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# The Action Plan for Agricultural Extension Agents in the Field of Bio-Control

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**Abstract :** The target of the research is to build a training program for agricultural extension agents in the field of bio-control, increasing their knowledge about the definition and the importance of the methods of biological control, namely 2- Confusion pheromone, 2- sexual attraction attraction pheromone, 3- Pathogenic bacteria 4- Pathogenic nematode, 5- Growth regulators and hormones alienation, 6- Sterilize male insects and acquisition of how to use these methods, the program is based on the identification of their training educational needs, also identify training methods that they prefer, and determine the relationship between the degree of their knowledge of the field of bio-resistance as a dependent variable , and some socio-economic variables in order to determine the most trainees' properties need training, and determine the educational and technical problems in this area. The research was conducted in the North Sinai, using a systematic random sample, data were collected by using interviewer personal questionnaire, data have been analysis by using statistical program SPSS, and the arithmetic average, the coefficient of simple correlation of Pearson, the results were presented in tables, using frequencys, percentages.

**Key words:** Bio-control –agricultural extension- change agent-needs assessment- Training program.

## Introduction and research problem

Agriculture is considered the most important productive sector, and the major economic activity in Egypt, it inclusive labour, as the number of workers in the agriculture sector in 2012 nearly 6.4 million workers, representing 27.1% of the total employees in Egypt in 2012, and contribute to this sector at about 13.4% of the total GDP. (Central Agency for Public Mobilization and Statistics, in August 2015.

[http://www.capmas.gov.eg/Pages/Publications.aspx?page\\_id=5104](http://www.capmas.gov.eg/Pages/Publications.aspx?page_id=5104)

The world is witnessing a growing trend towards the use of organic farming technology, as the total cultivated areas worldwide are about 25 million , and sales volume reached about \$ 40 billion in 2005, and the world has turned to these technologies driven by many reasons, including consumer desire for safe food without pesticide residues or chemicals, and reducing environmental degradation, and the preservation of fertility and vitality of soils through the use of organic fertilizers, and conservation of biological diversity, and the preservation of human health by avoiding contaminated food with chemicals consumption, in addition to the physical yield profitable by depending on organic agriculture (Hamdy 2006: 152).

So Egypt has adopted the trend towards clean agriculture that relies on the use of organic fertilizers, bio control of insects, pests and diseases that affect different agricultural crops (Bahloul 0.1999: 2), where increased the cultivated organically area from 11.8 thousand acres in 1999 to 43.2 thousand acres in 2004 spread over fifteen governorates (Kassem, 2003: 20), the Egyptian Center of organic Agriculture was created as a center for the inspection of organic farming in Egypt and the Ministry of Agriculture in Egypt through the conviction of organic farming added an item in the new Agriculture Law, which allows organize these crops. It was assumed the central management of land, water and the environment to be responsible of technology transfer related to land and water from ARC to farmers through its performance as a specialist and charged with preparing a list of organic agriculture that are consistent with regulations adopted by the European Common Market, then Egypt became a producer of organic agriculture centers, and headed to the attention of importers from Europe and the world, and launched a number of Egyptian companies to engage in this area, as the number of working in the field of agriculture companies membership to 40 companies, Egypt now produces a large number of organic crops, including fruit and vegetables, field crops, medicinal and aromatic plants, so it must have a greater attention to overcome the problems of environment, human and animal health (Tolba, Abdul Rahman, F., (2008)).

Biological control is considered the most important pest management elements, the meaning of biological control can also be called "biological control" is working on the promotion and propagation of natural enemies of pests that found them in the same environment or the import of those natural enemies and try adapted them locally and deployed on a large scale to reduce the proliferation of pests, including the natural enemies of pests such as: parasites and predators

Bio control relies on the use of what is known as vital pesticides that the most important components of microbial pesticides which include the causes of various diseases as (fungi, bacteria, viruses, nematodes and protozoa), and pesticides resulting from fermentation processes of Oktanomaysitat which occur naturally in the soil, and also include pheromones insecticides, pesticides derived from plants, and genetically modified plants to resist pests (Huneidi, et al 2004).

Egypt is one of the countries that does not meet the food production needs of a growing population, where the population growth rate is always higher than the growth rates in agricultural production, Egypt's population rose from 18.97 million in 1947 to about 83.6 million in 2012 at a time decreasing the per capita of the cultivated area of about 0.3 acres in 1947 to about 0.11 acres in 2012, although the efforts of the government to increase the agricultural area, but the erosion and the loss of agricultural land often equate with land reclaimed inter Egypt, where it lost more than 750 000 acres of the best farmland in the Delta and upper region during the second half of the last century.

Central Agency for Public Mobilization and Statistics, in August 2015  
[http://www.capmas.gov.eg/Pages/Publications.aspx?page\\_id=5104](http://www.capmas.gov.eg/Pages/Publications.aspx?page_id=5104)

Economic and social development plans has targeted successive reach a comprehensive, balanced and stable development to catch up with international and regional developments, and face of increasing population, so Egyptian government has tended to vertical and horizontal agricultural development, and especially the horizontal development of increasing new and newly reclaimed areas, Sinai is considered the of these areas. (Information Center and decision support in Arish: January 2005).

Egypt has focused on Sinai Peninsula, in particular, has established a national project for the development of Sinai, which was approved by the Cabinet in 1994 in order to achieve sustainable development, youth employment in the agricultural sector, and to secure Egypt's eastern borders and end the isolation of the Sinai and link them to the valley, the project consists of two phases:

The first stage: includes the construction of Al-Salam Canal in front of Damietta dam to reclaim 220 thousand acres west of the Suez Canal, it has been completed the national infrastructure work, it is currently cultivating nearly 180 thousand acres, and will be reclaimed 20 thousand acres.

The second stage: Create a culvert under the Suez Canal and the establishment of Sheikh Jaber Al-Sabah canal, to reclaim 400 thousand acres, east of the Suez Canal. (Ministry of Irrigation and Water Resources in 2015 <http://www.mwri.gov.eg/project/sinai.aspx>

In spite of the efforts made by the government to bring about agricultural development, especially in Sinai Peninsula, agriculture still characterized by traditional methods, the rates of agricultural development are almost intangible, in spite of the a relative advantage enjoyment of this region in the production of some crops (bulletin of agricultural Economics, 2013, p. 332).

Hence the importance of agricultural extension as an educational and service organization aims to solve the problem of low agricultural productivity and resistance to pests and diseases through guiding educational efforts, where the creation of desirable behavioral changes among farmers.

The agricultural extension depends on the performance of its role in this area on the efficiency and skills of its change agents, in terms of their ability to transfer technology to farmers in the light of their learning experiences, (safty of 2008: 23).

Therefore training is helping to raise the efficiency of agricultural extension workers and linking them to agricultural innovations, the importance of training as the necessary fundamentals for the development and success in all areas of life, it can be through providing individuals with knowledge, skills and attitudes that make them more efficient in their work. (Abou-El -Soud 1998: 24).

Klsy, Hern mention that (1963: 62) the success of a training program is determined on the basis of the study of the real situation and determine the actual needs and to identify needs and desires and problems of trainees before starting implementation The upgrading of agricultural extension workers strongly associated with the design, planning and implementation of training programs, reflecting the importance of studying the training needs and classified it according to their priority (Abdul Ghaffar, 1975: 226)

Change agents can make desired behavioral changes in farmers' knowledge, skills and attitudes to reduce the use of pesticides and chemical fertilizers, they must be provided with the necessary information and skills in the field of biological control. Where review on training needs in relevant research showed that 81% of change agents need training in the field of integrated pest management, (Hassan, 2000).

There is increasing interest in the agricultural extension organization for encouraging farmers to apply technical practices of organic planting, which rely on the role of agricultural extension agents, so it became necessary to build a program to train them with respect to practices art of biological control, so they can do their part in educating farmers and provide them with information and skills.

## **Research Problem**

In light of the foregoing, the study problem seeks to answer the following questions;

1. What are the training needs of agricultural extension change agents in the field of biological control?
2. What are training methods favored by extension workers?
3. What is the relationship between some socio-economic variables, reflect the characteristics and conditions of the trainees as dependant variables, and the degree of their knowledge of the field of biological control as a dependant variable?
4. What is the agricultural extension change agents' perception to the problems of the application of biological control?

## **Research goals**

Consistent with previous research problem presented might elaborate on the following objectives:

1. Identify the training needs of agricultural extension change agents in the field of biological control.
2. Identification of training methods favored by extension worker-
3. Determine the relationship between some socio-economic variables of agricultural extension change agents, as dependant variables, and the degree of their knowledge of the field of biological control as a dependant variable.

4. Identify agricultural extension change agents' perception to the problems of the application of biological control.
5. Prepare a training program for change agents' application of biological control.

### Research hypotheses:

To verify the third goal, formulation of research hypothesis was as the following:" There is a significant relationship between the degree of agricultural extension change agents' knowledge in the field of biological control as the dependent variable and between each of the following studied independent variables: worker 'age, academic qualification, area of study, period of service in the agricultural work, period of service in extension work, upbringing, training experience, and the degree of job satisfaction.

### Methodology:

**Definition of Biological Control:** It is the use of living organisms (natural enemies) to reduce the density of the number of animal and plant harmful organisms (pests) to below the limit of economic damage.

**The search area:** This research was conducted in North Sinai Governorate, where it is one of the largest desert areas with a density in agricultural extension works where the number of staff is 120.

(Agricultural Directorate in North Sinai Governorate -2015).

### The research sample

It includes a comprehensive search of all agricultural extension change agents working in North Sinai Governorate, 121 workers were distributed on the 7 centers of the governorate.

(Agricultural Department- North Sinai governorate, 2016, unpublished data)

The research sample was selected from the total number of agricultural extension workers in North Sinai, according to (Krejcie & Morgan: 1970: 610-607)

$$(P-1) P X^2 + (1- N) d^2 \div (P-1) P N X^2 = S$$

The size of a random sample from all members included 95 of agricultural extension agents, according to the previous equation.

### The method and tool of data collection

The questionnaire by personal interview was used as a tool to gather the necessary research data, and validated through the initial test, it has been collected during March 2016.

### Quantitative measurement of the data

First, the studied independent variables;

1. **Age**, it was distributed into 3 categories: Young (less than 35 years old), middle age (35 - less than 47 years old), the elderly (47 years and above).
2. **Academic Qualifications:** respondents were distributed into 3 categories: intermediate qualification (one degree), university qualification (degrees), qualified above University (three degree).
3. **Specialization in Education:** respondents were distributed to the three categories, namely: Agricultural extension (three degrees), general (two degrees), and other disciplines (one degree).
4. **length of service in the agricultural work:** respondents were distributed to three categories: service of short duration (less than 12 years), medium length of service (12 – less than 23 years old), the service for a long time (23 years and above).
5. **period of service in Extension Work:** respondents were distributed to three categories: small service (less than 10 years), medium f service (10 - less than 19 years) long, service (more than 19 years).

6. **Socialization**; being a rural or an urban, this variable has been measuring by giving two degrees in the case of rural upbringing, and one grade in the case of urban upbringing.
7. **Training Experience**:- means the total training courses for respondent during his tenure, they were distributed into the following categories: small training experience (less than 3 courses), medium training experience (3 - less than 5 courses), great training experience (5 courses and more).
8. **Degree of job satisfaction**: It is intended as a set of psychological and functional factors and environmental conditions that make the employee satisfied with his work in agricultural extension, measuring this variable by using 11 items, each item consists of three responses such as; ( agree, to some extent, disagree) these responses confined between 3-1 in the case of positive phrases, and vice versa in the case of negative items, the total scores obtained by the respondent represent the degree of job satisfaction ., respondents were divided into three categories, namely: - job satisfaction is low (less than 18 degrees), medium job satisfaction (from 18- less than 25 degrees), great job satisfaction (25 and over)
9. **Training methods favored by extension workers in the field of bio-control**: It has been measured by the respondent about six training methods, namely, (workshops, field demonstration, Symposiums. discussions, lectures, field visits) through a two scale (preferred, not preferred) and were given grades (2.1) respectively, are arranged according to the weighted average

### **Second; The dependent variable: -**

**The degree of the training requirement** of the respondents in the biological control of the following methods:

- 1-Confusion pheromone, .2-sexual attraction pheromone, 3- Pathogenic bacterial
- 4- Pathogenic nematode, 5. Growth regulators and hormones alienation, 6- Sterilize male insects

Through a scale of two levels, namely, (needs, and does not need), and given grades (2.1), respondents were divided into three categories, namely: - low need (less than 24 degrees), and the medium need (24-30 degrees), severe need (30 degrees or more). The average scores were accounted for the respondents that reflect the training requirement for them in each of the studied methods, calculating the percentages of the mean scores of the need in every method. Training requirements were divided into three levels, severe training needs 76% or more, medium training requirement of 50% -75% ,then low training requirement is less than 50%.

**Third: - perception of problems in the field of bio- control**: - Use in measuring this variable nine items, each item gave the following responses (yes, no), and given grades 2.1 to these responses, respectively, it was arranged by the weighted average.

**Statistical analysis tools**: The statistical computer program SPSS was used for data analysis, data analysis was included; the arithmetic average, the coefficient of simple correlation of Pearson, and the data were presented in a tabular format using the repetition of responses, percentages, and the percentage of the average.

## **Results and Discussion**

**First**: Situation analysis; determine personal, professional, social and economic variables of the trainees

The results showed the most important attributes of the trainees in agricultural extension directorate in North Sinai as follows;

1. **Age**: showing that nearly half of respondents over the age of 47 year.
2. **Academic Qualifications**: The results showed that 40% of respondents hold a medium education, and 52.6% of them have a university qualification, and 7.4% of them hold a postgraduate education.
3. **Specialization in Education**: Results showed that 1.1% of respondents are agricultural extension specialization, and 54.7% of them specialization other disciplines, and 44.2% in general specialty.
4. **Length of service in the agricultural work**; 44.% of the respondents in the medium-Service category (less than 12- 23), 40% of the respondents in the large category of service (23 years and over).

5. **Period of service in Extension Work:** Results show that 56.8% of respondents in Extension work were in the small service category (less than 10 years).
6. **Socialization:** Results show that 67.4% of the respondents have origination from an urban, while 32.6% of them with rural origination.
7. **Training Experience:** The results show that 42.1% of respondents with a small training experience (had less than 3 courses).
8. **Degree of job satisfaction;** the results showed that 61.1% of workers in a high degree of job satisfaction.
9. **Second: The dependent variable:** - For agricultural extension workers training needs in the field of bio-control explained the results contained in Table 1 as follows:

The training requirements of the agricultural extension workers in North Sinai are severe regarding the following methods;

1-Confusion pheromone, 2-sexual attraction pheromone, 3- Pathogenic bacteria 4- Pathogenic nematode, 5. Growth regulators and hormones alienation, 6- Sterilize male insects, where the percentage of the averages of the training needs were respectively; **83%, 81.5%,89.5%,95.5 %, 94 %,92.5 %**.

The total averages of the respondents training needs of such practices degrees respectively. **1.66, 1.63, 1.79, 1.91,1.88 , 1.85** .

**Table (1) the distribution of the respondents according to their needs in the training methods of bio-control**

Seq	Technical methods	Recommendations of the bio control techniques	The maximum degrees of training needs	Average	% of the average	Needs
1	1.Confusion pheromone	1-Its idea relies on the artificial synthesis of the smell of female butterflies. 2- Used spray on plants or linked to plants' stems in the form of tubes or rings in big spaces. 3-Consequent use of pheromone dispersing and scattering males 4-Therefore less chance of mating 5- Lay eggs are not fertilized hatch larvae, thereby reducing the incidence.	<b>10</b>	<b>1.66</b>	<b>83</b>	Intense
2	2-sexual attraction pheromone	1-Its idea relies on the synthesis of the smell of female butterflies industrially. 2- Used their materials in capsules inside the private traps (water / paper) to hunt male butterflies. 3- results in a lack of opportunities for mating, 4-leading to the development of non-fertilized eggs and not hatched larvae	<b>8</b>	<b>1.63</b>	<b>81.5</b>	Intense
3	3.Pathogenic bacteria	1-The idea is to develop pathogenic bacteria in the crystalline material. 2- Where insects feed on it and then get sick and die. 3- resulting from eat these crystals dissolve insect' wall in contact with the bacteria. 4- causing bloody poisoning of the insect, the active substance starts where insects cause death (particularly in squamous wings)	<b>8</b>	<b>1.79</b>	<b>89.5</b>	Intense
4	4.Pathogenic nematode	1-They can Kill the insect within 48 hours, where they multiply nematodes on insects, insect is killed by bacteria found inside them, and then look for other insects, and so on	<b>4</b>	<b>1.91</b>	<b>95.5</b>	Intense

		until it is eliminated. 2- Sprinkle nematodes lotion in the morning or at sunset				
5	5. Growth regulators and hormones alienation	1-Are materials that regulate insect growth and hinder the continued growth hormones prevent insects from metamorphosis before the real phase thus contributing to eliminate them	<b>2</b>	<b>1.88</b>	<b>94</b>	Intense
6	6- Sterilize male insects	1-Used to resist Drosophila insect Ptaqimha and released into the air. 2- cause sterilize male to lay unfertilized eggs and they are eradicated	<b>4</b>	<b>1.85</b>	<b>92.5</b>	Intense



**Third: Training methods favored by agricultural change agents in North Sinai.**

The results shown in Table (2) that the training field visits located on the first ranking in the training methods favored by trainees, it reached about (1.98), then the field demonstration is in the second preference, with average (1.93), Symposiums in third place with an average (1.84) , workshops, ranking fourth with an average (1.80), respectively ranked fifth discussions average (1.75), while the lectures in the final standings with an average (1.69).

**Table (2) Training methods favored by agricultural change agents in North Sinai.**

Training methods	Favoured		does not favour		Average	Rank
	N	%	N	%		
field visits	93	97.9	2	2.1	1.98	1
Field demonstration,	88	92.6	7	7.4	1.93	2
Symposiums.	80	84.2	15	15.8	1.84	3
workshops	76	80	19	20	1.80	4
Discussions	71	74.7	24	25.3	1.75	5
Lectures	66	69.5	29	30.5	1.69	6

**Fourth, Recognize of change agents to the problems of the field of bio-control:** The results have shown in Table (3) indicate that the most frequent problems faced by workers in the field of bio-control are as follows: 1- lack of financial and incentives are more urgent problem, with an average (1.91),2- then the problem lack of Rural education programs on television for the field of bio-control, with an average (1.89),3- then lack of extension tools, with an average (1.85), 4- Short period of time for training courses for change agents in the field of bio-control, 5- then the problem of Lack of means of transport for change agents, with average (1.83), 6- lack of training programs for change agents in the field of bio-control with average (1.80),7 - then the problem of Lack of financial resources to extension work,8 - then lack of extension bulletins for bio-control, with average (1.77), 9- late arrival of agricultural extension publications, with an average (1.71), 10 -and assign extension workers other work, with average(1.68), which demand the attention of agricultural extension organization in the Ministry of Agriculture, work on the study of those problems facing the agricultural extension agents, and seek to resolve them.

**Table (3) the distribution of extension workers according to their perception of the problems in the field of bio-control**

The problems in the field of bio-control	urgent		Non Urgent		Average	Rank
	No	%	No	%		
lack of financial and incentives	86	90.5	9	9.5	1,91	1
lack of Rural education programs on television	85	89.5	10	10.5	1,89	2
lack of extension tools	79	83.2	16	16.8	1,85	3
Short period of time for training courses	79	83.2	16	16.8	1,83	4
Lack of means of transport	79	83.2	16	16.8	1,83	5
lack of training programs for change agents	85	89.5	10	10.5	1,89	6
Lack of financial resources for extension	73	76.8	22	32.2	1,77	7
lack of extension bulletins for bio-control,	73	76.8	22	23.2	1,77	8
late arrival of agricultural extension publications	67	70.5	28	29,5	1,71	9
Assign extension agents other works	65	68.4	30	31.6	1,68	10

#### Fourth: -The relationship between the degree of change agents' knowledge to the field of bio- control and each of the studied independent variables

The relationship is helping to choose the target trainees who are most need of , for this purpose has been formulated statistical hypothesis between change agents' knowledge to the field of bio- control and each of the studied independent variables and each of the independent variables "There is no significant relationship between change agents' knowledge to the field of bio- control and each of the studied independent variables : change agents 'age, academic qualification, area of study, period of service in the agricultural work, period of service in extension work, upbringing, training experience, and the degree of job satisfaction."

Testing the statistical hypothesis using a simple Pearson correlation coefficient (r) the results indicated in Table (4) the following;

1. There is a positive and very significant relationship in the level of 0.01 between the change agents' knowledge to the field of bio- control and the change agents 'age variables as the value of (r) calculated 0.248, and training experience (r) calculated 0.246, indicating that it the increase in the age of the respondent, and increase training experience increases the degree of change agents' knowledge to the field of bio- control.
2. There is a positive and significant relationship in the level of 0.05 between the change agents' knowledge to the field of bio- control and the following variables: -1- academic qualifications as the value of (r) calculated 0.192, 2- area of study variable as the value of (r) calculated 0.189, 3- period of service in the agricultural work r as the value of (r) calculated 0.191, 4- length of service in the extension work as the value of (r) calculated 0.185, and the degree of job satisfaction as the value of (r) calculated 0.184, data are indicating that the increase in academic qualifications, area of study , period of service in the agricultural work , period of service in extension work, and the degree of job satisfaction, increases the degree of change agents' knowledge to the field of bio- control.
3. There is no significant relationship between the change agents' knowledge to the field of bio- control and change agents' upbringing variable.
4. In the light of previous findings trainees will be selected from agricultural extension workers who are most in need of training, according the following characteristics: (1 – Young age, 2 - less training experience, 3- less in the academic qualification, 4 -no specialization in agricultural extension, 5 - less period of service in the agricultural work, 6- less period of service in extension work and, 7 - less in the degree of job satisfaction)

**Table 4; the values of correlation coefficients for the relationship between the degree the change agents' knowledge to the field of bio- control and between each of the independent studied variables**

ser	independent studied variables	Pearson simple correlation coefficient (r)
1	change agents 'age	**0.248
2	Academic qualification	*0.192
3	Area of study	*0.189
4	period of service in the agricultural work	*0.191
5	Period of service in extension work	*0.185
6	upbringing	0.106
7	training experience,	**0.246
8	The degree of job satisfaction.	*0.184

Significant at 0.05 level\*

Significant at 0.01 level\*\*

#### Fifth: A plan for agricultural extension agents in the field of bio-control

This program has been proposed in the light of the existing situations analysis, identify trainees' needs for agricultural extension change agents in the field of bio-control, and to identify the educational and technical

problems and identify attributes of trainees who are more urgent need of training, and determine the favorite training methods for them. In the light of the research results, the program includes the following;

### **First-The existing situations analysis**

**First- 1-** The number of agricultural extension staff in North Sinai Governorate is 120, where there are seven agricultural extension centers to help in increasing farmer' awareness in various areas of comprehensive development, and the Arish College of Agricultural and Environmental Sciences provide agricultural extension services to farmers in the governorate, and also the presence of two regional research stations belonging to the desert Research Center play a significant role in the Agricultural Extension activities.

**First- 2-** The results showed that most of the respondents' change agents did not receive specialized training course in the field of bio-control.

**First-3-** Extension agents, mostly non-specialist in agricultural extension, and their service duration in agricultural extension are small.

**First- 4-** Change agents 'training needs in the field of bio- control are urgent, reflecting the necessity of training efforts.

**First-5-** Benefits of training courses are low, as a result of their short periods, and implement traditional ways.

**First-6-** The existence of administrative problems with the extension workers, necessitating resolved to take advantage of the training.

### **First-7-Identify characteristics of change agents of the trainees in North Sinai,**

**7-1- Age:** showing that nearly half the number of respondents over the age of 47 years

**7-2-Education:** The results showed that 40% of respondents hold a medium education, and 52.6% of them have a university qualification, and 7.4% of them hold a postgraduate education.

**7-3-The area of study:** Results showed that 1.1% of respondents were agricultural extension specialized, and 54.7% were other disciplines, and 44.2% were general specialized.

**7-4- period of service in the agricultural work ;** results showed that 44.2 of the respondents in the middle period of the service category (less than 12- 23 years) 0.40% of the respondents in the service for a large category (23 years and over).(

**7-5- Period of service in extension work:** Results show that 56.8% of the respondents in the small service category (less than 10 years).

**7-6- upbringing:** Results show that 67.4% of respondents, with the urban emergence, while 32.6% of them with rural origins.

**7-7-Training Experience:** The results show that 42.1% of respondents with small training experience (less than 3 courses).

**7-8- The degree of job satisfaction.** The results showed that 61.1% of the workers with big job Satisfaction.

**Second:** The training requirements of the agricultural extension workers in northern Sinai are severe regarding the following methods;

1-Confusion pheromone, .2-sexual attraction pheromone, 3- Pathogenic bacterial

4- Pathogenic nematode, 5. Growth regulators and hormones alienation, 6- Sterilize male insects

**Third**, the most frequent problems faced by workers in the field of bio-control which demand the attention of agricultural extension organization in the Ministry of Agriculture, work on the study of those problems facing the agricultural extension agents, and seek to resolve them they are as follows:

1. Lack of financial and incentives are more urgent problems.
2. Lack of Rural education programs on television for the field of bio-control.
3. Lack of extension tools. 4- Short period of time for training courses .
4. Lack of means of transport for change agents.
5. Lack of training programs for change agents in the field of bio-control.
6. Lack of financial resources to extension work.
7. Lack of extension bulletins for bio-control.
8. Late arrival of agricultural extension publications.
9. Assign extension workers other work.

#### **Fourth: the Action plan**

The action plan is considered as a written document include all measures that benefit officials with training in the implementation of the training program's objectives, taking into account the availability of sufficient flexibility, so that it can enter appropriate changes to cope with emergency conditions. as shown in table (5).

**Table ( 5 ) The action plan for agricultural extension agents in the field of bio-control**

Educational goals	Training messages	Training Methods	Places of execution	Time schedule	Target trainees	Organizers of the activity	Evidence of progress
<p><u>First:</u> Acquisition of workers' knowledge about the definition and the importance of the methods of biological control, namely: 1-confusion pheromone  .2-sexual attraction pheromone  3- Pathogenic bacteria  4- Pathogenic nematode  5. Growth regulators and hormones alienation  6- Sterilize male insect  <u>Second:</u></p>	<p><b><u>1-confusion pheromone</u></b> 1-Its idea relies on the artificial synthesis of the smell of female butterflies. 2- Used spray on plants or linked to plants' stems in the form of tubes or rings in big spaces. 3-Consequent use of pheromone dispersing and scattering males 4-Therefore less chance of mating 5- Lay eggs are not fertilized hatch larvae, thereby reducing the incidence.  <b><u>2-sexual attraction pheromone</u></b> 1-Its idea relies on the synthesis of the smell of female butterflies industrially. 2- Used their materials in capsules inside the private traps (water / paper) to hunt male butterflies. 3- results in a lack of opportunities for mating 4-leading to the development of non-</p>	<p>1- Field visits  2-Field demonstration  3-Symposiums.  4-Workshops  5-discussions, 6 -lectures</p>	<p>Local agric., administration  Research centres  Agric., colleges</p>	<p>5 -7 days for each method</p>	<p>Extension workers' attributes  1-Young age 2-Less training experience 3 -less qualification 4 -non specialist 5-less service for agricultural work 6-Less for service in extension work 7-Less degree in job satisfaction</p>	<p>1-Specialists in research centers  2-Agricultural colleges  3-specialists in organizations  4-factories operating in this field</p>	<p>1-increasing change of agents' knowledge about importance and how to use biological control and the effects of their use.  2-Increase farmers' use of agricultural methods for bio-control.          3-Inference on the progress of the case study to measure behavioral changes</p>

<p>Acquisition of change agents' knowledge on how to use these methods</p> <p><u>Third:</u> Acquisition of change agents' knowledge on the consequences of use these methods.</p>	<p>fertilized eggs and not hatched larvae</p> <p><b><u>3-pathogenic bacteria</u></b> 1-The idea is to develop pathogenic bacteria in the crystalline material. 2- Where insects feed on it and then get sick and die. 3- resulting from eat these crystals dissolve insect' wall in contact with the bacteria. 4- causing bloody poisoning of the insect, the active substance starts where insects cause death (particularly in squamous wings)</p> <p><b><u>4-pathogenic nematodes</u></b> 1-They can Kill the insect within 48 hours, where they multiply nematodes on insects, insect is killed by bacteria found inside them, and then looks for other insects, and so on until it is eliminated. 2- Sprinkle nematodes lotion in the morning or at sunset.</p> <p><b><u>5-regulators and hormones alienation.</u></b> 1-Are materials that regulate insect growth and</p>	<p>1- Field visits</p> <p>2-Field demonstration</p> <p>3-Symposiums.</p> <p>4-Workshops</p> <p>5-discussions,</p> <p>6 -lectures</p>					
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	<p>hinder the continued growth hormones prevent insects from metamorphosis before the real phase thus contributing to eliminate them</p> <p><b><u>6-sterilize male insects</u></b></p> <p>1-Used to resist Drosophila insect Ptaqimha and released into the air.</p> <p>2- cause sterilize male to lay unfertilized eggs and they are eradicated</p>						
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