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EVALUATION OF SOME ELEMENTS OF INTEGRATED MANAGEMENT IN CONTROLLING THE WHITE FLY, BEMISIA TABACI (HEMIPTERA: ALEYRODIDAE), WHICH INFECTS OKRA CROP IN CENTRAL IRAQ.

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Abstract

This study was conducted in a field belonging to the Department of Horticulture at the College of Agricultural Engineering Sciences / University of Baghdad for the season 2021-2022 with the aim of controlling the white fly (Hemipteh: Aleyrodidac) Bemisia tabaci on the okra crop with three cultivars (bitra, hasanawia, Abeer) and with three dates using three species of the pesticides are the chemical pesticide Decis and growth regulators Applaud, Match. The results showed the excelled of the Decis pesticide, as it achieved the highest killing rate (71.58, 74.94, 77.11) for the cultivar Btre and for the three dates. The results also showed excelled of the pesticide itself for hasanawia cultivar and for the three dates with a killing rate of (74.04, 74.94, 77.11).Where the killing rate for the cultivar and for the three dates was (70.41, 76.13, 79.27). The results of the study showed that the cultivar was superior to the rest of the other cultivars, and the third date was excelled on the rest of the other dates.

introduction

The okra (Abelmoschus esculentus L.), which belongs to the Malvaceae family, is one of the most important summer vegetable crops globally, where it is cultivated in vast areas in Asia and Africa. It is also widely cultivated in India, Nigeria, Pakistan, Ghana and Egypt (Akanbi et al., 2010). Okra is characterized by its high nutritional importance due to its content of protein, calcium, potassium, and other vitamins and minerals beneficial to humans (Khan et al., 2015).Okra is a versatile crop. The edible part is the immature pod, which is harvested when it becomes soft. Its fruits and stems contain raw fibers that can be used in the paper industry (Kumar et al., 2013). While the roots, seeds, and bark contain mucilage, as well as its presence in flowers, leaves, and wall cells (Kumar et al., 2010). In addition to its high economic value (Sawadogo et al., 2009). In Iraq, the area cultivated with okra in 2020 amounted to approximately 64,146 dunums, with a production rate of 93,719 tons (Central Statistical Organization, 2020)Okra is exposed to many insect pests that cause great damage, starting from seedlings to the harvest phase (Kedar et al., 2014). The most important of these pests are the cotton aphid (Aphis gossypii Glover), the white fly (Bemisia tabaci), and the leafhopper (Amrasca biguttula) (Sarkar et al., 1996; Rao; Rajendr, 2003). as well as Thrips tabaci, bud borer (Earias spp), and fruit borer (Helicoverpa armigera) (Asish et al., 2008).The white fly is one of the insects that cause great damage to different types of crops, such as vegetable crops, fruits, and ornamental plants, in addition to infecting some types of weeds. The white fly, B. tabaci, belongs to the Aleyrodidae family and the order Hemiptrera, and it has several names, namely the tobacco white fly and the cotton white fly (Al-Mashhadani, 2011). As for Al-Malo (1988), several species of white flies that infested citrus fruits were recorded, such as Bemisia afer (Priesner & Hosny), B.tabaci (Gennadius), B.jasmina, Siphoninus phillyreae (Haliday), Trialeurodes rara

Singh, T.ricini (Misro), and T. .vaporariorum (Westwood), Several methods have been used to control the spread of the white fly insect and thus reduce its numbers, including chemical control, bio control, Industrial insecticides (Ahmed et al., 2013; Ahmed et al., 2016; Fu et al., 2017; Ahmed et al., 2018; Ahmed et al., 2019).At the present time, chemical control is one of the methods widely spread all over the world despite its negative effects on humans, animals, enemies, and vitality (Saif-Ur-Rehman et al., 2019a; Saif-Ur-Rehman, 2019b; Mastoi et al., 2020; Sayed et al., 2021a). ;Sayed et al., 2021b). In view of the increasing spread of insect pests and their damage to the okra crop in most of the governorates of Iraq, and the importance of this crop and the lack of scientific studies and research, this research suggested:

Materials and methods

Field preparation and cultivation

These field studies were conducted in a field belonging to the Department of Horticulture at the College of Agricultural Engineering Sciences / University of Baghdad for season 2021-2022 in a field of 300 square meters, a length of (15) meters and a width of (15). It was prepared for cultivation by conducting all the necessary agricultural operations and according to the approved recommendations, and after preparing the soil well, the field area was divided for the purpose of planting it with the okra crop, and the experiment was designed according to the Randomized Complete Block Design (RCBD) with three replicates and each replicate includes (three experimental units), each of which consists of 15 edges , the length of the lane is (5m), the width of the edge is (95cm), and the distance between one edges and another is 90cm, and a distance of 2m is left for the peripheral edges of the field. The okra crop was cultivated with three dates.The first date, which is the early date, is dated 2-15-2022, and the second date, which is the specified date, the customary one, is dated 3-1-2022. The third and last date is the late date, dated 3-15-2022, and in three cultivars: (bitra, hasanawia, and Abeer) for each of The three dates mentioned above, and follow a fertilization program that includes mixing a group of chemical fertilizers (urea 10 kg, 20 kg N, P, K (20 20 20) all mixed in a container of 50 liters and fertilized the plants as needed.

Field evaluation of some elements of integrated management in controlling insect pests affecting the okra crop

An in-field experiment was designed according to the Randomized Complete Block Design (RCBD) with three blocks:

Each sector was divided into 4 experimental units. The treatments (pesticides) were randomly distributed among the experimental units within each sector. Each experimental unit was marked with a specific number to indicate the treatment, as follows:

1 – Applaud at a concentration of 5 g / 5 liters

2 – Match at a concentration of 5 ml / 5 liters

3 – Decis at a concentration of 1.75 g / 5 liters

4 – Control water only

The plants in the experimental units were sprayed with pesticides using a hand sprayer with a capacity of 16 liters of the type of pressure sprayer (Japanese origin). The pesticides were used at

the recommended concentrations in the field.Each experimental unit was isolated during the spraying process by using a nylon barrier to ensure that the pesticide spray does not volatilize to the other experimental units.A sprinkler was specified for each treatment to ensure that the treatments were not mixed. As for the control treatment, it was treated with water only, and samples were taken one day before spraying and 1, 3, 7, 10, 14 days after spraying, with 5 leaves for each replicate, where the total number of leaves for each cultivar became 45 and I followed this method for the three dates, the samples were placed in nylon bags and all the information related to the crop, date, cultivar and refined was recorded. It was transferred to the laboratory and examined by a microscope to calculate the insect roles it contained. Henderson and Tilton (1955) equations were used to calculate the relative efficiency of each treatment.

% relative efficiency = 100 x (number of live individuals in treatment after control x number of live individuals in control treatment before control) / (number of live individuals before treatment after control * number of live individuals in control treatment before control)

statistical analysis

The field experiments were designed according to the randomized complete block design (R.C.B.D), and the data were analyzed statistically using the ANOVA table of variance. The least significant difference test (L.S.D) was adopted at the probability level of 0.05 to compare the mean results according to the statistical program Genstat v.12.1 (Al-Sahuki, 1990).

Results and discussion

The efficacy of the used pesticides varied in affecting the white fly insect on the crop of okra (bitra) first date during different time periods, Table (1) and by observing the relative efficacy rate of the different treatments on the whitefly insect, the excelled of Decis pesticide was shown on the rest of the used pesticides with significant differences, where the relative efficacy rate was 71.58%, followed by the growth regulator treatment, Applaud, and its efficiency was 71.07%, and the least was the match regulator treatment, and its efficiency was 60.28%. The results also showed that there was a discrepancy between the death rates achieved between the treatments used depending on the concentration and the type of treatment used. As for the effect of the time period on the efficiency of the different treatments, they were all affected after one day of treatment with the superiority of the pesticide Decis, followed by the Match treatment, and the least effective was the treatment with the regulator. Applaud, with significant differences,The efficiency of the three treatments was 28.14, 23.45, and 23.24, respectively. The results also showed the effect of the overlap between the efficiency of the three treatments, with a direct relationship with the time periods after the treatment As the Decis pesticide treatment continued to outperform the rest of the other treatments with significant differences after 7 days of treatment, as the relative efficiency rate reached 52.92, 89.22. % respectively for 3, 7 days of treatment.While the efficiency of the Match treatment gradually increased to reach its maximum after 14 days of treatment, it was also found that the Applaud treatment was excelled on the Decis treatment in the rest of the periods, where the relative efficiency rate for Applaud was 97.43, 94.29%, respectively, and the efficiency rate for the Decis treatment was 97.16, 90.45%, respectively. For periods of 10, 14 days after the treatments .As for the match treatment, the results showed an increase in the relative efficiency for

the 3-day period, reaching 59.85% after 3 days of the treatment. The delayed effectiveness of Applaud growth regulator after 14 days of spraying can be explained by the fact that in most cases the lethal effect of growth regulators is delayed.Which helps the pest cause additional damage to the crop before death occurs (Pener, 2020), where the researchers (Alani and Al-Gadban, 2019) explained. The number of white fly nymphs decreased by a large percentage when they used both the chemical pesticide Evisect and the growth regulator Applaud, as the killing rate reached 84.88 and 82.83%, respectively, with no significant difference between them.

Table (1) Comparative efficiency of some elements of integrated management in the different death events of the white fly insect on okra crop (bitra) first date

nymphs						
average	Corrected percentage of death % after treatments in days					treatments
	14	10	7	3	1	
71.58	97.16	90.45	89.22	52.92	28.14	Decis
60.28	97.16	71.92	67.08	59.85	23.45	Match
71.07	97.43	94.29	88.17	52.22	23.24	Applaud
	91.24	85.55	81.49	55	24.94	average
3.592	treatments *day	2.074	day	1.606	treatments	LSD

The efficacy of the used pesticides varied in affecting the white fly insect on the crop of okra cultivar bitra, the second date, during the different time periods Table (2), and from observing the relative efficacy rate of the different treatments on the white fly insect, it was shown that Decis pesticide was excelled on the rest of the pesticides used with significant differences, where it reached Its relative efficiency rate is 76.61%. It was followed by the growth regulator treatment, Applaud, with an efficiency of 74.66%, and the lowest was the treatment of the regulator Match, with an efficiency of 65.09%. The results also showed that there is a discrepancy between the death rates achieved between the treatments used, depending on the concentration and the type of treatment used. As for the effect of the time period on the efficiency of the different treatments, all of them were affected after one day of treatment, with the superiority of the pesticide Decis, followed by the treatment of Applaud. The results also showed the effect of overlapping between the efficiency of the three treatments with a direct relationship with the time periods after the treatment, where the treatment with Decis pesticide continued to excelled on the rest of the other treatments with significant differences after 7 days of treatment, as the relative efficiency rate reached 58.79, 94.19. % respectively for the periods 3, 7 days of treatment, While the efficiency of the Match treatment gradually increased to reach its maximum after 14 days of treatment, it was also shown that the Applaud treatment was superior to the Decis treatment, where the relative efficiency rate of the Applaud was 97.54% and the efficiency rate of the Decis treatment was 96.86% for the period of 14 days after the treatment. As for the match treatment, the results showed an increase in the relative efficiency for the 3-day period, reaching 67.01% after 3 days of the

treatment. This is consistent with Gogi et al. (2021), as they indicated the effectiveness of Buprofezin, Pyriproxyfen, and Fenoxycarb in Integrated Pest Management (IPM) programs against the white fly B. tabaci on the cotton crop, as the death rate of the white fly when used reached 80-91%.In a similar study, Rehman et al. (2020) noted that Buprofezin 25WP achieved a high mortality rate of 82.13% of whiteflies on the cotton crop.

Table (2) Comparative efficiency of some elements of integrated management in the different death events of whitefly insect on okra crop bitra, second date

nymphs						
average	Corrected percentage of death % after treatments in days					treatments
	14	10	7	3	1	
76.61	96.86	95.21	94.19	58.79	38.00	Decis
65.09	96.86	75.71	72.47	67.01	26.60	Match
74.66	97.54	94.31	94.15	57.83	29.47	Applaud
	92.69	88.41	86.93	61.21	31.36	average
3.293	treatments *day	1.901	day	1.473	treatments	LSD

The efficacy of the used pesticides varied in affecting the white fly insect on the crop of okra cultivar bitra, the third date, during the different time periods Table (3), and from observing the relative efficacy rate of the different treatments on the white fly insect, the superiority of Decis pesticide on the rest of the used pesticides showed significant differences. The rate of relative efficiency was 79.91%, followed by the treatment of the growth regulator Applaud, and its efficiency was 77.58%, and the lowest was the treatment of the regulator Match, whose efficiency was 69.65%. The results also showed that there was a discrepancy between the death rates achieved between the used treatments depending on the concentration and the type of treatment used. As for the effect of the time period on the efficiency of the different treatments, they were all affected after one day of treatment, with the excelled of the pesticide Decis, followed by the treatment of Applaud, and the least effective was the treatment with the regulator. Match with significant differences,The efficiency of the three treatments was 44.30, 33.74, and 31.48, respectively. The results also showed the effect of overlap between the efficiency of the three treatments with a direct relationship with the time periods after the treatment, where the treatment with Decis pesticide continued to excelled on the rest of the other treatments with significant differences after 7 days of treatment, where the relative efficiency rate reached 64.00, 96.92. % respectively for the periods 3, 7 days of treatment,While the efficiency of the Match treatment gradually increased to reach a maximum after 14 days of treatment, it was also shown that the Applaud treatment was excelled on the Decis treatment, where the relative efficiency rate of the Applaud was 97.41% and the efficiency rate of the Decis treatment was 95.89% for the period of 10 days after the treatment. As for the match treatment, the results showed an increase in the relative efficiency for the 3-day period, reaching 71.61% after 3 days of the treatment. This is consistent with Koohzad-

Mohammadi et al. (2021) who indicated the excelled of the efficacy of delta-mthrin on both dinotefuran and spiromesifen in reducing the numbers of eggs, second-instar nymphs, as well as the larva phase of the whitefly insect on sugarcane crop. This superiority is due to the effect of delta-mthrin on sugarcane. Insect embryonic development as indicated by Buczek et al. (2019) when testing both deltamethrin and alpha-cypermethrin on Ixodes ricinus .Noting that both pesticides caused disruption of the embryonic development of the insect, as well as hindering the transition to the nymphal role. Fadlelmawla et al. (2021) also indicated the effectiveness of lufenuron in reducing the numbers of sucking borer insects, including the whitefly, as the decrease in the infection level reached from 8.12% to 69.11%.

Table (3) Comparative efficiency of some elements of integrated management in the different death events of the white fly insect on okra crop (bitra) date three

nymphs						
average	Corrected percentage of death % after treatments in days					treatments
	14	10	7	3	1	
79.91	98.46	95.89	96.92	64.00	44.30	Decis
69.65	98.46	79.20	78.27	71.61	31.48	Match
77.58	98.38	97.41	96.28	62.11	33.74	Applaud
	94.84	90.83	90.49	65.90	36.51	average
3.32	treatments *day	1.92	day	1.49	treatments	LSD

The efficacy of the used pesticides varied in affecting the white fly insect on the okra crop (hasanawia cultivar) the first date during the different time periods Table (4), and from the observation of the relative efficiency rate of the different treatments on the white fly insect. Decis showed excelled on the rest of the used pesticides with significant differences, where the relative efficiency rate reached 74.04%, followed by the growth regulator treatment, Applaud, and its efficiency was 72.41%, and the least was the match regulator treatment, and its efficiency was 62.33%. The results also showed that there is a discrepancy between the death rates achieved between the treatments used, depending on the concentration and the type of treatment used. As for the effect of the time period on the efficiency of the different treatments, all of them were affected after one day of treatment, with the excelled of the pesticide Decis, followed by the treatment of Applaud.The results also showed the effect of interaction between the efficiency of the three treatments with a direct relationship with the time periods after the treatment, where the treatment with Decis pesticide continued excelled on the rest of the other treatments with significant differences after 7 days of treatment, where the relative efficiency rate reached 56.43, 92.10. % respectively for the periods of 3, 7 days of treatment, while the efficiency of Match treatment increased gradually to reach a maximum after 14 days of treatment, It was also shown that the Applaud treatment was eexcelled on the Decis treatment in the rest of the periods, as the relative efficiency rate for it was 93.57, 95.20%, respectively, and the efficiency rate for the Decis

treatment was 93.18, 93.09%, respectively, for the periods 10 and 14 days after the treatment. As for the match treatment, the results showed an increase in the relative efficiency for the 3-day period, reaching 64.09% after 3 days of the treatment. The results indicate that Applaud treatment achieved the highest killing rate despite the slow effect of Buprofezin, and this is consistent with Das et al. (2014) who indicated the effectiveness of Fipronil, Buprofezin and Imidacloprid in combating both whitefly B. tabaci and Amrasca devastans. Despite the effect Buprofezin, however, had the highest lethality rate after 3 and 7 days of treatment.

Table (4) Comparative efficiency of some elements of integrated management in the different death events of the white fly insect on okra crop hasanawia cultivar, first date

nymphs						
average	Corrected percentage of death % after treatments in days					treatments
	14	10	7	3	1	
74.04	93.09	93.18	92.10	56.43	35.41	Decis
62.33	93.09	72.74	69.84	64.09	24.37	Match
72.41	95.20	93.57	90.61	55.67	27.01	Applaud
	89.63	86.50	84.18	58.73	28.93	average
3.21	treatments *day	1.853	day	1.435	treatments	LSD

The efficacy of the used pesticides varied in affecting the white fly insect on the okra crop (hasanawia cultivar) the second date during the different time periods Table (5), and from observing the relative efficacy rate of the different treatments on the white fly insect, the superiority of Decis pesticide on the rest of the pesticides used was shown by significant differences, as it reached Its relative efficiency rate was 74.94%, followed by the Applaud growth regulator treatment with an efficiency of 72.95%, and the lowest was the Match regulator treatment with an efficiency of 62.45%. The results also showed that there was a discrepancy between the death rates achieved between the used treatments depending on the concentration and the type of treatment used. As for the effect of the time period on the efficiency of the different treatments, they were all affected after one day of treatment, with the excelled of the pesticide Decis, followed by the treatment of Applaud, and the least effective was the treatment with the regulator. Match with significant differences, as the efficiency of the three treatments was 35.61, 26.79, and 24.06, respectively. The results also showed the effect of interaction between the efficiency of the three treatments with a direct relationship with the time periods after the treatment, where the treatment with Decis pesticide continued to excelled on the rest of the other treatments with significant differences after 7 days of treatment, as the relative efficiency rate reached 92.31. % for the period of 7 days of the treatment, while the efficiency of the Match treatment gradually increased to reach a maximum after 14 days of the treatment, it was also found that the Applaud treatment was excelled on the Decis treatment, as its relative efficiency rate reached 57.42% and the efficiency rate for the Decis treatment was 56.08% for the period of 3 days after the treatment. As for the

match treatment, the results showed an increase in the relative efficiency for the 3-day period, reaching 63.36% after 3 days of the treatment. This is consistent with what researchers Shah and Scott (2020) found, when they found that the white fly had low resistance to the pesticide and Deltamethrin, with a mortality rate of 47.0-59.6%, which encourages its use in integrated management programs to control the white fly insect. In another study on the sucking insect Dysdercus koenigii, Saeed et al. (2016) found that Lufenuron and Deltamethrin, as well as other pesticides, were effective in controlling them.

Table (5) The relative efficiency of some elements of integrated management in the different death events of the white fly insect on the okra crop hasanawia cultivar, the second date

nymphs						
average	Corrected percentage of death % after treatments in days					treatments
	14	10	7	3	1	
74.94	96.52	94.17	92.31	56.08	35.61	Decis
62.45	96.52	72.82	70.07	63.36	24.6	Match
72.95	96.1	93.89	90.54	57.42	26.79	Applaud
	91.33	86.96	84.31	58.96	29	average
3.049	treatments *day	1.76	day	1.363	treatments	LSD

The efficacy of the used pesticides varied in affecting the white fly insect on the okra crop (hasanawia cultivar) the third date during the different time periods Table (6), and from observing the relative efficacy rate of the different treatments on the white fly insect, the superiority of Decis pesticide was shown over the rest of the pesticides used with significant differences, as it reached Its relative efficiency rate was 77.11%, followed by the Applaud growth regulator treatment with an efficiency of 74.71%, and the lowest was the Match regulator treatment with an efficiency of 67.22%. The results also showed that there was a discrepancy between the death rates achieved between the used treatments depending on the concentration and the type of treatment used. As for the effect of the time period on the efficiency of the different treatments, they were all affected after one day of treatment, with the superiority of the pesticide Decis, followed by the treatment of Applaud, and the least effective was the treatment with the regulator. Match with significant differences, where the efficiency of the three treatments was 42.23, 31.13, and 28.91, respectively. The results also showed the effect of interaction between the efficiency of the three treatments with a direct relationship with the time periods after the treatment, where the treatment with Decis pesticide continued to outperform the rest of the other treatments with significant differences after 7 days of treatment, as the relative efficiency rate reached 61.02, 95.67. % respectively for the 3.7 days of the treatment, while the efficiency of the Match treatment gradually increased to reach a maximum after 14 days of the treatment, and the Applaud treatment was excelled on the Decis treatment, as its relative efficiency rate reached 94.76% and the efficiency rate for the Decis

treatment was 94.23 for the period of 10 days after treatment. As for the Match treatment, the results showed an increase in the relative efficiency for the 3-day period, reaching 68.82% a day after 3 days of treatment. This is consistent with Khalaf et al. (2022) when they tested the effectiveness of a group of pesticides, including Applaud, Decis and Match, on the Jasmine white fly, Aleuroclava. jasmine, as the recommended dose for each of the tested pesticides gave high efficiency in reducing the numbers of different insect roles, as it caused a decrease of 88-98% of the numbers of adults after one week of treatment, and it amounted to 0.5-9 insects per leaf compared to 41.9 in comparison treatment. While the killing rates for both eggs and nymphs together ranged around (87% - 88%) after two weeks of treatment.

Table (6) Comparative efficiency of some elements of integrated management in the different death events of the white fly insect on the okra crop hasanawia cultivar, the third date

nymphs						
average	Corrected percentage of death % after treatments in days					treatments
	14	10	7	3	1	
77.11	92.24	94.23	95.67	61.2	42.23	Decis
67.22	92.24	76.35	75.98	68.82	28.91	Match
74.71	93.32	94.76	94.42	59.89	31.13	Applaud
	90.53	88.45	88.69	63.3	34.09	average
3.899	treatments *day	2.251	day	1.744	treatments	LSD

The efficacy of the used pesticides varied in affecting the white fly insect on the crop of okra cultivar Abeer first date during the different time periods Table (7), and from observing the relative efficacy rate of the different treatments on the white fly insect, it was shown that Decis pesticide was superior to the rest of the used pesticides with significant differences, as it reached Its relative efficiency rate is 70.41%. It was followed by the growth regulator treatment, Applaud, with an efficiency of 70.15%, and the lowest was the treatment of the regulator Match, with an efficiency of 59.17%. The results also showed that there is a discrepancy between the death rates achieved between the treatments used, depending on the concentration and the type of treatment used.As for the effect of the time period on the efficiency of the different treatments, all of them were affected after one day of treatment, with the excelled of the pesticide Decis, followed by the Match treatment. The results also showed the effect of the interaction between the efficiency of the three treatments, with a direct relationship with the time periods after the treatment .As the Decis pesticide treatment continued to outperform the rest of the other treatments with significant differences after 7 days of treatment, as the relative efficiency rate reached 51.72, 88.06. % respectively for the periods of 3, 7 days of treatment, While the efficiency of the Match treatment gradually increased to reach its maximum after 14 days of treatment, the Applaud treatment was also excelled on the Decis treatment in the rest of the periods, where its relative efficiency rate A

was 93.66, 97.02%, respectively, and the efficiency rate for the Decis treatment was 89.61, 96.55%, respectively. For periods of 10, 14 days after treatments. As for the match treatment, the results showed an increase in the relative efficiency for the 3-day period, reaching 58.71% after 3 days of the treatment. This is consistent with Al-Alaf (1998) when he indicated the high effectiveness achieved by the growth regulator Buprofezin against whitefly larvae, as the effect of Buprofezin continued for more than six weeks after treatment, which indicates its high effectiveness and stability in the Iraqi environment. While Amjad et al. (2009) found during their evaluation of seven insecticides represented by Acetamaprid, Thiamethoxam, Diafenthiuron, Buprofezin, Fenpropathrin, Endosulfon, Imidacloprid, they proved that all of these pesticides were effective in causing a high killing rate against the white fly insect on the cotton crop, especially Acetamiprid. and Imidacloprid 7 days after treatment.

Table (7) Comparative efficiency of some elements of integrated management in the different death events of the white fly insect on the okra crop, Abeer cultivar, first date

nymphs						
average	Corrected percentage of death % after treatments in days					treatments
	14	10	7	3	1	
70.41	96.55	89.61	88.06	51.72	26.11	Decis
59.17	96.55	70.93	65.94	58.71	22.02	Match
70.15	97.02	93.66	87.01	51.07	21.98	Applaud
	90.61	84.73	80.33	53.83	23.37	average
3.654	treatments *day	2.109	day	1.634	treatments	LSD

The efficacy of the used pesticides varied in affecting the white fly insect on the crop of okra cultivar Abeer, the second date, during the different periods of time. The rate of relative efficiency was 76.13%, followed by the treatment of the growth regulator Applaud, and its efficiency was 73.86%, and the lowest was the treatment of the regulator Match, whose efficiency was 63.42%. The results also showed that there is a discrepancy between the death rates achieved between the treatments used, depending on the concentration and the type of treatment used.As for the effect of the time period on the efficiency of the different treatments, all of them were affected after one day of treatment, with the superiority of the pesticide Decis, followed by the treatment of Applaud.The results also showed the effect of overlap between the efficiency of the three treatments with a direct relationship with the time periods after the treatment, where the treatment with Decis pesticide continued to excelled on the rest of the other treatments with significant differences after 7 days of treatment, as the relative efficiency rate reached 57.34, 93.34. % respectively for the periods of 3, 7 days of treatment, While the efficiency of the Match treatment gradually increased to reach its maximum after 14 days of treatment, it was also found that the Applaud treatment was excelled on the Decis treatment, where the relative efficiency rate for it was 94.99 and the efficiency rate for the Decis treatment was 94.08 for the period of 10 days after

the treatment. As for the match treatment, the results showed an increase in the relative efficiency for the 3-day period, reaching 65.38% after 3 days of the treatment. This is consistent with Diab et al. (2006) when they used a group of chemical pesticides, Lufenuron, Chlorfenapyr, Pyreproxyfen, Pymetrozine, Flufenoxuron, Imidacloprid on the whitefly All of these pesticides were effective in causing high rates of death, especially Lufenuron and Pymetrozine, while Ahmed et al. (2017) found that Lufenuron had little effect on the whitefly B. tabaci.

Table (8) Comparative efficiency of some elements of integrated management in the different death events of the whitefly insect on the okra crop, Abeer cultivar, the second date

nymphs						
average	Corrected percentage of death % after treatments in days					treatments
	14	10	7	3	1	
76.13	98.19	94.8	93.34	57.34	36.98	Decis
63.42	98.19	73.66	70.77	65.38	25.26	Match
73.86	97.58	94.99	91.53	57.09	28.1	Applaud
	92.61	87.82	85.21	59.94	30.11	average
3.195	treatments *day	1.844	day	1.429	treatments	LSD

The efficacy of the used pesticides varied in affecting the white fly insect on the crop of okra cultivar Abeer, the third date, during the different periods of time. The rate of relative efficiency was 79.27%, followed by the treatment of the growth regulator Applaud, and its efficiency was 76.62%, and the lowest was the treatment of the regulator Match, whose efficiency was 68.15%. The results also showed that there is a discrepancy between the death rates achieved between the treatments used, depending on the concentration and the type of treatment used. As for the effect of the time period on the efficiency of the different treatments, all of them were affected after one day of treatment with the superiority of the pesticide Decis, followed by the treatment of Applaud.The results also showed the effect of overlapping between the efficiency of the three treatments with a direct relationship with the time periods after the treatment, as the treatment with Decis pesticide continued to excelled on the rest of the other treatments with significant differences after 7 days of treatment, as the relative efficiency rate reached 62.35, 96.41. % respectively for the periods of 3, 7 days of treatment, While the efficiency of the Match treatment gradually increased to reach its maximum after 14 days of treatment, the Applaud treatment was also superior to the Decis treatment, where its relative efficiency rate was 96.95%, and the efficiency rate for the Decis treatment was 96.75% for 10 days after the treatment. As for the match treatment, the results showed an increase in the relative efficiency for the 3-day period, reaching 70.02% after 3 days of the treatment. This is consistent with what researchers Bhatt and Karnatak (2018) found when they evaluated six insecticides that included Carbofuran, Thiamethoxam, Chlorantraniliprole, Quinalphos, Cypermethrin and Buprofezin against aphids and whiteflies.

Among all the pesticides used, Buprofezin was highly effective against whitefly with a killing rate of 77.45% and 74.22% after the first and second spraying, respectively. While Lufenuron was superior in a study conducted by Lacer and Carrido (1996) to Fenazaquin and Azadirachtin when evaluating the effect of these three pesticides on the jasmine white fly.

Table (9) Comparative efficiency of some elements of integrated management in the different death events of the white fly insect on the okra crop, Abeer cultivar, the third date

nymphs						
average	Corrected percentage of death % after treatments in days					treatments
	14	10	7	3	1	
79.27	97.76	96.75	96.41	62.35	43.09	Decis
68.15	97.76	77.78	76.16	70.2	30.17	Match
76.62	97.65	96.95	95.34	61.1	32.05	Applaud
	93.95	90.49	89.3	64.55	35.1	average
3.821	treatments *day	2.206	day	1.709	treatments	LSD

We conclude from the above tables (1,2,3,4,5,6,7,8,9) that the third date is excelled on the rest of the dates mentioned and for the three varieties represented by (bitra, hasanawia, and Abeer) due to its biochemical and morphological traits. ,As the third date, especially the bitra cultivar, excelled with a higher leaf thickness than the rest of the other cultivars, the reason for the white fly insect's preference for this variety in the third date may be due to its biochemical nature, and this is consistent with Jindal and Dhaliwal (2011) who studied the importance of some morphological and biochemical characteristics of cotton plant infected with the white fly. The results showed that the greater the leaf thickness, the greater the ability of the white fly insect to lay eggs. Hasanuzzaman and others (2016) also explained that white flies prefer thick leaves more than thin leaves, because the thin leaves have less freshness and less food preference by the insect.

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