
International Journal of Advanced Research in Biological Sciences

ISSN : 2348-8069

www.ijarbs.com

Research Article



Efficacy of extracts for controlling aphid at milking stage of wheat

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Abstract

The study had been planned to evaluate the efficacy of some extracted plant material viz. Neem leaves crush (*Azadirachta indica*); Citrus fruit peel crush (*Citrus sinensis*); Garlic fruit crush (*Allium sativum*); Marigold flower crush (*Tagetes erecta*) and AK leaf crush (Aswagandha) sprayed against aphid in wheat crop at Chhachhar Zari Farm, Rohaila Road, Basirpur Tehsil Depalpur, District Okara during three crop seasons (2012-14). Significantly highest aphid mortality was recorded by citrus peel (69.05%)>garlic (66.91%)>Ak(59.73%)>Neem (53.97%) & marigold (50.56%) compared to infested control (-2.31%) during 2012. During 2013, significantly highest mortality was recorded by citrus peel (64.17%)>garlic (56.46%)>Neem (48.40%) however Ak (43.55%) & Marigold (40.02%) showed almost same effect compared to control (-2.78%). During 2014, significantly highest mortality was recorded by citrus fruit peel (70.14%)>garlic (69.53%)>Neem (56.55%)>Ak (48.11%) & Marigold (42.07%) compared to control (-1.28%). It is concluded that all the plant extracts showed insecticidal properties against aphid in wheat crop and successfully be integrated, as a part of IPM.

Keywords: Plant: extracts; spray; aphid; Mortality; wheat; Okara.

Introduction

Aphids caused yield losses directly (35-40%) by sucking the sap of the plants or indirectly (20-80%) by transmitting viral and fungal diseases (Aslam *et al.*, 2005). In spite of development of various modern synthetic insecticides, loss of crop from pests and diseases is still considerable due to vector versatility and increasing tolerance of pests against chemicals. Excessive and indiscriminate use of pesticides has unlimited hazards for human beings and every naturally growing population. The crops are exposed directly to pesticides; consumed by humans before the plant system is able to get rid of these pesticides. Fumigation, spraying and dusting of pesticide liberate a fair volume of harmful vapors in atmosphere and consequently create a certain degree of atmospheric pollution (Dheeraj *et al.*, 2006). Over 2000 plant

species are known having insecticidal properties (Feistein, 1952). Pesticides from plant origin are indigenously available and considered cheapest, comparatively safe for human health. Extracts of vegetable and plant origin have found to possess insecticidal properties and because of their easy availability in rural areas these could be widely used for plant protection measures (Lal *et al.*, 1977). Organic pesticides have many advantages over synthetic pesticides; generally they possess low mammalian toxicity that constitute least or no health hazards and environmental pollution (Islam, 2000). Practically no risk of developing pest resistance to biopesticides when used in natural forms except synthetic pyrethroids no adverse effect on plant growth, seed viability and cooking quality of the

grains; less expensive and easily available because of their natural occurrence in oriental countries (Prakash *et al.*, 2008). Botanical extracts having sulphur and polyphenolic compounds block the spiracle system of insects, causing them died from asphyxiation and suffocation (Iqbal *et al.*, 2011). Smearing of these extracts on the cuticle of insect act as a barrier leads to dehydration causing death of insect. Extracts disrupted feeding behavior of insects which are important in transmission of some plant viruses by aphid sucking (Jagan *et al.*, 1981 and Kishore *et al.*, 1999). The present study had therefore, been planned to evaluate the inhibitory properties of organic pest control extracts sprayed against aphid in wheat crop to reduce excessive usage of pesticide.

Materials and Methods

The study had been planned to evaluate the efficacy of extracted material from plants viz., Neem leaves crush (*Azadirachta indica*); Citrus fruit peel crush (*Citrus sinensis*); Garlic fruit crush (*Allium sativum*); Marigold flower crush (*Tagetes erecta*) and AK leaf crush (Aswagandha) sprayed against aphid in wheat crop at Chhachhar Zari Farm, Rohaila Road, Basirpur Tehsil Depalpur, District Okara during Rabi 2012-2014. Wheat variety Sehar-2006 was used in the experimant because aphid infestation was high in it. The plots were arranged with Randomized Complete Block Design with three replications and in each treatment. Extraction from plants materials, 500 ml rectified dilution (DL) was taken from homeopathic store and 5kg of fresh leaf extract of treatments (Neem, Citrus peel & AK); fruit (Garlic) and flowers (Marigold) after grinding wa taken in dark brown glass bottle. The bottle was stirred, tight with stop cork; rapped with black cloth and kept in dark room. Stirred the solution after seven days rapped it again; after 30 days solution was ready to use. At milking stage 100 spikes were selected randomly heavily infested with aphid population & data was recorded; tags were fixed on selected tillers in each treatment. The infestation of aphids on wheat crop is abundant during the heading and flowering stages (Khan *et al.*, 2012). Infestation of aphid on wheat crop was

recorded during the heading and flowering stages and reduced during the maturity stage of the crop (Riedell, 1990). Plant extracts were sprayed in standing wheat crop; observation was recorded before and after 96 hours in each treatment within each replication. The mechanism of mortality (%) was recorded in accordance to Khanstically by analysis of variance technique at 5% level of probability (Steel *et al.*, 1997) to construct ANOVA for comparing means of each treatment.

Results and Discussion

Mortality (%)

Table-1 and photograph 1 revealed that mortality of aphid was recorded in order to citrus peel (69.05%)>garlic (66.91%)>Ak (59.73%)>Neem (53.97%) & marigold (50.56%) compared to control (-2.31%) during Rabi 2012. Similar result was recorded during the crop season 2013, however Ak (43.55%) & Marigold (40.02%) showed almost similar mortality compared to control (-2.78%). During Rabi 2014, mortality was recorded by citrus peel (70.14%)> garlic (69.53%)>Neem (56.55%)>Ak (48.11%) & Marigold (42.07%) compared to control (-1.28%). These results were in accordance to Dheeraj *et al.*, (2006), Gaby *et al.*, (1996). Many growers developed ways of making their sprays of plant extracts, these were inexpensive and had proved to be most affected against pests (Bhathal *et al.*, 1994; Singh *et al.*, 1995; Sarwar, 2013). These results were also in accordance to Iqbal *et al.*, (2011) who reported that citrus fruit peel crush (*Citrus sinensis*) reduced maximum level of aphid (65.69%) followed by Garlic fruit crush (*Allium sativum*) (57.91%). Khaliq *et al.*, (1995) reported that aphid mortality was recorded by chlorpyriphos (100%) after 72 hrs of spraying compared to neem oil-treated plots (84%) & controls (47%). Our results were also in line with Pedro, (1996) who reported that essential oils of *Citrus* peels caused reduction in oviposition through parental adult mortality however neem's as natural pesticides had also been documented in previous and recent literature (Schmutterer, 1990).



Photograph 1. Aphid attack on different parts of Wheat crop

Table 1. Efficacy of plant extract on mortality (%) of aphid during Rabi 2012-14

Treatments	Aphid population tiller ⁻¹ before spraying			Post treatment of aphid population tiller ⁻¹ 96 hrs after spraying			Mortality (%)		
	2012	2013	2014	2012	2013	2014	2012	2013	2014
Control (Aphid infested plot)	27.69	21.58	25.74	28.33	22.18	26.07	-2.31	-2.78	-1.28
Neem leaves crush (<i>Azadirachta indica</i>)	20.27	21.90	23.91	09.33	11.30	10.39	53.97	48.40	56.55
Citrus fruit peel crush (<i>Citrus sinensis</i>)	29.37	26.43	28.43	09.09	09.47	08.49	69.05	64.17	70.14
Garlic fruit crush (<i>Allium sativum</i>)	27.59	29.33	24.55	09.13	12.77	7.48	66.91	56.46	69.53
Marigold flower crush (<i>Tagetes erecta</i>)	25.22	18.99	23.46	12.47	11.39	13.59	50.56	40.02	42.07
AK leaf crush (Aswagandha)	29.03	22.09	25.44	11.69	12.47	13.20	59.73	43.55	48.11

Conclusion

It is concluded that all the extracted materials showed insecticidal properties against aphid. However plant extracts are easily degradable; ecofriendly and safe for consumption. However the farmer's are advised to spray these locally formed plant extracts for controlling aphid to overcome excessive usage of pesticides.

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