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DIVERSITY OF APHIDIDAE OF UTTARAKHAND

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ABSTRACT

Agricultural crops face numerous pest-problems, particularly due to aphids, scale-insects, mealybugs, white-flies, mites, *etc*. Aphids (Homoptera: Aphididae) are one of the important pests of crops, and are highly injurious for cultivated and non-cultivated crops. We reported eighteen aphid species belong to twelve genera in Kumaun region. There are eight species of *Aphis*, two species each of *Macrosiphum* and *Rhopalosiphum*, and one species each *Brevicoryne*, *Ceratovacuna*, *Hyperomyzus*, *Lipaphis*, *Macrosiphoniella*, and *Metopolophium* infesting several cultivated and non-cultivated crops. We are also reporting fifty-five host plants in Kumaun region of Uttarakhand belonging to 18 families, *viz.* Anacardiaceae, Apiaceae, Apocynaceae, Araceae, Asteraceae, Brassicaceae, Commelinaceae, Cucurbitaceae, Fabaceae, Lamiaceae, Malvaceae, Myrtaceae, Poaceae, Punicaceae, Ranunculaceae, Rosaceae, Rutaceae and Solanaceae.

Keywords: Homoptera, Aphididae, host-plant, aphids.

INTRODUCTION

India is predominantly an agriculture country, where about 65-66% population lives in rural areas and people largely depend on agricultural crops. However, these crops are always under the attack of various pests, who damage them by sucking their saps, transmitting viruses (Will and Vilcinskas 2015) and can even destroy the entire plant. Aphids (Homoptera: Aphididae) are one of the most pests of cultured and uncultured crops. They are small soft-bodied insects, commonly known as plant lice or ant- cow or green flies or black flies. These aphids exist in numerous colours, such as, brown, black, pink, and white wooly with size ranging between 0.7 mm to 1.5 mm (Dixon 1998). They feed on cell sap and phloem fluid of plants and attack on young leaves, shoots and buds. They are one of the most important groups of phytophagous insects because of their polymorphism, polyphagy, and host alternating behaviour, reproductive habits and their role as insect vectors of plant pathogenic viruses. These aphids are best biological models to investigate symbiosis, virus transmission and insect–plant interactions (Skaljac 2016).

Numerous aphid species damage cultivated agriculture crops (cereals, vegetables, fruits, pulses, oil yielding plants and ornamentals plant) and non-cultivated crops of Uttarakhand in India. Kennedy et al. (1962) listed 247 viral diseases of plants transferred by aphids found in winged (alate) or wingless (apterous) forms. The aphid fauna of India and adjacent countries

constitute about 16% of the world fauna. Out of 4703 globally known aphid species (Remaudiere and Remauudiere 1997), 1013 species are reported from the Oriental region (Agarwala and Ghosh 1984) and 659 species belonging to 208 genera represent Indian Aphididae (Ghosh and Singh 2000). Aphids showing parthenogenetic viviparity (obligate parthenogenesis where mothers give birth only to daughter young ones), short generation time, telescopic generations (where granddaughters begin developing directly within the daughters which themselves are not yet born) and polymorphism are major traits of aphids that make them highly prolific in reproduction (Singh and Ghosh 2000). Many species of aphids display complex life cycles with alternation of sexual and asexual generations and host plant alternation (Ghosh et al. 2000). The aphids excrete honeydew, which attracts wasps, butterflies, some moths and ants (Singh et al. 2000). Aphids transmit viral diseases to several crops. Aphids are the major hosts for a number of parasitoids, predators and an essential meal for numerous other predators *viz.* ladybird beetles, aphid-lions, lacewings, birds, *etc*. Keeping in view, the importance of aphids, we surveyed the plants infested with aphids and catalogued the host plant and aphids of the Kumaun region of Uttarakhand.

MATERIALS AND METHODS

Study area

The study area included the temperate and tropical Kumaun region of Uttarakhand, located between 28º 44' & 31º 28' N Latitude and 77º 35' & 81º 01' E Longitude. Aphids collected from agricultural, horticultural, and floricultural habitats of Kumaun region of Uttarakhand.

Sampling Methods

We checked the aphid-infestations along with their host and collected them in plastic beakers (height 11.0 cm and diameter 8.5 cm). Thereafter, these beakers were covered with muslin cloths and fastened with rubber bands with proper labeling regarding their location, botanical and common names of host plants, date and time of collection. These beakers were brought to the laboratory and kept in an Environmental Test Chamber (*REMI Instruments*, India) maintained at controlled chilling abiotic conditions (5±1°C, 65±5% R.H and 12L: 12D) so that the development of aphids may cease and host plants remain in their original conditions. Some beakers were even kept at sub-zero temperature in the Deep Freezer (*REMI Instruments*, India). and aphid species were kept stored in plastic vials containing 80% ethyl alcohol for further studies and preserving them for a longer duration.

Slide preparation

The apterous and alate aphids were slide mount following the methodology of Foottit et al. (2009). The morphometric characters of the aphid specimens were used for the identification and description of the species using the key given by Blackman and Eastop (1994, 2000 and 2006) and other relevant literature.

RESULT AND DISCUSSION

1. Aphis craccivora (C.L. Koch 1854)

Aphis craccivora is a eurytopic, cosmopolitan, black or dark brown colour plant lice and commonly known as cowpea aphid, groundnut aphid or black legume aphid. These aphids attack on 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 *et al* ., 1962a; Ghosh *et al* ., 1963); Bihar (Ahmed and Singh, 1996a; Ahmad and Kumar, 2006; Jha, 1998); Chhattisgarh (Oudhia, 2001); Delhi (Ghulam-Ullah, 1940); Gujarat (Patel and Patel, 1971); Goa (Ramesh *et al*., 2016); Haryana (Verma *et al*., 1975); Himachal Pradesh (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); Maharashtra (Rao and Kulkarni, 1972); Manipur (Agarwala, *et al*., 1980; Chatterjee *et al*., 1961; Raychaudhuri, D., 1978); Mizoram (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 *et al* ., 1962b; Joshi and Mathur, 1967; Raychaudhuri *et al*., 1959; Vir and Singh, 2004); Sikkim (Agarwala, 1979); Tamil Nadu (Basheer, 1958; David, 1956); Telangana (War *et*

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al., 2016); Tripura (Ganguli and Ghosh, 1965); Uttar Pradesh (Rizvi and Paul Khurana, 1970; Ahmed and

APHID - PLANT CATALOGUE

Table-1: Listing of aphid-host plant species, common name, family, habit and aphid species infesting it found from the Kumaun region of Uttarakhand.

Sr. No.	PLANT SPECIES	COMMON NAME	FAMILY	HABIT	APHID SPECIES
A. Cultivated agriculture crops					
I.	**Cereals**				
1.	*Avena sativa* (L.)	Oat	Poaceae	Herb	*Rhopalosiphum padi*
2.	*Saccharum officinarum* (L.)	Ganna	Poaceae	Herb	*Ceratovacuna lanigera*
3.	*Sorghum vulgare* Pers	Jwar	Poaceae	Herb	*Rhopalosiphum maidis*
4.	*Triticum aestivum* (L.)	Gehun	Poaceae	Herb	*Macrosiphum miscanthi* and *Rhopalosiphum padi*
5.	*Zea mays* (L.)	Makka	Poaceae	Herb	*Rhopalosiphum maidis*
II.	**Vegetables**				
6.	*Brassica oleracea* var. *botryis* (L.)	Phulgobhi	Brassicaceae	Herb	*Brevicoryne brassicae*, *Lipaphis erysimi* and *Myzus persicae*
7.	*Brassica oleracea* var. *capitata* (L.)	Bandh-gobhi	Brassicaceae	Herb	*Brevicoryne brassicae* and *Lipaphis erysimi*
8.	*Capsicum annum* (L.)	Mirch	Solanaceae	Herb	*Aphis gossypii*
9.	*Cucumis melo* (L.)	Kharbuja	Cucurbitaceae	Herb	*Aphis gossypii*
10.	*Cucumis sativus* (L.)	Kheera	Cucurbitaceae	Herb	*Aphis gossypii*
11.	*Cucurbita pepo* (L.)	Safed-Kaddu	Cucurbitaceae	Herb	*Aphis gossypii*
12.	*Daucus carota* (L.)	Gajar	Apiaceae	Herb	*Aphis fabae*
13.	*Lablab purpureus* (L.) Sweet.	Sem	Fabaceae	Herb	*Aphis craccivora*
14.	*Lagenaria siceraria* (Molina) Standley	Lauki	Cucurbitaceae	Herb	*Aphis gossypii*
15.	*Lycopersicon lycoperslcum* (L.)	Tamatar	Solanaceae	Herb	*Myzus persicae*
16.	*Raphanus sativus* (L.)	Muli	Brassicaceae	Herb	*Myzus persicae*, *Lipaphis erysimi* and *Brevicoryne brassicae*
17.	*Solanum melongena* (L.)	Baingan	Solanaceae	Shrub	*Myzus persicae* and *Aphis gossypii*
18.	*Solanum tuberosum* (L.)	Aalu	Solanaceae	Herb	*Myzus persicae*
19.	*Vigna unguiculata* (L,) Walpers	Lobiya	Fabaceae	Herb	*Aphis craccivora*

III.	**Fruits**				
20.	*Citrullus lanatus* (Thunb.)	Tarbooj	Cucurbitaceae	Herb	*Aphis gossypii*
21.	*Citrus spp*.	-	Rutaceae	Tree	*Aphis craccivora*
22.	*Prunus persica* (L.) Batsch	Aaru	Rosaceae	Tree	*Myzus persicae*
23.	*Psidium guajava* (L.)	Amrood	Myrtaceae	Tree	*Aphis punicae*
24.	*Punica granatum* (L.)	Anar	Punicaceae	Shrub	*Aphis gossypii* and *A. punicae*
25.	*Malus spp.* (L.)	Apple	Rosaceae	Tree	*Aphis pomi*
26.	*Syzygium cumini* (L.) Skeels	Jamun	Myrtaceae	Tree	*Aphis pomi*
IV.	**Pulses**				
27.	*Cajanus cajan* (L) Millsp.	Arhar	Fabaceae	Herb	*Aphis craccivora*
28.	*Glycine max* (L.) Merrill	Soyabean	Fabaceae	Herb	*Aphis glycines* and *Aphis gossypii*
V.	**Ornamentals plants**				
29.	*Cascabela thevetia* (L.)	Peeli-Kaner	Apocynaceae	Shrub	*Aphis nerii*
30.	*Cestrum nocturnum* (L.)	Rat ki rani	Solanaceae	Shrub	*Aphis gossypii*
31.	*Chrysanthemum indicum* (L.)	Guldaudi	Asteraceae	Herb	*Macrosiphoniella sanborni*, *Aphis craccivora* and *Aphis gossypii*
32.	*Hibiscus rosa-sinensis* (L.)	Gudhal	Malvaceae	Shrub	*Aphis gossypii*
33.	*Leucanthemum vulgare* Lam.	Daisy	Asteraceae	Herb	*Aphis gossypii*, *M. sanborni*
34.	*Nerium oleander* (L.)	Kaner	Apocynaceae	Shrub	*Aphis nerii*
35.	*Rosa spp.*	Rose	Rosaceae	Shrub	*Macrosiphum rosaei*
36.	*Tagetes erecta* (L.)	Genda	Asteraceae	Herb	*Aphis fabae*, *Aphis gossypii* and *Aphis spiraecola*
VI.	**Oil yielding crops**				
37.	*Brassica campestris* Hook. f. & Anderson	Sarson	Brassicaceae	Herb	*Lipaphis erysimi*, *Myzus persicae* and *Brevicoryne brassicae*
38.	*Brassica nigra* (L.)	Black mustard	Brassicaceae	Herb	*Lipaphis erysimi*, *Myzus persicae* and *B. brassicae*
39.	*Gossypium herbaceum* (L.)	Kapas	Malvaceae	Shrub	*Aphis gossypii*
40.	*Mentha piperita* (L.)	Peppermint	Lamiaceae	Herb	*Aphis gossypii*
41.	*Sinapis alba* (L.)	Yellow mustard	Brassicaceae	Herb	*Lipaphis erysimi*, *Myzus persicae* and *B. brassicae*
B. Non Cultivated crop					
42.	*Ageratum conyzoides* (L.)	Gundrya	Asteraceae	Herb	*Aphis gossypii*, *M. persicae*
43.	*Calotropis gigantea* (L.) Dry.	Aak	Apocynaceae	Shrub	*Aphis nerii*
44.	*Coccinia grandis* (L.) Voigt	Kundaru	Cucurbitaceae	Herb	*Aphis gossypii*
45.	*Colocasia*	Elephant ear	Araceae	Herb	*Aphis gossypii*
46.	*Commelina benghalensis* (L.)	Kansura	Commelinaceae	Herb	*Aphis gossypii* and *Myzus persicae*
47.	*Dactyloctenium aegypticum* (L.) P. Beauv.	Makra	Poaceae	Herb	*Myzus persicae*

48.	*Eleusine indica* (L.) Gaertner,	Mandla	Poaceae	Herb	*Myzus persicae*
49.	*Parthenium hysterophorus* (L.)	Gajar ghas	Asteraceae	Herb	*Aphis pomi* and *Macrosiphoniella sanborni*
50.	*Ranunculus sceleratus* (L.)	Jal dhaniya	Ranunculaceae	Herb	*Aphis craccivora*
51.	*Rhus parviflora* Roxb.	Tungla	Anacardiaceae	Shrub	*Aphis gossypii*
52.	*Solanum nigrum* (L.)	Makoi	Solanaceae	Herb	*Myzus persicae*
53.	*Sonchus spp.* (L.)	Dudhkani	Asteraceae	Herb	*Hperomyzus lactucae* and *Myzus persicae*
54.	*Tridax procumbens* (L.)	Kumra	Asteraceae	Herb	*Aphis gossypii*
55.	*Vernonia spp.*	_	Asteraceae	Herb	*Aphis gossypii* and *Macrosiphoniella sanborni*

Table-2: The details of the aphid species found from the Kumaun region of Uttarakhand.

Sr. No.	Genus	Species
1.	*Aphis*	*craccivora* C.L. Koch, 1854
2.	*Aphis*	*nerii* Boyer de Fonscolombe, 1841
3.	*Aphis*	*punicae* Passerini, 1863
4.	*Aphis*	*fabae* Scopoli, 1763
5.	*Aphis*	*pomi* de Geer,1773
6.	*Aphis*	*glycines* Matsumura
7.	*Aphis*	*gossypii* Glover, 1877
8.	*Aphis*	*spiraecola* Patch, 1914
9.	*Brevicoryne*	*brassicae* Linnaeus, 1758
10.	*Ceratovacuna*	*lanigera* Zehntner
11.	*Hyperomyzus*	*lactucae* Linnaeus, 1758
12.	*Lipaphis*	*erysimi* Kaltenbach, 1843
13.	*Macrosiphoniella*	*sanborni* Gillette, 1908
14.	*Macrosiphum*	*rosae* Linnaeus, 1758
15.	*Macrosiphum*	*miscanthi* Takahashi, 1921
16.	*Myzus*	*persicae* Sulzer, 1776
17.	*Rhopalosiphum*	*padi* Linnaeus, 1758
18.	*Rhopalosiphum*	*maidis* Fitch, 1856

Singh, 1996b; Singh *et al*., 1999; Agrawal and Singh, 2005); Uttarakhand (Chakrabarti, 1972; Maity and Chakrabarti, 1979), and West Bengal (Agarwala *et al*., 1982; Basu *et al*., 1969). We reported six host plant of *Aphis craccivora* as- *Lablab purpureus* (L.) Sweet (Sem) (Banerjee and Basu, A.N., 1955; Ganguli and Ghosh, 1965; Singh, R. *et al.*, 1999), *Aphis craccivora* firstly reported on *Vigna unguiculata* (L.) Walpers (Lobiya) in India by Lefroy and Howlett (1909), *Cajanus cajan* (L.) Millsp (Arhar) (Basu, A. N. and Banerjee, 1958; Ahmed and Singh, 1996a; Ahmad and Kumar, 2006); *Cajanus spp.* (Banerjee and Basu, A.N., 1955; *Citrus spp*. (Konar and Paul, 2006); *Chrysanthemum indicum* (L.) (Patel and Patel, 1971) and *Ranunculus sceleratus* (L.) (Pervez and Kumar, 2017). Aphids are highly affected of *Lablab, Vigna* and *Ranunculus* plants.

2. *Aphis nerii* Boyer de Fonscolombe 1841

Aphis nerii is yellow and dark brown coloured cosmopolitan aphid (Lazzari and de Carvalho, 2006), which is commonly known as milkweed aphid or Oleander aphid. We reported its three host plants from Kumaun region. The chief host of this aphid is *Calotropis gigantea* (L.) Dryander and as per W. T. Aiton, it is commonly known as milk weed or Aak and belongs to family Apocynaceae (Saikia *et al.,* 2015). This plant is native to India and grows wild up to the height of 900 m all over the country (Kumar *et al.,* 2012). Usually this weed is used in the treatment of fever and many human abnormalities (Saikia *et al.,* 2015). *Calotropis gigantea* has been reported to exhibit medicinal as well as insect repellent properties especially against *Culex gelidus* and *Culex tritaeniorhynchus* species of mosquitoes. The aqueous extract of leaves exhibited significant larvicidal, repellent and ovicidal activity (Kumar *et al.,* 2012), which makes the plant resistant to different pests and hence only some specific pests attack this weed, particularly, *Aphis nerii*. These aphids attack on various plants of family Apocynaceae / Asclepiadaceae (Evans and Halbert, 2007) along with certain ornamental plants like *Cascabela thevetia* (L.), and *Nerium oleander* (L.) (Laamari M *et al.,* 2010).

***3.* *Aphis punicae* Passerini 1863**

Aphis punicae is yellow–green aphid. This aphid attack on fruit crops in India. We reported only two hosts from Kumaun region *viz.* *Psidium guajava* (L.) and *Punica granatum* (L.) (Khan and Shah, 2017). *Aphis punicae* is commonly called as pomegranate aphid, which only attack on the ventral side of young leaves.

4. *Aphis fabae* Scopoli, 1763

Aphis fabae is black colour aphid. It's commonly known as black bean aphid. In summer time this aphid highly seen in new leaves and stems of vegetables and ornamental crops. We reported two host plants of this aphid in this area *viz. Daucus carota* (L.) and *Tagetes erecta* (L.) (Singh *et al*., 2015).

5. *Aphis pomi* de Geer,1773

Aphis pomi is a widely distributed horticultural aphid-pest. It's commonly called as apple aphid or green apple aphid. This aphid attacks on young leaves and buds of plant. We reported three host plant of this aphid in this region *viz. Malus spp.* (L.) (Bhagat R.C. 2012); *Syzygium cumini* (L.) Skeels and *Parthenium hysterophorus* (L.) (Mall *et al.,* 2010 and Singh *et al.,* 2015).

6. *Aphis glycines* Matsumura

Aphis glycines is commonly called as soyabean aphid and is native to Asia. We reported only single host of this aphid in Kumaun region *viz. Glycine max* (L.) Merrill (Raychaudhuri, D.N., 1973; Raychaudhuri, D., 1978; Raychaudhuri, D.N., 1980; Ghosh L.K., 1990 and Singh *et al.,* 2016). This pest attack on young leaves stems and buds.

7. *Aphis gossypii* Glover, 1877

Aphis gossypii is widely distributed aphid, which is commonly known as cotton aphid. It highly polyphagous and destroy cereals, fruits, and vegetables, ornamental and grasses. It attacks young leaves, stems and buds of plants. We reported its 21 host plants from Kumaun region *viz.*, *Capsicum annum* (L.) (Singh *et al.,* 1999 and 2014); *Cucumis melo* (L.) (Joshi and Mathur, 1967; Shuja Uddin, 1973 and Singh *et al.,* 2014); *Cucumis sativus* (L.) (Singh *et al.,* 1999 and 2014); *Cucurbita pepo* (L.) (Chakrabarti, 1972 and Singh *et al.,* 2014); *Lagenaria siceraria* (Molina) Standley (Singh *et al.,* 1999 and 2014); *Solanum melongena* (L.) (Saha *et al.,* 2016); *Citrullus lanatus* (Thunb.) (Sengupta *et al.,* 1962 and Singh *et al.,* 2014); *Punica granatum* (L.) (Ghosh, 1977 and Singh *et al.,* 2014); *Glycine max* (L.) Merrill (Raychaudhuri, D.N., 1973; Singh *et al.,* 2016); *Cestrum nocturnum* (L.) (Singh *et*

al., 1999 and 2014); *Chrysanthemum indicum* (L.) (Patel and Patel, 1971); *Hibiscus rosa-sinensis* (L.) (Singh *et al.,* 1999 and 2014); *Leucanthemum vulgare* Lam, *Gossypium* sp. (L.) (Basu and Banerjee, 1958 and Singh *et al.,* 2014); *Mentha* sp. (Raychaudhuri, 1973 and Singh *et al.,* 2014); *Ageratum conyzoides* (L.) (Raychaudhuri, 1973; Nayak *et al.,* 1982 and Singh *et al.,* 1999); *Coccinia grandis* (L.) Voigt, *Colocasia* (Rizvi and Paul Khurana, 1970; Sengupta *et al.,* 1962); *Commelina benghalensis* (L.) (Rao, 1969 and Singh *et al.,* 2014); *Rhus parviflora* Roxb, *Tridax procumbens* (L.) (Singh *et al.,* 1999 and 2014) *Tagetes erecta* (L.) (Verma *et al.,* 1975 and Singh *et.al.,*2015) and *Vernonia* species (David, 1957).

8. *Aphis spiraecola* Patch, 1914

Aphis spiraecola is commonly called as green citrus aphid attacking young shoots, leaves and floweral buds of *Tagetes erecta* (L.) (Mall *et al.,* 2010 and Singh *et.al*, 2015) from Kumaun region.

9. Brevicoryne brassicae Linnaeus, 1758

Brevicoryne brassicae is commonly known as cabbage aphid. It is a cosmopolitan species and we found it attacking on the young leaves and flowered buds of six host plants from Kumaun region, *viz. Brassica oleracea* var. *botryis* (L.) (Agarwala *et al*., 1988), *Brassica oleracea* var. *capitata* (L.) (Agarwala *et al*., 1988), *Raphanus sativus* (L.) (Basavaraju, *et al*., 1995), *Brassica campestris* Hook. f. & Anderson (Agarwala *et al*., 1988), *Brassica nigra* (L.) (Agarwala *et al*., 2000) and *Sinapis alba* (L.) (Pal and Singh, 2013).

10. *Ceratovacuna lanigera* Zehntner

It is known as sugarcane wooly aphid and was found attacking on young leaves of sugarcane, *Saccharum officinarum* (L.) (Sunil Joshi and C. A. Viraktamath, 2004).

11. *Hyperomyzus lactucae* Linnaeus, 1758

This aphid is waxy green coloured, resembling *Aphis nerii* and was found attacking the young shoots, leaves and floweral buds of *Sonchus oleraceus* (L.) (Behura, 1963; and Singh *et.al*, 2015) from Kumaun region. This aphid.

***12. Lipaphis erysimi* (Kaltenbach, 1843)**

It is commonly called as mustard aphid or turnip aphid, which infest members of family *Brassicaceae*. It is reported from six host plants from Kumaun region *viz. Brassica oleracea* var. *botryis* (L.), *Brassica oleracea* var. *capitata* (L.), *Raphanus sativus* (L.) (Khan and Shah, 2017); *Brassica campestris* (Hook. f. & Anderson) (Pervez and Kumar, 2017); *Brassica nigra* (L.) and *Sinapis alba* (L.) (Sharma Neha, 2016).

13. *Macrosiphoniella Sanborni* Gillette, 1908

This aphid attack on young floweral buds and shoots and destroy ornamental crops. We reported its four host plants from Kumaun region *viz. Chrysanthemum indicum* (L.) (Behura, 1963; Chakrabarti, 1972; Raychaudhuri 1980; Basu and Raychaudhuri, 1976 and Singh *et al*., 2015), *Leucanthemum vulgare* (Lam.), *Parthenium hysterophorus* (L.) (Mall *et al.,* 2010 and Singh *et al.,* 2015) and *Vernonia spp.* (Behura, 1963 and Singh *et al.,* 2015).

14. *Macrosiphum rosae* Linnaeus, 1758

It is a green, pink and reddish-brown colour aphid commonly known as rose aphid infesting on floral buds and leaves of *Rosa* species) (Khan and Shah, 2017) frfom Kumaun region.

15. *Macrosiphum* miscanthi Takahashi, 1921

It is a stenotypic aphid, which attacks of young and top parts of shoots and destroy crops. of *Triticum aestivum* (L.) (Raychaudhuri, 1978).

16. *Myzus persicae* Sulzer, 1776

This aphid is commonly known as green peach aphid, which is widely distributed in India and polyphagous in nature. There are fifteen host plants reported of this aphid in this region *viz. Brassica oleracea* var. *botryis* (L.), *Raphanus sativus* (L.), *Lycopersicon lycoperslcum* (L.) *Solanum melongena* (L.), *Solanum tuberosum* (L.), *Prunus persica* (L.) Batsch (Khan and Shah, 2017); *Brassica campestris* Hook. f. & Anderson, *Brassica nigra* (L.), *Sinapis alba* (L.), *Ageratum conyzoides* (L.) (Behura, 1963, Chakrabarti, 1972 and Singh *et al*., 2015), *Commelina benghalensis* (L.), *Dactyloctenium*

aegypticum (L.) P. Beauv, *Eleusine indica* (L.) Gaertner, *Solanum nigrum* (L.) (Shuja-Uddin 1974 and Khan and Shah, 2017) and *Sonchus spp.* (L.) (Singh *et al.*, 1999 and 2015). It has the second highest number of host plants in Kumaun region after *Aphis gossypii*.

17. Rhopalosiphum padi Linnaeus, 1758

It is commonly called as Bird cherry-oat aphid infesting young leaves of *Avena sativa* (L.) (Behura, 1963, Raychaudhuri, 1980) and *Triticum aestivum* (L.) (Verma *et al.*, 1975 and Singh *et al.*, 2015) found in Kuamun region.

18. *Rhopalosiphum maidis* Fitch, 1856

This cosmopolitan aphid is known as corn leaf aphid. It infests young leaves and freshly shoot of host plants. We reported two hosts of this aphid, viz. *Sorghum cernuum* (Behura, 1963, Kar *et al.*, 1990) and *Zea mays* (L.) (Chakrabarti, 1972; Agarwala, 1979; Bhalla and Pawar, 1980; Singh *et al.*, 2015 and Khan and Shah, 2017) from Kumaun region.

CONCLUSION

We reported fifty-five host plants and eighteen aphid species belonging to 12 genera from Kumaun region. *Aphis gossypii* infests twenty-one host plants belong to family Solanaceae, Cucurbitaceae, Punicaceae, Fabaceae, Asteraceae, Malvaceae, Lamiaceae, Araceae, Commelinaceae, Anacardiaceae. This is followed by *M. persicae* with fifteen host plants belonging to family Brassicaceae, Solanaceae, Rosaceae, Asteraceae, Commelinaceae, Poaceae. Third number is *Aphis craccivora* that has six host plants belong to family Fabaceae, Rutaceae, Asteraceae, and Ranunculaceae. Aphids, *B. brassicae* and *L. erysimi* are reported from six host plants belonging to family Brassicaceae.

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