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*RESEARCH ARTICLE*
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# The Role Of Agricultural Extension In Educating Vegetable Farmers About The Safe Use Of Pesticides In Halfa Elgadida Area –Kassala State –Sudan.

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ABSTRACT

This study was conducted in Halfa Elgadida area, Kasala State, Eastern Sudan, it was aimed to evaluate how vegetable farmers use pesticides. Population of the study was constituted of (241) vegetables A random sample of 60 farmers representing 25% of the population from the three vegetables growing areas. Data was collected by using questionnaire form through field interviews. Statistical Package for Social Sciences (SPSS). The findings of the study show that; (45%) of the respondents have 5-10 experience farming years, (86.7%) of the respondents are under 45 years old, and (50%) have a primary school certificate and are illiterate. (55%) not use protective cover during spraying, (48.4%) used Knapsack spryer, (51.7%) from respondents spraying in the morning, (53.3%) storage pesticides inside their house, only (20%) of the farmers included in the study store pesticides in safe places. (45%) non-observance of waiting period. It also turns out that morning is the preferred time for farmers to control pests, Television and radio ranked first among the sources of information from which farmers obtain agricultural information. The study concluded that the absence of agricultural extension in training farmers about safety used of pesticides. The study recommends organizing training programs to improve farmers' knowledge. to handling, mixing, storage, safety use, effective and responsible extension role to improve farmer awareness against pesticides application and its hazards to human and environment, mass media channel should be involved in giving different programs related to safe usage of pesticides. Individuals handling pesticides must be trained and licensed to do so, and manufacturers are required to affix instructional labels to their containers.

*Keywords*: *Human poisoning, Pest control, Pesticides, Safety use, Vegetable, waiting period.*



## INTRODUCTION

Similar to various countries in Africa, Sudan has experienced a migration of people from countryside areas to cities, leading to a heightened demand for vegetables in urban centers. In response, small farmers have started growing their produce in these semi-urban and urban settings. These farmers have begun using pesticides, acknowledging that this practice helps minimize crop losses and enhances overall production. [1] They view pesticides as a means to save time and labor, while effectively managing pest issues. However, both farmers and their communities are expressing worries not only about the effects on the environment but also regarding the health risks to their families and neighbors [2]. In less developed nations, less than 20% of the global agrochemical output is utilized. Yet, these chemicals cause about 1.1 million acute poisoning cases among the working population, which represents 70% of the total incidents. [3] To achieve sustainable farming and safeguard the environment as well as public health, using safer pesticides is crucial [4]. The knowledge that farmers possess about the potential dangers of pesticides plays a significant role in preventing exposure. Numerous studies suggest that training farmers on the proper application of pesticides is necessary, including educational efforts aimed at improving awareness about pesticide safety and health threats. [5] A vital initial step in creating suitable training programs to mitigate pesticide risks is to assess the level of the issue by exploring farmers' knowledge, attitudes, and views on pesticide safety. Furthermore, understanding the factors influencing farmers' use of pesticides can be essential for designing effective policies and initiatives [6].

Earlier studies have frequently highlighted the necessity of enhancing farmers' understanding of the repercussions of improper pesticide use, alongside the need for outreach and educational initiatives that seek to diminish risk perceptions related to pesticide safety [7][8]. The highest risk is often borne by farmers and their families, as they are likely to come into contact with pesticides when mixing or applying these chemicals to their crops. Numerous poisoning incidents in developing countries, where education and training about the harmful health impacts of these substances are usually insufficient, are linked to pesticides. Acute pesticide poisoning is a worldwide public health crisis, responsible for approximately 300,000 deaths globally each year [9]. A significant number of these pesticide-related poisonings, particularly in less developed regions, are intentional. A cautious estimate by Mew et al. indicated around 110,000 deaths from pesticide self-poisoning annually between 2010 and 2014, which constituted 13.7% of all worldwide suicides.

Beyond their target pests, pesticides can also harm other species (like beneficial insects, birds, earthworms, and fish) in or near agricultural areas, leading to wildlife deaths, loss of farm animals, and diminished biodiversity. [2].

This study was performed to determine the safety used of pesticide and perception of farmers on pesticide effectiveness and potential health risks. The probability of reducing the environmental risk associated with the pesticide use is very low because the producers believe that lowering risk implies either decreased output or increased input resulting by the substitution for the pesticide inputs [10]. The application of pesticides was noted to be extensive, with more than 40 different types being used, likely because farmers believe that they must spray more often and try various pesticides to combat pest issues [11]. Additionally, research has indicated that improper use of pesticides has caused health issues like breathing problems for farmers [12], while another study [13] highlighted that the effectiveness and cost of pesticides are crucial factors influencing their buying and usage.

The Halfa Elgadida area, Kasala State, Eastern Sudan was chosen for the study because it is a region where vegetables are widely grown. Many farmers who lack adequate understanding of safety measures for storage and disposal of waste. These farmers frequently use various pesticides in different strengths to manage pests and diseases, which they purchase from chemical supply stores. On the other hand, many of these farmers do recognize how pesticides can affect both human health and the environment. This situation is linked to the farmers' limited education and the absence of proper training for pesticide application, along with weak support services and insufficient knowledge about safety practices.

**Objectives Of The Study:**

1- To identify the personal and social characteristics of respondents
2- To evaluate the agricultural extension activities awareness of pesticides and safety use of pesticides
3- To evaluate the extent application of some pesticides used in the field and preventive measures during handling
4- To identify the information sources of the respondents about safety used, storage and their residuals
5- Assess farmers' practices and attitudes regarding storage, handling and disposal of pesticides.
6- To rank some variables such as (extension activities, sources of information and farmers attitudes) regarding pesticides using.

**Research Methodology:**

**STUDY AREA**

The town of Halfa Elgadida serves as both the administrative and commercial hub, stretching 100 kilometers towards the North-Northwest, with a width ranging from 20 to 35 kilometers. The weather is classified as semi-arid, experiencing rainfall between June and September that can reach over 150 mm. Generally, temperatures are quite high, with the average daily temperature around 29°C, and the highest daily average reaching 41°C in May. August sees the highest humidity at 45%, while April has the lowest at 10%. From November to April, strong winds come from the north, while southern winds dominate for the remainder of the year.

Population of the study was consisted of (241) vegetable growers in Halfa Elgadeda area. Sampling was done random sample, the study sample size was determined as (60) farmers from the three locations, which represents 25% of the population. Data collected by using questionnaire which content of personal and social characteristics of respondents and the practices of pesticides safety used measurement, how to storages and residuals secondary data from previous scientific research in the area interviews .Data analyzed was performed using statistical software package SPSS version 17.0, through using descriptive statistical analysis which was done to formulate frequency tables, in addition to the median which was used for some variables such as (information source, extension contact methods and farmers attitudes) regarding pesticides in order to rank these variables based on the respondents view, also Lekert scale of three options was used to assist in ranking these variables.

**Results And Discussion:**

Table (1) shows that most of the people surveyed were aged between 40 and 45, making up 53.3%. The participation of younger farmers (under 45) in growing vegetables offers a promising opportunity to teach modern and safer pest control methods, unlike older farmers. Among the farmers surveyed, over 31.3% had only completed primary education, while 25% had secondary or higher education, and 18.3% were illiterate. Around 20% of the farmers had been involved in commercial vegetable farming for over 10 years, while 35% began their farming journey recently, within the last five years. The data indicates that 20% of farmers have been in the business for more than a decade, highlighting how vital agriculture is in the area, though the number of long-term farmers has declined as years of farming increase. This suggests that more people are entering vegetable farming, likely due to the rising need for vegetables in growing urban areas.

Table (1) Frequency distribution of the respondents by personal characteristics

| Variables | Categories | Frequency | % |
|---|---|---|---|
| Age / years | 30-35 | 7 | 11.7 |
| | 36-41 | 13 | 21.7 |
| | 42-47 | 32 | 53.3 |
| | More than 47 | 8 | 13.3 |
| | Total | 60 | 100 |
| Education level | Illiteracy | 11 | 18.3 |
| | Primary | 19 | 31.7 |
| | Secondary | 15 | 25 |

| | | | |
|---|---|---|---|
| | Graduate | 15 | 25 |
| | Total | 60 | 100 |
| Experience / years | Less than 5 | 21 | 35 |
| | 5-10 | 27 | 45 |
| | More than 10 | 12 | 20 |
| | Total | 60 | 100 |

Table (2) showed that most participants do not use protective gear (55%), with just (20%) using complete protective cover. The absence of personal protective equipment and ineffective application of pesticides are significant issues in the area studied. Farmers understood the potential health risks that pesticides pose to people. This may be due to the high cost of personal protective equipment against pesticides or farmers' ignorance of the importance of using them.

Table (2) Frequency distribution of the respondents by types of protective cover use

| Protective Tools | Frequency | % |
|---|---|---|
| No protective cover use | 33 | *55* |
| Partial protective cover use | 15 | *25* |
| Full protective cover use | 12 | *20* |
| Total | 60 | 100 |

Table (3) indicated that, regarding the methods of applying pesticides, 48.4% of farmers used a knapsack sprayer, while 18.3% utilized a motorized sprayer. The primary obstacle for farmers in acquiring necessary tools like motorized sprayers was the lack of funds. Additionally, 11% of those surveyed did not possess any type of sprayer. Some farmers who did not have a knapsack sprayer resorted to using a brush, broom, or bundled leaves to apply pesticides from a bucket. Many local farmers commonly relied on knapsack sprayers because they are affordable, readily available, and simple to use and maintain.

Table (3) Frequency distribution of the respondents by types of sprayer used

| Sprayer Type | Frequency | % |
|---|---|---|
| Hand held application | 9 | *15* |
| Motorized spryer | 11 | 18.3 |
| Knapsack spryer | 29 | 48.4 |
| Not owning sprayer | *11* | *18.3* |
| Total | 60 | 100 |

Table (4) indicates that, majority of respondents spraying in the morning (51.7%) they aware about insects density in the morning. Only (33.33%) spraying in the evening.

Table (4) Frequency distribution of the respondents by Spraying Time

| Time Of Spraying | Frequency | % |
|---|---|---|
| Evening | 20 | *33.3* |
| Afternoon | 9 | 15 |
| Morning | 31 | 51.7 |
| Total | 60 | 100 |

Table (5) shows that most participants (45%) collect their crops right after the day they spray. Even though they know about health and safety guidelines for using chemicals, they don't follow them. They often enter the treated fields less than 12 hours after spraying and ignore the waiting time. It's widely understood that using pesticides too near the harvest time can leave harmful chemicals in the food we eat. This may be due to their ignorance of the residual effect of pesticides on the fruits, which requires waiting for an appropriate period before harvesting.

Table (5) Frequency distribution of the respondents by pre- harvesting period

| Intervals | Frequency | % |
|---|---|---|
| Following days | 27 | 45 |
| After a week | 22 | 36.7 |
| After two weeks | 11 | 18.3 |
| Total | 60 | 100 |

Table (6) shows that most of the people surveyed (53.3%) keep pesticides in their houses, which suggests a significant risk of exposure for both farmers and their families since these chemicals are stored in easily reachable areas. A mere (8.4%) have designated spaces for storing pesticides safely. Keeping pesticide containers alongside food is extremely risky. This can lead to contamination and widespread effects.

Table (6) Frequency distribution of the respondents by pesticides storage

| Pesticides Stores | Frequency | % |
|---|---|---|
| Farm field | 11 | 18.3 |
| Inside the Home | 32 | 53.3 |
| Safe location | 12 | 20 |

| | | |
|---|---|---|
| Store Pesticides | 5 | 8.4 |
| Total | *60* | 100 |

Table (7) shows that 16.66% of people seldom burn their food. Most farmers, at 61.6%, leave empty containers in the environment, while 21.7% consistently wash and reuse containers at home. Additionally, improper disposal of leftover pesticides and their containers can significantly contribute to pesticide exposure. Farmers often discard products and containers in dangerous manners. Such actions can result in environmental pollution through runoff, leaching, or spreading through the air to different areas, which is common in many developing nations.

Table (7)Frequency distribution of the respondents' behavior on the use of empty poisons

| Behavior | Frequency | % |
|---|---|---|
| Burning | 10 | 16.7 |
| Leaving the environment | 37 | 61.6 |
| Using after washing at home | 13 | 21.7 |
| Total | *60* | 100 |

It is clear from Table (8) that the advisory meetings, which were (25) meetings, were more effective in changing farmers' attitudes towards the safe use of pesticides used in combating agricultural pests, so, this result was agreeing with [14].

Table (8) Respondents view in ranking of extension contact methods :

| Extension methods | Rarely | Continuously | Sometime | Median | Rank |
|---|---|---|---|---|---|
| Extension meeting | 27 | 8 | 25 | 25 | 1 |
| Field days | 31 | 9 | 20 | 20 | 2 |
| Results demonstration | 19 | 12 | 29 | 19 | *3.5* |
| Farm Field School | 28 | 13 | 19 | 19 | *3.5* |

Table (9) shows that, T.V and Radio come at the first rank as information sources followed by agrochemical shops as a method of information source which take a no. two rank, this may be due to the talking and dialogue which happen between the customers and the shop sellers regarding pesticides. Therefore, the role of electronic agricultural extension must be activated in disseminating agricultural ideas by employing electronic websites for agricultural extension, such as YouTube and Facebook [15].

Table (9) Respondents view in ranking the sources of information

| Source | Rarely | Continuously | Sometime | Weighted average | Rank |
|---|---|---|---|---|---|
| T.V and Radio | 0 | 14 | 46 | 55 | 1 |
| Package Label | 17 | 23 | 21 | 42 | 3 |
| Agrochemical shops | 6 | 30 | 24 | 46 | 2 |
| Extension agents | 17 | 32 | 11 | 38 | 5 |
| Relatives and friends | 18 | 23 | 19 | 40 | 4 |

Table (10) reflects the respondent's attitudes towards the danger of using pesticides on soil and human life, so the first rank goes to the two statements (used of pesticides damage soil organisms and used of pesticides cause human cancer) with a median of (30), while the second rank was about the use of pesticides can increase crop production have median of (19) at the second rank because it is protecting crops from incidences of pests, diseases, and weeds. Furthermore, the use of pesticides causes human poisons with a median of (14) comes at the third rank. [*16*] It was found that farmers' attitudes are related to their educational level, and therefore the low educational level of the farmers surveyed may have affected their attitudes towards the use of pesticides.

Table (10) Ranking of respondents attitudes towards pesticides

| Attitudes | Strongly Agree | Agree | Disagree | Median | Rank |
|---|---|---|---|---|---|
| Used of pesticides damage soil organisms | 51 | 9 | - | 30 | 1.5 |
| Used of pesticides cause human Cancer | 55 | 5 | - | 30 | 1.5 |
| Used of pesticides increased crop productivity | 9 | 32 | 19 | 19 | 3 |
| Used of pesticides cause human poisons | 11 | 35 | 14 | 14 | 4 |
| Used of pesticides caused human paralyses | 44 | 12 | 4 | 12 | 5 |
| Used of pesticides caused pollution of the air and water | 41 | 11 | 8 | 11 | 6.5 |
| Importance of pre-harvesting period | 8 | 11 | 41 | 11 | 6.5 |

**Discussion**

The application of pesticides in vegetable farming in Sudan is commonplace. In Halfa Elgadeda, commercial vegetable growers depend significantly on chemical pesticides. All the farmers involved in this research were men. Age, which is a key socioeconomic aspect, plays a crucial role in how aware farmers are about what chemicals are allowed and what are banned. Some older farmers (13.3%) might not know about newer pesticides because they lack information. A farmer's understanding of pesticides is connected to their level of education. The majority of participants (81.7%) were able to read and write, which can impact their knowledge about the safe application of pesticides. Thus, it is highly recommended that agriculture extension workers should offer special educational programs for all farmers before they start using pesticides. Regular training is essential for farmers to promote safe pesticide practices and inform them about the dangers of incorrect and improper pesticide use.

Our findings, as well as another study [17], show that none of the farmers we studied had undergone training in pesticide usage. Experience in farming (65%) is also a key factor as it helps in developing necessary skills. With more experience, farmers can enhance production, utilize inputs more efficiently, improve output quality and quantity, and lower costs. It is anticipated that greater experience will positively affect a farmer's agricultural management capabilities [18].

Conclude that inadequate agricultural extension services are the most important external factor in the overuse of chemical inputs, including pesticides this finding agree with our finding only (18.3%) of respondents contact continuously with extension agents. Retailers of pesticides who provide these products to farmers can also serve as valuable sources of information regarding the safe handling of these chemicals, particularly because there aren't enough agricultural extension officers in many regions. Nevertheless, farmers are at significant risk of exposure to harmful substances, which may be banned or limited in other nations, due to improper application methods, poorly kept or unsuitable spraying equipment, inadequate storage methods, and frequently the reuse of old pesticide containers for storing food and water. This observation aligns with our findings, showing that 53.3% of farmers store pesticides inside their homes and that 48.4% utilize handheld application methods that are relatively inexpensive, readily available, and simple to use and maintain.

When asked if they thought pesticides could be harmful to their health and the environment, all respondents confirmed this belief. About 85% stated that pesticides are poisons, while 68.33% strongly agreed that they cause air and water pollution, and 53.33% reported that they could lead to cancer. This shows that farmers are conscious of the potential health risks associated with pesticide use, yet their behaviors suggest they do not fully follow the guidelines for safe usage. The results indicated a negative correlation between health problems related to pesticide exposure and farming experience.Regarding the disposal of rinsates from washing spraying equipment and pesticide containers, a majority (74%) discharged the rinsates onto uncultivated land, while roughly 5% released them into nearby streams and waterways where washing occurred. Typical disposal practices for empty pesticide containers include discarding them on the farm where they were used (30.4%), burning them in the open air (23.2%), throwing them into village trash dumps (11.6%), and repurposing them for other uses (7.1%). These current disposal methods highlight that farmers are engaging in unsafe practices that could increase environmental pollution and human exposure. This finding is consistent with our results, suggesting that farmers with lower education and knowledge levels are likely to be less aware of the health and environmental risks tied to pesticides and more prone to store them in their homes.The results indicate a positive correlation between farmers' contact with extension services and their use of pesticides.

This means that farmers who interact with extension agents tend to use pesticides more safely. Those who access extension services or participate in agricultural extension meetings are more effective at changing their attitudes, with agrochemical stores serving as a primary source of information. The use of pesticides was noted to enhance crop productivity at a medium level, making these farmers less likely to experience health issues associated with pesticide exposure compared to those without extension support. The limited involvement of agricultural extension in sharing information about handling, application, storage, and disposal of empty containers leads them to rely on family and pesticide sellers.

Additionally, farmers who apply pesticides without protective gear (55%) may be exposing themselves to levels that could result in acute health symptoms. Therefore, proper training is essential—not only to increase knowledge but also to encourage farmers to implement at least some recognized safety practices. Our earlier conclusions also support this finding. (53.33%) of respondents storage pesticides in their home only (8.33%) have special pesticides store, According to [19], many nations have strict regulations that prohibit the storage and transport of pesticides with food. Pesticides should never be kept in containers meant for food or beverages at home [20], which aligns with our findings. The study shows that most vegetable farmers purchase pesticides from agrochemical stores mainly for pest control, mix various chemicals, and apply them without wearing protective gear. The correct handling and storage of pesticides, along with the proper disposal of empty containers, were found to be lacking. However, almost 30 percent of farmers ignore the recommended 2-3-week pesticide-free period prior to harvesting their crops [21].

A significant portion of the respondents (45%) pick their crops on the same day they sprayed them. Despite being aware of the health and safety measures related to agrochemicals, the farmers did not follow the required waiting period and entered treated fields within 12 hours of spraying. It is widely known that applying pesticides too close to harvest can lead to harmful substances remaining in the food consumed by people. This finding is consistent with the results noted in [22].

**Conclusion**

Using pesticides without proper regulations can lead to increased poisonings among farmers. However, equipping them with greater knowledge can enhance their practices for self-protection while handling these chemicals. To enhance the safety and practices of other farmers applying pesticides on their farms, essential training programs can be introduced. Ultimately, the challenges related to farmers' unsafe methods, as highlighted in this and various other researches, are complicated because they require efforts to modify farmer behavior. While the suggestions provided here aim to tackle this issue, additional in-depth studies are necessary to fully understand and address it. The heavy application of pesticides may happen because many local farmers are not receiving agricultural support services. Research indicates that a lack of adequate agricultural extension services is the primary external factor contributing to the excessive use of chemical inputs, including pesticides.

**Recommendations**

(1) The Technology Transfer and Extension Administration (TTEA) will inform farmers about the health risks linked to pesticides, ensuring they use suitable protective gear, maintain personal hygiene, and recognize early signs of pesticide exposure.
(2) The TTEA will educate the general public about the dangers of improperly disposing of empty pesticide containers, including throwing them in the trash or leaving them in the fields.
(3) Extension agents should support local leaders so they can receive training using the Farmer Field School (FFS) method to improve knowledge and the spread of farming techniques among smallholder farmers.
(4) The TTEA should regularly offer educational and training programs on the safe use of pesticides for farmers.
(5) The plant protection agency should supply protective gear to farmers at fair prices to encourage safety measures.
(6) Agricultural extension officials should partner with mass media outlets to broadcast programs that focus on the safe application of pesticides.
(7) Those who sell pesticides should only give them to individuals who have been adequately trained or licensed, and ensure that the full manufacturer's label is visible on the container.
(8) There should be additional research to investigate health issues related to the safe use of pesticides.

**References:**


[1]. Kiribou, R., Bedadi, B., Dimobe, K., Ndemere, J., Neya, T., Ouedraogo, V., & Dejene, S. W. (2024). Urban farming system and food security in sub- Saharan Africa: Analysis of the current status and challenges. *Urban Agriculture & Regional Food Systems*, *9*(1), e70007.

[2]. Damalas, C.A. and Eleftherohorinos, I.G. (2011) Pesticide Exposure, Safety Issues, and Risk Assessment Indicators. International Journal of Environmental Research and Public Health, 8, 1402-1419. http://dx.doi.org/10.3390/ijerph8051402 [Citation Time(s):1

[3]. Regis Magauzi, Bigboy Mabaera, Simbarashe Rusakaniko, Anderson Chimusoro, Nqobile Ndlovu, Mufuta Tshimanga, Gerald Shambira, Addmore Chadambuka,1,& and Notion Gombe (2011), Health effects of agrochemicals among farm workers in commercial farms of Kwekwe district, Zimbabwe, The pan African Medical Journal, 9 (26), doi: 10.4314/pamj.v9i1.71201.

[4]. Ibitayo, O. O. (2006). Egyptian farmers' attitude es and behaviors regarding agricultural pesticides: Implications for pesticide risk communication. *Risk Analysis*. 26:989–95.

[5]. Yassin MM, Abu Mourad TA, Safi JM (2002) Knowledge, attitude, practice, and toxicity symptoms associated with pesticide use among farm workers in the Gaza Strip. Occup Environ Med 59:387–393

[6]. Sakina, M. (2023). Extension knowledge needs of farmers in the field of extensional recommendations for the use of agricultural pesticides in sharbazher district - Sulaymaniyah Governorate. *Kirkuk University Journal For Agricultural Sciences*, *14*(1), 17-27. doi: 10.58928/ku23.14102

[7]. Sibanada Ms.Lt (2000) Pesticides Use and Policies in Ghana. An Economic and Institutional Analysis of Current Practice and Factors Influencing Pesticide Use. A Publication of the Pesticide Policy Project. Publication Series, Hanover University

[8]. Paul CJM, Ball VE, Felthoven RG, Grube A, Nehring RF(2002). Effective costs and chemical use in United States agricultural production: using the environment as a 'free' input. Am. J. Agr. Econ. 2002;84:902–915

[9]. Hoque, M. K., Alam M. A., Molla M. M. U., Mosaddeque H.Q.M. and Mollah M.A.F. (2008). Environmental Awareness of the FFS Farmers in Practicing IPM. J. Innov. Dev. Strategy 2(3): 17-21.

[10]. Hoppin JA, Umbach DM, Long S.(2017) Pesticides Are Associated with Allergic and Non-Allergic Wheeze among Male Farmers. Envir Health Pers 2017; 125(4): 535-43.

[11]. Sharifzadeh, M.S.; Damalas, C.A.; Abdollahzadeh, G.(2017) Perceived usefulness of personal protective equipment in pesticide use predicts farmers' willingness to use it. Sci. Total Environ. 2017, 609, 517–523. [CrossRef] [PubMed]

[12]. Albadawi Khalid Haj Khalifa, Agricultural Extension (2014) National Library Cataloging-Sudan –Sudan, currency printing Press.

[13]. Sun, B.; Zhang, L.; Yang, L.; Zhang, F.; Norse, D.; Zhu, (2014). Agricultural Non- Point Source Pollution in China: Causes and Mitigation Measures. United States Environmental Protection Agency (USA EPA)

Organophosphate pesticide information: Over view of Malathion risk assessment 20001.
[14]. Sosan, Mosudi & Oladepo, Waheed & Ajibade, T.. (2020). Assessment of Pesticide Wastes Disposal Practices by Cocoa Farmers in Southwestern Nigeria. The Journal of Solid Waste Technology and Management. 46. 230-238. 10.5276/JSWTM/2020.230.
[15]. Hussein, E. A., & Mohammad, K. A. (2023, April). Diffusion of Agricultural Ideas Through the Website of the Agricultural Extension and Training Department on the Social Networking "YouTube". In *IOP Conference Series: Earth and Environmental Science* (Vol. 1158, No. 9, p. 092003). IOP Publishing.
[16]. Mohammed, K. A., & Mahmood, E. T. (2022, July). Attitude of Al-Qasimia Village Farmers in Hawija District/Kirkuk Province Toward Cultivation and Consumption White Eggplant. In IOP Conference Series: Earth and Environmental Science (Vol. 1060, No. 1, p. 012147). IOP Publishing.
[17]. Abdul Latif, M., Al-Salhi, A., Kata, Y., & Muhammad, M. (2023). The role of the agricultural extension in educating farmers about the legislation on protecting the environment from pollution with chemical pesticides. *Kirkuk University Journal For Agricultural Sciences, 14*(1), 218-229. doi: 10.58928/ku23.14118
[18]. Fishel, F.M.(2007) Pesticide Use Trends in the U.S.: Global Comparison; Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida: Gainesville, FL, USA, 2007; p. 3.
[19]. Padmajani, M. & Aheeyar, Mohamed & Bandara, Sidath. (2014). Assessment of Pesticide Usage in Up-Country Vegetable Farming in Sri Lanka. 10.13140/2.1.4241.7289.
[20]. Hades Jassim Al- jumaily, M. (2017). Application level of the procedures of the cucumber's peasants to reduce pesticide risks in samarra distrac - sallh adden provinc and its relationship with some factores. *Kirkuk University Journal For Agricultural Sciences, 8*(3), 11-21. doi: 10.58928/ku17.08303
[21]. Ekanayaka, H.K.J. and Wijeratne,M. (2004). Adoption of preharvest interval in rice production in Sri Lanka. IIRR 29.1, June. Pp 81 – 82.
[22]. AL-Chalabi, R. (2018). The Role of Agricultural Employees in Nineveh Directorate of Agriculture in Management of pesticide pollution and Relationship with some variables.. *Kirkuk University Journal For Agricultural Sciences, 9*(3), 1-7.

# دور الإرشاد الزراعي في توعية مزارعي الخضراوات حول الاستخدام الآمن للمبيدات في منطقة حلفا الجديدة – ولاية كسلا – السودان.

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*[3] قسم المحاصيل الحقلية، كلية الزراعة، جامعة كركوك، العراق.*

الخلاصة

أُجريت هذه الدراسة في منطقة حلفا الجديدة، ولاية كسلا، شرق السودان، بهدف تقييم كيفية استخدام مزارعي الخضراوات للمبيدات. شمل مجتمع الدراسة (241) مزارع خضروات. تم اختيار عينة عشوائية من 60 مزارعًا تمثل 25٪ من السكان من مناطق زراعة الخضراوات الثلاثة. تم جمع البيانات باستخدام استمارة الاستبيان من خلال المقابلات الميدانية. الحزمة الإحصائية للعلوم الاجتماعية ***(SPSS)*** . اظهرت نتائج الدراسة أن (45٪) من المبحوثين لديهم خبرة في الزراعة من 5 إلى 10 سنوات، وان (86.7%) من المبحوثين تقل اعمارهم عن 45 سنة، وان (50%) لديهم شهادة ابتدائية واميين، كما تبين ان (55٪) لا يستخدمون الغطاء الواقي أثناء رش المبيدات، وان (48.4٪) يستخدمون مرشة ظهرية، وان (53.3٪) يخزنون المبيدات داخل منازلهم، تبين ان (45٪) لا يراعون فترة الأمان، كما تبين ان وقت الصباح هو الوقت المفضل للمزارعين لمكافحة الآفات. كما خلصت الدراسة إلى غياب دور الإرشاد الزراعي في ممارسة دورة بتدريب المزارعين على الاستخدام الامن للمبيدات. وان التلفزيون والراديو جاء بالمرتبة الأولى من بين مصادر المعلومات التي يأخذ منها المزارعين معلومات زراعية. أوصت الدراسة بضرورة تنظيم برامج تدريبية مناسبة لرفع مستوى معارف المزارعين في التعامل مع المبيدات، وخلطها، وتخزينها، واستخدامها الآمن، ودور الإرشاد الفعال والمسؤول في رفع وعي المزارعين بمخاطر استخدام المبيدات على الإنسان والبيئة، كما ينبغي إشراك وسائل الإعلام في تقديم برامج مختلفة تتعلق بالاستخدام الآمن للمبيدات. وان لا يتم تداول المبيدات من قبل اي شخص إلا إذا كان مُدرّبًا أو مُرخّصًا له، وضرورة وجود مُلصق الشركة المُصنّعة كاملًا على العبوة.

الكلمات المفتاحية: التسمم البشري، مكافحة الافات، المبيدات، الاستخدام الآمن، الخضراوات، فترة الأمان.