

***Aphis craccivora* Koch on wheat in Pakistan**

Saif Ul Islam¹, Mian Inayatullah¹, Saleem Jan¹, Muhammad Ibrahim^{2*} and Syed Jawad Ahmad Shah²

1.Department of Entomology, The University of Agriculture, Peshawar, Pakistan

2.Nuclear Institute for Food and Agriculture (NIFA) Tarnab, Peshawar, Pakistan

Corresponding author: Muhammad Ibrahim

ABSTRACT: Aphids are important insect pest of wheat (*Triticum aestivum* L.) which affect crop directly through feeding and indirectly by transmitting different viral diseases. Various aphids are reported in Pakistan and their population intensity on wheat crop is observed increasing over the last few years. An aphid specie on wheat was observed during 2009 which has consistent natural occurrence and association with the crop during the subsequent years (i.e. 2010-13) at the Nuclear Institute for Food and Agriculture (NIFA), Peshawar, Pakistan. Morph-taxonomic analyses of 2009 aphid collections were carried out and the aphid was identified as *Aphis craccivora* Koch commonly called cowpea aphid. This is the first report of *Aphis craccivora* Koch occurring on wheat in Pakistan. Further studies are needed to confirm this aphid as wheat pest and to explore its potential role as vector of barley yellow dwarf virus (BYDV's) the cause of barley yellow dwarf disease in cereals.

Keywords: *Triticum aestivum*; *Aphis craccivora* Koch; identification; morphology; taxonomy

INTRODUCTION

Aphids are important pests of different host plants worldwide and have direct and indirect effect on crops (Blackman and Eastop, 2007). Twenty nine aphid species are reported as wheat pests and 25 out of these; transmit viral diseases in the crop (Gray and Gildow, 2003). The dominant species are rose-grass aphid, *Metopolophium dirhodum* (Walker), russian wheat aphid, *Diuraphis noxia* (Mordvilko), english grain aphid, *Sitobion avenae* (Fabricius), greenbug, *Schizaphis graminum* (Rondani), and the bird cherry oat aphid, *Rhopalosiphum padi* (L.) (Bospucperez and Schotzko, 2000). Wheat occupies over 8 million hectares in Pakistan where it is adversely affected by aphids (Zeb , 2011). Direct and indirect effects of aphids to wheat crop are well-documented from Pakistan (Bashir ., 1997; Ibrahim ., 2006; Aheer ., 2008; Siddiqui ., 2012). Several survey reports are available on types of aphid population infesting wheat crop and morph-taxonomic approach is regarded as a reliable and powerful tool for aphid's discrimination (Nasir and Yousaf, 1995; Poullos . 2007; Zeb , 2011). This paper reports the detection and identification of *Aphis craccivora* Koch, a new aphid specie associated with wheat crop in Pakistan.

MATERIALS AND METHODS

An unknown aphid was observed during 2009 in wheat crop at NIFA farm Peshawar, Pakistan. Aphid collection from the field was carried out as described (Akhtar ., 2010). Aphids were identified using morpho-taxonomic approach and maceration procedure for specimen preparation as described in the identification and information guide (Blackman and Eastop, 2000; Noordam, 2004). Sample maceration procedure included, gentle boiling of specimen in 95% alcohol for 1-2 minutes, removal of alcohol and adding 1cm depth of 10% potassium hydroxide (KOH) and finally pipette off all KOH solution and made sample free of KOH. The macerated aphid specimen was completely dehydrated and cleared before mounting in Canada balsam on microslide by using Martin's method (Martin, 1983).

The mounted slides were kept at 50°C in oven for one week and aphid specimen was identified using compound microscope with the help of above mentioned guides. Aphid images were captured using Nikon Coolpix 990 digital camera.

RESULTS AND DISCUSSION

Identification of new aphid species are important for their management and timely detection and potential risk analysis (Miller and Footitt, 2009). Morpho-taxonomic approach is practiced in many fields including entomology since long time (Daly, 1985). *A. craccivora* Koch was identified using this approach which was based on three distinguished characteristics including; extensive black patch on dorsal side of abdomen (Fig. 1), cauda with 4-7 hairs and siphunculi also black (Fig. 2) and 3-4 antennal segments (Fig. 3). These three prominent characteristic features of *A. craccivora* Koch were also reported by Blackman and Eastop (Blackman and Eastop, 2000), and Noordam (Noordam, 2004). *A. craccivora* Koch, has wide host range and can attacks about 50 crop plants in 19 different plant families (Blackman and Eastop, 2007) and morpho-taxonomic studies on this aphid specie from different countries/hosts were reported in the past (Heie, 2000; Mier Durante . 2003; Perez Hidalgo and Nieto Nafria, 2004; Voegtlin . 2004).

In this study, *Aphis craccivora* Koch was detected, identified and remained associated with wheat crop over seasons. Adaptations in relation to host plants in aphids are reported as they have biologically complex life cycles (Martin & Brown, 2008). Further studies are needed to confirm *A. craccivora* Koch as wheat pest because this aphid is not reported previously on wheat crop in Pakistan. *A. craccivora* Koch should also be tested as Barley yellow dwarf virus (BYDV) vector which cause yellowing of wheat crop, a disease occurring regularly in the country (Bashir , 1997; Ibrahim ., 2006).

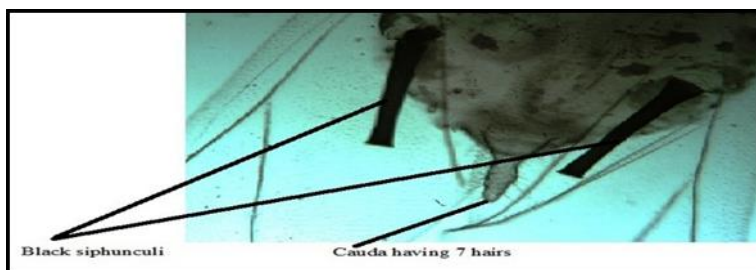


Figure 1. Black patch on dorsal side of abdomen of *Aphis craccivora* Koch

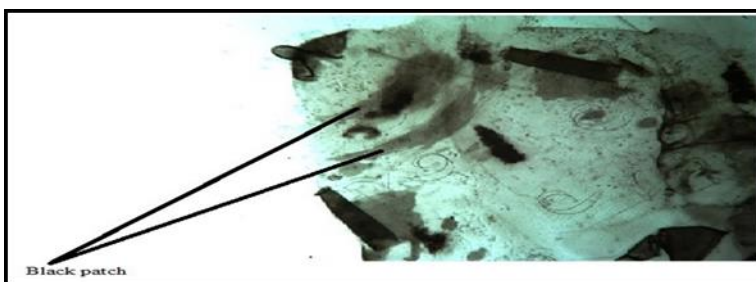


Figure 2. Alate *Aphis craccivora* Koch with black siphunculi and cauda having 7 hairs

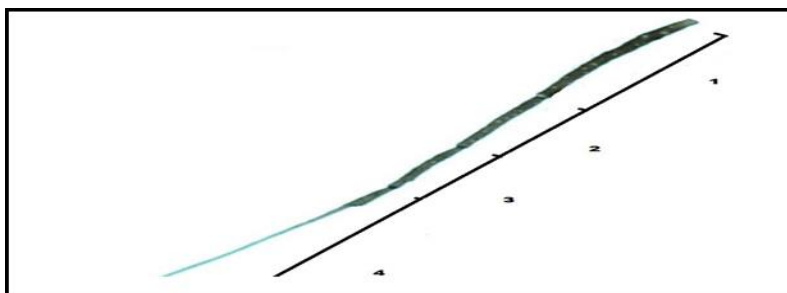


Figure 3. *Aphis craccivora* Koch with 4 antennal segments

REFERENCES

- Aheer GM, Ali A and Ahmad M. 2008. Abiotic factors effect on population fluctuation of alate aphids in wheat. *J. Agric. Res.* 46, 367-371.
- Akhtar LH, Hussain M, Iqbal RM, Amer M and Tariq AH. 2010. Losses in grain yield caused by Russian wheat aphid *Diuraphis noxia* (Mordvilko). *Sarhad J. Agric.* 26, 625-628
- Bashir M, Bertschinger L, Kisana NS, Mujahid MY and Hashmi NI. 1997. Detection of five Barley Yellow Dwarf Luteovirus serotypes in Pakistan. *Rachis.* 16, 47-49.
- Blackman RL and Eastope VF. 2000. *Aphids on the World's Crops, an identification and Information Guide.* Wiley, Chichester, UK.
- Blackman RL and Eastop VF. 2007. Taxonomic issues. pp.1-29. In: van Emden, H.F.,
- Bospucperez NA and Schotzk JDJ. 2000. Wheat genotypes, early plant growth stage and infestation density effects on Russain wheat aphid (Homoptera: Aphidae) population increase and plant damage. *J. Entomol. Sci.*, 35, 22-38.
- Daly HV. 1985. Insect Morphometrics. *Annual Review of Entomol.*, 30, 415-438.
- Gray MS and Gildow FE. 2003. Luteovirus-aphid interactions. *Ann. Rev. of Phytopathol* 41, 539-566.
- Heie OE. 2000. Three *Aphis* spp. new to the Danish aphid fauna (Hemiptera: Aphidoidea). *Entomologiske Meddelelser* 68, 61-62.
- Ibrahim M, Shah SJA, Muhammad T, Hussain S and Waseemullah AS. 2006. Field Assessment of candidate and commercial varieties naturally infected with barley yellow dwarf virus (BYDV) in Peshawar, Pakistan. *Proceeding of International wheat seminar, AARI, Faisalabad.* 292-295.
- Martin JH. 1983. The identification of common aphid pests of tropical agriculture. *Trop. Pest Management.* 29, 395-411.
- Martin JH and Brown PA. 2008. Global aphids. *Systematic Entomology* 33, 214-215.
- Mier Durante MP, Nieto Nafria JM and Ortego J. 2003. Aphidini(Hemiptera: Aphididae) living on *Senecio* (Asteraceae), with descriptions of a new genus and three new species. *The Canadian Entomologist* 135, 187-212.
- Miller GL and Footitt RG. 2009. The taxonomy of crop pests: The aphids. In: *Insect Biodiversity: Science and Society*, Footitt R.G., Adler P.H. (Eds.), Wiley- Blackwell, Oxford, pp. 463-473.
- Nasir A and Yousaf M. 1995. Aphids and their host plants in the province of Punjab, Pakistan. *Pak. J. Zool.* 27, 282-284.
- Noordam D. 2004. Aphids of Java. Part V: Aphidini. *Zool. Verh. Leiden* 346.
- Perez Hidalgo N and Nieto Nafria JM. 2004. A new species of *Aphis* (Hemiptera: Aphididae) living on roots of *Thymus mastichina* (Lamiaceae) from Spain. *Annales de la Société Entomologique de France* 40, 193-198.
- Poulios KD, Margaritopoulos JT and Tsitsipis JA. 2007. Morphological separation of host adapted taxa within the *Hyalopterus pruni* complex (Hemiptera: Aphididae). *European Journal of Entomology* 104: 235-242.
- Siddiqui NN, Ilyas M, Mansoor S, Azhar A and Saeed M. 2012. Cloning and phylogenetic analysis of coat protein of barley yellow dwarf virus isolates from different regions of Pakistan. *J Phytopathol* 160:13-18.
- Voegtlin DJ, Halbert SE and Qiao G. 2004. A guide to separating *Aphis glycines* Matsumura and morphologically similar species that share its hosts. *Annals of the Entomological Society of America* 97, 227-232.
- Zeb Q, Badshah H, Ali H, Shah RA and Rehman M. 2011. Population of aphids on different varieties/lines of wheat and their effect on yield and thousands grain weight. *Sarhad J. Agric.* 27, 443-450.