

# Some of Farmers' Agricultural Beliefs and Practices in Duhok, Iraqi Kurdistan: A Qualitative Study

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ARTICLE INFO	ABSTRACT
<p><i>Article history:</i> Received: March 25, 2026 Accepted: June 02, 2026 Published: June 30, 2026</p> <p><i>Keywords:</i> Agricultural beliefs; Farming practices; Food sovereignty; Chemical pesticides; Qualitative research; Iraqi Kurdistan</p>	<p>This qualitative study explores the local agricultural beliefs and daily practices of farmers in Duhok Governorate, Iraqi Kurdistan. Because existing literature often focuses on macro-economic agricultural development, there is a critical lack of research emphasizing the lived realities of local farmers. This study employs a qualitative, exploratory design and semi-structured interviews with 14 current and former farmers across five diverse villages around Duhok City. Findings reveal a profound disconnection between farmers' agricultural knowledge and beliefs and their daily practices. Participants showed a strong desire for food sovereignty, and recognized ecological and health benefits of organic inputs. However, structural neglect, lack of governmental support, and economic pressures force them to rely on chemical inputs and adopt harmful practices. There is a resulting demoralization among farmers, and the younger generation is distancing itself from farming. To ensure agricultural sustainability, the study suggests strict regulatory oversight of chemical inputs, expanded extension services, and the adoption of protective policies to hedge against imported crops.</p>

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## 1. Introduction

Agriculture is an important sector in the economy and food security of Iraq and Kurdistan Region. In Duhok Governorate, rural communities have engaged in farming for generations to sustain their livelihoods and shape the village society. However, agricultural success depends largely on the widespread perceptions, beliefs and practices among farmers, and this is why this study focuses on exploring them. Existing research has addressed agricultural development and success on a macro-economic scale, but there is a lack of qualitative literature that emphasizes the lived realities, perceptions, and practices of the real agricultural practitioners, the farmers, in this specific region. Therefore, this qualitative study seeks to consider farmers' own perspectives and ways of practice, in certain specific themes, in Duhok Governorate. Specifically, perceptions and beliefs regarding food sovereignty, fertilizer effects, pesticide effects, and prospects will be discussed. Furthermore, specific practices will also be included, regarding crop types, fertilizer use, and pesticide use. By exploring these direct narratives, this research aims to provide a grounded understanding of the localized agricultural perceptions, beliefs and practices of the farming communities in Duhok, setting the stage to inform more effective and targeted interventions.

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## **2. Literature review**

Existing literature surrounding agriculture in Iraq and Kurdistan, rural farming practices and attitudes, and the socioeconomic status of agricultural practitioners is explored in this review. To set context for the specific focus of the study, this review is structured thematically. First, it sets context for agriculture in Iraq and Kurdistan Region. Next, it examines the concepts of food security and food sovereignty. Then, it analyses farmers' perceptions and practices regarding important agricultural inputs, specifically comparing organic and inorganic fertilizers alongside the use of chemical pesticides. Finally, this review highlights a lack of qualitative literature exploring the lived realities of farmers in the Duhok Governorate, showing the necessity for the current qualitative investigation.

### **2.1 Agriculture in Iraq and Kurdistan and Future Prospects**

Agriculture in Iraq plays an important role in the economy and food security. However, Al-Tulaibawi et al. (2025) state that it faces significant challenges. These include inadequate infrastructure, prolonged insecurity and unrest, and the dumping of agricultural goods from neighbouring countries, among others. Additionally, Iraq has seen a significant decline in agricultural production and more dependence on oil exports instead. This is shown in the decline of agricultural sector's contributions to the country's GDP from 16.23% in 1968 to around 2% in 2019 (Mahmud, 2021). Exacerbating this, Iraq is considered one of the most affected countries by climate change in the Middle East (Al-Jaf et al., 2025). Water levels are declining in the Tigris and Euphrates rivers, groundwater is getting depleted, desertification is taking place at an accelerated pace, and dust storms are occurring more often (Wali & Khdiar, 2025). All of this shows indications of a bad future and necessitates research and targeted interventions to ensure the sustainability of agriculture in Iraq and Kurdistan.

### **2.2 Food Sovereignty vs. Food Security**

Food security and food sovereignty are two distinct concepts that are similar in some aspect, while different in others. Cadavid et al. (2024) mention that the World Food Summit defines food security in relation to food availability, accessibility, and utilization, all within the context of nutritional well-being. On the other hand, food sovereignty is related to obtaining healthy and culturally appropriate food, that is based on sustainable and eco-friendly methods (Cadavid et al., 2024). Furthermore, the definition of food sovereignty also extends to the right to define one's own agricultural system (Cadavid et al., 2024). Both concepts are similar in food provision and accessibility, but food sovereignty is more focused on local agricultural systems. These concepts' importance is shown when prices for agricultural products soar, as in the 2007-2008 crisis (Kamrava et al., 2012). In such times, demand for local products increases and self-sufficiency becomes of paramount significance. But in Iraq, such concepts are at risk, or rather, not evident at all. Iraq's food security is profoundly influenced by an oil-based economy and decades of conflict and wars (Woertz, 2017). Furthermore, Iraq's food security is affected by politics more than most other countries around the globe (Woertz, 2017). To conclude, local agricultural development is important for food security and food sovereignty to be achieved and maintained.

### **2.3 Farmers' Attitudes and Practices Regarding Fertilizers and Pesticides**

Fertilizers, both organic and inorganic, are essential for proper crop production. Rashmi et al. (2020) state that environmental contamination occurs because of indiscriminate use, incorrect rate, and improper storage of fertilizer. Fertilizers contain heavy metals, which can affect soil properties and plant

health (Rashmi et al., 2020). A study in China by Yang & Fang (2015) showed that most farmers have wrong fertilizer use practices, which can in turn lead to more pollution and bad consequences. Use of chemical materials, one of which is chemical fertilizer, and especially if used in the wrong way, can have negative consequences on soil, environment and human health (Kaleel et al., 2025). So, fertilizer attitudes and practices are a crucial part of a healthy and sustainable agriculture. Pesticides, on the other hand, also impose a serious negative impact on the environment.

These chemicals can lead to the destruction of biodiversity (Mahmood et al., 2016). Furthermore, they stay in the crops people eat and their excessive and long-term use can have bad health consequences (Mahmood et al., 2016).

Meanwhile, a study in Iraq (Kshash & Oda, 2024) shows vegetable farmers use such chemicals in large quantities. Wrong and unsafe practices are also widespread (Kshash & Oda, 2024). Yet another study in Kurdistan region shows similar results (Hama et al., 2020). This shows that pesticides are not used correctly and bad practices are widespread.

## 2.4 Research Gap

Existing research provides valuable insights on agricultural development, but there is a lack of sufficient qualitative literature emphasizing the lived realities, localized perceptions, and practices of farmers in Duhok Governorate. Agricultural success depends heavily on the widespread beliefs and daily practices of local farmers; that is why it is important to investigate these. There is a critical need for qualitative studies that explore farmers' direct narratives, to provide a grounded understanding and to inform targeted and effective interventions.

## 3. Methods

### 3.1 Research Design

This study adopts a qualitative, exploratory research design. This research design was chosen because of the scarcity of qualitative data regarding farmers' widespread agricultural beliefs, practices, and subjective experiences in Duhok Governorate. This design allowed for in-depth exploration of agriculture and its related issues from the perspective of farming practitioners themselves, contributing to a better understanding.

### 3.2 Study Setting and Participants

The study was conducted in five villages within Duhok Governorate, selected to represent diverse locations all around Duhok City.

The sites included:

- ❖ Villages around Duhok Dam: Lenava (North-West) and Sundore (East).
- ❖ Villages around Zawita Area: Bade Village.
- ❖ Villages between Zakho/Semel: Kashe and Basitke Villages.

A convenience sampling method was initially used to identify key informants, followed by a snowball sampling technique to recruit more participants. The final sample consisted of 14 individuals (N = 14), all of whom were either currently farming or were former farmers.

### 3.3 Data Collection

The data was collected using in-person semi-structured interviews, in a field-based manner. The interviews took place in Nov. and Dec. 2025 (cross-sectional timeframe). The interviews were guided by pre-written open-ended interview questions designed to elicit in-depth narratives regarding diverse agricultural beliefs and practices. All interviews were conducted in the local Kurdish dialect (Bahdini Kurdish) to ensure participants' comfort and accuracy of data.

### 3.4 Data Analysis

The interviews were conducted in villages in a field-based manner. At the time of interview conduction, interviews were recorded using a tablet. Immediately after returning home from the field, they were transcribed into a text file in the same local language (Bahdini Kurdish) on an MS Word document on a computer. At the end of all interviews, a Word document of 80 pages was the result of the transcription process. The word file was divided into sections, each section for a single interview, with a total of 14 sections. This made navigating between interviews easy using the Word navigation pane. Afterwards, data was read entirely a few times, then an inductive approach was used to identify codes, categories and themes.

During this process, the text was highlighted in different colours according to codes and categories, then at the beginning of each highlighted sentence (or sentences), a comment was added with the specific code in English language. Sometimes, two codes were added to the same sentence (or sentences). In the end, the codes were grouped and categorized, and a codebook was made in the first two pages of the document. When implementing the actual thematic analysis, navigation between related highlighted text was done using the search feature on Word, which can be used to search comments as well (where codes were written). In the end, themes emerged from the data and were written in the final paper.

### 3.5 Ethical Considerations

The study adhered to research ethics and standards by providing the participants with a written consent form (or reading it to them when needed). The consent form detailed their rights to voluntary participation and ability to withdraw at any time. Verbal permission was also obtained from the farmers for audio recording. Furthermore, to ensure confidentiality, all participants' names were not mentioned during the transcription and reporting phases.

## 4. Results

### 4.1 Participant Demographics

The study sample consisted of 14 participants, all of whom were current or former male farmers. The age distribution was skewed towards older adults, with 13 participants aged over 40 and only one participant in his thirties.

Geographically, the sample covered both mountainous and plain terrains across five villages in the Duhok governorate: Lenava (N = 6), Sundore (N = 2), and Bade (N = 2) represented mountainous areas, while Kashe (N = 3) and Basitke (N = 1) represented plain areas (see Figure 1 and Figure 2).

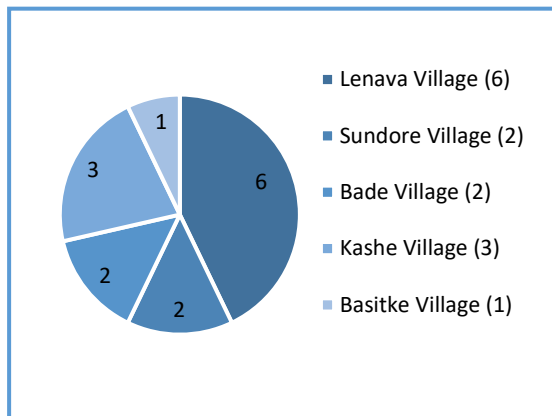


Figure 1. Participants in each village

Source: Author

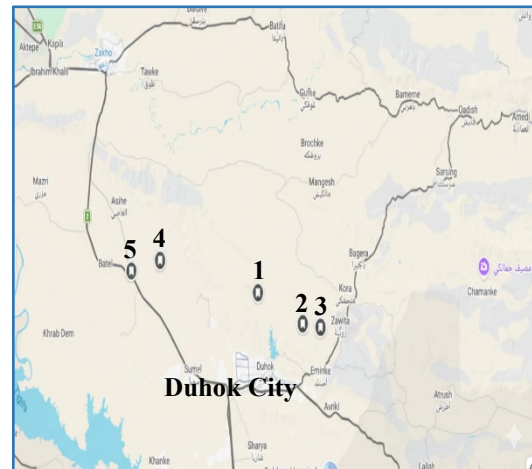


Figure 2. Location of Studied Villages (1, Lenava. 2, Sundore. 3, Bade. 4, Kashe. 5, Bastike)

Source: Author

## 4.2 Farmers' Agricultural Beliefs

Participants shared diverse perspectives on different agricultural topics that were researched. The topics included food sovereignty, the efficacy of various fertilizers (organic and inorganic), the impacts of chemical pesticides, and the overall future of the agricultural sector.

### 4.2.1 Theme 1: Beliefs Regarding Food Sovereignty

All participants expressed positive sentiments regarding food sovereignty. They described self-reliance as "much better" and "something good". But achieving this sovereignty was frequently viewed as dependent upon external assistance, with farmers stating that success requires structured "support and help". Farmers also demonstrated strong pride in local agriculture, arguing that domestic crops are "much tastier" than imported goods, which they described as merely "beautiful to watch" but lacking in flavour. On the other hand, many felt the region is currently "so far away from achieving" true sovereignty. If realized, farmers believed the region would attain complete self-sufficiency, eliminating the need for imported products like wheat, rice, and potatoes. As one farmer was emphasizing the geopolitical security of self-reliance, he likened agriculture to "everlasting oil," pointing to how foreign conflicts, such as a potential war in Russia, immediately cause local market prices to surge.

### 4.2.2 Theme 2: Beliefs about Fertilizer Effects (Organic and Inorganic)

Most participants considered organic fertilizer as livestock manure, locally referred to as zibil. Detailed knowledge regarding other organic constituents and alternatives was lacking. An agreement emerged regarding a fundamental trade-off: organic manure is superior for long-term soil integrity and human health, whereas inorganic (chemical) fertilizers are better for immediate crop yields.

Farmers observed that while chemical fertilizers are "stronger," they physically degrade the land, making the soil "hard" and containing what one participant described as "unnatural killing materials". On the other hand, organic manure was praised for its long-term effects, with farmers noting that it "withstands for years," whereas chemical alternatives are effective for only a single season.

#### **4.2.3 Theme 3: Beliefs about Chemical Pesticide Effects**

Participants were divided into three groups regarding their understanding and trust of chemical pesticides. One subset of four farmers showed total unawareness of any adverse health or environmental effects, mentioning that they use them without "any problem". Whereas a second group expressed uncertain awareness of potential health hazards, pointing out the presence of "killing materials" in the formulas. However, they lacked specific knowledge of the biological impacts. One of the participants in this group expressed psychological unease when using chemicals, stating, "When you become afraid of them, you won't use them anymore, because these chemicals are edible". Finally, a third group focused heavily on the ineffectiveness and bad structural regulation of these products. They expressed deep scepticism toward pesticides used and sold within Iraq and Kurdistan Region. Participants also felt frustrated by an influx of "ineffective" and potentially expired chemical products in Duhok markets. Furthermore, several farmers preferred traveling to Turkey or Iran to obtain reliable chemicals.

#### **4.2.4 Theme 4: Beliefs about Future Prospects**

Farmers showed a unanimous sense of pessimism about the outlook on the future of local agriculture. Participants mentioned a severe lack of governmental support, and warned that without intervention, the farming community "will be destroyed". This structural neglect has resulted in a widespread wave of demoralization, with farmers expressing that they "do not have any more courage to work" because their hard labour fails to yield fruitful economic results. Furthermore, there is also a crisis of succession, as younger generations refuse to adopt agriculture after witnessing their parents' struggles. As one former farmer concluded, "Believe me, farming is gone".

### **4.3 Farmers' Agricultural Practices**

Agricultural practices in the region differed significantly based on geographic topography. This has directly affected crop selection practices, fertilizer type and use, and chemical pesticide usage.

#### **4.3.1 Theme 5: Crop Types Practices**

In the mountainous villages (Lenava, Sundore, Bade), due to spatial limitations, the cultivation is usually of smaller, manually irrigated areas. These fields are primarily dedicated to vegetables (onions, cucumbers, tomatoes, peppers, eggplant, potatoes) and orchards (pomegranates, grapes, apples, apricots, pears). Interestingly, older participants from Lenava mentioned historical cultivation of lentils, rice, and chickpeas, though these crops are no longer viable in the village. On the other hand, the wide arable lands of the plain villages (Kashe, Basitke) are used for large-scale, rain-fed cultivation of wheat, barley, lentils, and chickpeas. These crops depend on rainfall, but farmers in such plains also maintain smaller, self-irrigated farms for vegetables and trees, which included olives, almonds, and pistachios.

#### **4.3.2 Theme 6: Fertilizer Use Practices**

Obtaining fertilizer is strongly influenced by area and extent of livestock availability. In mountainous areas, the presence of animal husbandry makes livestock manure an accessible and common fertilizer choice used by farmers. Farmers use different processing methods; this ranges from burying the manure in plastic bags for up to a year to mixing it directly into the soil.

The dependence on manure is an economic choice, because of the prohibitive costs of chemical alternatives, which range from 50,000 to 75,000 IQD per 25kg bag. However, even in livestock manure accessible areas, chemical fertilizers are still applied out of necessity to maintain a good production season. In plain areas, agricultural scale drives fertilizer practices. Here, farmers measure fertilizer in tons rather than kilograms, showing the large scale of use. Furthermore, they rely mainly on chemical fertilizer for wheat and barley fields, and this is partly because of the logistical difficulty of obtaining large quantities of manure. Manure fertilizer in plain villages is only sometimes used for small, manually irrigated vegetable farms.

#### **4.3.3 Theme 7: Chemical Pesticide Use Practices**

Chemical pesticide usage is a widespread practice across the sample, and it is used for crop preservation out of necessity. Farmers viewed pesticides as a necessary defence against total crop failure and bad production. One participant attributed a season of "wasted and small" pomegranates entirely to his decision not to spray chemicals. One example of pesticide application practices is wheat farmers in the plains, who follow rigorous regimens that include treatments for Sunn Pest (Smke in Kurdish), and distinct medications for broad-leaf and narrow-leaf weeds, and foliar fertilizers.

### **5. Discussion**

This paper explored local agricultural beliefs and practices of farmers in Duhok Governorate, to address a gap in qualitative literature regarding farmers lived realities in the region. The results show complex interrelated themes of farmers' agricultural knowledge, economic realities, and structural challenges.

#### **5.1 Food Sovereignty and Structural neglect**

An important finding in this paper is the contrast between farmers' strong desires and positive attitudes toward food sovereignty and their extreme pessimism regarding the future of local agriculture. Participants showed good understanding of the geopolitical importance of self-reliance, while comparing agriculture to "everlasting oil".

This coincides with Woertz's (2017) emphasis on the fact that food security in Iraq is profoundly influenced by regional politics and an oil-based economy. But, despite farmers' belief in the quality of local crops, they are completely isolated due to the lack of governmental support. This structural neglect has led to widespread demoralization and crisis of succession, as the younger generation moves away from the farming lifestyle.

These narratives show micro-realities of macro-economic challenges mentioned by Al-Tulaibawi et al. (2025), including inadequate infrastructure and the dumping of agricultural goods by foreign countries.

#### **5.2 Agricultural Inputs: Between Belief and Economic Necessity**

The data also reveals a major disconnection between farmers' beliefs about agricultural inputs (pesticides and fertilizer) and their actual practices of use. Most farmers acknowledged the superior long-term benefits of organic manure (Zibil) for soil and human health, but still chemical fertilizer and pesticides are used extensively.

This is out of economic necessity and fear of crop failure. Farmers are aware of how chemical inputs can physically degrade land and have bad consequences on the entire ecosystem. But the prohibitive

logistics of organic farming on a large scale, especially in areas like Kashe and Basitke, have forced farmers to use chemical alternatives instead.

Additionally, the paper also highlights gaps and regulatory failures regarding pesticide use. This is consistent with findings in other studies including Kshash & Oda (2024) and Hama et al. (2020), which mention widespread unsafe chemical practices in different areas across Iraq.

Farmers in this study showed that they either lack awareness of the biological impacts of chemical pesticides, or they have deep scepticism toward the quality of pesticides sold locally. This psychological unease expressed by farmers who understand the dangers of chemical inputs, combined with the frustration over unregulated and ineffective pesticides entering Duhok markets, shows a severe lack of institutional oversight and agricultural extension services.

### **5.3 Topography and Agriculture**

The research data also confirms that geographic topography of the area dictates which crops are selected and how agriculture is practiced in Duhok. The spatial limitations of mountainous villages lead farmers to adopt a manual irrigation, small-scale, vegetable farming with vegetable and orchard dominated cultivation. On the other hand, the wide arable plain of Kashe and Basitke are used for large-scale, rain-fed cultivation of essential grains, with heavy reliance on chemical fertilizer which is usually discussed in tons in this area. These differences show that future agricultural interventions must be tailored and localized to the specific topographic realities.

### **5.4 Study Limitations**

Some limitations of this study are acknowledged. For example, the study sample might be small (14 participants), but it is appropriate to achieve qualitative depth. Moreover, all study participants were males; although this might show a living reality (most farmers being males), it is still seen as a weakness in the study because women might be facing different or additional challenges which this study did not capture.

This occurred because, in the visited households, males were primarily responsible for agricultural activities, so they were more knowledgeable of their work. Another limitation is data being collected in winter (November and December), so farmers could have felt differently if interviewed during the harvest season.

## **6. Conclusion**

This study provides valuable lived realities of farmers in Duhok Governorate and shows a disconnected link between agricultural beliefs on one hand, and daily farmers' practices on the other hand. Farmers have a strong desire for food sovereignty and recognize the long-term ecological and health consequences of chemical inputs, but severe structural neglect and economic pressures force them into reliance on such inputs. This structural deficiency has led to widespread demoralization and has distanced the young generation from the farming lifestyle. Additionally, the study also showed that farming practices can vary widely depending on the geographic topography of the area, indicating the need for tailored interventions.

In the end, ensuring the development of sustainability of agriculture in Iraq and Kurdistan Region requires focus beyond macro-economic perspectives to include and address micro-level realities of the local farmers. Moreover, the pessimism expressed by the farming community shows that urgent targeted interventions, governmental support, and robust institutional oversight are needed.

### 6.1 Recommendations

A strict regulatory oversight is recommended on agricultural chemicals and pesticides entering the local market. This will prevent the entrance of unregulated, ineffective or expired pesticides and improve farmers' trust.

Wider and better agricultural extension services are needed to address the lack of awareness regarding chemical pesticide use and ensure safe and regulated application methods.

Subsidizing and improving the logistics of organic fertilizer, through a focus on making bulk organic fertilizer economically and logistically viable, will help farmers produce healthier crops and adopt better practices and inputs.

Adopting protective local market policies will contribute to the region's goal of food sovereignty and protect local products from the dumping of agricultural products by foreign countries.

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