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# EFFICACY OF PLANT DERIVED OILS AND EXTRACTS AGAINST WHITE-FLY, *BEMISIA TABACI* (GENNADIUS) ON SESAME CROP

Aniqa Iram*, Javed Khan**, Nadeem Aslam**, Ehsan-ul-Haq**, Habib Iqbal Javed**, Muhammad Irfan*, Awais Rasool*, Muhammad Ishaque Mastoi** and Sumera Aslam*

**ABSTRACT:- Whitefly, *Bemisia tabaci* (Genn.) is a polyphagous pest and is reported on more than 600 host plants worldwide. Different methods are being used for its control. The present experiment was conducted to determine the effect of some plant extracts of mint (*Mentha* spp.) and geranium (*Pelargonium graveolens*) and soybean oil (*Glycine max*), mustard oil (*Brassica* spp.) and taramera oil (*Eruca sativa*) against whitefly, *Bemisia tabaci* on sesame crop. The data were recorded 24h before and 24h, 48h, 72h and 168h after application of each spray material. The results showed that whitefly population was significantly suppressed by both the botanical oils and extracts as compared to the control treatment but in general botanical oils showed significant results as compared to plant extracts. Soybean oil was quite effective in reducing whitefly population per leaf, while after second spray soybean oil and extract of *Mentha* spp. was more effective in the reducing whitefly population per leaf. The results indicated that plant derived oils and extracts have the potential to be used in plant protection strategies but still more research has to be incorporated in the pest management programmes.**

*Key Words: Sesame, White Fly, Bemisia tabaci, Population; Control Measures, Plant Derived Oils; Plant Extracts; Pakistan.*

## INTRODUCTION

Insect pests are serious threat to sesame crop and cause economic losses every year. Among these white fly, *Bemisia tabaci*, jassids, thrips and aphids are economically important insect pests of sesame crop (Shaukat, 2004).

Among the various insect pests of sesame, whitefly *Bemisia tabaci* (Gennadius) nymphs and adults are a serious pest of sesame crop, they suck cell sap from leaves, flower and pods. Due to which curl downward leaf margins, stunted growth, sickly appearance of the crop and abnormal growth of the leaf tissue is observed. The peculiar yellow spots are found on upper surface of leaves affected by white fly (Ahirwar et al., 2010).

The indiscriminate use of synthetic insecticides has created problems, such as secondary pests emergence, hazards to human beings, livestock, beneficial insects, fish and pollinators which eventually disturb the natural ecosystem (Shukla et al., 1998).

To avoid these problems, it is necessary to use non-toxic materials for the control of insect pests. Some botanical insecticides if found effe-

* *Department of Entomology, Pir Meher Ali Shah, Arid Agriculture University, Rawalpindi, Pakistan.*
** *Insect Pest Management Programme, National Agricultural Research Centre , Islamabad, Pakistan.*
Corresponding author: javednarc2010@gmail.com

ctive are not only economically and ecologically safe but are also free from residual problems. For the last few years, the interest in the botanical insecticides has increased as a result of environmental concerns and insect resistance to synthetic insecticides.

The present study was therefore designed to evaluate and study the influence of different plant extracts and botanical oils against white fly population on sesame crop under field conditions.

## MATERIALS AND METHOD

The experiment was carried out at the experimental farm of University of Arid Agriculture, Rawalpindi under rainfed conditions. Sesame crop was sown in the last week of July 2005. There were six treatments (soybean oil; taramera oil; mustard oil; *Pelargonium graveolens* leaf extract; *Mentha* spp. leaf extract. and control) laid out in Randomized Complete Block Design (RCBD) each with three replicates.

The experimental plot was 1226 $m^2$ with 12 rows having 75 cm row to row and 30 cm plant to plant distance. The agronomic practices were done as and when required and were kept uniform for all the treatments.

The spray formulation for mustard (*Brassica*), soybean (*Glycine max*.) and taramera (*Eruca sativa*) was prepared by mixing oil @ 30ml per liter of water. Castille soap was used as an emulsifier @ 1g per liter. Extract of mint (Mentha) and geranium (*P. graveolens*) was prepared by adding 100g of dried leaves in two litres of water, meshed and kept overnight. The extract was filtered through cheese cloth and further mixed with one litre of water and Castille soap was added as an emulsifier. The data were recorded by selecting 10 plants diagonally in each treatment at regular intervals before spray and then 24, 48, 72 and 168 hours after spray application. A total of 2 spray applications were given at bi-weekly interval. The control plot was also sprayed twice with water by mixing Castille soap @ 1g per liter. Populations of whitefly were recorded alternatively from upper, middle and lower leaves and then means were calculated. The data was statistically analyzed using analysis of variance (ANOVA) and means were compared by Duncan's Multiple Range Test (DMRT).

## RESULTS AND DISCUSSION

### First Spray

Twenty four hours after 1st spray the results indicate that soybean oil, extract of *Mentha* spp. and *P. graveolens* showed the least population of whitefly 0.22, 0.23 and 0.27 per leaf, respectively (Table 1), while in taramera and mustard oil treatments the population was 0.30 per leaf. After 48h, of 1st spray, the extract of *Mentha* spp. was found the most effective showing minimum population (0.09 per leaf) which was significantly different from other treatments. While soybean oil and taramera oil showed 0.14 and 0.18 per leaf population of whitefly, respectively. Extract of *P. graveolens* was the least effective giving 0.24 whitefly per leaf, which was significantly different from other treatments. After 72h, the results revealed non-significant differences in controlling whitefly population among all treatments (Table 1). However, soybean oil, mustard oil and extract of *Mentha*

**Table 1. Effect of plant derived oils and extracts on white fly population on 1st spray in sesame crop**

| Treatment | 24h before | 24 h after | 48h after | 72h after | 168h after |
|---|---|---|---|---|---|
| Soybean oil | 0.17 [b] | 0.23 [b] | 0.14 [b] | 0.14 [b] | 0.13 [b] |
| Taramera oil | 0.20 [b] | 0.30 [b] | 0.18 [b] | 0.17 [b] | 0.20 [b] |
| Mustard oil | 0.13 [b] | 0.30 [b] | 0.24 [b] | 0.14 [b] | 0.17 [b] |
| *Pelargonium graveolens* | 0.10 [b] | 0.27 [b] | 0.20 [b] | 0.20 [b] | 0.13 [b] |
| *Mentha* spp. | 0.13 [b] | 0.24 [b] | 0.09 [b] | 0.14 [b] | 0.13 [b] |
| Control | 0.43 [a] | 0.46 [a] | 0.46 [a] | 0.45 [a] | 0.47 [a] |

*Means followed by same letters do not differ significantly by DMRT at P = 0.05*

spp. proved to be the most effective treatments with a population of 0.14 whitefly per leaf. Extract of *P. graveolens* was the least effective treatment exhibiting a population of 0.20 whitefly per leaf. After 168h, taramera oil, extract of *Mentha* spp. and *P. graveolens* were statistically at par with other treatments except untreated check, each having 0.13 per leaf population of whitefly. Taramera oil and mustard oil showed non-significant differences with other treatments except control treatment having 0.20 and 0.16 per leaf population of whitefly, respectively.

**Second Spray**

Twenty four hours before 2nd spray the results indicated that all the treatments were equally effective in reducing the whitefly population as compared to data collected before 1st spray (Table 2). Soybean oil was most effective showing minimum population of whitefly (0.03 per leaf). Maximum population of whitefly was 0.43 per leaf under control treatment. Twenty four hours after 2nd spray, the results revealed non-significant differences among the treatments against untreated check. Minimum population of whitefly showed by mustard oil (0.06 per leaf) followed by soybean oil and taramera oil which were also effective showing 0.10 and 0.13 whitefly population per leaf, respectively. However, all the treatments showed better results as compared to control treatment, where population of whitefly was 0.53 per leaf. After 48h of 2nd spray, the results indicated that *Mentha* spp. treatment had lowest population of whitefly (0.07) which was significantly different from all other treatments (Table 2), followed by mustard oil, 0.11 per leaf. Soybean oil and extract of *P. graveolens* each had 0.14 whitefly per leaf. Maximum population of whitefly was observed on untreated control (0.29 per leaf). After 72h, data indicated that soybean oil, mustard oil and taramera oil were effective treatments each having no population of whitefly and were significantly different from extract of *P. graveolens* and untreated check but were not significantly different from extract of *Mentha spp*. Untreated check showed maximum population of whitefly (0.14 per leaf) which was

**Table 2. Effect of plant derived oils and extracts on white fly population on 2nd spray in sesame crop**

| Treatments | 24 h before | 24h after | 48h after | 72 h after | 168 h after |
|---|---|---|---|---|---|
| Soybean oil | 0.03 c | 0.10 b | 0.14 b | 0.00 b | 0.00 c |
| Taramera oil | 0.20 bc | 0.13 b | 0.17 b | 0.00 b | 0.00 c |
| Mustard oil | 0.17 bc | 0.06 b | 0.11 b | 0.00 b | 0.00 c |
| *Pelargonium graveolens* | 0.23 b | 0.17 b | 0.14 b | 0.06 b | 0.02 c |
| *Mentha* spp | 0.10 bc | 0.17 b | 0.07 b | 0.02 b | 0.00 c |
| Control | 0.43 c | 0.53 b | 0.29 b | 0.14 b | 0.00 c |

*Means followed by same letters do not differ significantly by DMRT at P = 0.05*

significantly different from all other treatments (Table 2). After 168h, significant variations existed among treatments regarding whitefly, per leaf (Table 2). The soybean oil, taramera oil, mustard oil and extract of *Mentha* spp. were statistically at par, gave effective response and each showed minimum population of whitefly per leaf. Extract of *P. graveolens* showed 0.02 per leaf population of whitefly which was significantly different from all other treatments. Untreated check showed 0.04 per leaf population of whitefly which was significantly different from all other treatments.

The effect of all treatments was significant on the population of white fly 48, 72 and 168 hours after 1st spray and 24, 48, 72 and 168 hours after 2nd spray. The results revealed that the population of whitefly was significantly reduced in all the above mentioned intervals as against control treatment. It was also observed that effectiveness of all the treatments increased on prolonged interval. Soybean oil was thus the most effective treatment 48, 72 and 168 hours after 1st spray. *Mentha* spp. was also effective treatment 24, 48 and 168 hours after 2nd spray and showed minimum population of whitefly. The results are in accordance with those of Bulter and Heinneberry (1990) who found that the use of common household cooking oil in combination with liquid laundry detergent and commercial cotton seed oil greatly reduced the population of *Bemisia tabaci* on cotton, water melon, pepper and cucumber. However, differences in population reduction may also be due to different environmental conditions under which the experiments were conducted. Golmohammadi et al (2014) through an experiment showed that pyrethrum resulted in an acceptable level of whitefly control and was more effective than other treatments. Jazzar and Abou-Fakhr (2003) also observed effective control of *B. tabaci* with azadirachtin. Khalil et al. (2010) used castor oil for the control of white fly in the field and found satisfactory results. The present results are in accordance with the findings of Bulter and Heinneberry (1990) and Bulter et al. (1991) who had reported 60-75%

population reduction in whitefly population by applying cotton seed oil and 90% by soybean oil. The results are also in accordance with the findings of Fazal (1998) who reported 80-90% reduction in whitefly population by using mustard oil.

The results of the present study indicated that plant extract of *P. graveolens*, *Mentha* spp., soybean oil, taramera oil and mustard oil may be used for the control of white fly on sesame crop in the field with least environmental and health hazards as in chemical pesticides.

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