Field Efficacy of bio-rational pesticide fytomax N against dubas bug *Ommatissus lybicus* De berg (Homoptera: Tropiduchidae) in autumn and spring generation

Salem Mohammed Bashomaila[1], Ibrahim Jadou Al-Jboory[2] and Abdulla Omer Madi[3]
1-AREA. Plant Protection. Mukalla.Yemen. smbashomaila@gmail.com
2-University of Baghdad, College of Agriculture
3-Agriculture department Mukalla

ABSTRACT

Dubas bug represent the most economic important pest on date palm in Yemen, especially in eastern coastal area(Coast of Hadramout, Shabwa and Al-Mahra). National campaigns carried out annually by using ground application of conventional chemical pesticides include pyrethriod and organophosphate. Many of which are effective but simultaneously it kill beneficial insects like parasite, predator and bees. Even though Dubas bug can be adequately controlled with chemical insecticides,but the cost availability, health and environmental risks impose serious limitations on the use of conventional chemicals. Recently Dubas bug has also acquired reduction in susceptibility to insecticides that have been previously effective. Therefore, an alternative approach is urgently needed for controlling this devastating pest. One possible solution is the use of natural bio-rational plant extract that could be safe, sustainable, eco-friendly and effective control measure and to achieve this approach, field efficacy by using commercial neem insecticides. for this purpose Fytomax N(Azadirachtin 1%) has been selected for dubas bug control in organic date palm cultivation in 2012-2013. Fytomax N was applied at a rate of 3ml/litre of water in the spring using HV sprayer in the area of Ghaidat Albhich in May 11,2013 and in autumn-generation in Valley Asd Aljabel at coast of Hadramout on October22,2013 in the area of severely infested palms on which no pesticides have been used for several years. The dominant individuals were fourth nymphal instar and adult stages present in the experimental site. Comparisons have been made with Dimethoate 40 EC in the autumn generation, while Desirin 250EC(Deltamethrin) at spring generation at a rate of 1ml/ litre water and untreated control. The results have been statistically analyzed and revealed control of nymphs and adult was(86,87%),(89.8,87%) and (89.8,86.5%) respectively, in spring generation after one day, one week and two weeks after application of Fytomax N, While Decirin 250 EC Efficacy was an average of 98.5%. In autumn generation the dubas population was less in treatment area in compare to the untreated control plots. The efficacy of Fytomax N on controlling nymphs and adult stages was (92.42, 94.0%) and (94.7,93.74%) on week and two weeks after application respectively, moreover, no significant deference was observed on dubas bug population decline while applied of Fytomax N and Dimethoate in the treated area. This outstanding performance encouraged

us to recommend the inclusion of Fytomax N in Dubas bug control National campaign in Yemen as a green bio-rational solution. Future work will focus on biological aspects of Fytomax N on eggs lying,eggs hatching of dubas and its impacton the egg parasitoid Pseudoligosita babylonica.

Key words: Dubas Bug, Fytomax N, Field Efficacy. Date palm, Hadramout, Yemen.

INTRODUTION

Dubas bug represent first economic importance in many Arab countries and in Yemen. especially in the eastern coastal area (the coast of Hadramout, Shabwa and Al-Mahra), where the Dubas insect cause significant economic damage, which call for the use of large amounts of chemical pesticides (Al-Baker, 1972; Abdul Hussain 0.1974; Al-Jboory1999; Bashmilah.2002; Alshamsy, 2002; Baangood and others, 2009). Health and environmental problems that accompanied the use of chemical pesticides, as well as the economic costs of these pesticides has stimulated researchers to use Botanical, organic plant-based pesticides (Jurani .1991, Al-Rubaie and others, 1992 and Zidane, 2002) which can be a safe alternative for chemical pesticides manufactured currently in circulation because it has desirable specifications which is not available in chemical pesticides, including rapid analyzes to non-toxic materials as a result of their sensitivity to intense light, heat and humidity and it›s low toxicity to humans, animals and non-target organisms (Al-Jboory and others, 1999, and Ashamsy 2002),and non-toxic to plants in recommended dose, and it can be manufactured locally (Al-Rubaie and others, 2000) moreover it can not be considered as environmental pollutants (Kleeberg and Hummel2001) . The difficulty of appearance of pests resistance, against these pesticides is over come ((Mitchell, 1990), in addition to the weakness of their effect on the parasites eggs and the Predators (Raguraman and Singh, 1999 and Akol et.al., 2002 and Simmondset.al.,2000 and Schmutterer,1997).

The plants represent the richest sources of bioactive chemicals, where there are around 2,400 plant contain chemicals with the effectiveness of the lethal lesions are distributed in 189 various plant families (Grainge and Ahmed, 1988). Plants species belonging to the *Meliaceae* family represent the most important plant families in this aspect due to the large number of species of adverse effects on pests and especially *Azadirachta indica* and *Melia azedarach* L. (Singh and Wahab, 1996.)

It is found that Salanin and Azadirachtin chemicals compounds, that have been isolated in a pure form, from Neem and *Melia azedarach* L, have a good effectiveness on several pest insects(Warthen,1979). Al-Rubai and others.2000, mentioned that aqueous and oil extracts influenced to kill nymphs and adults of Dubas at laboratory .however field efficacy of neem aqueous extracts proved a good effectiveness on nymphs and adults of dubas bug(Bashomaila,2011),and on pests like leaf miner on citrus, stem borer on Tabacco, *Earias insulana* on Okra and Thrips on onion(Bashomaila,2006). The neem tree in one of these plants scattered in Hadramout region have several uses (Bashomaila and Bamossa,2012). commercial formulations of Neem have shown high field effect on various stages of dubas bug as noted by Al-Dhamen 2002. Spraying campaigns by using commercial preparations of Neem in Iraq have been effective according to the Iraqi -Date palm website(2011).

Depending on the data above and on our experiences preliminary earlier in this context field efficacy of Fytomax N pesticide prepared from neem oil has been conducting, which provided to us thankfully by British company Russell IPM, to be used in biological control of Dubas bug, hoping to be included in the integrated management in organic farming of date palm.

MATERIALS AND METHODS

To test the effectiveness of the neem pesticide Fytomax N which contains the active ingredient Azadrechtin 1% (10,000 ppm) and neem oil 30% made by private technology company Russell to fit fumigation and ground spraying. One of the infected fields was selected in autumn generation in the area of Valley Asd Al-Jabel in the October 11, 2012 and in the spring generation in the Ghaidat Albhich Valley on May 11, 2013 at the fourth nymphs age and adult of Dubas bug, where the infestation is present on most of the trees with the presence of honey. The experiment was conducted in four areas where each treatment area ranged about half an acre (2100m^2) from each treatment five tree palms were chosen, the data and analyzed based on randomized complete block design in five replicates.

Inspection was conducted before spraying and one day, one week and two weeks after spraying, by inspecting each of the four fronds in different directions, ten leaflets of each frond where inspected, by calculating nymphs and adult insects. Attributed to the effectiveness of the control numbers of nymphs and adult before spraying and after spraying was measured by the following equation:

$$\text{Effectiveness\%} = \frac{\text{insect number after spraying} - \text{Insect number before spraying}}{\text{Insect number before spraying}} \times 100$$

Spraying each treatment was conducted by using the sprayer Capacity thousand liters of high-pressure machine ad also100-liter machine was used when necessary. Packed the machine with water and then add the necessary dose of experience materials as the table below:

No.	Formulation	Active ingredient	Dosage
1	Fytomax N	Azadirachtin	3ml/l water
2	Dimathoate	Dimathoate	1ml/l water
3	Disirin	Deltamethrin	1ml/l water
4	by water Spraying	Tap water	10ml/ palm tree
5	Control		

Data were subjected to statistical analyze using Costat program.

RESULTS AND DISCUSION

Fytomax N effectiveness in autumn generation:

Table.1 describes the result obtained from this experiment in autumn generation, howed that, the natural pesticide Fytomax N one week and two weeks after application, had a clear effect on insect numbers of Dubas bug (nymphs and adult), which decreased to (2.06, 0.32) and (1.56,0.3) insect/leaflet respectively, with significant difference for the treatment of water spray, which reached (18.12,4.24) and (20.12,3.22) respectively, as well as with the control treatment, which had increased the Dubas bug population to (26.56,5.34) and (29.92,4.6) respectively, moreover, no significant deference was observed on dubas bug population decline while applied of Fytomax N and Dimathoate in the treated area, except population of adult two weeks after spraying.

It is also notes from the same table that, the treatment of spraying by water has reduced the nymphs population significantly compared to the control a week and two weeks after spraying, however there is no significant decline of adults compared. to the control.

Results in table2 showed a big reduction of Dubas bug population a week and two weeks after Fytomax N application revealed good control of nymphs and adult Was (92.24%,94.0%) and(94.7%,93.5%) respectively, moreover it is noticed that, the death percentage was high for the treatment of Fytomax N, and more than that of Dimathoate insecticide, which effectiveness had decreased rapidly two weeks after application to 87.83% and 75.21% respectively(tab.2).

The effectiveness of the pesticide in the spring generation

It is clear from the results of Table (3) that the spraying by Fytomax N pesticide in spring generation gave similar results with the results of the spraying in autumn generation, but at lower rates, which decreased Dubas population significantly compared to the control, but this decline did not differ significantly with Disiri treatment a day, one week and two weeks after application and with the treatment of mixture of Fytomax N and Disirin a week and two weeks after spraying, which has reflected on the effectiveness against nymphs and adults. Effectiveness of the FytomaxN a day and one week two weeks after spraying (85.9% and 87%) and (89.8% and 86.5%) and (89.8 and 86.5%, respectively) (4)..

Effectiveness of Disirin insecticide a day after spraying on the nymphs and adult was (97.9% and 98.3%) while that the one week and two weeks after spraying was (97.3% and 94.5%). The mixture of Fytomax and Disirin Gave greater efficiency a week and two weeks after spraying it was (98.9% and 97.8%) (Table 4).It can be observed that the rate of death percent and effectiveness of the pesticide Fytomax N on nymphs was higher than on the adult, and this is agree with results found by Al-Rawi and Hamidawi (1999) who mentioned that the adult insect of Dubas bug is more tolerant than nymphs stage.

The obtained results in this research, in which commercial neem biorational pesticide Fytomax N with concentration of 1% Azaderachtin is used refers to high rates of death for nymphs and adults of Dubas bug in two generations, these are agree with what indicated by Al-Dhamen (2002) who notes that, the concentrations of (0.5-3%) of the commercial neem pesticide Superneemic revealed to high death rates of fourth instar of nymphs ranged from 66.66 -100% and 63.3-100% for two generations, while on fifth stage ranged from 60-100% and 57-100% for two generations., however percentages of adult death ranged from 50.3 to 97% and 47-100% for two generations. Moreover this formulation had a repellent effect on Dubas bug.

RECCOMMENDATION

The experiment concluded that the effectiveness of the Natural Neem pesticide Fytomax N reached in the spring generation (89.8% and 86.5%) on fourth nymphs age and adult respectively however, were higher in the autumn generation and reached (94.7 and 93.74%) on nymphs and adult respectively.

This outstanding performance encouraged us to recommend the inclusion of Fytomax N in Dubas bug control in National campaign in Yemen as a green bio-rational solution. Future work will focus on biological aspects of Fytomax N on eggs lying, eggs hatching of dubas and its impact on the egg parasitoid *Pseudoligosita babylonica.*

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Tables

Table 1. Number of Dubas Bugs after control in autumn season of 2012

№	Treatments	7DAT		14 DAT	
		Nymphs	Adult	Nymphs	Adult
1	Fytomax N	2.06c	0.32c	1.56c	0.30b
2	Dimathoate	1.84c	0.58c	3.64c	1.14c
3	Water spray	18.12b	4.24b	20.12b	3.22a
4	Control	26.56a	5.34b	29.92a	4.60a

Table 2. Efficacy of Fytomax N for controlling Dubas in autumn season 2012

№	Treatments	7DAT		14 DAT	
		Nymphs	Adult	Nymphs	Adult
1	Fytomax N	92.24	94	94.7	93.5
2	Dimathoate	93.07	89.13	87.83	75.21
3	Water spray	31.77	20.59	32.75	30
4	Control	----------	---------	----------	---------

Table 3. Number of Dubas bug after control with Fytomax N in the Spring season 2013

Treatments	BT		1DAT		7DAT		14 DAT	
	Nymphs	Adult	Nymphs	Adult	Nymphs	Adult	Nymphs	Adult
Control	12	15.3	19.20a	17.70a	11.16a	5.54a	8.70a	4.54a
Fytomax N	15.6	14.3	2.70b	2.34b	1.14b	1.30b	0.85b	0.92b
]Disirin	26.6	22.3	0.88b	0.30b	0.30b	0.18b	0.18b	0.18b
Fytomax N+Disirin	18.07	17.3	-	-	0.12b	0.12b	0.12b	0.12b

Table 4. Efficacy of Fytomax N for controlling Dubas bug in Spring generation 2013

Treatments	1DAT		7DAT		14 DAT	
	Nymphs	Adult	Nymphs	Adult	Nymphs	Adult
Fytomax N	85.9	87	89.8	86.5	89.8	86.5
]Disirin	97.9	98.3	97.3	94.5	97.3	94.5
Fytomax N+Disirin	-	-	98.9	97.8	98.9	97.8