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Use some plant oils, and organic nicotinic pesticides and bio-bacterial formulation (Thurcide) and its integration in control corn stem borer *Sesamia cretica* Led. (Lepidoptera:Phalaenidae) on maiz .

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ABSTRACT

The results of evaluation of plant oils (neem oil, colocynth oil and castor oil) Actara, crusier bactericide and *B. thuringiensis var kurstaki* showed their compatibility with the phases of the field insect after three months of treatment where one (neem oil+ bacteria *B. thuringiesis* + crusier) of these treatments proved its success with less ratios of infection in the plants of *Sesamia cretica* Led reached 8.89%. The treatments with (colocynth oil+ bacteria *B. thuringiesis* + crusier) and (watering Actara + crusier) achieved a ratio of infection reached 13.22%, and 23.33% respectively comparing with the control treatment where the ratio of infection reached 94.50%.

The less ratios of infection of corncobs in treatments (crusier + spraying Actara), (crusier + watering Acvtara), (neem oil + thurcide + crusier), and (castor oil + thurcide + crusier) reached 14.85%, 19.80%, 19.60%, and 19.90% respectively. These ratios have not differed incorporeally comparing with control treatment where the infection reached 54.61%.

The results showed that all the treatments have increased the weight of the one corncob in comparison with the control treatment. The high weight of one corncob achieved in the treatments (castor oil + thurcide + crusier) and (neem oil + thurcide + crusier) which reached 134.4 g. and 133.13 g. respectively. The treatment (watering Actara + crusier) where the weight of the one corncob reached 129.52 g. in comparing with the control treatment where the weight of one corncob reached 96.04 g.

Introduction

Zea mays L. is considered one of the most important strategic and widespread cereals in the world and in the Arab countries. It is ranked third in the world after rice and wheat in terms of the economic importance of its wide and multiple uses, the size of its increasing demand and the low quantities offered. It is a good source of vegetable oil, starch, human food, poultry and livestock food, glue, soap, paint, pesticide production, bio-ethanol production and other products. A total of 142 million hectares of maize are cultivated worldwide, of which 7.46 million hectares are in the Arab world and 185,000 hectares are in Iraq. Iraq is ranked fourth after Egypt, Somalia and Morocco at the level of the Arab world with a productivity of 416 thousand tons (2.25 tons / he) in comparison with total production in Egypt of 6236.1 thousand tons (7.9 tons / he) [1]

Sesamia cretica is one of the most significant pests of maize production, which causes significant damage to the quantity and quality of maize. Losses in Iraq are estimated between 16-78% of production and sometimes up to 80% [2,3], several studies have indicated the importance of using *Bacillus thuringiensis var kurstaki* to control insect pests, which belong to the stratosphere level, which affects maize, especially leg riders, including *Sesamia*, and improve their efficiency by mixing with some safe and environmentally friendly chemical pesticides and plant extracts, which achieved satisfactory results in the control of insect pests and reduced the treatment rate of these pesticides and reduced the risk of environmental pollution and delayed the emergence of resistance by insects against the action of chemical pesticides [4,5].

In view of the importance of the *S.cretica* stalk digger, the large losses caused by maize crop and the low effectiveness of chemical control methods in reducing the infection of maize fields, and to increase the effectiveness of the control by using some vegetable oils, organic nicotine and *B. thuringiensis var . kurstaki*, the study aims were:

- Field assessment of the performance of vegetable oils, organic nicotine pesticides and Bacterial lotion (Thurcide) and their accord with the phases of the field insect.
- Studying the integration of vegetable oils, organic nicotine pesticides and the bacteria Bacterial lotion (Thurcidein) the productivity of the hectare.
- The economic feasibility calculation calculated according to the basis of the cost of applying such techniques and productivity of one hectare.

Materials and methods

The maize field was prepared with an area of 780 m^2. The yellow maize field was prepared in Autumn, 2016 in Salah al-Din governorate/Balad district/ Ishaqi area with an area of 780 m^2. The field was divided into equal parts. The experiment was completed in Ishaqi where the soil was leveled with the settlement plough in 2016-2017 using the design of the complete random sections and (RCBD). The field was divided into three replications (pieces of land) and of each one was 12 treatments. the area of each single treatment was 4 × 3 by following all the recommended agricultural methods for growing the crop: softening the soil, watering the crop and weeding [6]. Seeds were distributed in the middle of July in Autumn evening 15/7/2017, and then planted in lines, the distance between them was 75cm and the distance between each seed was 20cm. Meanwhile a distance of 2m was left on the edges of the field and a distance of 1m between each treatment. A week later of growing the crop, a process of patching was achieved and the percentage of growing was 90%. After three weeks of cultivation of maize, the height of the plant reached 15-20 cm. 8/8/2016 was the first full treatment of the field with the pesticide, used in the experiment at the time of sunset where the temperature was low. after seven days from the fighting process, the first reading was taken from the beginning of 14/8/2016 to 16/10/2016 as follows:

1- The estimation of percentages of infection of *Sesamia cretica* after the third week of growing of maize by calculating the numbers of the plants showing the symptoms of *S.cretica* and by the presence of four parallel holes on the surface of the leave and the presence of the effects of feeding the larvae and calculating the percentage of infection.

2- The assessment of the damage caused by the insect to plants grown in the field.

3- Evaluating the efficiency of vegetable oils, organic nicotine pesticides and bacteria *B.thuringinsis var. Kurstaki* and their compatibility with the stages of *S.cretica* according to the treatments above.

Table (1) Treatment rates for chemical pesticides used in compatibility tests with the biological resistance factor.

The pesticide	Recommended Field Rate	
	*R . F	R .F 50 %
Crusier	14 ml / Kg	7ml/ Kg
Actara	0.5 ml / L	0.25 ml / L

*That is R. F = Recommended Field Rate

The used design and the reliable analysis methods.

A complete experiment with the design of complete random segments (R.C.B.D) was applied with three replications for the distribution of total treatments [6]. The results were analyzed by using the SAS program and the coefficients were measured under the Dunkin Multipliers test at a 5% probability level. A weekly sampling program was developed from the field as the actual sampling program was started from 14/8/2016 to 16/10/2016. Five plants were selected from each line from the one replication.

Discussion Results

1-infection percentage.

A- infection percentage of within a month August

The results showed in Fig. (1) that there were significant differences in the proportions of infection of maize by *S.cretica* during August. It was found that all the treatments were able to reduce the infection rates compared with the control treatment (watering Actara + crusier), which amounted to 0.74%, followed by (*B. thuringiensis* + crusier + neem oil), (*B, thuringiensis* + crusier + castor oil) and (crusier + *B. thuringiensis* + colocynth oil) with a rate of 2.97%, 11.86% and 6.67%, respectively. While the highest rate of infection in the treatment (crusier only) amounted to 59.27% compared to the control treatment, which amounted to 66.67%.

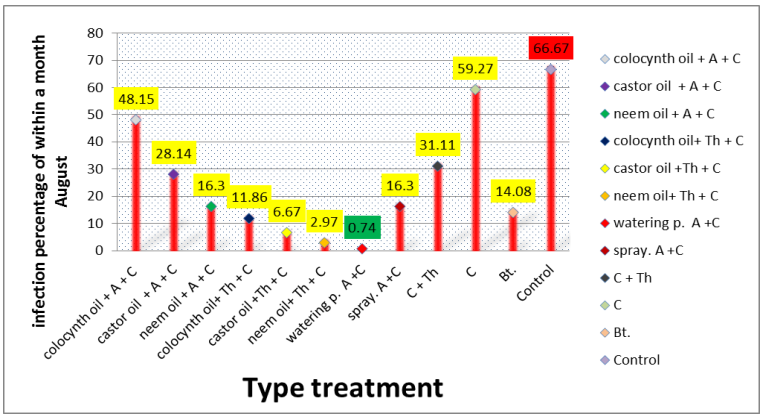

Fig. (1) the Effects of vegetable oils and nicotine inhibitors, Actara and *B. thuringiensis var. kurstaki* and its compatibility with the lnfection percentage of within a month August.

B- infection percentage of within a month September

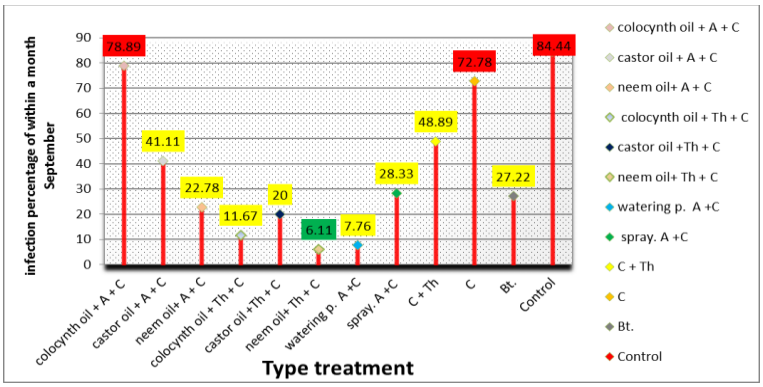

Fig. (2) the effects of vegetable oils and nicotine pesticide Actara *and B. thuringiensis var. kurstaki* and its compatibility in the proportions of within a month September

The results showed that in September in (fig 2), the rate of (neem oil + *B. thuringiensis* + crusier) was the lowest infection in *S.cretica* amounted to 6.11%, followed by the treatment of (*B.thuringiensis* + colocynth oil+ crusier) and (watering Actara + crusier) with a rate of infection of 20.00% and 11.67%, respectively. while the highest rate of infection in treatment of (crusier +Actara + colocynth oil) amounted to 78.89% compared to the control treatment, which amounted to 84.44%.

C- infection percentage of within a month October

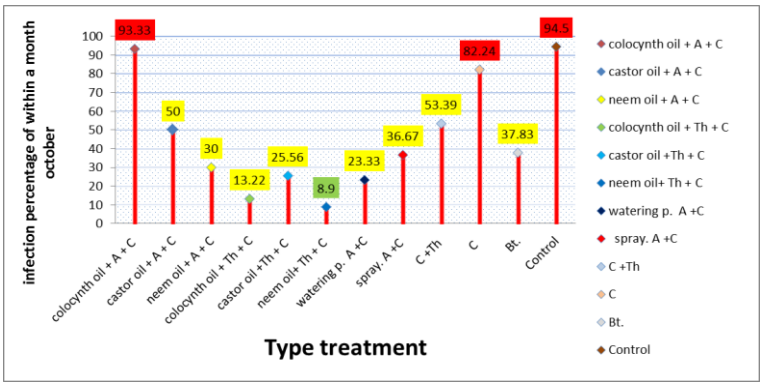

Fig. (3) the effects of vegetable oils and nicotine inhibitors Actara and *B. thuringiensis var. kurstaki* and its compatibility with the rate of infection of within a month October.

The results showed that in October (Fig 3). the rate of (neem oil + *B. thuringiensis* + crusier) was the lowest infection in *Sesamia cretica amounted to* 8.89%, followed by the treatment of (*B.thuringiensis* + colocynth oil+ crusier) and (watering Actara + crusier) with a rate of infection of 13.22% and 23.33%, respectively. while the highest rate of infection in treatment of (crusier + Actara + colocynth oil) amounted to 93.33% compared to the control treatment, which amounted to 94.50%.

The results showed that the treatment by (Actara watering + crusier) protected maize plants during 60 days of growing, which ranged between 0.74 - 7.8% and did not exceed 23.56% after 90 days of growing,

and this is due to the active ingredient Thiamethoxam and the cruiser pesticide gave protection for more than 30 days. Actara was a supplement to the Cruiser pesticide because the active substance was Thiamethoxam which also spread organically through the roots to different plant parts to give good protection against infection.

2- weight of corn cob after treatments

The results in Table (2) showed that all the treatments increased the weight of the corn cobs comparing with the control treatment. The highest weight of the corn cob was in the (castor oil +Thurcide + crusier) and (neem oli +Crusier +Thurcide) Respectively, followed by the treatment of (watering Actara + crusier) in was which the mean weight of corn cob was 129.52 g, while the lowest weight for one corn cob in the crusier treatment was 104.93 g comparing with the control treatment, where the weight of one corn cob amounted to 96.04 g. The weight of the infected corn cob in all the treatments was between 56-84 g, which are higher than the control treatment where the weight of infected corn cob reached 33.22 g. Everybody agrees with [20] to Neem lotion spray has had a positive effect on reducing rates of loss in plant height caused by the rig in recent days, balnim spraying treatment was characterized by one spray with the lowest rate of loss in plant height reached Almost half of what it is in the treatment compared with loss of plant height 12.08%.

Table (2) The weight of one corn cob in the treatments.

Transactions	Average weight of one clovecon gm	
	Sound	Infected
colocynth oil+ crusier+Actara	a 118.59	a74.02
castor oil+ crusier+Actara	a 121.38	a84.26
neem oli +crusier+Actara	a 115.57	ba63.46
colocynth oil+ crusier +Thurcide	a 126.22	a83.41
castor oil + crusier + Thurcide	a 134.42	a74.77
neem oli +crusie+ Thurcide	a 133.13	a64.31
watering Actara + crusie	a 129.52	a70.18
spraying Actara + crusie	a 121.33	b a56.33
crusie+Thurcide	a 105.52	a79.23
Crusier	a 104.93	a73.64
Thurcide	A 114.21	a66.78
Control	a 96.04	ba33.22

- **sound yellow maize in treatments (ton/ hectare)**

The results of the maize crop in the treatments Fig. (4) showed a superiority of the treatment [*Bt.* (Thurcide) + colocynth oil + Crusier] with the highest crop production of 1.5 tons / dunum, followed by the treatment (crusier + Actara + castor oil) with a crop production of 1.2 ton / dunum in comparison with the control treatment of 0.12 ton / dunum .

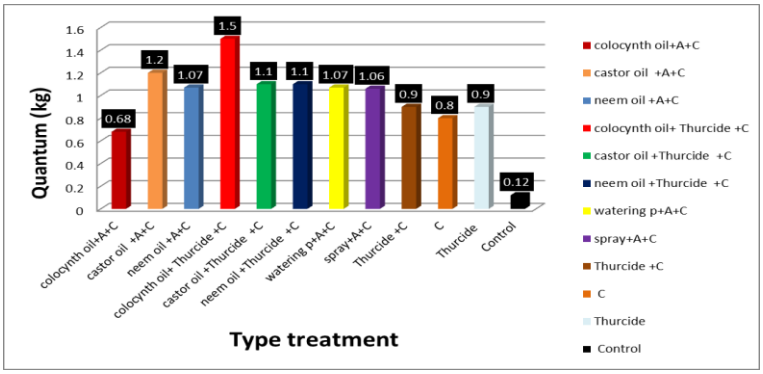

Figure (4) The yield of *Zea mays* L. in the treatments calculated on the basis of ton / hectare

The results are compatible with what researchers pointed out that one of the most effective modern strategies in the control of insects that inflict economic crops is the use of mixtures of Neem oli or its preparations and *B. thuringiensis var. kurstaki* in fighting and curative control. In Egypt) [7] found that a combination of Nimbecidine (0.03% Azadirachtin) and *Bacillus thuringiensis var. kurstaki* in controlling larvae of *Tata absoluta* in open fields of tomato in summer has reduced 91.88% of the larvae and the rates of killing increased over time and reached the highest rate of killing in the seventh day of the treatment with the death rates 93.62%, 94.44%, 97.01% and 98.06% after 2, 5, 7, and 10 days of treatment by mixing the pesticide and bacteria. [8] found that three doses of acetamiprid with an average of 50 g / ha reduced the rate of infection with *S.cretica* in the maize from 60.11% to 13.45% and the which quitting quantity increased from 675.91 kg / ha to 1192.88 kg / ha, due to the fact that acetamiprid was a systemic insecticide that moved with the plant juice in all parts of the plant.[9,10] found that the Cruiser pesticide was significantly higher in reducing the infection of *S. cretica* in comparison to diazinon and control treatment.[10] reported that the treatment of maize seeds with a crusier reduced the infection of *S. cretica*. [11] found that the Crusier pesticide reduced the infection of *S. cretica* and protected maize plants from infection to 28 days. [2] approved the findings with the superiority of pesticide Actara in achieving less rates of infection and increasing the weight of the crop. [13] showed that pesticides Alnekitonadah (Nicotinoids) had high polarity, were absorbed quickly and moved to all parts of the plant.

[12] found that the use of Neem Azal in fighting *S.cretica* increased the maize crop to 20%. [14] agreed that the spraying the Neem 0il had a positive

effect in reducing the rate of infection and loss of maize in recent days. The spraying treatment was characterized by a single spray, which led to the lowest rate of loss of plant. The plant reached half its growth in control treatment where the rate of loss reached 12.08%, The lowest percentage of killing by using neem oil treatment reached (0.25 and 0.5 cm/L) in the first day of treatment, which the percentage of killing reached 0.0% for larvae. These results were compatible with [15] who affirmed that neem compounds containing Azadirachtin reduced the age of the insects.

[16] showed that neem pesticides used in experiments have no obvious effects or minor effects on many useful insects and spiders, including eggs and larvae of coccinellids. Neem products can therefore be recommended for many Integrated pest management programs beneficial.

According to [19] the efficiency of Actara pesticide in the control of white fly on cotton, whether spraying on green plants or soil treatment, continued for five weeks. [18] showed that Actara pesticide had an effect on the sensitive nervous system actara. The period of its effect on the white fly lies in the efficiency and slow process of dissolution within the plant tissues. The study by [16] showed that the use of Neem oil in fighting against the European *O.nubilalis* on the white corn led to the results that by spraying neem oil before the infection of the crop maize may provide great protection for the crop from the damage caused by the insect.[15] noted that the neem products had little impact on non-targeted neighborhoods, and the compounds were less likelihood to develop insect resistance, as well as the effect of the nematodes as growth regulators that are not fast on the target, but require more nutrients to induce the effect.

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استعمال بعض الزيوت النباتية والمبيدات النيكوتينية العضوية والمستحضر الحيوي البكتيري Thurcide وتكاملها في مكافحة حفار ساق الذرة الصفراء *Sesamia cretica* Led. على الذرة الصفراء (Lepidoptera:Phalaenidae)

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الملخص

أظهرت نتائج التقييم الحقلي للزيوت النباتية (زيت النيم, زيت الخروع, زيت الحنظل) والمبيد النيكوتيني Actara, Crusier وبكتريا *B.thuringiensis* var. *kurstaki* وتوافيقها على ادوار الحشرة حقليا بعد ثلاثة اشهر من المعاملة عن تفوق معاملة (زيت النيم +البكتريا *B. thuringiensis*+crusier) باقل نسبة إصابة في نباتات الذرة بحفار ساق الذرة بلغت8.89%، ثم تلتها معاملتي(زيت الحنظل +البكتريا *B. thuringiensis*+crusier) و(Actara سقيا +crusier) بنسبة إصابة بلغت 13.22 و 23.33% على التوالي مقارنة مع معاملة المقارنة التي بلغت فيها نسبة الاصابة 94.50 %.

تبين ان اقل نسب للعرانيص المصابة في المعاملات (Actara رشا + crusier)، (Actara سقيا + crusier)،(زيت النيم + + crusier Thurcide) و(زيت الخروع +Thurcide + crusier) التي بلغت فيها نسب الاصابة14.85، 19.80، 19.60 و 19.90% على التوالي والتي لم تختلف فيما بينها معنويا، مقارنة مع معاملة المقارنة التي بلغت فيها نسبة الإصابة 54.61%.

بينت النتائج ان جميع المعاملات قد زادت من وزن العرنوص الواحد مقارنة مع معاملة المقارنة، وان اعلى وزن للعرنوص الواحد السليم كانت في معاملتي (زيت الخروع+ Thurcide + crusier) و (زيت النيم +Thurcide+ crusier) التي بلغت 134.42 و133.13غم على التوالي ، تلتها معاملة(Actara سقيا + crusie) التي بلغ فيها وزن العرنوص الواحد 129.52 غم مقارنة مع معاملة المقارنة التي بلغ فيها وزن العرنوص 96.04 غم.