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# Determinants of adopting soybean cultivation from the perspective of farmers in Kirkuk Governorate, Iraq

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**Abstract**

This research aims at identifying the determinants of soybean cultivation adoption from the perspective of farmers in Kirkuk Governorate, Iraq. The descriptive approach was used, depending on a questionnaire distributed to a sample of 361 farmers. The results showed that the majority of farmers (79.78%) saw the determinants facing soybean cultivation as significant, tending towards moderate. The most significant determinants were identified as a lack of trust in government agencies, weak financial and technical support, and difficulties in marketing the crop. Marketing problems and the scarcity of local markets emerged as the most prominent obstacles related to the crop, while limited extension services and weak responsiveness from agricultural extension agents constituted the most significant institutional impediments. The research concluded that it is necessary to develop effective extension programs and provide incentive-based government and marketing support to encourage farmers to adopt soybean cultivation and achieve sustainable agricultural development in the governorate.

**Keywords:** Determinants, soybeans

## Introduction

Agricultural development is a cornerstone of food security and comprehensive economic development in any country. With rapid population growth and changing climate challenges, the agricultural sector is gaining increasing importance in providing food, creating jobs, and achieving economic and social stability [1]. Agricultural development is not limited to increasing production; it also includes improving the efficiency of natural resource use, adopting modern technologies, and developing agricultural value chains to ensure sustainable production and improve farmers' livelihoods. In Iraq, [2] the agricultural sector, in particular, is the lifeblood of the country's economy and a primary source of income for a large segment of the population. Despite the sector's considerable potential in terms of arable land and water resources, it faces numerous challenges that hinder its growth and limit its contribution to the GDP [3]. These challenges include a lack of investment, limited use of modern technologies, climate change, and marketing challenges. Reforming the agricultural sector in Iraq requires concerted efforts from the government, the private sector, and civil society. These efforts should focus on strengthening irrigation and drainage infrastructure [4]. Providing affordable agricultural inputs, and developing an effective agricultural extension system that provides technical support to farmers. Field crops play a vital role in the global and local food basket [5]. as cereals, pulses, and oilseed crops provide essential nutrients for human and animal nutrition and industry. Soybeans are among the most important of these crops, given their high nutritional value as a source of protein and oil, and their role in improving soil fertility through atmospheric nitrogen fixation.[6] Soybeans are also used in the manufacture of animal feed, vegetable oils, and many other food products, making them a strategic crop of major economic and nutritional importance at both the global and local levels.[7] Despite this importance, the adoption of soybean cultivation faces many challenges in different parts of the world, especially in developing countries, which may limit its spread and increase its production [8]. The limitations on the dissemination or adoption of modern agricultural technologies and practices are among the most important factors affecting the achievement of sustainable agricultural development. Farmers, as the main actors in the agricultural sector, face a range of challenges that influence their decisions to adopt new crops or improved farming techniques.[9] These determinants include economic factors such as high input costs, difficulty in accessing finance, and uncertainty regarding market prices; socio-cultural factors such as acceptance of new practices, level of education, and farming experience [10]; as well as institutional factors such as the availability of agricultural extension services, infrastructure, and supportive government policies [11]. Understanding these determinants is crucial for designing effective extension and development programs that encourage farmers to adopt agricultural innovations.[12] Kirkuk Governorate is one of the Iraqi governorates characterized by its geographical and climatic diversity, making it suitable for cultivating many field crops, including soybeans [13]. Despite its promising agricultural

potential, adopting this crop may face challenges specific to the governorate, related to the economic, social, environmental, and institutional factors that influence farmers' decisions [14]. Understanding these determinants from the perspective of farmers in Kirkuk Governorate Kirkuk will provide valuable insights for policymakers and agricultural planners to develop targeted support programs aimed at increasing soybean productivity in the governorate, thereby contributing to achieving food security and local economic development [15]. Therefore, an in-depth study of farmers' experiences in Kirkuk and understanding the challenges they face from their perspective will be crucial in designing effective strategies to promote soybean cultivation in the region. Based on the above, the current research attempts to answer the following research questions:

1. What are the most important determinants of soybean cultivation adoption from the perspective of farmers in Kirkuk Governorate, Iraq, in general?
2. What are the most important determinants of soybean cultivation adoption from the perspective of farmers in Kirkuk Governorate in each of the study areas?

**Study Objectives**

The current research aims to achieve the following research objectives:

1. To identify the determinants of soybean cultivation adoption from the perspective of farmers in Kirkuk Governorate, Iraq, in general.
2. To identify the determinants of soybean cultivation adoption from the perspective of farmers in Kirkuk Governorate in each of the study areas.

**Research Methodology**

The descriptive method was adopted to achieve the objectives of this research, in order to accurately describe the subject to be studied through a sound scientific methodology. Through this, the data obtained by the researcher is transformed into expressive numbers through which we can interpret it accurately. One of its advantages is that it produces real information that helps in interpreting human and social phenomena [16]. The descriptive method is defined as the method or set of methods that enables researchers to describe scientific phenomena and the conditions surrounding them in their environment and the scientific field to which they belong, [17] and to depict the relationship between them and other phenomena that affect and are affected by them, as well as to depict the nature of the relationship between their variables, using the methods and tools of scientific research that suit the objectives that the researchers seek to achieve through the use of this method [18].

**Research Population and Sample**

The research population is defined as all elements or individuals related to the study problem to whom the researcher seeks to generalize the results (Al-Jubouri, 2017). Accordingly, the research population included all farmers registered with the Kirkuk Agriculture Directorate and its affiliated agricultural divisions in Kirkuk Governorate, totaling (23,256) farmers distributed across (4) districts: Kirkuk, Hawija, Dibis, and Daquq. Hawija district was chosen from among the four districts due to its reputation for cultivating field crops. The Hawija district includes five agricultural divisions (Hawija, Abbasi, Zab, Riyadh, and Mahooz). Three agricultural divisions were selected at a rate of (60%), namely (Hawija, Abbasi, and Mahooz). The number of farmers in the three agricultural divisions is (6000) farmers according to the records of the Kirkuk Governorate Agriculture Directorate. A random sample was taken according to the (Morgan) equation, so that the number of farmers in the research sample was (361) farmers.

**Preparing the Questionnaire**

To achieve the research objectives, the researcher relied on several sources to develop the initial research plan. A questionnaire was used, a crucial tool for obtaining accurate information related to the circumstances and realities (Dalila, 2022). This was done after reviewing previous studies, literature, and conducting interviews with specialists and research relevant to the current study. To achieve the research objectives, a questionnaire consisting of three parts was developed.

**Validity Measurement**

The face validity of the scales used was measured by presenting the questionnaire to agricultural extension experts. Content validity was also measured by presenting the questionnaire to field crop experts for appropriate adjustments. The questionnaire was reviewed to ensure the proper formulation of the study domains and the items within each domain, and their suitability for measuring the constraints facing soybean cultivation.

**First Objective: To identify the constraints on adopting soybean cultivation from the perspective of farmers in Kirkuk Governorate, Iraq, in general**

The results showed that the farmers surveyed indicated that the size of the constraints facing the cultivation of soybean crop ranged between (117-200) degrees, on a scale whose theoretical range ranged between (56-224) degrees, with an overall average of (159.51) degrees and a standard deviation of (21.9) degrees. The respondents were divided into three categories according to the actual range and using the laws of range and class length, as shown in Table (1).

**Table 1:** Identifying the size of the determinants of soybean crop cultivation in general

| Categories of Determinant Size | Number | % | Average Determinant |
|---|---|---|---|
| (117-143) Small | 73 | 20.22 | 126.56 |
| (144-170) Medium | 141 | 39.6 | 153.35 |
| (171 and above) Large | 147 | 40.72 | 181.78 |
| Total | 361 | 100 | |
| Deviation= 21.9 | | Average =159.51 | |

Table (1) shows that 40.72% of respondents indicated that there were significant constraints (171 or more), with an average score of 181.78. The second category (144-170) represented 39.06% of the respondents, indicating that the constraints facing soybean cultivation were moderate. Table (1) also shows that 73 respondents (20.22%) indicated that the constraints were small, with an average score of 126.56.
From the above, it is clear that the majority of respondents (79.78%) indicated that the constraints on soybean cultivation were significant but moderate. This suggests the existence of difficulties facing soybean cultivation in Kirkuk Governorate that need to be identified and addressed with appropriate solutions to promote the cultivation of this strategic crop in the region.

**The second objective: To identify the determinants of adopting soybean crop cultivation from the perspective of farmers in Kirkuk Governorate in each of the study areas**

**First area: Determinants related to farms**

The results showed that the magnitude of farm-related constraints affecting soybean cultivation ranged from 31 to 76 on a scale with a theoretical range of 18 to 72, with an overall mean of 51.06 and a standard deviation of 7.62. The respondents were divided into three categories based on the actual range, using the range and class length formulas, as shown in Table 2.

**Table 2:** Identifying the magnitude of farm-related constraints affecting soybean cultivation.

| Categories of Determinant Size | Number | % | Average Determinant |
|---|---|---|---|
| (31-45) Small | 124 | 34.34 | 42.34 |
| (46-60) Medium | 210 | 58.17 | 54.6 |
| (61-76) Large | 27 | 7.47 | 63.55 |
| Total | 100 | 361 | |
| Deviation= 7.62 | | Average =51.6 | |

Table (2) shows that 58.17% of the surveyed farmers indicated that the constraints related to soybean cultivation were moderate, with an average score of 54.6. Meanwhile, 34.34% of the surveyed farmers stated that the constraints related to their farms were small, with an average score of 42.34 and a range of 31-45. Only 7.47% indicated that the constraints were large. From the above, it is clear that more than half of the surveyed farmers (58.17%) indicated that the constraints related to soybean cultivation were moderate. Despite this, it means that there are obstacles related to soybean cultivation that must be addressed to facilitate the crop's expansion. In order to identify the determinants related to the farms that face crop cultivation, they were arranged according to their size according to the farmers' opinions, as their weighted averages ranged between (2.47-3.24), and their relative importance ranged between (61.77-80.89) degrees, as shown in Table (3).
Table (3) shows that "farmers' lack of trust in government agencies or companies providing support" ranked first in importance, with a score of (80.89). This likely indicates that farmers do not trust government decisions or private sector companies regarding the provision of support, such as supplying production inputs or purchasing the harvest, which discourages them from risking soybean cultivation.
The table also shows that "adherence to a specific type of crop in the region" ranked second among the factors affecting farmers' decisions regarding soybean cultivation, with a relative importance of (80.06). This suggests that farmers are reluctant to change and prefer to stick with their current crops, such as yellow corn, which may find market opportunities, or because there are no outlets for selling soybeans. The last and second-to-last determinants were (the farmer's unwillingness to follow the necessary scientific recommendations for soybean cultivation) and (the farmer's lack of effort to improve their current income through crop diversification), with relative importance scores of 61.77 and 62.12 respectively. This may indicate that the farmer has sufficient income to meet their daily needs, or that they believe soybean cultivation will not provide additional income, and that they are willing to follow modern recommendations related to soybean cultivation. Therefore, they consider it a relatively minor determinant compared to the other determinants mentioned that pertain to the farmer.

**Table 3:** Determinants of Soybean Cultivation Related to Farmers.

| S | Determinants | Weighted average | Relative importance | Order |
|---|---|---|---|---|
| 1 | The farmer's lack of trust in government agencies or companies that provide support. | 3.24 | 80.89 | 1 |
| 2 | Adherence to a specific type of crop in the region. 2 | 3.20 | 80.06 | 2 |
| 3 | Insufficient government support for soybean farmers. | 3.06 | 76.45 | 3 |
| 4 | Lack of capital for planting and maintaining the crop. | 3.00 | 75.07 | 4 |
| 5 | Lack of ownership or difficulty in renting the machinery and equipment necessary for planting and harvesting soybeans. | 2.99 | 74.65 | 5 |
| 6 | Farmers' lack of confidence that soybean cultivation will be profitable. | 2.98 | 74.58 | 6 |
| 7 | Farmers' lack of awareness of the importance of marketing or the absence of a plan to sell the crop. | 2.88 | 71.95 | 7 |
| 8 | Farmers' inability to secure a sufficient water source for irrigation. | 2.86 | 71.47 | 8 |
| 9 | High labor costs for planting and maintaining the crop. | 2.86 | 71.40 | 9 |
| 10 | Lack of information about soybean cultivation. | 2.81 | 70.22 | 10.5 |
| 11 | Difficulty for farmers to access information about soybeans. | 2.81 | 70.22 | 10.5 |
| 12 | Negative influence on farmers from other farmers' failure stories, or lack of positive influence from colleagues. | 2.78 | 69.39 | 12 |
| 13 | Farmers' lack of acceptance of the risks involved in cultivating the crop. | 2.74 | . 68.42 | 13 |
| 14 | Impact of the family's decision to try a new crop. | 2.72 | 68.07 | 14 |
| 15 | Low educational level of farmers. | 2.60 | 65.10 | 15 |
| 16 | Farmers' unwillingness to learn new skills related to soybean cultivation. | 2.59 | 64.82 | 16 |
| 17 | Farmers' lack of efforts to improve their current income by diversifying their crops. | 2.48 | . 62.12 | 17 |
| 18 | The farmer's unwillingness to follow the necessary scientific recommendations for soybean cultivation. | 2.47 | 61.77 | 18 |

**he second area: Crop-related constraints**

The results showed that the magnitude of crop-related constraints affecting soybean cultivation ranged from 31 to 65 on a scale with a theoretical range of 18 to 72, with an overall mean of 49.89 and a standard deviation of 8.39. The respondents were divided into three categories according to the actual range, using the range and class length formulas, as shown in Table 4.

**Table 4:** Identifying the magnitude of crop-related constraints affecting soybean cultivation.

| Categories of Determinant Size | Number | % | Average Determinant |
|---|---|---|---|
| (31-42) Small | 72 | 19.9 | 38.18 |
| (43-54) Medium | 193 | 53.5 | 49.16 |
| (55 and above) Large | 96 | 26.6 | 60.14 |
| Total | 361 | 100 | |
| Deviation= 8.39 | | Average =49.89 | |

Table (4) shows that (53.5%) of the surveyed farmers indicated that the constraints related to soybean cultivation were moderate, with an average score of (60.14). Meanwhile, (26.6%) of the surveyed farmers stated that the constraints related to the crop were significant, also with an average score of (60.14), while (19.9%) indicated that the constraints were minor.

From the above, it is clear that the majority of respondents (80.1%) indicated that the constraints related to soybean cultivation were moderate to significant. This means that the obstacles related to soybean cultivation are perceived by the respondents as limiting factors that hinder its cultivation and prevent its widespread adoption by farmers. Therefore, it is necessary to identify these constraints, rank them according to their importance, and then work to address them. Table (5) shows (18) factors affecting soybean cultivation, ranked according to their importance based on farmers' opinions. Their weighted average scores ranged from (2.30-3.19) and their relative importance ranged from (57.48-79.71), as detailed in Table (5).

Table (5) shows that the factor "lack of a local market for soybean crop" ranked first in terms of relative importance, with a score of (79.71). This likely indicates that the farmer's inability to sell and market their crop after harvesting may discourage them from cultivating it.

It was also found that the determinant (difficulty selling the crop after harvest and the existence of marketing obstacles) ranked second among the determinants related to the crop facing soybean cultivation, with a relative importance of (79.64) points. This indicates that farmers are reluctant to cultivate the crop due to the lack of outlets for selling or marketing it, resulting in either selling it at a low price or bearing the additional burden of storage.

The determinants (need for more research related to local cultivation) and (difficulty storing the crop after harvest) ranked second and last, with relative importance of (59.76) and (57.48) points, respectively. This may indicate that farmers see the need for field trials and observations to demonstrate the crop's cultivation in the region. The lack of storage facilities is important, but it ranked last among the determinants.

**Table 5:** Determinants of Soybean Cultivation Related to the Crop.

| S | Determinants | Weighted average | Percentage | Order |
|---|---|---|---|---|
| 1 | Lack of a local market for soybean production. | 3.19 | 79.71 | 1 |
| 2 | Difficulty selling the crop after harvest and the presence of marketing barriers. | 3.19 | 79.64 | 2 |
| 3 | Inability to consume the crop fresh by humans. | 3.18 | 79.43 | 3 |
| 4 | High costs of cultivating soybeans compared to other crops. | 3.08 | 76.94 | 4 |
| 5 | Prevalence of insects that infest the crop. | 3.07 | 76.80 | 5 |
| 6 | Abundance of weeds growing in soybean fields in the region. | 2.90 | 72.51 | 6 |
| 7 | High water requirements for soybeans compared to other crops. | 2.86 | 71.47 | 7 |
| 8 | The seeds require special and complex treatments before planting. | 2.83 | 70.84 | 8 |
| 9 | Limited availability of high-yielding hybrid varieties. | 2.81 | 70.15 | 9 |
| 10 | High susceptibility of soybean crops to disease. | 2.80 | 70.08 | 10 |
| 11 | Incompatibility of climate (temperature, humidity) with soybean growth requirements. | 2.71 | 67.66 | 11 |
| 12 | Low potential profit margin from soybean cultivation. | 2.63 | 65.72 | 12 |
| 13 | Soybean cultivation and harvesting require unavailable or expensive machinery and equipment. 13.5 | 2.53 | 63.30 | 13.5 |
| 14 | Unstable soybean market prices, impacting farmers' financial planning. | 2.53 | 63.30 | 13.5 |
| 15 | Long soybean growing season, from planting to harvest, conflicting with the cultivation of other crops. 15 | 2.48 | 61.91 | 15 |
| 16 | Lack of available pesticides for controlling crop pests. | 2.42 | 60.60 | 16 |
| 17 | The crop requires further research related to its local cultivation. | 2.39 | 59.76 | 17 |
| 18 | The crop faces difficulties in storage after harvest. 18 | 2.30 | 57.48 | 18 |

Third Area: Determinants Related to Extension Services.

The results showed that the magnitude of the constraints facing soybean cultivation related to extension services ranged from 25 to 77 on a scale with a theoretical range of 20 to 80, with an overall mean of 58.55 and a standard deviation of 11.31. The respondents were divided into three categories according to the actual range, using the range and class length formulas, as shown in Table 6.

**Table 6:** Identifying the magnitude of constraints on soybean cultivation related to extension services.

| Categories of Determinant Size | Number | % | Average Determinant |
|---|---|---|---|
| (25-41) Small | 32 | 8.87 | 28.5 |
| (42-58) Medium | 111 | 30.75 | 53.8 |
| (59 and above) Large | 228 | 60.38 | 65.36 |
| Total | 361 | 100 | |
| Deviation= 11.31 | | Average =58.55 | |

Table (6) shows that (60.38%) of the surveyed farmers indicated that the size of the constraints facing soybean cultivation related to extension services was large, with an average of (65.36) points, while (30.75%) of the surveyed farmers stated that the size of the constraints related to extension services was medium, with an average of (53.8) points, while (8.87%) of them indicated that the size of the constraints was small. From the above, it is clear that the majority of respondents, at a rate of (91.13%) of the total respondents, indicated that the size of the determinants of soybean cultivation related to extension services was large to medium. This means that the obstacles related to soybean cultivation that are linked to extension services are seen by the respondents as a determining factor for its cultivation, which indicates a weakness in the service provided by the agricultural extension apparatus in the region, which may include a lack of extension activities that should contribute to convincing farmers to adopt soybean cultivation.

Table (7) shows (20) determinants of soybean cultivation related to extension services. These were ranked according to their magnitude and based on farmers' opinions, with weighted average scores ranging from (2.57-3.22) and relative importance ranging from (64.34-80.54) as detailed in Table (7).

Table (7) shows that the determinant "the inappropriateness of the timing of extension activities to farmers' needs" ranked first in terms of relative importance, with a score of (80.54). This likely indicates a problem with the timing of extension activities, perhaps at the daily level, with farmers being occupied with other tasks that prevent them from participating in extension activities, or at the seasonal level, with activities being conducted at times that do not align with the crop's planting season.

It was also found that the determinant (weak response from extension agents causes frustration among farmers) ranked second among the crop-related determinants facing soybean cultivation, with a relative importance of (80.40) points. This indicates that agricultural extension agents do not respond to farmers' needs when conducting extension activities, such as the timing or type of activities desired.

The two determinants (inflexibility of crop extension programs, sometimes rendering them unsuitable) and (lack of demonstration fields to teach farmers crop management practices) ranked second to last and last, with relative importance of (66.34) and (64.34) points, respectively. This may indicate that respondents consider these two determinants to be the least influential on soybean cultivation, but this does not negate their importance and the need to find solutions for them.

**Table 7:** Determinants of Soybean Cultivation Related to Extension Services

| S | Determinants | Weighted average | Percentage | Order |
|---|---|---|---|---|
| 1 | The timing of extension activities is not aligned with farmers' needs. | 3.22 | 80.54 | 1 |
| 2 | The weak response of extension agents leads to farmer frustration. | 3.22 | 80.40 | 2 |
| 3 | Failure to consider farmers' feedback affects the suitability of programs to their needs. | 3.11 | 77.84 | 3 |
| 4 | Farmers' lack of trust in extension agents reduces their acceptance of extension services. | 3.11 | 77.70 | 4 |
| 5 | Ineffective monitoring and evaluation mechanisms for extension program outcomes make improvement difficult. | 3.04 | 76.11 | 5 |
| 6 | The absence of crop-specific extension campaigns. | 3.00 | 75.07 | 6 |
| 7 | Unclear extension messages are difficult for farmers to understand. | 2.98 | 74.45 | 7.5 |
| 8 | Insufficient budgets limit the scope of extension activities. | 2.98 | 74.45 | 7.5 |
| 9 | A lack of diverse extension channels hinders information dissemination. | 2.96 | 73.96 | 9 |
| 10 | The lack of collaboration between agricultural extension services and seed and fertilizer companies reduces the benefits. | 2.92 | 72.99 | 10 |
| 11 | A shortage of experienced extension agents in soybean cultivation and management limits technical support. | 2.91 | 72.71 | 11 |
| 12 | Extension recommendations are not tailored to the region's conditions. | 2.90 | 72.51 | 12 |
| 13 | A limited number of training courses on soybean cultivation and management restrict farmers' skill development. | 2.88 | 71.95 | 13 |
| 14 | The absence of forums or communication groups limits farmers' collective learning. | 2.85 | 71.26 | 14 |
| 15 | The inefficiency of extension agents or their limited ability to provide accurate technical advice. | 2.85 | 71.19 | 15 |
| 16 | Weak cooperation between research centers and the extension service hinders the updating of information. | 2.85 | 71.19 | 16 |
| 17 | The extension agent's inability to provide quick solutions to problems increases losses. | 2.81 | 70.15 | 17 |
| 18 | The remoteness of extension centers limits access to information when needed. | 2.75 | 68.70 | 18 |
| 19 | The inflexibility of crop-specific extension programs sometimes renders them unsuitable. | 2.65 | 66.34 | 19 |
| 20 | The lack of demonstration fields to teach farmers crop management practices. | 2.57 | 64.34 | 20 |

Finally, the three study areas were ranked according to their relative importance. The determinants related to extension services ranked first, with a weighted average of 2.92 and a relative importance of 73.19. Determinants related to farmers came in second, with a weighted average of 2.83 and a relative importance of 70.92. Determinants related to the crop itself ranked third and last, with a weighted average of 2.77 and a relative importance of 69.29. This indicates a weakness in extension activities related to the cultivation and marketing of soybeans. Extension activities should be intensified, and their timing should be adjusted to suit farmers' needs and circumstances.

**Table 8:** shows the ranking of the determinants of soybean cultivation according to their relative importance.

| Area | Weighted average | relative importance | Order |
|---|---|---|---|
| Determinants related to extension services | 2.92 | 73.19 | First |
| Determinants related to the farm | 2.83 | 70.92 | Second |
| Determinants related to the crop | 2.77 | 69.29 | Third |

## Conclusion

1. It is evident that the majority of farmers face significant constraints in adopting soybean cultivation, ranging from weak institutional support and limited extension services to low levels of trust in official agricultural sector bodies.
2. Economic and marketing constraints constitute the greatest obstacle to the expansion of soybean cultivation, particularly in the absence of stable marketing channels and prices that incentivize farmers.
3. Administrative and organizational constraints are a key factor limiting the expansion of soybean cultivation. The results showed weak coordination among agricultural institutions and a low level of technical support for farmers.
4. The lack of specialized extension programs and targeted training for farmers has led to limited knowledge of modern agricultural practices related to the crop, negatively impacting its adoption rate in the region.

## Recommendations

1. The government should adopt supportive policies to encourage soybean cultivation by providing financial incentives and marketing guarantees to farmers to ensure the continuity of production.
2. Agricultural extension services should be strengthened to raise awareness of the importance of soybeans as an economic and strategic crop through the implementation of field training programs and practical workshops for farmers.
3. Partnerships between agricultural institutions and the private sector should be activated to establish an integrated marketing system that includes collection, processing, and distribution centers for the product, thus ensuring a profitable economic return.
4. Modern agricultural technologies and applied research specific to soybean cultivation should be introduced to improve productivity and reduce farming costs, in accordance with the environmental conditions of Kirkuk Governorate.

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