Planning a Extension Program for the Development of the Knowledge of Tomato Growers in Fayoum Governorate in the Area of Safe Use of Agricultural Pesticides

Shaaban El-Sayed Mohamed, Abdu Omran Mohamed and Reda Hassan Abdel Ghaffar

Agricultural Economics Research Department National Research Center, Egypt.

Agricultural Extension And Rural Development Research Institute, Agricultural Research Center, Egypt.

ABSTRACT

The study aimed to determine the level of knowledge of tomato growers with safe use of agricultural pesticides, and to determine the relationship between the degree of the knowledge of tomato growers of the safe use of agricultural pesticides as a dependent variable and some studied independent variables, and to identify problems that facing the tomato growers in the field of the safe use of agricultural pesticides, and finally to propose an action plan for the development of tomato growers knowledge in the area of safe use of agricultural pesticides. The study was conducted in the Fayoum governorate, as one of the largest provinces in the country having cultivated area with tomatoes crop. The top three districts, having cultivated area with tomatoes crop, Tamia and Etsa and Ebshiway, were selected. The largest village of each district, namely Almtataly, El Gharak El Bahary and Abu Dengash were selected from the selected districts respectively. Data were collected by personal interview from a random sample of 314 respondents of tomato growers during the months of August and September 2011, using a questionnaire form, and frequencies, percentages, arithmetic mean and standard deviation, and Pearson's simple coefficient of correlation were used in the presentation and analysis of data. Most important findings of this study were summarized as follows:

1. It was found that 9.9% of the respondents had low knowledge of the studied recommendations, and 56% had average knowledge, while 34.1% of them had high knowledge. It was found that there was a significant relationship at the level of significance 0.01 between the degree of knowledge of tomato growers of the safe use of agricultural pesticides and each of the age, agricultural expertise, distance from the pesticide dealer to farms, the attitude towards extension activities. There were significant positive correlations at the level of significance 0.05 with the degree of education, availability of the pesticide companies in the region, and the attitudes towards the use of pesticides, while there was not significant relation between the degree of knowledge of tomato growers of the safe use of agricultural pesticides and the rest of the studied independent variables.

2. It was found that the most critical problems facing respondents of tomato growers were: the high price of pesticides, the spread of diseases and insects, lack of attention to the farms, the misuse of pesticides, shortage of farmer experience, commercial fraud in pesticide manufacture, pesticide dealer's remoteness from the village, poor of extension skills, and finally lack of extension instructions.

3. At the end, the study presented a proposal for a plan of action directed to the tomato crop growers to improve their knowledge in the safe use of agricultural pesticides practices.

Kew words: Planning a Extension Program, Development of the Knowledge, Tomato Growers, Agricultural Pesticides.

Introduction and Research Problem:

The capacity of agricultural extension and rural development programs, to respond to the needs and problems of the target groups, is considered of the most important challenges facing extension program planners, and those responsible for rural development in the world. the world has witnessed, over the last four decades of the twentieth century and during the current decade of the twenty-first century, considerable changes, covering all areas of life and production, and because of the immensely speed of such changes and active integration of people in these changes, or their participation as a mere target audiences, thus, rural development and agricultural extension programs seek to help people to cope with these rapid changes, such as, new agricultural policies and changing requirements of agricultural markets, and these programs would also be target, in some cases, to help individuals, groups and rural communities at the grassroots level in the construction and development of change programs that fit with their needs and aspirations. No doubt that both of the previous positions require good planning and preparation for different types of extension programs (El Shafie: 2008, p. 4 ).

Corresponding Author: Shaaban El-Sayed Mohamed, Agricultural Economics Research Department, National Research Center, Egypt.
E-mail: shaabankh123@yahoo.com
The tomato crop is of great importance in terms of cultivated area and nutritional and economic importance, as the vegetable crops considered from agricultural crops that have economic importance, since they fall within the intensive agriculture, which allows a profit higher than the regular crops. Vegetables cover an area of plantation about 1.5 million feddan in Egypt at present, producing more than 17 million tones for domestic consumption, export, manufacturing, and production of seeds. This area needs to multiply due to population growth, and raising the nutritional level, in addition to that the vegetable crops are essential for domestic consumption and an important source of vitamins, minerals, and it is also an important source for many agricultural industries (the International Potato Center, 2005: p. 8).

Thus, the efforts being made to serve the vegetable crops in Egypt are of great value because of the economic importance of vegetable crops as a main component of national agricultural income, as the annual income of the vegetable crops production value in 2010 amounted to 6,092,967 million pounds, up to 36.62% of the annual average of gross agriculture income, amounting to 21934681 million pounds per year (the Central Administration of Agricultural Economics, 2010: unpublished data).

The tomato crop is one of the most important vegetable crops in terms of area cultivated area per year, which amounted in 2010 to about 344,562 feddan, and the total production amounted to 12,336,860 tons, therefore, it needs a lot of effective extension programs and services to improve its productivity, which necessarily requires the continuous assessment of these extension activities that provided to tomato growers (the Central Administration of Agricultural Economics, 2010: unpublished data).

The tomato crop is of great importance in terms of cultivated area and nutritional and economic importance, that is why the state has given a considerable interest to this crop, but it is noticeable that there are many diseases insect and pests that infect tomato crop, which force farmers to use many of pesticides to combat these pests, diseases and insects, which could expose them to several health problems, as a result of the misuse of pesticides during spraying the crop, in spite of all extension efforts and activities and services, provided by the agricultural extension organization, in this area, in order to develop knowledge of tomato growers of the safe use of these pesticides to keep them from contamination with agricultural pesticides. Despite of that, there is still a severe lack of effectiveness of those extension activities and services directed to tomato growers in Fayoum Governorate, and farmers are face many difficulties and problems that reflect on the misuse of agricultural pesticides, which could affect their health, or the quality of the final product of tomato crop. It was noticed that the prevalence of many of the wrong concepts and practices among tomato growers in Fayoum Governorate, which led to some questions about the level of knowledge of tomato growers of the safe use of agricultural pesticides in the governorate, which stated as the follows:

1. What is the most important extension knowledge, the tomato growers need to acquire in the area of safe use of agricultural pesticides?
2. What are the factors affecting the knowledge of tomato growers in the area of safe use of agricultural pesticides?
3. What are the obstacles that hinder the tomato growers in the area of safe use of pesticides?
4. What are their most important suggestions to overcome these problems?

All this, called for the necessity to conduct such a study to answer those questions and determine the degree of knowledge of tomato growers of the safe use of agricultural pesticides, as well as the factors that affect the knowledge of tomato growers in the area of safe use of agricultural pesticides to be taken into account during the planning and implementation of extension programs.
Study Objectives:

To answer the questions of the research problem, the study objectives were identified as follows:
1. To determine the level of tomato growers knowledge of the safe use of agricultural pesticides.
2. To determine the relationship between the degree of tomato growers knowledge of the safe use of agricultural pesticides as a dependent variable and some independent variables.
3. To identify the problems facing by tomato growers in the area of safe use of agricultural pesticides.
4. To propose an extension action plan for the development of the tomato growers knowledge in the area of safe use of agricultural pesticides.

Research Importance:

The research importance is based upon the importance of the threat that resulted by the unsafe use of agricultural pesticides to the farmers themselves, and to human health in general, and the importance of proposing extension action plan based upon the result of this study for the development of the tomato grower knowledge of safe use of agricultural pesticides in theory and practice. Theoretically, this research is an addition to the efforts made and are still being made in connection with the safe use of agricultural pesticides.

Research limits:

In consistence with the research problem and objectives, and in light of the available possibilities, and the time allocated, the study focused on Fayoum governorate, and the study was limited to identify the knowledge of tomato growers of the safe use of agricultural pesticides, and to identify the relationship between the level of knowledge of tomato growers of the safe use of agricultural pesticides and some personal variables of the farmer.

Research Method:

Research Area:

This study was conducted in Fayoum governorate, as one of the largest governorate in Egypt in terms of area cultivated with tomato crop in the 2010 season, as area planted with tomatoes has amounted to 17,144 feddans. The biggest three districts, Tammeia, Etsa and Ebshiway in the governorate, in terms of area cultivated with tomato crop were selected, and the largest village in each district was selected in accordance with the same criteria, they were Almtatala, El Gharak El Bahary and Abu Denqash villages, out of the three selected districts, respectively.

Research population and Sample:

The research population was 1719 representing farmers represented in tomato growers in the three selected villages in the governorate of Fayoum, the total of this population was distributed as follows: 621 farmers in the village of Almtatala, 694 farmers in the village of El Gharak El Bahary, and 404 farmers in the village of Abu Denqash, The sample size of respondents were identified by using Krejcie& Morgan equation (1970: pp. 607-610). The sample size required after the application of this equation, was 314 farmers representing 18.3% of the overall population, that were allocated to farmers of the villages studied to the same proportion as follows 113 respondents from Almtatala village, and 127 respondents from the village of El Gharak El Bahary, and 74 respondents from the village of Abu Denqash and they were selected randomly out of the owner sheets in the agricultural cooperative in the selected villages.

Data Collection:

The field data were collected using a questionnaire through personal interview during the months of August and September 2011, after a preliminary testing with 15 respondents from the village of El Gharaq El Quebly, Etsa district, to verify its validity and how much the respondents have understood its content. The form included three parts, the first is a set of questions for measurement of independent variables, the second for determining of the tomato growers knowledge of the safe use of agricultural pesticides, and the third is to identify respondents related to the study subject.

Quantitative Treatment of the Variables:

First: Independent Variables:
1. **Age:**

   Age was measured by asking the respondent about his age to the nearest calendar year, reported in raw data.

2. **Degree of education:**

   This variable were measured through asking the respondent of his status of education and number of years of formal education. The respondents were classified according to their responses in terms of their education, into three categories of; illiterate, reads and writes without formal education, and formally educated. A degree of one were given to illiterate individual, and who reads and writes without a school certificate was considered equivalent to fourth grade, while the rest of the respondents were given a degree of one score for each year he had spent in education, thus, each respondent was given a score possible to establish a system of degrees indicative to his education.

3. **Size of agricultural holdings:**

   This variable was measured by asking the respondent about his agricultural holdings in Kirat, whether this area was a owned, rent or sharing.

4. **Area planted with tomatoes:**

   This variable was measured as the number of the of kirats cultivated with tomato crop during the year 2011.

5. **Agricultural experience:**

   This variable was measured as the number of years of respondent experience in the cultivation of tomato crop.

6. **Availability of pesticide companies in the region:**

   This variable was measured by giving the following score for the categories of pesticide company presented in the region: large (4 degrees), medium (3 degrees), low (two degrees), and non-existed (one degree). the respondent was given score according to his response, to the presence of pesticide companies in the region.

7. **The pesticides dealer distance from the farmer:**

   This variable were measured by giving the following scores for the categories of pesticides dealer distance from farmer, which are: large distance (3 degrees), average distance (two degrees), and small distance (one degree). By collecting score the respondent was given score according to his responses how far the pesticides dealer from the farmer.

8. **The attitude towards the use of pesticides:**

   A twelve item scale was used in the measurement of this variable, each item was to be responded to in there point response, agree. Neutral, disagree. These responses were given degrees of 3,2,1 in the case of positive items, and vice versa in the case of negative items . Items score were then added to get the total attitude for each individual and the highest score on the scale was 24 degrees, and lower score was 12 degrees.

9. **The attitudes towards extension activities:**

    Seven items scale was used for measuring this variable, each item was to be responded to in an three – point patterns of response, agree, neutral, disagree. These responses were given scores 3-1 in the case of positive items, and vice versa in the case of negative items, and the highest score on the scale was 21 degrees, and lower was 7 degrees. Items scores were then added to get the respondent, total attitude score towards extension activities.

10. **Second: Dependent Variable:**

    The tomato growers knowledge of the safe use of agricultural pesticides as dependent variable was measured, from their point of view- using eighteen items relating to the safe use of agricultural pesticides for tomato growers. In order to get such degree, The respondent was given two degrees in the case of his response that indicate he has knowledge of each item of the recommendations, and the degree of zero in the case of lack of knowledge. To get
the total score expressing the degree of knowledge of tomato farmers of the safe use of agricultural pesticides for each individual, the scores the respondent achieved for item were added together.

Problems facing tomato growers:

To identify the problems facing tomato growers during the agricultural season in the area of the safe use of agricultural pesticides, each respondent was asked about the most important problems facing him in this area.

Third: Statistical Analysis:

The tabular presentation was used in presenting frequencies and percentages, as well as the arithmetic mean and standard deviation, and simple coefficient of correlation (Pearson) was used to test statistical hypotheses and determine the significance or non-significance of the relationship between the dependent variable and independent

Results And Discussion

First: Tomato growers knowledge of the technical recommendations for the safe use of agricultural pesticides:

Table (1), shows that the average degree of knowledge of the majority of the items of the studied recommendations was high, the average degree of knowledge of these items was ranged between 0.74 degree for lower item with percentage of 37%, and 1.95 degrees as higher item with a percentage of 97.5%, and the overall average scores for tomato growers knowledge of the items of recommendations for the safe use of agricultural pesticides was 1.39 degrees with a percentage of 69.5%.

A - With respect to the items of the recommendations, with high the average degree of knowledge of the respondents were arranged as follows:

For the item, when feeling any symptoms such as itching and headache, the average degree of knowledge of the respondents was 1.95 degrees with a percentage of 97.5%, and for the item of the use of a clean water source for mixing and processing pesticides, as well as the item of checking the validity of the pesticides against the card attached, with the average degree of knowledge of the respondents were 1.90 degrees with a percentage of 95% for the two items , and the term on observing the appropriate timing for spraying pesticide for tomato crop, the average degree of knowledge with respondents was 1.77 degrees, with a percentage of 88.5%, and the item to stop of spraying during high winds, and the item of observing of the period between the last spray and harvesting the crop, these item were equal in the average degree of respondents knowledge of 1.76 degrees, with the percentage of 88%.

B - With respect to the items of the recommendations, which have low average degree of knowledge of the respondents, were arranged as follows:

For the item of burying the empty containers of pesticides in the ground, the average degree of knowledge was 0.74 with the percentage of 37%, and for the items of changing filters in breathing masks after each use, and not to use herbicide spraying machines in spraying tomato crop, and not to leave clothes without washing after spraying, the averages degrees of knowledge were 0.88 and 0.96 and 0.98, with percentages of 44% and 48%, and 49% respectively.

Distribution of respondents according to their level of knowledge of the studied. The data of Table (2) shows that 9.9% of respondents were with low knowledge of the recommendation items studied, and 56% were with the medium knowledge, while 34.1% of them were with high knowledge of the terms of the recommendations studied. These results indicate that the majority of respondents, 90.1% had above average of knowledge, of the studied items, which indicates a high level of knowledge of the respondents, although their knowledge was low for some of the items studied, which may indicate the need For providing them with the correct knowledge in the area of safe use of pesticides.

Second: The relationship between tomato growers knowledge of the safe use of agricultural pesticides as a dependent variable and some of the independent variables studied:

To test this relationship, the following statistical hypothesis was formulated, "there is no relationship between the degree of knowledge of tomato growers of the safe use of agricultural pesticides and each of the following independent variables: respondent age, degree of education, size of agricultural holdings, the planted area with
tomatoes, experience in cultivation of tomatoes, the degree of availability of pesticide companies in the region, the distance between the pesticides dealer to the farmer, attitude towards the use of pesticides, and attitude towards extension activities. To test this relationship the simple coefficient of correlation, of Pearson were used.

Table 1: Averages and percentages of the tomato growers knowledge of the items of the technical recommendations for the safe use of agricultural pesticides.

<table>
<thead>
<tr>
<th>% age</th>
<th>Average Degrees of Knowledge</th>
<th>Description</th>
<th>items of technical recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>1.90</td>
<td>1 -</td>
<td>To affirm the validity of the pesticides from the card attached</td>
</tr>
<tr>
<td>61</td>
<td>1.22</td>
<td>2 -</td>
<td>To wear protective clothing when spraying pesticides and during processing</td>
</tr>
<tr>
<td>71</td>
<td>1.42</td>
<td>3 -</td>
<td>To use the appropriate vessels recommended for processing each pesticide</td>
</tr>
<tr>
<td>37</td>
<td>0.74</td>
<td>4 -</td>
<td>To bury pesticide containers in the ground</td>
</tr>
<tr>
<td>58</td>
<td>1.16</td>
<td>5 -</td>
<td>To notify neighbors before spraying pesticides</td>
</tr>
<tr>
<td>78</td>
<td>1.56</td>
<td>6 -</td>
<td>Not to smoke while spraying</td>
</tr>
<tr>
<td>49</td>
<td>0.98</td>
<td>7 -</td>
<td>Not to leave clothes without washing after spraying</td>
</tr>
<tr>
<td>95</td>
<td>1.90</td>
<td>8 -</td>
<td>Use clean source of water for mixing and processing pesticides</td>
</tr>
<tr>
<td>88</td>
<td>1.76</td>
<td>9 -</td>
<td>To stop spraying during high winds</td>
</tr>
<tr>
<td>84</td>
<td>1.68</td>
<td>10 -</td>
<td>To wash thoroughly after spraying and processing, with soap and water</td>
</tr>
<tr>
<td>97.5</td>
<td>1.95</td>
<td>11 -</td>
<td>When feeling any symptoms such as itching and headache, to stop spraying and go to the doctor immediately</td>
</tr>
<tr>
<td>88</td>
<td>1.76</td>
<td>12 -</td>
<td>To take into account the period between the last spray and the harvest</td>
</tr>
<tr>
<td>72</td>
<td>1.44</td>
<td>13 -</td>
<td>To training on the operation of spraying machine before use</td>
</tr>
<tr>
<td>88.5</td>
<td>1.77</td>
<td>14 -</td>
<td>taking into account the appropriate timing for spraying pesticide for tomato crop</td>
</tr>
<tr>
<td>48</td>
<td>0.96</td>
<td>15 -</td>
<td>Not to use herbicide spraying machines in spraying tomato crop</td>
</tr>
<tr>
<td>55</td>
<td>1.10</td>
<td>16 -</td>
<td>To wash spraying machines thoroughly before use</td>
</tr>
<tr>
<td>72</td>
<td>1.44</td>
<td>17 -</td>
<td>To clean sprayers away from the plants</td>
</tr>
<tr>
<td>44</td>
<td>0.88</td>
<td>18 -</td>
<td>To change breathing mask filters after each use</td>
</tr>
<tr>
<td>69.5</td>
<td>1.39</td>
<td>Overall Average</td>
<td></td>
</tr>
</tbody>
</table>

The percentage of the total number of respondents, amounting to the number of 314 and the maximum score of 2

Table 2: Respondent distribution according to their knowledge of the studied recommendation items.

<table>
<thead>
<tr>
<th>%</th>
<th>Number</th>
<th>Level of knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.9</td>
<td>31</td>
<td>Low knowledge (less than 28 degrees)</td>
</tr>
<tr>
<td>56</td>
<td>176</td>
<td>medium knowledge (28-32 degrees)</td>
</tr>
<tr>
<td>34.1</td>
<td>107</td>
<td>high knowledge (above than 32 degrees)</td>
</tr>
<tr>
<td>100</td>
<td>314</td>
<td>Total</td>
</tr>
</tbody>
</table>

The data of Table (3) shows that there are a significant relationships at the level of significance 0.01 between the degree of knowledge of tomato growers of the safe use of agricultural pesticides, and each of the these independent variables, age, experience of cultivation of tomato crop, the distance between the dealer of pesticides to farmer, and the attitude towards extension activities. The relationship was significant at the level of significance of 0.05 with each of the respondent degree of education, the degree of availability of pesticide companies in the region, and the attitude towards the use of pesticides, while there was not a significant relationship between the degree of tomato growers knowledge of the safe use of agricultural pesticides and the rest of the studied independent variables, that may be due to that the more the age of farmer with higher level of education and agricultural, the more he may seek for dealers of pesticides in order to broaden and increase its expertise in this area.

Based on this result, we can conduct that there were significant relations between the degree of knowledge of farmers tomatoes safe use of agricultural pesticides and the respondent age, degree of education, experience in the cultivation of tomato crop, the degree of availability of pesticide companies in the region, the distance between the pesticide dealer to farmer, the attitude towards extension activities.

Table 3: Values of coefficients of correlation between tomato growers degree of knowledge of the recommendations of the safe use of agricultural pesticides, and some of the independent variables studied.

<table>
<thead>
<tr>
<th>S.</th>
<th>Values of coefficient of correlation r</th>
<th>Independent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.217**</td>
<td>Age</td>
</tr>
<tr>
<td>2</td>
<td>0.116*</td>
<td>Respondent level of education</td>
</tr>
<tr>
<td>3</td>
<td>0.08  **</td>
<td>Area of agriculture holding</td>
</tr>
<tr>
<td>4</td>
<td>0.081</td>
<td>Area cultivated with tomato</td>
</tr>
<tr>
<td>5</td>
<td>0.165**</td>
<td>Experience in cultivating tomato crop</td>
</tr>
<tr>
<td>6</td>
<td>0.127*</td>
<td>Availability of pesticide dealers in the region</td>
</tr>
<tr>
<td>7</td>
<td>0.177**</td>
<td>Remoteness of the dealer from the farmer</td>
</tr>
<tr>
<td>8</td>
<td>0.123*</td>
<td>Attitude towards use of pesticides</td>
</tr>
<tr>
<td>9</td>
<td>0.190**</td>
<td>Attitude towards extension activities</td>
</tr>
</tbody>
</table>

* Tabular value of the coefficient of correlation at level of significance 0.05, and degrees freedom 314 = 0.109
** Tabular value of the coefficient of correlation at level of significance 0.01, and number of degrees freedom respondents amounting to 314 = 0.142
Third: The problems facing tomato growers in the area of safe use of agricultural pesticides:

The data of Table (4) show nine problems that mentioned by the respondents in the study, and the most important ones were the high prices of pesticides, being mentioned by 81.5%, the problem of spread of diseases and insects that mentioned by 59.3%, the problem of lack of interest in farmer that mentioned by 52.8%, the problem of misuse of pesticides that mentioned by 52.2%, the problem of lack of experience of farmers that mentioned by 50.6%, the problem of commercial fraud in the use of pesticides, mentioned by 42.3%, the problem of the pesticides dealer remoteness from the village, that mentioned by 41.7%, the problem of poor skills of workers that mentioned by 35.7%, and finally the problem of lack of instruction and guidelines that mentioned by 28.8%.

Table 4: Problems facing tomato growers face in the use of pesticides.

<table>
<thead>
<tr>
<th>%</th>
<th>Frequency</th>
<th>problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>81.5</td>
<td>256</td>
<td>high prices of Pesticide</td>
</tr>
<tr>
<td>59.3</td>
<td>188</td>
<td>Spread of diseases and insects</td>
</tr>
<tr>
<td>52.8</td>
<td>166</td>
<td>Lack of interest paid to farmer</td>
</tr>
<tr>
<td>52.2</td>
<td>164</td>
<td>Misuse of pesticides</td>
</tr>
<tr>
<td>50.6</td>
<td>159</td>
<td>Lack of farmer experience</td>
</tr>
<tr>
<td>42.3</td>
<td>133</td>
<td>Commercial fraud in pesticide manufacture</td>
</tr>
<tr>
<td>41.7</td>
<td>131</td>
<td>Remoteness of dealer from village</td>
</tr>
<tr>
<td>35.7</td>
<td>112</td>
<td>Low skills of extension agent</td>
</tr>
<tr>
<td>28.8</td>
<td>89</td>
<td>Lack of extension guidance</td>
</tr>
</tbody>
</table>

Fourth: The proposed action plan for the development of knowledge of farmers surveyed in the field of the safe use of agricultural pesticides:

Consistent with what has come out of the research results, and as indicated in the Data in Table (1) of the respondents knowledge of the items of the technical recommendations for the safe use of agricultural pesticides, the results indicate a relative decrease in their knowledge of four items, compared to the rest of the studied items. It were arrived at to a proposal of an extension action plan addressed to avoid the aspects of knowledge limitations of tomato growers in the area of the safe use of agricultural pesticides, the study considers the importance of increasing interest in agricultural extension to these recommendations items, through undertaking, at the moment and the future, the extension activities and tasks aiming at developing the cognitive structure of knowledge to tomato farmers in respect to some items of the technical recommendations for the safe use of agricultural pesticides. According proposal action plan was develop as shown in Table (5).

Table 5: A proposed an action plan for tomato growers in the area of safe use of agricultural pesticides.

<table>
<thead>
<tr>
<th>Time framework</th>
<th>Evidence of progress achieved</th>
<th>Person In charge of activity</th>
<th>Targeted people</th>
<th>Times of execution</th>
<th>Places of execution</th>
<th>Extension methods and aids</th>
<th>Extension messages</th>
<th>Extension knowledge objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>- specifying a period of 5-7 days of training for each level of technical training in the safe use of pesticides, and may increase as needed</td>
<td>- Tomato growers knowledge of modern methods of how to bury empty pesticide casings in ground - Responding to technical recommendations to notify neighbors prior to pesticide spraying - Tomatoes grower response to the correct ways to bury the casings of pesticides in ground - Tomato grower queries, during meetings, of guidelines for some terms of technical recommendations for the operations above-mentioned - Using a questionnaire or a case study to identify these knowledge changes - Safe use of pesticides</td>
<td>- Agricultural extension workers - Researchers, specialists from research centers in the region - Professors from the Faculty of Agriculture - Experienced tomato growers</td>
<td>Tomato growers</td>
<td>During cultivation</td>
<td>- Cooperative agricultural society in the village - Agricultural Administrators in the district - Some Model tomato farms</td>
<td>Extension meetings Video Seminars Extension bulletins Instruction means</td>
<td>Farmers understanding importance of and how to bury empty pesticide casings in ground</td>
<td>Knowing the importance and how to bury empty pesticide containers in ground</td>
</tr>
</tbody>
</table>

Continued Table 5: A proposed an action plan for tomato growers in the area of safe use of agricultural pesticides.

<table>
<thead>
<tr>
<th>Time framework</th>
<th>Evidence of progress achieved</th>
<th>In charge of activity</th>
<th>Targeted public</th>
<th>Times of execution</th>
<th>Places of execution</th>
<th>Extension methods and aids</th>
<th>Extension messages</th>
<th>Extension knowledge objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>- specifying a period of 5-7 days of training for each level</td>
<td>- Tomato growers knowledge of not to use herbicide spraying machines in spraying tomatoes - Responding to technical recommendations of not to use herbicide spraying machines in</td>
<td>- Agricultural extension workers - Researchers, specialists</td>
<td>Tomato growers</td>
<td>During cultivation</td>
<td>- Cooperative agricultural society in the village - Agricultural Administrators</td>
<td>Extension meetings Video Seminars Extension</td>
<td>Farmers understanding importance of not to use herbicide spraying</td>
<td>Knowing the importance of not to use herbicide spraying</td>
</tr>
</tbody>
</table>
of technical training in the safe use of pesticides, and may increase as needed

spraying tomatoes
- Tomato growers response to the correct ways to of not to use herbicide spraying machines in spraying tomatoes
- Tomato grower queries, during meetings, of guidelines for some terms of technical recommendations for the operations above-mentioned
- May use a questionnaire or a case study to identify these knowledge changes
- Safe use of pesticides

from research centers in the region
- Professors from the Faculty of Agriculture
- Experienced tomato growers

Administraton in the district
- Some Model tomato farms

bulletins instruction means

herbicide spraying machines to spray tomatoes

machines in spraying tomatoes

- specifying a period of 5-7 days of training for each level of technical training in the safe use of pesticides, and may increase as needed

- Tomato growers knowledge of the importance of changing breathing mask filters after each use
- Responding to technical recommendations to changing breathing mask filters after each use
- Tomato growers response to the correct ways of changing breathing mask filters after each use
- Tomato grower queries, during meetings, of guidelines for some terms of technical recommendations for the operations above-mentioned
- May use a questionnaire or a case study to identify these knowledge changes
- Safe use of pesticides

- Agricultural extension workers
- Researchers, specialists from research centers in the region
- Professors from the Faculty of Agriculture
- Experienced tomato growers

Tomato growers

During crop cultivatio n

-Cooperative agricultural society in the village
- Agricultural Administrati on in the district
- Some Model tomato farms

Extension meetings Video Seminars Extension bulletin instruction means

Farmers understanding of the importance of changing breathing mask filters after each use

Knowing the importance of changing the filters in the breathing masks after each use

References

Abdel Galil, Samir Abdel-Ghaffar, 1992. Assessment Study for planning Of Extension program in Egypt, Ph.D., Faculty of Agriculture, Al-Azhar University, Cairo.


The International Potato Center, 2005. Cultivation and production of tomatoes in Egypt, the national program for the cultivation of potatoes, Egypt-Netherlands.