



The Reality And Determinants Of Organic Agriculture In Iraq: A Review Of The Most Important Studies And Implemented Programs (The Wheat Crop: A Case Study)

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ABSTRACT

With scientific progress in agricultural sciences and the steady increase in population, many technologies have been used to increase production. These technologies include the use of chemical fertilizers and various chemical pesticides, including insecticides, fungicides, herbicides, nematodes, and other chemicals. These chemicals have disrupted the natural balance between these factors, on the one hand, and negatively impacted the environment, on the other. These negative effects on humans, animals, and plants are significant, with the aim of meeting the growing global population's need for crops. Estimates indicate that nearly half of the world's population is currently fed as a result of the use of synthetic nitrogen fertilizers and chemical pesticides, which has led to severe environmental issues such as land degradation, pollution from non-point sources, and greenhouse gas emissions. This has prompted growing consumer awareness to demand the natural production of agricultural products, thus ensuring clean and healthy food and environmental conservation. This is known as organic, natural, biological, green, or clean production, all of which are different names for a type of agriculture without the use of dangerous chemicals or toxins. Previous studies indicate that the adoption of organic agriculture depends on several factors, including individual farm characteristics and farmer knowledge and training, as well as socioeconomic factors such as fertilizer supply chains and environmental policies. Despite these advantages, farmers should be encouraged to adopt organic farming due to its soil conservation and environmental friendliness. This should be achieved through media campaigns (written, audio, and visual) on the importance of converting to organic farming. An insurance program should be established for organic crops, providing farmers with security in the event of their conversion to organic farming, given the sustainable nature of organic production, which produces healthy crops and feeds animals with safe and healthy products without harming the environment or humans.

Keywords: Organic farming; Safe food; Sustainable development ; Ecological balance; program.

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INTRODUCTION

According to the Food and Agriculture Organization of the United Nations, organic agriculture is defined as a comprehensive production management system that works to enhance and improve the health of the agricultural ecosystem, including biodiversity, biological cycles, and soil biological activity[1]. It is a farm design and management system that creates an ecosystem capable of achieving sustainable productivity without the use of artificial external inputs such as chemical fertilizers and pesticides [2]. Organic (or biological) agriculture is also known as a system of agricultural land management that places major restrictions on the use of chemical fertilizers and pesticides. This technology aims to achieve a number of goals, the most important of which are producing food that does not contain chemical residues and developing safe, healthy and environmentally friendly production methods that avoid the use of manufactured chemical fertilizers, in addition to applying production techniques that can restore and maintain soil fertility [3]. Organic farming is a vital system and agricultural method that aims to produce clean and healthy food in safe ways without disturbing the ecosystem. This system takes into account the natural capacity of the land and plant and animal microorganisms, and relies on local agricultural production inputs. It does not allow

the use of manufactured inputs such as seeds, fertilizers, pesticides, veterinary drugs, genetically modified strains, as well as preservatives or radioactive materials [4]. Manufactured fertilizers are considered to be rapidly decomposing and therefore effective immediately. They contain known proportions of added nutrients compared to organic fertilizers, and they produce substances that are directly toxic to plants, humans, animals, and the biological ecosystem in general [5]. Any product marketed under the name "organic product" must be produced by a farm that produces under the supervision and inspection of one of the inspection and monitoring centers specialized in applying this technology, and that the specifications of this product conform to the basic specifications and standards of these centers, according to which certificates of eligibility for these products as organic products are granted. Organic agriculture contributes to sustainable development by increasing production in areas with low potential. Preserving biodiversity, biological resources, and natural resources, in addition to increasing farm income, producing safe and diverse foods, and achieving long-term environmental, social, and economic sustainability [6].

Benefits Associated with Organic Agriculture:

Organic agriculture provides the scientific means to improve soil fertility and increase crop yields with limited chemical additives. The increasing demand for organic products worldwide has recently emerged, as a result of extensive research that has highlighted the importance of organic agriculture. Its importance is represented in the following [7] [8] :

1. Benefits of organic farming for farmers:

- Increased crop productivity due to improved soil fertility in the long term.
- Cost savings due to reduced use of chemical inputs such as fertilizers and pesticides.
- Maintaining the health of the animals they own on their farms.
- Increased soil retention of irrigation water, which leads to rationalization of water use and costs.
- Preserving biodiversity and environmental diversity.

2. Benefits of organic farming for consumers:

- Ensuring access to healthy food free from chemical fertilizer and pesticide residues.
- Ensuring access to food free from genetically modified organisms.
- Consuming safe, high-quality products.
- Reducing risks and negative effects on the human body.

3. Benefits of organic farming for the environment:

- Reducing soil and water pollution and pesticide and chemical fertilizer residues.
- Reducing the use of renewable energy sources and manufactured materials, thus reducing global warming.
- Enhancing biodiversity by making the soil habitable for beneficial organisms and insects.
- Conserving water use and ensuring its quality.
- Developing rural areas and increasing employment opportunities.

Advantages of Organic Agriculture:

Organic agriculture has a number of advantages, the most important of which are the following [9] 1. Organic agriculture is a holistic approach that addresses all components of the system.

2. It is nature-based, environmentally friendly, and sustainable, ensuring the conservation of resources for the future.

3. Organic foods are better in appearance, taste, flavor, and nutritional content.

4. Organic foods are free of chemical residues; therefore, they pose no threat to human and animal health.

5. Organic agriculture is a system based on locally available and renewable resources, and is therefore affordable, even for small and marginal farmers.

6. If implemented properly, an organic agriculture system ensures consistent and optimal productivity and can successfully feed the world.

7. Organic products are inexpensive, considering the support and assistance provided to conventional agriculture.

Disadvantages of Organic Agriculture:

Organic agriculture faces a number of challenges, the most prominent of which are the following[10].

1. Organic foods constitute Greater risk of disease and infection.

2. Organic food is by no means superior to conventionally grown food.

3. Some problems have emerged in conventional agriculture, but they can be addressed with scientific knowledge.

4. Organic agriculture cannot feed the world and can pose a threat to national food security.

5. Organic food is more expensive and cannot feed the poor.

6. Organic farming is suitable for large farmers and not practical for small and marginal farmers.

7. There is not enough organic material available to meet the demand for nutrients.

8. Organic farming is an ideology, not a science.

Organic Agriculture Principles

The principles of organic agriculture are based on the foundations upon which this type of agriculture is based. They express a future vision in which organic farming practices can contribute to improving the agricultural sector. They represent the way humans interact with soil, water, plants, and animals to produce, prepare, and distribute food. These principles help encourage organic agriculture in all its diversity. These principles can be divided into four sections: the principle of health, the principle of ecology, the principle of fairness, and the principle of care. Given the importance of organic agriculture, the International Federation of Organic Agriculture Movements (IFOAM) developed the four principles of organic agriculture to include how to best manage environmental elements for safe agricultural production [11] The following explains the content of each principle [12]:

1. The Health Principle: Organic agriculture must support and improve the health of humans, soil, plants, animals, and the earth as an indivisible whole.
2. The Environment Principle: Organic agriculture must support and work with agricultural cycles and living ecosystems. In harmony and contribute to its sustainability.
3. The Principle of Justice: Organic agriculture must build relationships that include justice with regard to the shared environment and life opportunities.
4. The Principle of Care: Organic agriculture should be managed in a responsible, preventative manner to protect the health and well-being of present and future generations, in addition to environmental protection.

Reasons for the Difference Between the Costs of Organic and Conventional Products:

The difference in the prices of organic products and their higher prices compared to conventional products is due to a number of reasons, perhaps the most important of which are the following [13]:

1. The supply of organic food is very limited compared to the demand for it.
2. The costs of producing organic food are higher due to the high costs of labor inputs per unit of production. Furthermore, the great diversity of businesses means that economies of scale cannot be achieved.
3. Post-harvest consumption of the relatively small quantity of organic food leads to higher costs due to the mandatory separation of organic and conventional products, especially during processing and transportation.
4. The marketing and distribution chain for organic products suffers from inefficiencies, and costs are high due to the relatively small volumes. With the increasing demand for organic products, technological innovations and economies of scale must lead to lower production, processing, and distribution costs. Organic food prices include not only the costs of producing the food itself, but also cover many factors not included in conventional product prices, such as environmental protection and avoiding future costs of pollution mitigation. For example, higher levels of animal welfare, avoiding health risks to farmers due to improper fertilizer handling and avoiding future medical expenses, and rural development by providing more job opportunities.

The Reality of Organic Agriculture in Iraq

The Ministry of Agriculture, through the former National Center for Organic Agriculture, began producing organic fertilizers and biopesticides and distributing them to farmers as part of its free support campaigns. In 2013, the National Center for Organic Agriculture was detached from the ministry and transformed into a department within the Crop Protection Department, based on a decision by the Ministry of Agriculture's Opinion Board. This was accomplished by approving the conditions for establishing organic agriculture units in all governorates and ratifying them by the Minister of Agriculture. The organic agriculture program is part of the campaign to increase the quantity of organic agriculture to support farmers. The program aims to promote clean agriculture in Iraq, as well as to establish several other legislations that serve this purpose, keeping pace with the progress taking place globally in general and the Middle East in particular, and producing clean, toxic-free crops to support healthy eating and eliminate diseases that have increased due to environmental pollution resulting from the extensive use of chemicals in agricultural and industrial production. It also works to restore the natural balance in the environment. And to enhance the organic matter in stressed Iraqi soil, since 2012, work has been ongoing to cover larger areas with organic fertilizers and biopesticides, which are manufactured in the Crop Protection Department and through its staff. The organic agriculture program aims to achieve sustainable development goals, represented by increasing plant production, both quantitatively and qualitatively, by protecting it from infection by some epidemic agricultural pests, which cause economic losses in production estimated at 40-60% or more if not combated. Several campaigns are implemented annually to combat these pests on strategic and important crops, in addition to securing the necessary supplies for their implementation, such as fertilizers, biopesticides, environmentally friendly and locally manufactured, and ground and aerial spraying equipment (agricultural aircraft), according to available financial and human capabilities. In addition,

the program adopts a sustainable and clean agriculture approach to protect the environment from pollution, as well as establishing and preparing the infrastructure for organic agriculture and working to formulate and legislate the necessary instructions for this. This program includes two main axes: organic fertilizers and organic pesticides, and will focus on the wheat crop.

Axis One - Implementing the Program Using Organic Fertilizers:

The use of fertilizers, especially clean ones, is the primary goal within integrated production management and crop protection programs. The healthier the plant, the greater its resistance to pests. It has been proven that organic biofertilizers have other benefits besides fertilization, namely reducing the development of some pathogens and some weeds, and their persistence in the soil is an additional factor that allows them to multiply and not be depleted in the coming years. These are environmentally friendly outcomes for reducing the risk of pests through the use of organic fertilizers derived largely from plant and animal waste, and biofertilizers that fix nitrogen and provide plants with essential elements. Within the organic agriculture program, locally manufactured organic fertilizers are distributed by the Crop Protection Department and supported by the Ministry of Agriculture to farmers, with a 100% subsidy rate for those who join the program. These farmers are distributed across several governorate s and are monitored through campaigns conducted by the Crop Protection Department. The productivity per dunum varies from one governorate to another, from one region to another, and from one farmer to another. These differences are due to several reasons, the most important of which is the quality of the crop. The soil and environmental conditions vary between the northern and southern governorate s, as well as the method of cultivation and irrigation, whether by sprinklers, flooding, or continuous irrigation, depending on rainwater. This is in addition to the farmer's culture, his method of managing the field, and the extent of his commitment to fertilizer recommendations and the method of using organic fertilizers.



Source: Department of Crop Protection

Approximately 720 dunums were fertilized during the 2023-2024 agricultural season. A total of 39 farmers applied organic fertilizers to their wheat crop, as shown in Table 1. The table shows that the largest area fertilized during the production season was 337 dunums in Nineveh Governorate , distributed among 20 farmers. Kirkuk governorate ranked second with 108 dunums, distributed among nine farmers within the governorate .

Table 1. Distribution of farmers across governorate s that applied organic fertilizers for the 2023-2024 season

governorate	Number of farmers	Fertilized areas in dunums
Baghdad	3	75
Kirkuk	9	108
Nineveh	20	337
Anbar	4	75
Salah al-Din	2	75
Wasit	1	50
Total	39	720

Source: Annual Report of the Department of Crop Protection for the year 2024.

Regarding productivity during the 2023-2024 season, the highest percentage increase in wheat crop productivity, approximately 29%, was recorded in Baghdad Governorate. The productivity per dunum using chemical fertilizers was approximately 1,000 kg, and after using organic fertilizers, it increased to approximately 1,288 kg. Kirkuk

Governorate recorded the lowest percentage increase, approximately 2.5%, with productivity increasing from 800 kg before using organic fertilizers to 820 kg after using organic fertilizers. This is a very small percentage compared to other governorates, as shown in Table 2.

Table 2. Productivity rates using chemical and organic fertilizers for the 2023-2024 season.

governorate	Productivity per acre using chemical fertilizer	Productivity per acre using organic fertilizer
Baghdad	1000	1288
Salah al-Din	650	700
Nineveh	650	755
Kirkuk	800	820
Mediterranean	775	890.75

Source: Annual Report of the Department of Crop Protection for 2024

Second Axis - Implementing the Program Using Organic Pesticides:

Organic agricultural pesticides are used to control pests in agriculture in an organic and environmentally friendly manner. Organic pesticides are characterized by their reliance on natural ingredients or plant extracts and often have less impact on the environment and human health than traditional chemical pesticides. They are often considered safe for human consumption in the long term. Organic pesticides rely on technologies and ingredients aimed at controlling harmful insects in crops without resorting to harmful synthetic chemicals. This includes the use of ingredients such as vegetable oils, live bacteria, or specific plant extracts that effectively affect insects. This represents a more sustainable and environmentally sound option for pest control in agriculture. It is part of efforts to promote organic agriculture and sustainable agricultural practices. The Ministry of Agriculture, through the Department of Crop Protection, is working within the Organic Agriculture Program to control insects that infect various crops, including the "Sunna" insect, in wheat fields and in areas where it disperses, to reduce its risks. This insect is a serious pest that attacks wheat crops and causes losses. It is a significant economic threat if not controlled, especially during its winter hibernation in wheat fields. The sunn beetle lays its eggs in groups on the underside of bush leaves from late March to the end of April. After hatching, the eggs transform into nymphs that feed on wild plants. Once fully grown, they migrate to the wheat and feed on the wheat plants. Biological control is used in the integrated pest management program for this insect, and significant control has been achieved within this program in recent years. Bioferia is sprayed in the sunn beetle's wintering areas. This highly effective, environmentally friendly pesticide is used on natural bushes, which are a major factor in the insect's presence and control of boulder shoulders and rivers. The pesticide is sprayed using sprayers mounted on agricultural tractors, and one kilogram is added to every 100 liters of water. It is noted from Table 3 that the total targeted areas increased during the 2023-2024 season compared to the previous season, as it reached 21,137 dunums, of which approximately 1,256 dunums were sprayed using 600 kg of organic pesticide. Karbala Governorate came in second place with approximately 356 dunums sprayed with the pesticide out of 965 dunums. These areas were distributed among 4 farmers who joined the program using 150 kg of Bioferia pesticide. Diyala Governorate came in second place in the total sprayed areas, as the area reached 300 dunums out of 12,162 dunums using 150 kg of biopesticides distributed among 3 farmers within the governorate. Diwaniyah Governorate came in third place, reaching approximately 400 dunums in Diwaniyah Governorate, using 101 kg of organic pesticide distributed among 10 farmers. It is worth noting that wheat fields are not sprayed completely, but only in The insect's potential for overwintering after these areas are identified by a specialized team under the supervision of those implementing the organic farming program.

Table 3. Distribution of farmers by governorate that applied organic pesticides for the 2023-2024 season.

governorate	Number of farmers	Total field area in dunams	Area sprayed with pesticide per dunam	Quantity of pesticide (kg)
Karbala	5	270	125	60
		380	152	50
		230	45	20
		45	18	11
		50	16	9
Wasit	5	2000	48	24
		4000	100	50
		20	6	3

		40	10	5
		500	36	18
		126	52	26
		100	24	12
		9	4	2
		3	2	1
		7	4	2
		5	2	1
		125	34	17
Diwaniya	10	60	22	11
		70	26	13
		90	30	15
		20	12	6
		10	6	3
		40	20	10
		60	28	14
		20	12	6
Babylon	9	105	20	10
		350	60	30
		135	24	12
		105	18	9
		4000	224	112
Diyala	3	7000	44	22
		1162	32	16
Total	32	21137	1256	600

Source: Department of Plant Protection Annual Report 2023



Source: Department of Crop Protection

The most important challenges facing organic farming:

There are many difficulties and challenges facing this type of agriculture. Therefore, governments must overcome these difficulties and challenges to achieve the goals of sustainable agricultural development, which include developing competitive, sustainable agricultural production and maintaining the proper management and sustainability of agricultural resources and ecosystems. We will address the most important challenges facing organic farming:

1. Initially, lower productivity and lower returns: Initially, agricultural returns may be lower compared to conventional farming, especially if the soil has been affected by the intensive use of pesticides and chemical fertilizers. The transition to organic farming requires time to restore soil health. Furthermore, there is a lack of widespread, advanced

technologies. Organic farming techniques are also less advanced compared to conventional agricultural techniques that rely on chemicals, which leads to challenges in increasing productivity.

2. High costs of organic products: Due to more expensive farming methods and intensive manual labor, organic products tend to be more expensive than conventional products, which can make them less accessible to many people. The initial costs of converting conventional farms to organic farming may also include additional costs due to changing farming methods, obtaining organic certification, and training in these new technologies.

3. Lack of natural fertilizers and pesticides and restrictions on pesticides and fertilizers: In organic farming, the use of very few natural pesticides and fertilizers is permitted, which can limit the ability to control pests and diseases in some cases. This can lead to crop losses or reduced quality in the event of a major problem. In addition, there are challenges in pest control. Although there are natural pest control techniques such as companion planting or the use of predators, these methods may be less effective compared to chemical pesticides. 4. Issues Related to Distribution and Marketing Scalability: Organic agriculture may face difficulties in expanding widely to meet the growing global market demand for organic products. This requires significant investments in distribution and infrastructure, in addition to insufficient government support in many countries. Furthermore, there are insufficient support policies for organic agriculture, making it less attractive to farmers compared to conventional agriculture, which can benefit from government support and modern agricultural technology.

5. Climate Change: Organic agriculture is more vulnerable to climate change and adaptation to such changes, such as drought or heavy rainfall, due to its heavy reliance on natural techniques to manage environmental conditions. This may limit organic agriculture's ability to adapt to rapid climate changes.

6. Brands, Certifications, and the Complex Certification Process: The process of obtaining organic certification can be costly and complex, requiring ongoing inspections and reviews to ensure compliance with organic standards and organic products. In some cases, farmers may face difficulties meeting requirements, hindering the ability to market organic products.

A review of the most important previous studies in the field of organic grain farming in Iraq.

First study: In 2018, researcher Jaafar conducted a study titled "Evaluation of the Efficiency of Supplying Key Nutrients and Growth of White Maize Yields under Conventional and Organic Farming Systems." The study aimed to identify the difference between organically growing white maize with compost and sheep manure and compare it with conventional farming. It also aimed to demonstrate the suitability of using sewage fertilizer in organic farming in terms of its impact on soil and environmental content, and to determine the efficiency of organic fertilizer on the yield and quality of white maize. The results of this study showed that adopting an organic farming system for grain crops, especially white maize, has an impact on increasing white maize production, reducing chemical pollution, and improving soil properties. The study recommended the need to provide organic fertilizers produced from agricultural and animal waste.

Second Study: In 2021, researcher Al-Ghanimi conducted a study titled "The Response of Four Wheat Varieties to Bio-, Organic-, and Mineral Fertilization in Growth and Yield Traits." This study aimed to identify the most suitable varieties for the region under conditions of using bio-, organic-, and mineral-based fertilizers. The results of this study showed that adding organic fertilizer led to an increase in wheat yield traits, such as the number of grains per spike and the percentage of protein in the grains. The study also found that the Abaa 99 wheat variety outperformed in the percentage of protein in the grains and the harvest index. The study recommended the importance of using organic fertilizers in clean and sustainable agriculture, given their advantages in terms of low cash costs, making them at least a successful complement to chemical fertilizers, in addition to the economic feasibility of this type of agriculture. The study also emphasized the need to raise awareness among farmers and peasants about the use of organic fertilizers for profitable agriculture and a clean, pollution-free, and sustainable environment. The third study: In 2021, researcher Al-Salihi conducted a study entitled "Explanatory activities provided to rice farmers in the field of raising their awareness of compost production in some areas of Diwaniyah Governorate ." The research aimed to educate rice farmers in the manufacture of organic fertilizer (compost), as well as to identify the most important problems they face in the field of manufacturing this fertilizer. A random sample of rice farmers was taken in some areas of Diwaniyah Governorate , in three agricultural divisions (Al-Shanafiyyah, Al-Salehiyyah, and Al-Mahnawiyah). The study sample amounted to 76 farmers out of the farmers belonging to these agricultural divisions, numbering 632 farmers. The results showed that the level of awareness among rice farmers about the manufacture of organic fertilizer (compost) is average and tends to decrease and can be described as weak. The research recommended the necessity of holding advisory seminars to educate them in the field of compost production, in addition to directing sufficient attention to the rice crop as it is one of the important strategic crops by benefiting from its waste and eliminating environmental pollution that occurs as a result of burning this Waste

Fourth Study: In 2022, researchers Al-Halfi and Al-Azzawi presented a study entitled "The Effect of Organic Fertilizer and Chemical Fertilization on Some Soil Physical Properties and Zucchini Yield." The first factor included three types

of locally manufactured organic fertilizers: organic fertilizer made from palm frond residues, organic fertilizer "vermicompost," and mixed fertilizer. Therefore, this research aims to determine the effect of organic fertilizer sources and chemical fertilization on some physical properties of soil and zucchini yield. Zucchini is one of the most important vegetable crops belonging to the Cucurbitaceae family. This importance stems from its use as human food and for its various medicinal purposes. Therefore, the use of organic fertilizers to produce soil crops with good physical properties is essential. The study results showed that a mixture of organic fertilizer (1:1) (30 tons/ha) with chemical fertilizer recorded the lowest apparent density of 1.2 g/cm, while a mixture of organic fertilizer (1:1) (30 tons/ha) with chemical fertilizer recorded the highest percentage of aggregate stability, reaching 1.2 g/cm. 16.17%, while the organic palm frond fertilizer recorded the highest level of available water, with an average of 5.50 cm. The organic fertilizer mixture (1:1) of 30 tons/ha without chemical fertilizer recorded the highest level of available water, reaching 6.93%, and the organic fertilizer (1:1) of 30 tons/ha with chemical fertilizer produced the highest production amount, reaching 26.67 tons/ha. This means that the organic fertilizer mixture is better than chemical fertilizer in improving the physical properties of the soil, followed by organic palm frond fertilizer in terms of importance and soil improvement, followed by organic vermicompost.

The fifth study: In 2023, researchers Shaker and Abdul-Rasoul addressed the effect of organic fertilizer and spraying with boron on the quantitative and qualitative characteristics of special potatoes. A field experiment was conducted at the College of Agricultural Engineering Sciences, University of Baghdad, for the fall season of 2020 and the spring season of 2021. The study aimed to investigate the effect of adding organic fertilizer and spraying with boron on the growth and productivity of special potatoes for manufacturing. The randomized complete blocks (RCBD) were designed within the study with three replicates. Organic fertilizer (palm frond waste) was added at four levels (0, 12, 24, 36) tons/hectare, in addition to the chemical fertilizer recommendation treatment. Boron was sprayed at four concentrations. The results showed significant superiority of the organic fertilizer addition treatment at the level of 24 hectare and spraying with boron at a concentration of 100 mg/L for the two seasons, respectively, in the number of tubers per plant and in the plant yield, which reached (13.78) tubers per plant and (833.3) grams per plant in the fall season. In the spring season, (9.27) tuber per plant and (1122.2) g per plant, respectively, as well as starch and apparent density of tubers.

Sixth Study: In 2023, researcher Al-Jubouri conducted a study entitled "The Effect of Adding Organic and Chemical Fertilizers and Spraying Seaweed Extract on the Growth and Yield of Cauliflower." This study aimed to compare organic and mineral fertilizers and determine the optimal level of organic and mineral fertilizer addition. It also studied the effect of organic and mineral fertilizers on the availability of some nutrients in plants and soil. The study concluded that adding organic and mineral fertilizers increased the availability of nutrients and their concentration in the plant. Increasing the addition of organic fertilizer from 5% to 10% did not affect the availability of soil elements, as adding organic fertilizers yielded results similar to those of mineral fertilizers. The study recommended the use of level 55 of organic fertilizer for its economic feasibility, in addition to the need to study an integrated fertilization system that combines mineral and organic fertilizers. Seventh Study: In 2024, researchers Al-Halfi and Hussein conducted a study entitled "The Effect of Organic Fertilizers and Nutrients on Anatomical Characteristics." The study aimed to identify the effect of organic fertilizers (earthworm compost and cow manure) and foliar spraying on sugar beets. This study was carried out in fields affiliated with the Department of Horticulture and Landscape Engineering - College of Agricultural Engineering Sciences - University of Baghdad. The varieties were prepared, represented by the main factor, organic media, and foliar spraying, with three replicates totaling 27. The results showed that the triple interaction between the Dark Red variety, Vermicompost, and spraying with silicon V2 S2 F1 was significantly superior to the rest of the treatments. The genetic makeup of the variety has a clear effect on the anatomical characteristics of the roots of the red beet plant, and the use of vermicompost fertilizer led to an improvement in the physical, chemical, and biological properties of the soil, which was reflected in the availability of nutrients for the plant, and this is the reason for the improvement in the structure of the root cell walls. As for the effect of foliar silicon on anatomical indicators, it had clear indications of increased thickness of the epidermis, cortex, and bark ring, due to its role in increasing the plant's sugar content and its impact on the structure of the cell walls. Therefore, the effect was synergistic for the study factors in improving the anatomical characteristics of the plant.

Conclusion:

Organic agriculture can play a fundamental role in mitigating obstacles to sustainable development in several areas, such as food security. Adopting organic production can contribute to bridging the food gap, which has received significant attention in recent decades due to its direct impact on economic, social, and environmental conditions. Organic agriculture can also support the green economy and create green jobs, preserve ecosystems, and mitigate environmental pollution by reducing the use of chemical fertilizers and pesticides. It also contributes to soil sustainability and reduces agricultural waste through recycling. Among the most important recommendations for

promoting organic agriculture are coordinating the efforts of relevant institutions, strengthening government support mechanisms, and promoting the role of extension programs to highlight the importance of organic agriculture due to its ability to preserve and increase crop yields in the long term. It also encourages the development of local markets for organic agricultural products.

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واقع ومحددات الزراعة العضوية في العراق: استعراض لأهم الدراسات والبرامج المطبقة (محصول القمح حالة دراسية)

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الخلاصة

مع التقدم العلمي في العلوم الزراعية وبسبب الزيادة المضطردة في عدد السكان استخدمت العديد من التقنيات التي تهدف لزيادة الإنتاج، ومن بين هذه التقنيات استخدام الأسمدة الكيميائية والمبيدات الكيميائية المختلفة الحشرية والفطرية والعشبية والنيماطودا وغيرها من المواد الكيميائية التي أحدثت خللا في التوازن الطبيعي بين هذه العوامل من جهة والآثار السلبية على البيئة من جهة أخرى، إضافة الى الآثار السلبية على الإنسان والحيوان والنبات كبير بهدف سد حاجة النمو السكاني العالمي المتزايد من المحاصيل، حيث تشير التقديرات إلى أن ما يقرب من نصف سكان الأرض يتغذون حاليا نتيجة لاستخدام الأسمدة النيتروجينية الاصطناعية والمبيدات الكيميائية، والذي أدت إلى عوامل بيئية شديدة مثل قضايا تدهور الأراضي والتلوث من مصادر غير محددة وانبعاثات غازات الاحتباس الحراري، مما دفع الوعي المتزايد للمستهلكين إلى المطالبة بالإنتاج الطبيعي للمنتجات الزراعية وبالتالي الحصول على غذاء نظيف وصحي والمحافظة على البيئة، وهذا ما يعرف بالإنتاج العضوي أو الطبيعي أو الحيوي أو الأخضر أو النظيف وجميعها مسميات مختلفة لنوع الزراعة بدون استخدام كيماويات أو سموم خطيرة. وتشير الدراسات السابقة إلى ان تبني الزراعة العضوية يعتمد على عوامل عديدة، منها الخصائص الفردية للمزرعة والمزارع المعرفة للتدريب، فضلا عن العوامل الاجتماعية والاقتصادية مثل سلسلة توريد الأسمدة والسياسة البيئية، وعلى الرغم من هذه الميزات الا انه يجب تشجيع المزارعين على اتباع نظام الزراعة العضوية بسبب خاصية الحفاظ على التربة وكونها صديقة، عن طريق الحملات الاعلامية (مقروءة، مسموعة، مرئية) بأهمية التحول الى الزراعة العضوية، ويجب وضع برنامج تأميني على المحاصيل التي تنتج بالزراعة العضوية يوفر للمزارعين الامان في حال تحولهم للزراعة العضوية، لما يتمتع به الانتاج العضوي بأنه نظام مستدام ينتج محاصيل صحية وتغذية الحيوانات على منتجات آمنه وصحية دون الإضرار بالبيئة والانسان.

الكلمات المفتاحية: الزراعة العضوية، الغذاء الآمن، التنمية المستدامة، التوازن البيئي، البرنامج.