

A study of Vegetable Growers knowledge towards Biological Control Techniques of Agriculture pests in the new lands in El-Behira Governorate

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ABSTRACT:

The aim of this research is to determine the knowledge level of some vegetable growers towards biological control of agriculture pests in the new lands in El-Behira Governorate. Research area was undertaken in West Nubaria district- El-Behira Governorate. One hundred and seventeen vegetable growers were selected by using the proportionate random sampling technique (According to cultivated area). A survey method through face-to-face interview by using structured questionnaire was used to collect data and suitable statistical analyses were used. The findings show that:

- 87.2% of the respondents with moderately or fewer knowledge level to the biological control techniques.
- The main sources of vegetable growers' respondents' knowledge about biological control techniques were the ministry of agriculture and the agricultural engineers. And the major sources of agricultural information for them were agricultural pesticide and supplies traders, their own experience, relatives and neighbours.
- There are highly significant positive relationship at 0.01 level between dependent variable and educational level and testability of the innovations in the agriculture. And there are significant positive relationship at 0.05 level between dependent variable and the previous application of biological control, the number of years of application and the attitudes toward biological control.
- farmers respondents know very little knowledge about the natural enemies of vegetable pests such as using of *Encarsia formosa* parasitoid for controlling the white fly, *Trichogramma spp.* parasitoid destroys *Tuta absoluta* and other fruit Lepidoptran larvae, the use of parasitoid *Aphelinus sp.* and aphidius *matricariae* to control aphidus, when the number of

plants infected with larvae on the vegetables the control will be done with the *Beauveria bassiana* fungi.

- The main problems which facing respondents are lack of experience and the implementation difficulties of the biological control techniques. And the need for increasing the effectiveness of the agriculture extension activities through technical training and encouraging farmers to develop positive attitudes toward agricultural production free of chemical pesticides in the research area.

Key words: *knowledge, vegetable growers, biological control techniques, agriculture pests, new lands*

INTRODUCTION:

The increasing demands of agricultural production through intensive agricultural to face growing food needs and achieve a more appropriate level of food security lead to uncontrolled use of pesticides. The overuse of chemical pesticides caused resistance in insect pests and the development mate of their new generations, and also has endangered the stability of the environment and human health (Helali and Ahmadpour, 2012). Therefore, interest in the biological control of agriculture is increasing throughout the world in response to safety food production.

Biological control is safety operation and good control methods, it utilizes one or more living organisms to prevent decrease and control the creatures that directly or indirectly cause damage to agricultural products, and also natural enemies or competitors to control those living creatures and pesticides that cause damage to agricultural products (Palis, 2006).

The history of biological control in Egypt was used from up to 4,000 years ago, where domestic cats were depicted as useful in rodent control (Jules Janick 2014). Since the 1990s, the Ministry of Agriculture and Land Reclamation emphasizes to spread the philosophy of integrated pest management (IPM) among the farmers to utilize all suitable means, techniques, and approaches for maintaining pest population levels below those causing economic losses.

The role of natural enemies in the agro-ecosystem is preserving and encourages their presence to suppress pest population numbers as

a main factor of IPM programs. Thus, it is essential need to know more about the existing natural enemies associated with the key pests of the economic crops. Thus, it was necessary to develop newly methods of bionomics of natural resources in various agro-ecosystems.

These data are considered a review article eagerly needed for IPM programs of serious insects and mite pests in Egypt. The role of the biological control agents, mainly parasitoids and predators in different economic crops were necessary to kept pests under control. Biological relies on predation, parasitism, herbivory, or other natural mechanisms, but typically also involves an active human management role (Brodeur et al. 2013).

Biocontrol control programs caused significantly reduce the abundance of the pest, but in some cases, they simply prevent the damage caused by the pest (e.g. by preventing it from feeding on valued crops) without reducing pest abundance (Lockwood, 2000).

At El-Beheira governorate many natural enemies against insect pests were recorded as biological control parasitoids and predators can kept pests under control if no pesticide applied (Askar et al. 2016), but the implementation of integrated pest management was not successful, due to lack of farmers' knowledge regarding biological control techniques of agriculture pests (Abdullah, 2017).

However, Perceptions and awareness are important determinants of the human behavior and also, assessment the knowledge is an important step in the planning process also should give us result in an identification of farmers' related problems.

Therefore, our purpose of this paper will be to identify the knowledge level of some vegetable growers towards biological control techniques in the new lands in El-Behira Governorate, through the following sub-goals;

- 1- Identify the knowledge level of farmer's respondent's regarding techniques of biological control of some vegetable crop pests.
- 2-Identify the information sources of the respondents farmer's about biological control techniques of agriculture pests.
- 3-Explore the relationships between knowledge level of respondent's farmer's regarding techniques of biological control of some vegetable crops pests and their individual, professional, agricultural, social and communication characteristics.

- 4- Determine the most important problems facing farmers respondent's in the application of biological control techniques.
- 5- Identifying respondent's farmer's suggestions to overcome the problems facing them when apply biological control techniques.

MATERIALS AND METHODS:

1. Measurement and definition of research Variables:

- The dependent variable of this research is the knowledge level of biological control by vegetable growers, which measured by 24 indicators (see table. 6) about biological practices (i.e. know or do not know).
- The Independent variables definition and measurement in this research are presented in table 1.

Table1. Definition and measurement of the dependent variables used in the analysis

Variables	Definition and measurement
1- Age the farmer	Measured in year
2- Education level ^(score)	Illiterates (1), can read and write or finished primary (2), public school education(3) and University education & up (4)
3- Land size	Represented by land area, measured in Feddan
4- Years worked in agriculture	Number of years worked in agriculture
5- Marital status	The state of respondents farmers (i.e. single(1), married(2) , or divorced(3))
6- Social participation	If the farmer has membership and participate in social organizations (i.e. participate (1) and non participate(2))
7- The communication with agri. Extension	Contact with agri. extension (i.e. communicate (2) and non communicate (1))
8- Testability of the innovations in the agriculture	The level of a farmer's response to six questions related to his ability to use new innovations or ideas in the agriculture: 2 if yes and 1if no.
9- The attitudes toward biological control	In order to determine the attitudes of vegetable growers toward biological control thirteen attitudinal questions in the Likert scale were used (i.e. agree, slightly agree, and disagree), weights (3, 2, and 1) for positive responses and (1, 2, and 3) for negative responses
10- The previous application of biological control	If farmer have applied biological control techniques before or not (i.e. yes (2) and no (1))
11- Years of application of biological control	Number of years

2. Study location and Data collection:

The survey method through face-to-face interview by using structured questionnaire was used to collect data from a total of 117 vegetable growers (According to cultivated area) in West Nubaria district- El-Beheira Governorate during November 2018. The respondents were selected by using the proportionate random sampling technique from the vegetable growers. And the most important cultivated vegetables in the research area are ;(tomato, strawberry, green peppers, beans, and cucumber).

3. Data analysis:

Suitable statistical tools were used to analyze the data, the descriptive statistics such as extent of mean, standard deviation, frequencies tables, and Pearson's simple correlation coefficient to explain and interpret the results.

RESULTS & DISCUSSION

Knowledge level of farmer's respondent's regarding techniques of biological control of some vegetable crops pests:

According to the Table (2), 87.2% of the respondents with moderately and low knowledge level to the biological control techniques. Much extension activities needed for increasing vegetable growers knowledge of the biological control techniques.

Table2. Frequency of respondent's Knowledge level regarding biological control techniques l of pests

Knowledge level Categories	Frequencies	%
Low	56	47.9
Moderate	46	39.3
High	15	12.8
Total	117	100

Source: Research findings (Field survey, 2018)

The sources of the information of the farmer's respondents about biological control techniques of some vegetable crops pests:

The results of the descriptive statistics reported in Table (3) shows that, the mean sources of vegetable growers' respondents in terms of the knowledge about biological control techniques were the ministry of agriculture (63.2%) and the agricultural engineers (47.9%).

Table3. Respondent's knowledge sources about biological control

knowledge sources about biological control	Frequencies	%
The Ministry of Agriculture	74	63.2
The Agricultural Engineers	56	47.9
Export companies	32	27.2
The neighbors	23	19.7

Note: Multiple answers allowed, % from, n = 117

Source: Research findings (Field survey, 2018)

In terms of the use of information sources the results reported in Table (4) shows that, the majority of farmers mentioned agricultural pesticide and supplies traders, their own experience, relatives and neighbours as the major sources and high exposure level of agricultural information for them, while the agricultural extension books, publications and magazine came out at the end of agricultural information sources for vegetable growers' farmers' respondents. This fact is indicating to the poor job that is being done by extension and research institutions to provide technical assistance and information to farmers in the study area.

The relationships between knowledge level of respondents farmer's of biological control of some vegetable crops pests and their individual, professional, agricultural, social and communication characteristics:

We begin with an overview of the main individual, professional, agricultural, social and communication characteristics of respondents. The respondents were asked to provide basic demographic information, including age, education level, land size, years worked in agriculture, marital status, social participation, communication with agriculture extension, testability of the innovations in the agriculture, the attitudes toward biological control, the previous application of biological control and years of application. As reported (Table 5). The median age of the respondents was 36-49 years of age (n = 60, 51.3%) with a mean of almost 41 years. 52.8% of the respondents are illiterate or only can read and write, The average land size is 8.1 Fed, a majority of farmers (88.0%) having lands acreage 15 Fed or below, thirteen to 22 years was the median category for years worked in agriculture, most of them (89.7%) are married, 79.5% of the respondents participated in the social organizations, 54.7% of them communicating with agriculture extension, about 58% of the

respondents have high testability of the innovations in the agriculture. And with regard to the attitudes toward biological control, 80.3% of the respondents have negative and neutral attitudes toward biological control, 46.9% of the respondents have applied biological control techniques before and 62% of them continue to apply only from 3 years and less.

Table4. Respondent's use and exposure to agricultural information sources

Information sources	Exposure level						Non exposure		Total	
	High	%	Medium	%	Low	%	N	%	N	%
1- Agricultural Pesticide and supplies traders	55	47	36	30.8	22	18.8	4	3.4	117	100
2- Own experience	43	36.8	67	57.3	6	5.1	1	0.9	117	100
3- Relatives and Neighbours	39	33.3	72	61.5	5	4.4	1	0.9	117	100
4- Agriculture researchers	8	6.8	26	22.6	47	40.2	36	30.8	117	100
5- Ministry of Agriculture	7	6	31	26.5	41	35	38	32.5	117	100
6- Social media(Face book)	6	5.1	19	16.2	20	17.1	72	61.5	117	100
7- The extension meetings	5	4.3	16	13.7	47	40.2	49	41.9	117	100
8- Internet Agricultural Sites	4	3.4	21	17.9	21	17.9	71	60.7	117	100
9- Agricultural Tv Channels	2	1.7	29	24.8	44	37.6	42	35.9	117	100
10- Agri. Extension books and publications	2	1.7	15	12.8	38	32.5	62	53	117	100
11- Agri. Extension magazine	1	0.9	15	12.8	43	36.8	58	49.6	117	100

Source: Research findings (Field survey, 2018)

Table (6) shows the respondent's knowledge level about biological control techniques of some vegetable crops pests, majority of respondents (80.3%) perceive white flies, aphid, grass hopper, and *Tuta absoluta* as the most important vegetable pests. And the most commonly biological control techniques known by respondents were; the seedlings should be free of eggs, larvae, nymphs and adult insect pests(72.6%), Parasitoids and predators feed on harmful insects(68.4%), when infected with aphid and grass hopper biological control is carried out using *species* of *coccinellidae* beetles (59%), the chemical control eliminates and kills the natural enemies after releasing or settling them(59%), the parasitoids and predators should be released in favorable conditions for each species(54.7%), it is preferable to use the bio-control method on large areas(54.7%) and when the red spiders are infected plants the predators are attacked(47%).

Table 5. Respondent's characteristic individual, agricultural, social and communication characteristics.

Characteristics data	Description	Frequencies	%
1- Age: Mean = 40.7 Std.Dev = 8.9	<input type="checkbox"/> 35	37	31.6
	36-49	60	51.3
	<input type="checkbox"/> 50	20	17.1
	Total	117	100
2- Educational level	Illiterates	10	8.5
	Can read and write	51	43.6
	Medium education	35	29.9
	University education	21	17.9
	Total	117	100
3- Land size (Fed)	<input type="checkbox"/> 5.0	57	48.7
	6.0 – 15	46	39.3
	<input type="checkbox"/> 16	14	12
	Total	117	100
4- agriculture experience (year)	<input type="checkbox"/> 12 years	40	34.2
	13- 22 years	42	35.9
	<input type="checkbox"/> 23 years	35	29.9
	Total	117	110
5- Marital status	Single	8	6.8
	Married	105	89.7
	Divorced	4	3.4
	Total	117	100
6- Social participation	Participate	93	79.5
	Non participate	24	20.5
	Total	117	100
7- The communication with agri. extension	Communicating	46	54.7
	Non communicate	53	45.3
	Total	117	100
8- Testability of the innovations in the agriculture	Low	49	41.9
	High	68	58.1
	Total	117	100
9- The attitudes toward biological control	Negative attitude	37	31.6
	Neutral attitude	57	48.7
	positive attitude	23	19.7
	Total	117	100
10- The previous application of biological control	Have applied	58	49.6
	Didn't Apply	59	50.4
	Total	117	100
11- Years of application of biological control Note: % from, n = 58	1 to 3 years	36	62
	4 to 7 years	17	29.3
	<input type="checkbox"/> 8 years	5	8.7
	Total	58	100

Source: Research findings (Field survey, 2018)

On the other hand the respondent's knowledge about the natural enemies of vegetable pests such as using of *Encarsia formosa* parasitoid for controlled the white fly, *Trichogramma spp.* parasitoid destroys *Tuta absoluta* and other fruit lepidoptran larva, the use of parasitoid *Aphelinus sp.* and *aphidius matricariae* to control aphid, when the plant infected with the showing worms of the vegetable total, the control will done with the *Beauveria bassiana* fungi was very limited.

However, a majority of farmers declared that the biological control has not adversely affected the environment and ecological balance (76.9%), the organic crops maintain public health and have no harmful effects (72.6%), crops produced by biological control agents was shopping highest price marketing value (72.6%), plant or organic extracts are one of the types or components of biological control (71.8%), the cost of the organic equalizer is lower in price and easier to carry (70.9%), these results reflected that, the benefits of biological control techniques are known by farmers respondents. And also most respondents know that the insects used in biological control have the requirements of the field to maintain their activity (69.2%) and continuity and the biological control is a constant use of living elements (65.8%). In the same manner, results showed that the respondent's opinion is asking the state to encourage clean organic production (59%). In general results reflected that, the vegetable farmers have more knowledge about biological control techniques and they believe in biological control.

According to results of investigating correlation between the independent variables and knowledge level of respondent's regarding biological control techniques of some vegetable crops pests, the data in Table (7) indicate that there are significant positive relationship at 0.01 level between dependent variable and educational level and testability of the innovations in the agriculture. In addition, there are significant positive relationship at 0.05 levels between dependent variable and the previous application of biological control, the number of years of application and the attitudes toward biological control. No significant difference was found between dependent variable and the rest of studied independent variables.

Table(6): Frequency and Percentages of respondent's knowledge level regarding biological control techniques of some vegetable crops pests

Knowledge indicators of biological control	know		do not know	
	N	%	N	%
1- One of the most important vegetable pests is white flies, ahpid, grass hopper, and <i>Tuta absoluta</i> .	94	80.3	23	19.7
2- The seedlings should be free of eggs, larvae, nymphs and adult insect pests.	85	72.6	32	27.4
3- Parasitoids and predators feed on harmful insects	80	68.4	37	31.6
4- When infected with aphid and grass hopper, biological control is carried out using <i>coccinellidae</i> beetles.	69	59	48	41
5- The chemical control eliminates and kills the natural enemies after releasing or settling them.	69	59	48	
6- The parasitoids and predators should be released in favorable conditions for each species.	64	54.7	53	45.3
7- It is preferable to use the bio-control method on large areas.	64	54.7	53	45.3
8- When the red spiders are infected plants, the predators are attacked	55	47	62	53
9- When the plant infested with leaf miner, it's controlled with parasitic wasps.	43	36.8	74	63.2
10- Coccinellidae, <i>Chrysopa</i> and <i>orius</i> are among the most important predators of aphid, White Fly, grass hopper, and lepidoptran Eggs	41	35	76	65
11- Using of Bacillus bacteria in control larvae which feed on Total Vegetables	38	32.5	79	67.5
12- When the plant infected with the showing worms of the vegetable total, the control will done with the <i>Beauveria bassiana</i> fungi	29	24.8	88	75.2
13- <i>Trichogramma</i> parasitoid destroys insects in eggs instars	20	17.1	97	82.9
14- The use of parasitoid <i>Aphelinus sp.</i> and <i>aphidius matricariae</i> to control aphid	20	17.1	79	82.9
15- Tricogramma parasitoid destroys <i>Tuta absoluta</i> and other fruit lepedoptan larva	18	15.4	99	84.6
16- Using of <i>Encarsia formosa</i> parasitoid for controled the white fly.	13	11.1	104	88.9
17- The biological control has not adversely affect the environment and ecological balance	90	76.9	27	23.1
18- The organic crops maintain public health and have no harmful effects	85	72.6	32	27.4
19- Crops produced by biological control agents was shopping highest price marketing value	85	72.6	32	27.4
20- Plant or organic extracts are one of the types or components of biological control	84	71.8	33	28.2
21- The cost of the organic equalizer is lower in price and easier to carry	83	70.9	34	29.1
22- The insects used in biological control have the requirements of the field to maintain their activity and continuity	81	69.2	36	30.8
23- The biological control is a constant use of living elements	77	65.8	40	34.2
24- The state encourages clean organic production	69	59	48	41

Source: Research findings (Field survey, 2018)

Table7. The result of Correlation Coefficient between the independent variables and knowledge level of respondent's regarding techniques of biological control of some vegetable crops pests.

Variable	samples	r	Sig. level
1- Age	Pearson	0.065-	Non Sig
2- Educational level	Pearson	0.265**	**
3- Land size (Fed)	Pearson	0.011	Non Sig
4- Years worked in agriculture	Pearson	0.119-	Non Sig
5- Marital status	Pearson	0.034-	Non Sig
6- Social participation	Pearson	0.006	Non Sig
7- The communication with agri. Extension	Pearson	0.114	Non Sig
8- The previous application of biological control	Pearson	0.194*	*
9- The number of years of application	Pearson	0.185*	*
10- Testability of the innovations in the agriculture	Pearson	0.257**	**
11- The attitudes toward biological control	Pearson	0.216*	*

Note: Significant at 5%, ** Significant at 1%,

Source: Field survey

Respondents farmers' mentioned the main problems which facing them in the application of biological control techniques are: lack of experience and the difficulty of the implementation of the biological control techniques(89.7%), the farmers not convinced by the biological control as a resistant to pests(88%), farmers used to the traditional control methods(82.1%), non available predators from reliable sources and not suitable for appropriate conditions affect the Predator (66.7%), the high cost of biological control compared to other methods(63.2%), the fragmentation of the existing farm holdings which hinders the application of biological control(59%), failure to follow the agricultural sessions and the lack of follow-up of actors and bodies entrusted (59%) (Table 8).

Finally respondents farmers were asked to give their suggestions to overcome the problems facing them. According to results in Table (9), increase the effectiveness of the agriculture extension activities through the training , encouraged farmers toward agricultural production free of chemical pesticides, encouraged farmers and the provision of technical and financial support, organize training courses for farmers in the field of biological control, encouraged specialized companies to produce the natural enemies by supervision of scientific research centers, encouraged companies specialized in the production

of natural enemies by the supervision of scientific research centers, work on improving the means of publicity for the local agricultural biotechnology products and the provision of follow-up from the concerned authorities and bodies.

Table8. The problems facing farmers respondent's in the application of biological control techniques

The problems	Frequencies	%
1-Lack of experience and the implementation difficulties of the biological control techniques.	105	89.7
2-The farmers not convinced by the biological control as a resistant to pests	103	88
3- Farmers used to the traditional control methods	96	82.1
4-Non available predators from reliable sources and not suitable for appropriate conditions affect the Predator.	78	66.7
5-The high cost of biological control compared to other methods	74	63.2
5-The fragmentation of the existing farm holdings, which hinders the application of biological control	69	59
7- Failure to follow the agricultural sessions	69	59
8- The lack of follow-up of actors and bodies entrusted	46	39.3

Note: Multiple answers allowed

Source: Research findings (Field survey, 2018)

Table9. A suggestions of the respondents to overcome the problems facing them.

Suggestions	Frequencies	%
1- Increase the effectiveness of the agri. extension activities through the training and encouraged farmers toward agricultural production free of chemical pesticides	110	94
2-Encouraged farmers and the provision of technical and financial support	109	93.2
3- Organize training courses for farmers in the field of biological control	102	87.2
4- Encouraged specialized companies to produce the natural enemies by supervision of scientific research centers	91	77.8
5-Work on improving the means of publicity for the local agricultural biotechnology products	83	70.9
6- The provision of follow-up from the concerned authorities and bodies	40	34.2

Source: Research findings (Field survey, 2018)

CONCLUSION and RECOMMENDATION:

It is found that majority of farmers respondents have moderately and low knowledge level to the biological control techniques, the ministry of agriculture, the agricultural engineers were the mean sources of vegetable growers' respondents in terms of the knowledge about biological control techniques and the major sources of agricultural information for them were agricultural pesticide and supplies traders, their own experience, relatives and neighbours.

Educational level, testability of the innovations in the agriculture, the previous application of biological control, the number of years of application and the attitudes toward biological control are the important factors in vegetable growers' respondents' knowledge of biological control techniques. That is drawing attention to these factors which seems to be important regarding knowledge of farmers.

In general, results showed that the vegetable farmers have more knowledge about biological control techniques and they believe in biological control, but they know very little about the natural enemies of vegetable pests such as using of *Encarsia formosa* parasitoid to control the white flies, *Trichogramma spp.* parasitoid destroys *Tuta absoluta* and other fruit lepidoptran larva, the use of parasitid *Aphelinus sp.* and *aphidius matricariae* to control aphid, when the plant infected with the showing worms of the vegetable total and the control will done with the *Beauveria bassiana* fungi.

It can be concluded that the respondents know the general concept of biological control techniques to some extent, essential to make farmers aware of the benefits of biological control techniques. Extension training programs and promotional activities needed for raising awareness among farmers and encouraging farmers to develop positive attitudes toward agricultural production free of chemical pesticides in the research area. The government also has to play an important role to support the growth of the biological control techniques especially for the vegetable production through specific policy and program development.

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دراسة معارف زراع الخضر بأساليب مكافحة الحيوية للآفات الزراعية في الأراضي الجديدة بمحافظة البحيرة

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الملخص:

يستهدف هذا البحث بصفة رئيسية التعرف علي المستوى المعرفي لبعض مزارعي الخضر بأساليب مكافحة الحيوية للآفات الزراعية بالأراضي الجديدة بمحافظة البحيرة. وجمعت بيانات البحث من خلال إستمارة إستبيان بالمقابلة الشخصية خلال شهر نوفمبر 2018، أختبرت عينة عشوائية بسيطة بلغ قوامها 117 مبحوث من مزارعي الخضر (كانت شاملة البحث وفقاً للمساحة المنزرعة لتعذر الحصول علي بيان بأعداد الحائزين مزارعي الخضر) بمنطقة غرب النوبارية، واستخدمت الأدوات الإحصائية الوصفية المناسبة لشرح وتفسير النتائج. وكانت أهم النتائج على النحو التالي:

- أن حوالي 87,2% من إجمالي المبحوثين لديهم معرفة بدرجة منخفضة ومتوسطة عن أساليب مكافحة الحيوية للآفات محاصيل الخضر.
- كانت أهم مصادر معلومات زراع الخضر المبحوثين بالمكافحة الحيوية هي وزارة الزراعة والمهندسين الزراعيين، في حين كانت أهم مصادر المعرفة الزراعية لهم هي تجار المستلزمات والمبيدات الزراعية يليها الخبرة الذاتية والأهل والجيران.
- أشارت النتائج إلى وجود علاقة ارتباطية طردية مغزوية عند المستوى الاحتمالي 0.01 بين درجة معرفة المبحوثين بأساليب مكافحة الحيوية للآفات محاصيل الخضر كمتغير تابع وبين كل من المستوى التعليمي والاستعداد لتجريب المستحدثات في الزراعة، كما تبين وجود علاقة ارتباطية طردية مغزوية عند المستوى الاحتمالي 0.05 بين درجة معرفة المبحوثين بأساليب مكافحة الحيوية كمتغير تابع وبين متغير، التطبيق المسبق لأساليب مكافحة الحيوية، عدد سنوات التطبيق و الإتجاه نحو مكافحة الحيوية.
- كان من أبرز المشكلات التي تواجه زراع الخضر عند تطبيق أساليب مكافحة الحيوية هي صعوبة تنفيذ المزارعين لتوصيات مكافحة الحيوية وقلة خبرتهم يليها عدم إقتناع المزارعين بالمكافحة الحيوية كأسلوب مقاومة و تعودهم على اساليب مكافحة التقليدية.
- أما أهم المقترحات للزراع المبحوثين لتعزيز استخدام أساليب مكافحة الحيوية للآفات كانت زيادة جهود الجهاز الإرشادي لتدريب وزيادة خبرات المزارعين وتشجيعهم للاتجاه نحو الانتاج الزراعي الخالي من المبيدات الكيماوية، تحفيز المزارعين وتوفير الدعم الفني والمالي المستمر، عمل دورات تدريبية متخصصة في مجال مكافحة الحيوية وتحفيز الشركات المتخصصة على إنتاج الاعداء الطبيعية بأشراف المراكز العلمية البحثية.
- مزيد من الجهود الإرشادية مطلوبة خاصة بمنطقة الدراسة لتزويد زراع الخضر بالمعرفة اللازمة لتطبيق أساليب مكافحة الحيوية للآفات الزراعية والحد من استخدام المبيدات الكيماوية لما لها من تأثيرات ضارة علي البيئة وصحة الانسان مع الأخذ في الاعتبار المتغيرات التي أظهرت النتائج تأثيرها علي معارف الزراع فيما يتعلق بتطبيق أساليب مكافحة الحيوية.

الكلمات الإسترشادية: معارف- زراع الخضر- أساليب مكافحة الحيوية- الآفات الزراعية- الأراضي الجديدة