetutianum* Guss. (=*Trifolium prutentianum* auct. nonn.) (Fabaceae)
- *Trifolium repens* L. (Fabaceae)
- *Trigonella foenum-graecum* L. (Fabaceae)
- *Trigonella polycerata* L. (Fabaceae)
- *Triticum aestivum* L. (Poaceae)
- *Trollius phamaceiodies* error, no species of this name exists in literature) (Ranunculaceae)
- *Vernonia cinerea* (L.) Less. (Asteraceae)
- *Vicia faba* L. (Fabaceae)
- *Vicia sativa* L. (Fabaceae)
- *Vigna mungo* (L.) Hepper (=*Phaseolus roxburghii* Wight and Arn.) (Fabaceae)
- *Vigna mungo* (L.) Hepper var. *mungo* (=*Phaseolus mungo* (L.) (Fabaceae)
- *Vigna radiata* (L.) R. Wiczek var. *radiata (=Phaseolus radiatus* (L.; *Phaseolus aureus* Roxb.) (Fabaceae)
- *Vigna sativa* (Fabr.) (Fabaceae)
- *Vigna* sp. (Fabaceae)
- *Vigna trilobata* (L.) Verdc. (=*Phaseolus trilobus* sensu auct.) (Fabaceae)
- *Vigna unguiculata* ssp. *cylindrica* (L.) Verdc. (=*Vigna catjang* Burm.f.) Walp.; *Dolichos biflorus* (L.)) (Fabaceae)
- *Vigna unguiculata* ssp. *sensquipedalis* (L.) Walp. (=*Vigna sensquipedalis* (L.) Fruwirh) (Fabaceae)
- *Vigna unguiculata* ssp. *unguiculata* (L.) Walp. (= *Vigna sinensis* (L.) Savi ex Hassk.) (Fabaceae)
- *Zea mays* L. (Poaceae)

- Unidentified plants (Asteraceae; Cucurbitaceae; Euphorbiaceae; Fabaceae; Labiatae; Nyctaginaceae; Scitaminaceae; Urticaceae).

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