SYRIA CROSS-BORDER HLG (NWS)
FOOD SECURITY & LIVELIHOODS
CLUSTER

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Wheat to Bread Market Assessment

Part 1

Northeast Syria – April 2023

DanChurchAid (DCA) -Wheat Farmer Interviews - Ain Al Arab/Aleppo

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1. Executive Summary

The Wheat to Bread Market System assessment focuses on the challenges and opportunities faced by wheat producers in Northeast Syria during the post-cultivation season of wheat for the 2022-2023 season. The study covered 31 sub-districts across 11 districts in 4 different governorates in Northeast Syria, where 313 farmers and 90 traders were interviewed. The findings highlight the main challenges faced by farmers, including the impact of climate change on wheat production, access to affordable inputs, production costs, and difficulties in accessing water for irrigation. Furthermore, the study found that most farmers have access to storage facilities, but there are variations in wheat production volumes and strategic storage capacities across different governorates in Northeast Syria. Overall, the study recommends interventions to mitigate the impact of climate change, increase farmers' access to affordable inputs, and promote sustainable wheat production practices to enhance the productivity of the wheat to bread market system in Northeast Syria.

2. Introduction

Bread is a crucial wheat-based food that serves as a staple in Syria. Wheat, the primary ingredient in bread, is considered one of the most essential food crops in the region. However, the conflict that began in 2011 has severely disrupted the wheat-flour to bread value chain in some communities, starting from wheat production and extending to bread production facilities. In Northeast Syria, government support has diminished, and the wheat-to-bread infrastructure is deteriorating. Additionally, climate change, global inflation, and reduced quality of wheat seeds have contributed to the reduction in wheat production. As a result, Northeast Syria now produces less than what is required to feed its own population[1].

To assess the capacity and functionality of bread production facilities in NES, iMMAP conducts quarterly mapping and monitoring of the entities. The goal is to identify the barriers to bread production, highlight gaps in production, and determine the accessibility and affordability of bread.

According to the most recent Wheat to Bread Processing Facilities Mapping conducted in October 2022[2], NES bread production market has remained stable compared to previous quarters, with low percentage of bread needs uncovered in six sub-districts. Even though this stability has been noticed for a couple of quarters it faces high risks of deterioration due to factors such as climate change, discontinuity or reduction of international support, disruption of agriculture supply chain etc.

To prevent such instability and prepare for any upcoming shocks, iMMAP conducted a deeper analysis of the wheat-flour to bread sector. In details, a market system assessment was conducted and focused on the input supply chain management and output market of wheat production in NES. The primary objective of this study was to complement existing assessments, such as the Wheat-Flour to Bread Processing Facilities Mapping, the Post-Harvest Study of Wheat Production in Northeast Syria (NES), and the Integrated Price Monitoring, with crucial information that sheds light on the market dynamics of wheat production and trade in Northeast Syria. The study aimed to provide additional insights into the complex economic environment of the wheat market in NES and help identify potential gaps and opportunities to support the sustainable growth of the sector.

To ensure a comprehensive evaluation of the wheat-flour to bread value chain, a two-part assessment will be conducted. This first part of the assessment will focus on the post-cultivation season, exploring the wheat production and trade market, including the analysis of wheat seeds, grains, and agricultural inputs utilized in the wheat production process. The primary goal of this part of the assessment is to gather data and insights into the wheat production and trade system, including the identification of potential challenges and opportunities for improvement.

The second part of the assessment will take place during the harvest season in the second quarter of 2023. It will enable a more extensive examination of the wheat grains, flour, and bread production, providing a more comprehensive view of the entire value chain. This segment will focus on examining several factors, such as the availability and quality of wheat grains and flour, milling and bread productivity, and the impact of imports on grains and flour. By conducting this assessment in two parts, we can ensure that the entire wheat-flour to bread value chain is evaluated thoroughly, and potential areas for improvement are identified.

1 Post-Harvest Study of Wheat Production in Northeast Syria (NES), 2021/2022 Winter Season. The full report can be accessed here.

2 Wheat-to-Bread Processing Facilities Mapping in Northeast Syria (NES), October 2022. The full report can be accessed here.

2.1. Study Objectives

The objectives of this initial assessment are multi-faceted and aimed at gaining a comprehensive understanding of the challenges and opportunities facing wheat producers in the NES region. The specific objectives of the study are:

1. To gain an understanding of the current challenges and opportunities faced by wheat producers in the NES region.
2. To explore the sources of wheat seeds and other agricultural inputs required for wheat production, including fertilizers, pesticides, herbicides, and fuel, as well as the cost of harvesting.
3. To study the prices of different sources of wheat seeds, wheat grains, and agricultural inputs.
4. To examine the wheat seeds and grains trading norms and the impact of imports on local wheat production.
5. To identify opportunities and inefficiencies in the current system that hinder farmers and traders within the wheat value chain from sustaining their agribusiness and livelihoods.
6. To identify leverage points along the value chain that have the potential to strengthen the effectiveness and efficiency of local wheat production across the NES region.
7. To understand the roles played by different stakeholders and market actors, such as farmers, traders, NGOs, and the Local Self Administration (LSA) in the wheat market system.
8. To identify potential interventions that can address the gaps in the marketing of wheat and promote sustainable local wheat production.

2.2. Study Methodology

The study methodology utilized a mixed and participatory design to gather insights from multiple perspectives to ensure a comprehensive understanding of the wheat production system in the NES region. This approach involved a review of relevant literature and documents, as well as key informant interviews with various stakeholders in the wheat value chain, including wheat farmers, wheat production input traders, and non-governmental organizations.

To carry out the interviews, enumerators were trained to use a data collection tool with semi-structured questions designed to elicit responses based on the study objectives. The questionnaire was developed by iMMAP in close coordination with the Food Security and Livelihood Working Group and the Agriculture Technical Working Group in NES. A total of nine organizations participated in the data collection process, in addition to iMMAP's data collection service provider.

To ensure that the study sample was indicative, the sample size of farmers and traders in each sub-district was determined based on the size of their cultivated lands, including all crop types. This was achieved by analyzing the Normalized Difference Vegetation Index (NDVI) of each sub-district, which allowed for the classification of sub-districts into three categories based on the size of their cropped land areas in hectares. It is important to emphasize that the analyzed NDVI does not solely comprise of wheat-cultivated lands, but rather includes all types of crops cultivated in NES.

Table 1 provides an overview of the three classifications, alongside the corresponding number of sub-districts and samples for each category. By using this approach, the study was able to obtain an indicative sample that reflected the distribution of croplands across the NES region, thereby enhancing the reliability and generalizability of the study findings.

Cropped Land Area (Ha)	# of Sub-districts	Farmers Sample	Traders Sample
0 - 10,000	17	102	30
10,000 - 20,000	8	102	30
> 20,000	6	102	30

Table 1: *NDVI Classification of Farmers and Traders Sample Size*

The study selected farmers and traders based on a set of predetermined criteria, which are as follows:

Farmers selection criteria

- Wheat farmers with cultivated lands of 10 dunums or more.
- Wheat farmers who have cultivated wheat for at least the last two seasons (2021-2022 and 2022-2023).
- Farmers who do not have exclusive contracts with the General Organization of Seeds Multiplication (GOSM) for seed multiplication.
- Farmers selected from different communities within the sub-districts to ensure geographic diversity.

Traders' selection criteria

- Traders who offer a range of wheat production inputs, including wheat seeds and grains.
- Traders who offer more than seven wheat production inputs if wheat seeds and grains are not available.
- Traders selected from different communities within the sub-districts to ensure geographic diversity.

2.3. Data Collection and Geographical Coverage

The study covered a total of 31 sub-districts located across 11 districts in 4 different governorates in Northeast Syria. These governorates include Aleppo, Al-Hasakeh, Ar-Raqqa, and Deir-ez-Zor. The data collection process involved conducting interviews with a total of 313 farmers and 90 traders. To ensure comprehensive data, a data collection tool was utilized, which consisted of both qualitative and quantitative questions to gather information related to market trends and challenges. A visual representation of the study's coverage is provided in Figure 1.

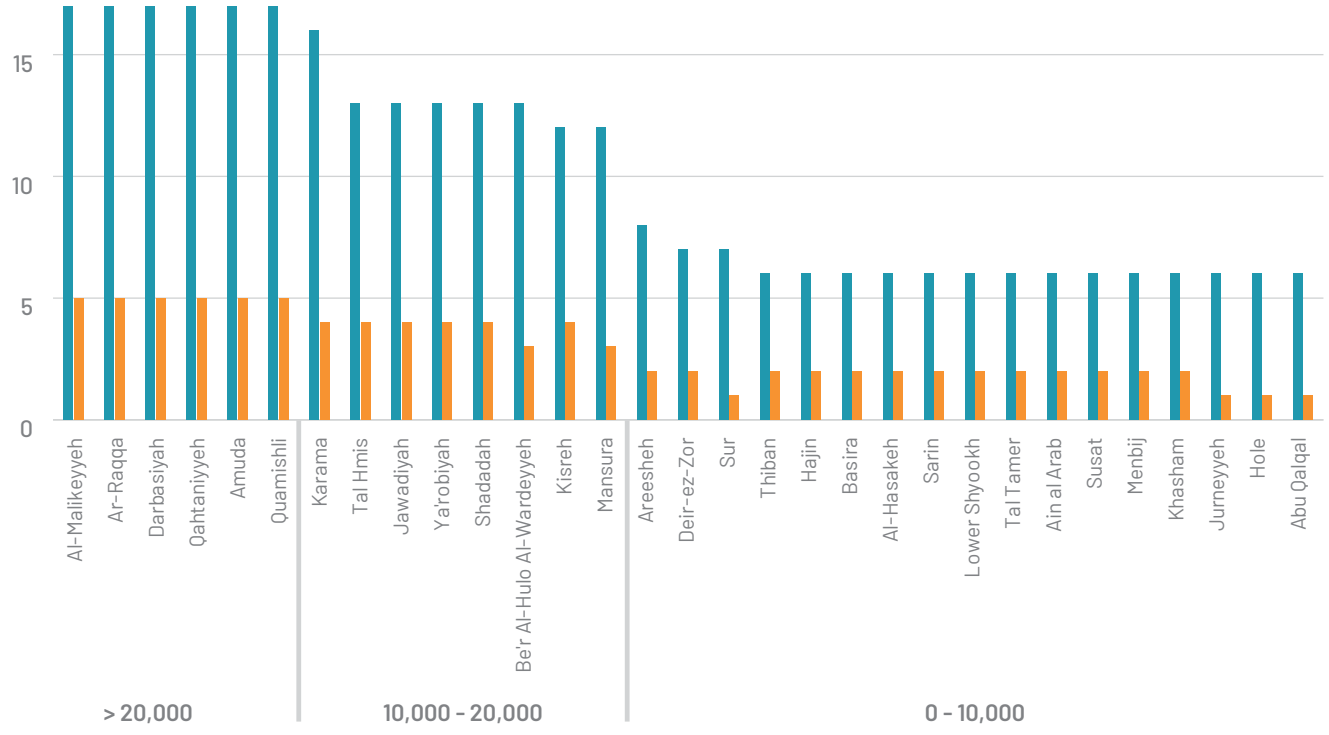
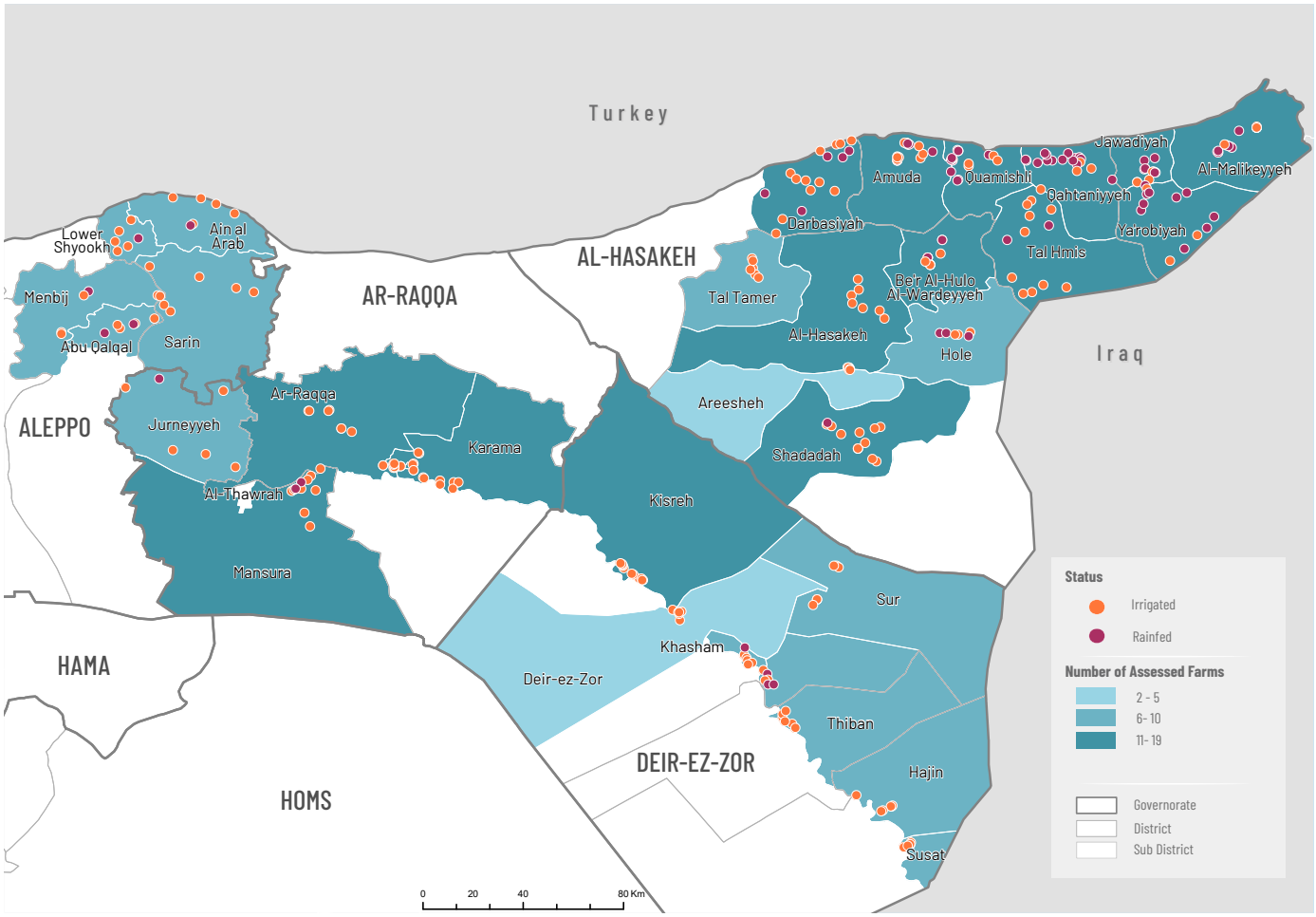


Figure 1: Number of Key Informant Interviews per Sub-District – Categorized by Cropped Land Area in Hectare



Map 1:Data Collection Coverage Map - Farmers

3. Market Environment

3.1. Seasonal Rainfall and Climate Change

Northeast Syria is experiencing the effects of climate change, resulting in below-average rainfall levels which are detrimental to agricultural and crop development. **In the 2022-2023 season, most farmers reported late rainfall (64%) and low rainfall levels (58%)**. The limited availability of water and irrigation sources was identified as the main challenge by 67% of the farmers due to low rainfall levels. Despite these challenges, only 5% of farmers with rainfed lands have resorted to supplementary irrigation this season. **Furthermore, over a quarter of the farmers (25%) reported that low rainfall levels and climate change were the main challenges affecting wheat production.** It is important to highlight that the data collection for this assessment took place during the mid-rainfall season in February 2023, and it is anticipated that additional rainfall will take place between the data collection period and the harvest season.

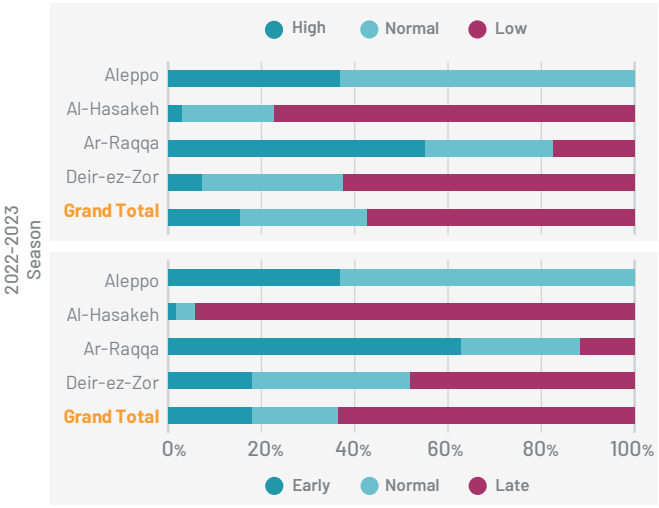


Figure 2: Farmers' Rainfall Levels Description

Figure 3 depicts Syria WFP VAM rainfall data for all NES districts; it compares the actual rainfall levels (in mm) for the rainy seasons of 2021-2022 and 2022-2023 and the annual average of rainfall (in mm) from September to May[3]. According to the Post-Harvest Study of Wheat Production in Northeast Syria, the region continued to experience the negative impacts of climate change with below-average rainfall levels. Despite a slight improvement in the preceding 2021-2022 season, the rainfall levels remained below the annual long-term average[4].

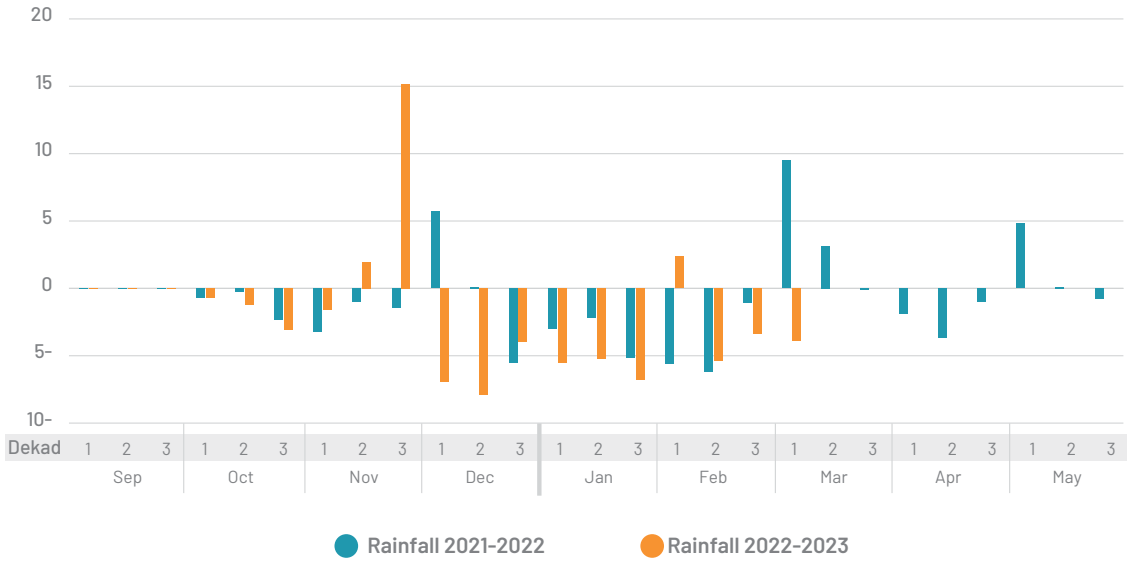


Figure 3: Rainfall Anomalies in mm for the 2021-2022 and 2022-2023 Winter Season – Average of all NES Districts

This trend continued into the current season, and study respondents confirmed that the rainfall levels were still mainly below the annual long-term average across most of the season. However, there were some exceptions, with November and February experiencing higher than average rainfall levels for the 2022-2023 season.

3 WFP VAM Seasonal Explorer; rainfall levels in Syrian Arab Republic NES Region for the years 2021-2023. Raw data used can be accessed through this link.

4 Post-Harvest Study of Wheat Production in Northeast Syria (NES), 2021/2022 Winter Season. The full report can be accessed here.

3.2. Availability of Wheat Production Inputs

The assessment evaluated the availability of wheat production inputs, mainly seeds, fertilizers, pesticides, and fuel.

Soft and hard wheat seeds were relatively available in NES; soft wheat seeds were slightly more available than hard wheat seeds. **On average, 70% of the farmers reported that both soft and hard wheat seeds were always available and the remaining 30% reported their fair availability.** Among the districts, Ath-Thawrah district had the highest percentage of fair availability (more than 60%) for both types of wheat seeds. Al-Hasakeh and Ain Al Arab districts reported more than 50% fair availability of soft wheat seeds, while Al Mayadin and Ar-Raqqa districts reported more than 50% fair availability of hard wheat seeds. For the remaining districts, there were higher percentages of constant availability for both types of wheat seeds.

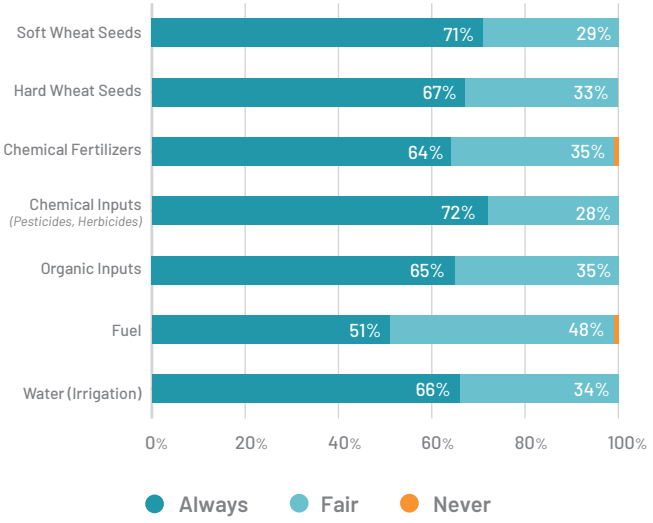


Figure 4: Availability of Wheat Production Inputs - Reported by Farmers

Additionally, the study found that both organic and chemical inputs, such as fertilizers, pesticides, and herbicides, were relatively available across NES, with an average of 67% of farmers reporting constant availability. **Fuel on the other hand was the least available among wheat production inputs, with 48% of respondents reporting fair availability.**

Despite the availability of these inputs in the market, farmers reported facing several access limitations, including price increases, fluctuations in the exchange rate of the US Dollar against the Syrian Pound, limited access to support, and the lack of their financial liquidity.

The availability of wheat production inputs was reported differently by wheat farmers and traders. According to the study, wheat seeds were considered relatively available by both groups, with farmers reporting a higher availability rate of 70% compared to traders at 62%, and 9% of traders reporting unavailability of wheat seeds. **Overall, traders reported a higher level of unavailability across all wheat production inputs compared to farmers. The study found that organic fertilizers and fuel were the least available at the traders' level (15%), indicating sourcing challenges.**

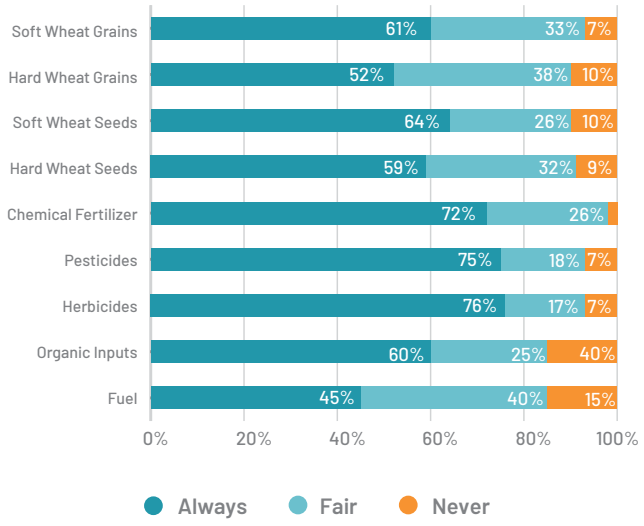


Figure 5: Availability of Wheat Production Inputs - Reported by Traders

4. Value Chain

4.1. Wheat Production

Irrigated wheat production was reported by approximately 73% of farmers, whereas 27% reported producing rainfed wheat. Notably, Al-Hasakeh governorate reported the highest percentage of rainfed lands at 41%, which can be attributed to its favorable climate conditions. On the other hand, soft wheat was the most cultivated wheat type in NES with 68% of farmers reporting planting soft wheat seeds, 25% hard wheat seeds, and 7% a mix of hard and soft wheat seeds.

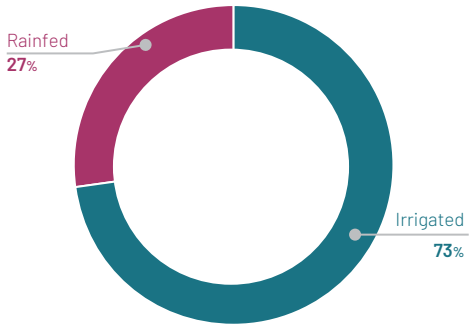


Figure 6: Wheat Production Methods

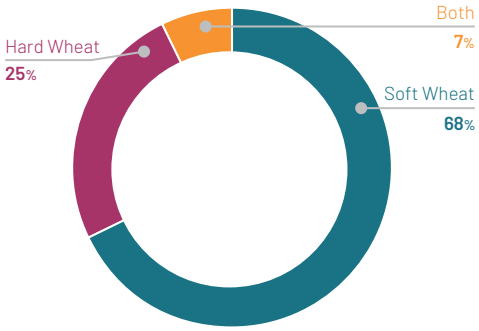


Figure 7: Types of Wheat Seeds Planted

As for the wheat production cycle activities, most farmers reported planned activities within the regular wheat cropping calendar as shown in Figure 7. In details, 92% of farmers planted their seeds between October and December 2023 while only 8% planted in January (7%) and February (1%) 2023; when questioned, the latter reported that the delays were due to their low financial liquidity and the delay of rainfall. **As for the rest of the agricultural activities, most farmers plan to harvest and sell their produce between June and August, indicating that farmers do not rely on storing wheat after harvest.**

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Purchase of Inputs	17%	47%	20%	4%	6%	1%			2%	1%		
Land preparation/Tilling	19%	38%	27%	4%	5%						1%	4%
Planting		12%	57%	24%	7%	1%						
Weeding	4%	4%	4%	4%	11%	21%	38%	11%	4%		1%	1%
Pesticide Application				2%	10%	27%	39%	16%	3%	1%		
Fertilizer Application	1%	2%	10%	8%	12%	31%	24%	9%	3%			
Supplementary Irrigation		1%	1%	9%	14%	11%	16%	21%	23%	3%	1%	
Full Irrigation			6%	14%	14%	15%	18%	18%	13%	1%		
Harvesting									7%	79%	12%	1%
Sale of Produce	1%									33%	56%	9%
Hire Labour	3%	13%	20%	2%	8%	10%	14%	7%	7%	12%	3%	1%

Figure 8: Wheat Production Cycle Activities

Moreover, while rainfed wheat production lands had larger average size, more lands were reported to be used to produce irrigated wheat. **Farmers with irrigated lands also anticipated a higher wheat crop yield than those with rainfed lands, with an expected yield of 0.39 MT of wheat grains per donum for the 2022-2023 season.** When asked about changes in their cultivated land sizes compared to the previous season, 22% of farmers reported a decrease (↓ 30%), 20% reported an increase (↑ 57%), and 56% reported no change. The decrease in size of cultivated land was attributed to various factors such as high agricultural production costs, drought, currency fluctuations, and poor financial liquidity. Conversely, the increase in size of cultivated land was attributed to factors like the success of the previous season's crop yielding better production and profit, implementing crop rotation techniques, and land rehabilitation. It should be noted that most farmers who reported changes in the size of cultivated land had irrigated lands rather than rainfed lands.

Production Method	# Respondents	Average Land Area (Donum) - 2022-2023 season	Average Expected Wheat Crop Yield (MT/dunum) - 2022-2023 season
Irrigated	228	103.97	0.39
Rainfed	85	131.48	0.20

Table 2: Average Cultivated Lands and Expected Wheat Yield for the 2022/2023 Season

Approximately 16% of farmers expressed their tendency to transition to cash crop production, specifically vegetables and cotton. While some farmers attributed this shift to the adoption of crop rotation practices, others associated it with the increase in wheat production costs and wheat production input prices, low yields and profits from wheat production, and the impact of drought and inadequate rainfall on the success of their yield. On the other hand, **about 13% of farmers reported that they were considering discontinuing their wheat production activities** due to financial constraints, insufficient support for wheat cultivation, unfavorable climate conditions for production, increasing production costs and input prices.

In general, the cost of producing one donum of wheat is greater for irrigated lands compared to rainfed lands, with a production cost of 97 USD/donum and 35 USD/donum, respectively. According to farmers, the most significant contributors to the production costs of wheat are the expenses for wheat seeds, chemical inputs, and fuel. Additionally, **87% of the farmers reported an average increase of 46% in the cost of producing wheat from the previous season.** This increase is largely due to the rising market prices of agricultural inputs and fuel, as well as the increase in the USD to SYP exchange rate. Despite the fair availability of fuel and the reported increase in its price, **over 40% of farmers managed to obtain their fuel from the Local Self Administration, the majority at subsidized prices, and others as free distributions or at unsubsidized prices.**

Production Method	Average Production Cost (USD/Donum)	Wheat seeds (USD/Donum)	Chemical inputs (Fertilizers) (USD/Donum)	Fuel (USD/Donum)
Irrigated	97	20	25	15
Rainfed	35	9.5	12	4

Table 3: Average Production Costs for the 2022/2023 Season

Types, Variety, and Quality of Wheat Seeds

Soft wheat seeds were the more prevalent types of wheat seeds used by farmers in NES, with improved and certified seeds being more commonly used for both soft and hard wheat. While hard wheat seeds had a broader range of varieties, Cham6 and Duma4 were the two most used varieties of soft wheat seeds, accounting for 24% and 23% respectively, whereas Cham3 and Duma1 were the most widely used hard wheat seeds varieties, accounting for 24% and 21% respectively. **It is worth noting that 31% of farmers using soft wheat seeds and 27% of those using hard wheat seeds reported not knowing the variety of wheat seeds they were using, indicating a potential lack of awareness among farmers regarding the types of wheat being cultivated and harvested.**

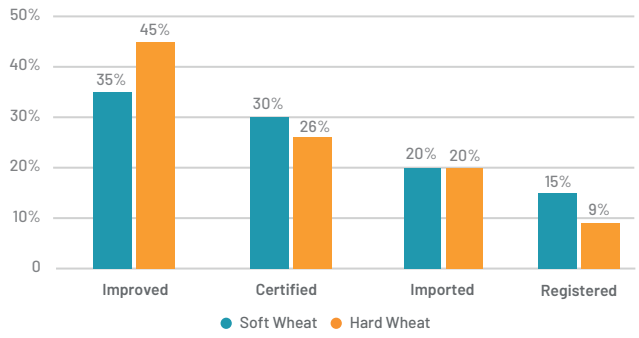


Figure 9: Types of Hard and Soft Wheat Seeds

When farmers were asked about the quality of the wheat seeds used, most of them (97%) reported the seeds as being of good or fair quality, while only 3% reported bad quality. However, it is worth noting that seeds of fair or bad quality were a mix of different varieties, and a significant proportion of them (38%) were even of unknown varieties. The usage of such mixes dramatically reduces crops yield and quality and often induces financial burdens on farmers.

In fact, many challenges were reported by farmers using the poor-quality seeds including low germination rate (42%) impurities and presence of weed seeds (21%), insects or rodents contamination (17%), fungi, and humidity among others.

According to the survey results, testing laboratories are scarce in the area, with only 10% of traders reporting their presence in Al-Hasakeh governorate, specifically in Amuda, Quamishli, and Al-Malikeyyeh districts. **Only 17% of traders reported carrying out lab tests on the wheat seeds and grains they sell, often in grain centers of the LSA. Farmers who lack access to testing laboratories rely on local experts to conduct tests in their warehouses.** Most traders (83%) are not conducting lab tests due to the lack of laboratories and experts in the area. This lack of testing laboratories adversely affects the quality of seeds available in the region.

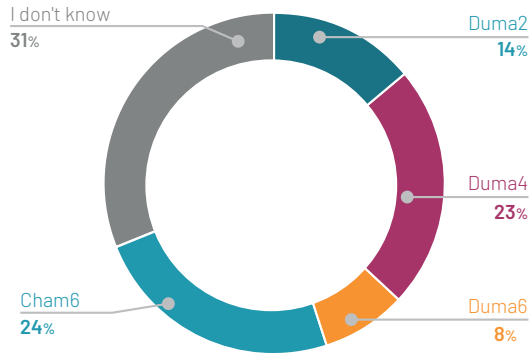


Figure 10: Varieties of Soft Wheat Seeds

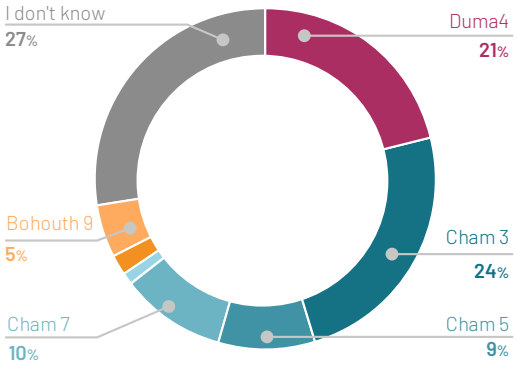


Figure 11: Varieties of Hard Wheat Seeds

Sources and Origin of Wheat Seeds and Grains

Farmers reported sourcing their wheat seeds from different market actors mainly local traders (53%), local farmers (14%), and the General Organization for Seed Multiplication (GOSM) (10.5%) among others as per Figure 13. As for cultivation of 2022-2023 season, about 30% of farmers reported partially or fully using retained wheat seeds from last seasons. Of these, 94% were initially purchased and planted in 2019 and onwards; the remaining 6% were purchased and planted more than four cropping seasons ago, between 2010 and 2018. **Nevertheless, farmers ensured not to store their retained seeds for more than three cropping seasons without cultivation, with 80% being stored for only one cropping season.** Retained seeds cultivation is a common practice among farmers, however, it often reduces seed viability, germination rate, and yield, especially when seeds are retained for more than 2-3 agricultural seasons. Only 18% of the seeds cultivated in the current season were imported primarily from Turkey.

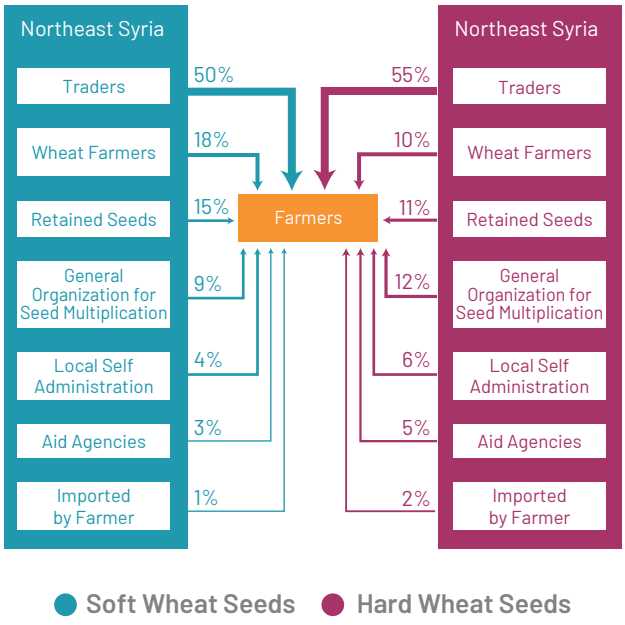


Figure 12: Farmers' Sources of Wheat Seeds

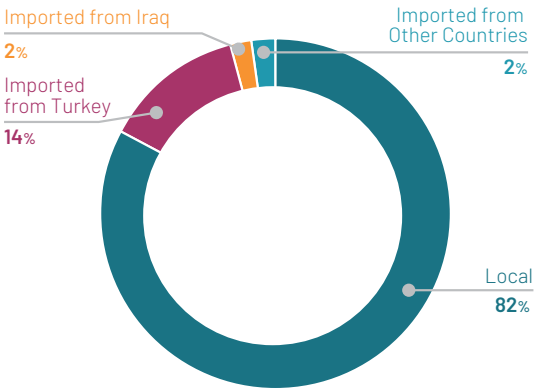


Figure 13: Origin of Wheat Seeds

On the other hand, the majority of the assessed wheat traders source their wheat seeds and grains from local wheat farmers in NES, followed by other local traders in NES. However, a distinct number of traders source their wheat from importers, as well as from farmers and traders in the NWS region.

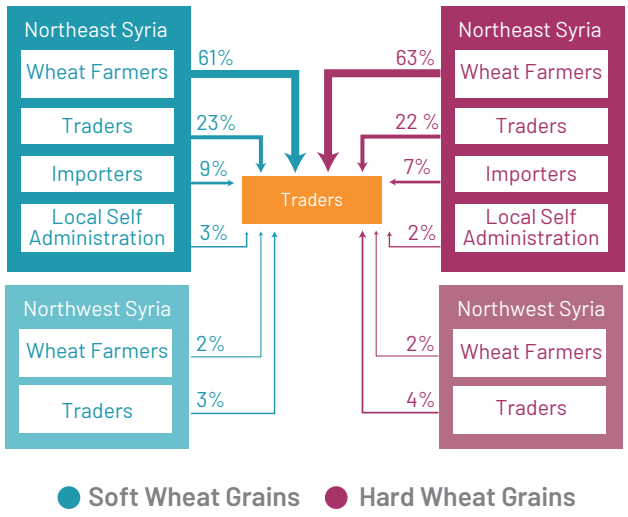


Figure 14: Traders' Sources of Wheat Grains

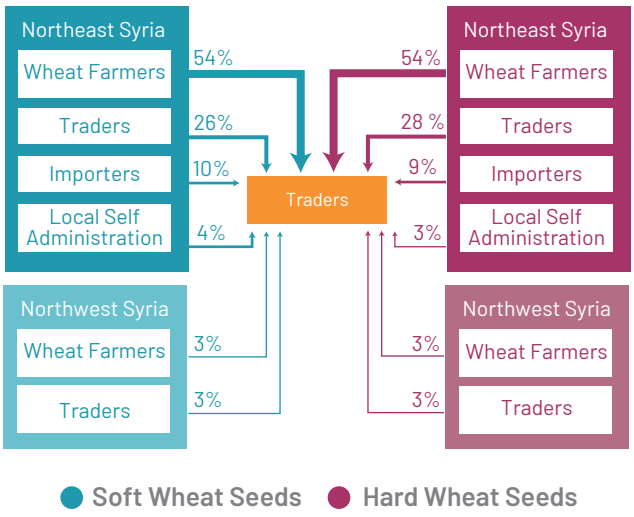


Figure 15: Traders' Sources of Wheat Seeds

Moreover, only a small percentage of traders (7%) have formal or informal agreements with their suppliers, outlining specific terms for wheat purchased, quality, and price, as well as a specified payment period. The primary mode of payment for traders is cash, followed by informal credit payments that are usually without conditions. Only a few traders reported that they have set payment period conditions with their suppliers. The absence of established conditions for credit payments can lead to economic challenges for traders, including the potential for financial burdens arising from delayed payments at the time of currency fluctuations. Consequently, traders may encounter difficulties that could affect their financial standing.

4.2. Climate Smart Agriculture Practices

Most farmers in the assessed areas reported utilizing a range of climate smart agriculture (CSA) practices, with crop rotation, minimum soil tillage, use of certified seeds and herbicides being the most commonly adopted methods as reported by over 80% of farmers. However, water **harvesting, and modern irrigation systems were particularly uncommonly implemented practices, followed by composting.** Overall, similar patterns in CSA practices were observed across the assessed areas.

The limited implementation of water harvesting was attributed to factors such as low levels of rainfall, the high cost of executing a harvesting system, and the farmers' limited knowledge and expertise in this area. Similarly, modern irrigation systems were not commonly used due to financial constraints, limited availability and accessibility of the required equipment, and the lack of support for implementation. Nonetheless, it was observed that although water harvesting and modern irrigation systems were infrequently used, 75% of farmers still relied on irrigation methods for their wheat production.

Composting, the next least commonly used CSA practice in the assessed areas, was reported to be used by only 23% of farmers in wheat production. This was partly due to the perception that this practice was not essential for their crop production, as well as difficulties in adopting it over large areas of cultivated land. Furthermore, many farmers reported a lack of knowledge and expertise in composting as a barrier to its implementation.

	Aleppo	Al-Hasakeh	Ar-Raqqa	Deir-ez-Zor	Total
Use of Herbicides	93%	84%	96%	93%	88%
Crop rotation	87%	91%	84%	68%	85%
Minimum soil tillage	67%	87%	75%	96%	85%
Certified Seeds	83%	85%	80%	75%	82%
Incorporate residue	63%	73%	61%	75%	70%
Use of Pesticides	63%	63%	92%	79%	70%
Drought Resistant Seeds	13%	57%	51%	32%	47%
Organic Manure	43%	44%	53%	38%	44%
Composting	17%	20%	29%	29%	23%
Water harvesting	17%	20%	16%	16%	18%
Modern Irrigation Systems	13%	14%	4%	2%	10%

Figure 16: Use of Climate Smart Agriculture Practices - Per Governorate

The overall attitude of the farmers in the assessed areas towards climate smart agriculture (CSA) practices was positive, with many of them adopting most of the assessed CSA activities. This suggests that farmers are adapting to the changing market environment for wheat production, including the impact of climate change and currency inflation on the stability of the wheat value chain. However, it should be noted that the implementation of these CSA practices requires a significant number of financial resources, which can increase the production costs for wheat. This could have a major impact on the capacity of farmers to produce wheat, which may lead to reductions in the size of their cultivated lands and ultimately affect their crop yields. **Therefore, while the adoption of CSA practices is an important step towards sustainable agricultural production, it is crucial to provide support to farmers to ensure that the costs associated with their implementation do not become prohibitive.**

Furthermore, out of the total number of farmers producing wheat, a majority of 73% rely on irrigation methods to cultivate their crops. However, **only 8% of these farmers have adopted modern irrigation systems, with the remaining 92% relying on traditional methods**. In contrast, only 27% of wheat farmers rely on rainfed methods, with a small proportion of 5% using supplementary traditional irrigation. **Artisan aquifers and water wells are the primary sources of irrigation for approximately 53% of farmers, followed by river water at 33%, and irrigation channels at 12%.** However, the low levels of rainfall have severely impacted farmers, leading to significant challenges in accessing water for irrigation. Furthermore, the rising fuel prices and the associated increase in the operational costs of pumping water for irrigation have also posed significant challenges for wheat crop production.

4.3. Planned Post-Harvest Handling of Wheat Grain, Trading and Marketing

On average, the direct selling of wheat grain harvest in the market was the highest post-wheat harvest activity reported by farmers (76%). This was followed by using the wheat grains for household consumption (10%) and storing the wheat grains to be either used as retained seeds for the next season or to be sold by the end of the season, accounting for only 6% and 5%, respectively. **The low rate of wheat grain storage highlights the weak market power of farmers, as they often require immediate cash upon crop harvest.**

The primary market outlets for farmers were through the Local Self Administration (LSA), including public mills and silos, and local traders. Many farmers (59%) reported selling directly to the LSA, followed by 38% of farmers selling to local traders. When selling to the LSA, farmers often used cheques, credit, and promissory notes instead of cash. In contrast, the most common selling modality with traders was cash, with only a few farmers reporting the use of informal credit. Transportation costs were typically covered by farmers, with 83% of farmers reporting covering transportation costs with the LSA at an average cost of 11 USD/MT of wheat grains. For traders, 34% of farmers reported covering transportation costs at an average cost of 11 USD/MT of wheat grains.

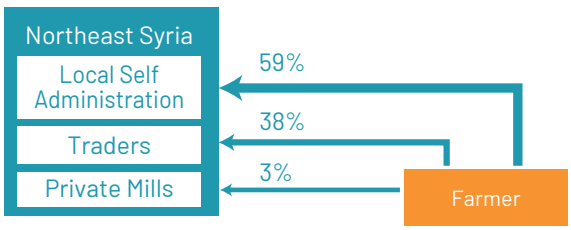


Figure 17: Farmers' Customers

Only 8% of farmers reported having formal or informal agreements with their customers. These agreements primarily involved providing wheat grains to the LSA post-harvest in exchange for the provision of wheat seeds, fertilizers, fuel, or other production inputs by the LSA at subsidized prices during the cultivation season.

Wheat Price

Figure 18 provides an illustration of the purchase and selling prices of soft and hard wheat seeds, as reported by traders. According to the breakdown, the average recorded purchase price for soft and hard wheat seeds was $0.45/Kg and $0.46/Kg respectively, whereas the average selling price for soft and hard wheat seeds was reported as $0.47/Kg and $0.48/Kg respectively. These prices were reported by traders, excluding any business costs. Based on these reported prices, it can be deduced that the trade of soft and hard wheat seeds yielded a profit margin of 4%, without considering any additional expenses or business costs.

Around 50% of the traders reported selling wheat grains in the current period prior to the harvest season. The market selling price for soft and hard wheat grains was recorded by traders as $444/MT and $454/MT respectively. It is worth noting that there was no significant variation in selling prices across different types of customers.

Figure 18: Traders' Purchase and Selling Prices of Wheat Seeds and Grains (USD/Kg)

4.4. Support Programs

Only 8% (n=25) of farmers reported receiving any form of assistance for their wheat production this season. The majority of the received aid (55%) was provided by the Agriculture Management Office, followed by 31% from NGOs, and 14% from the General Organization for Seed Multiplication. The support extended by the Agriculture Management Office primarily came in the form of fuel, while the GOSM extended assistance primarily in the form of wheat seeds. Most farmers mentioned having commitments for receiving support, which included specifying the area of land cultivated with the wheat production inputs provided by the support source, returning a portion of the wheat harvest to the support source, and some reported having exclusivity agreements, prohibiting them from engaging in any contracts or commitments with other organizations. Conversely, the NGOs' support was largely in the form of wheat seeds, with no accompanying commitments for the received aid. Overall, the reported support programs in place for the farmers across NES were minimal.

5. Market Infrastructure

5.1. Storage Facilities

A small proportion of farmers (11%) reported storing their wheat grain to be sold later in the season for higher prices or to be used as retained seeds in the next season. Most farmers (89%) had access to storage facilities, with home storage being the most common, followed by privately owned warehouses. For the minority of farmers (11%) who lacked storage facilities, financial constraints and high storage costs were the primary reasons reported. In some areas such as Ath-Thawrah district in Ar-Raqqa governorate, limited storage facilities were also reported as an issue. Conversely, 88% of traders had access to storage facilities, with the majority using rented or owned warehouses.

As for the strategic storage capacity in NES, iMMAP Wheat-Flour to Bread Processing Facility mapping most recent study reported that 58% (n=19) of the silos in NES were fully or partially operational in October 2022[5]. The primary and more recent reason for non-operation was attributed to the unstable security conditions and the need for rehabilitation of machines and buildings. The district of Quamishli had the highest number of operational silos, with a storage capacity of 384,000 MT of wheat. In total, the operational silos in NES have a combined maximum storage capacity of 874,000 MT of wheat.

The total wheat production for the 2021/2022 season in Northeast Syria was 470,000 MT, which represents only 54% of the maximum storage capacity of operational silos across the region[6]. However, there are notable variations in wheat production and storage capacity across different governorates. For example, in Al-Hasakeh governorate, the production of 143,170 MT of wheat in the previous season only utilizes 20% of the available silo storage capacity (726,000 MT) in all Al-Hasakeh sub-districts. In contrast, in the Northeastern regions of Deir-ez-Zor and Ar-Raqqa governorates, the total wheat production in the previous season (52,000 MT and 159,600 MT respectively) exceeded the total storage capacities of silos in these areas (12,000 MT and 100,000 MT respectively).

This suggests that the storage capacity in these governorates is insufficient to accommodate their production levels, which in turn can have severe consequences for their wheat productivity.

It is worth noting that inadequate storage capacity poses a serious risk to agricultural production and can result in post-harvest losses, restricted storage volumes during the off-season, and other negative impacts on the livelihoods of the farmers and the local population. Without proper storage facilities, the harvested wheat is vulnerable to environmental factors, pests, and rodents, which can cause spoilage, contamination, and damage. Moreover, this explains the finding that only 11% of farmers store their production, as they may be compelled to sell their wheat grains at reduced prices due to the inadequate storage capacity.

5 Wheat-to-Bread Processing Facilities Mapping in Northeast Syria (NES), October 2022. The full report can be accessed here.

6 Data on the total wheat production levels for the 2021/2022 season in Northeast Syria was obtained from the Northeast Syria Agriculture Department.

6. Market Challenges

Nearly 42% of farmers believe that certain entities hold power over the wheat market, with **the LSA and traders as the key actors. The LSA is reported as responsible for setting prices for wheat seeds and grains in the market, in addition to regulating the import and export levels across NES.** Furthermore, the LSA contracts farmers with the commitment that they sell their harvest exclusively to the LSA. **Meanwhile, traders also have significant market power, with a monopoly on the sale of wheat seeds and grains, particularly imported products.** Fuel traders are also found to have control over the fuel market, with increased prices during the irrigation season.

Among traders, 54% do not perceive any entities controlling the wheat market. However, 20% identified the LSA as the key market actor, while 26% referred to various market actors, including import traders, merchants, administrative staff, and government departments such as the district government and Department of Agriculture.

Farmers in NES are encountering numerous obstacles that hinder their wheat production, with the cost of agricultural inputs recorded as the primary challenge. Increases in the prices of production inputs, particularly fuel, coupled with its limited availability across the region, pose significant constraints on production. Farmers who receive subsidized fuel from the LSA report having to wait in long queues, which consumes time and affects their productivity. The extended fuel delivery periods are forcing farmers to purchase fuel from the black market at higher prices. **Despite the increase in input prices, farmers complain of declining wheat grain prices compared to the global market, causing a decline in profitability.**

In addition, the unstable exchange rate is a major concern for farmers, especially those with contracts to sell their wheat grains to the LSA or other customers at a fixed price. When payments are delayed, the rise in the value of the US dollar further worsens the situation. **Adverse climate conditions have also negatively impacted wheat production activities in NES, with drought and low rainfall levels reported over the past three cropping seasons.** These conditions have led to a decline in productivity and forced farmers to resort to supplementary irrigation, increasing their production costs. In light of these challenges, wheat farmers in NES are experiencing significant limitations due to their low financial liquidity and the weak economy. These constraints have placed a burden on their production and profitability.

Traders involved in wheat production inputs are also encountering significant challenges and limitations. **The survey results indicate that 42% of traders are facing restrictions in trading wheat inputs across different areas of control.** These limitations include taxes, customs fees, and transportation restrictions in Northeastern Syria. The local authorities exercise control over trade within their territories, making it difficult to transport wheat to other regions without official authorization and payment of fees. Theft and disruptions during transportation are also concerns, and some regions prohibit wheat trade altogether. Moreover, only 33% of traders stated that there are no rules or regulations that impact the trade of wheat seeds, grains, and inputs. **The majority of traders reported some rules and regulations that ban the export of wheat to other regions, restrict transportation of wheat between regions without permission, prohibit farmers from selling their wheat to traders, and impose high taxes and customs fees on wheat and other agricultural products.** The Local Self Administration authorities and various laws and regulations also contribute to the difficulties faced by traders, including restrictions on importing seeds.

In addition to the challenges with importing, **18% of farmers stated that the current volume of imports is affecting local wheat production.** While the import of wheat seeds is helping to increase local production due to the better quality and yield of the seeds, the import of grains is affecting locally produced wheat grains, and farmers need to reduce the prices of their grains to compete with the imported grains in the market.

7. Summary and Discussion

Climate Change and Rainfall

The majority of farmers experienced low and delayed rainfall levels during the 2022-2023 season, resulting in a scarcity of water and irrigation resources. This was identified as the main challenge faced by most farmers, along with the impact of climate change on wheat production. While there was a minor improvement from the preceding season, the rainfall levels for this season remained below the annual long-term average, except for November and February which experienced above-average rainfall levels.

These findings highlight the difficulties that farmers face due to changing weather patterns, emphasizing the necessity of alternative water and irrigation sources. To enhance water availability and crop resilience to drought, farmers require assistance in adopting climate change adaptation measures. Initiatives such as early warning systems for severe weather conditions, the renovation of irrigation systems, and the promotion and accessibility of drought-resistant wheat seeds are all critical actions to be taken along the wheat value chain in order to mitigate the effects of climate change on wheat production.

Availability of Wheat Production Inputs

According to the study, 70% of farmers reported that both soft and hard wheat seeds were always available, while the remaining 30% reported fair availability. The availability of organic and chemical inputs, including fertilizers, pesticides, and herbicides, was relatively high, with 67% of farmers reporting constant availability. However, fuel was the least available input, with only 48% of farmers reporting fair availability. Despite the presence of inputs, farmers faced access challenges such as increased prices, currency fluctuations, limited support, and insufficient financial liquidity. Traders reported a higher level of unavailability for all inputs, with organic fertilizers and fuel being the least available, with a 15% unavailability rate, indicating difficulties in sourcing.

These findings emphasize the necessity of providing farmers with access to essential inputs at reasonable prices in order to promote sustainable agricultural production. This may include concentrating on the production of fertilizers and examining other sources of locally available nutrients, such as compost and animal manure. Additionally, due to access limitations and unavailability of fuel, farmers must decrease their reliance on fuel for wheat production activities, such as water pumping for irrigation.

Wheat Production

According to the study, 73% of farmers reported cultivating irrigated wheat, while 27% cultivated rainfed wheat for the 2022-2023 season, and soft wheat was the most commonly cultivated wheat type across most districts. Only 8% of farmers reported late cultivation of wheat in January and February due to limited financial liquidity and delayed rainfall. Furthermore, most farmers plan to harvest and sell their produce between June and August, indicating that wheat storage after harvest is not a common practice across NES.

Irrigated lands had a higher production cost compared to rainfed lands, with the most significant contributors being the cost of wheat seeds, chemical inputs, and fuel. Furthermore, 87% of farmers reported an average increase of 46% in the cost of producing wheat from the previous season. Despite the limited availability of fuel, over 40% of farmers obtained their fuel from the Local Self Administration, with the majority at subsidized prices, and others as free distributions or at unsubsidized prices.

Additionally, 31% of farmers using soft wheat seeds and 27% of those using hard wheat seeds were unaware of the variety of wheat seeds they were using, indicating a potential lack of awareness among farmers regarding the types of wheat being cultivated and harvested. This lack of awareness could lead to challenges, such as low germination rates, impurities, insect or rodent contamination, and fungal and humidity issues.

The results suggest that farmers require more education and awareness about the type of wheat seeds they are planting, as well as the potential challenges associated with low-quality seeds. In addition, efforts are required to promote sustainable wheat production practices, such as decreasing production costs, increasing access to inputs, and promoting the use of improved seeds. Finally, providing farmers with access to credit and extension services can help overcome financial challenges and promote more sustainable agricultural practices.

Climate Smart Agriculture and Irrigation

In general, the adoption of climate smart agriculture (CSA) practices by farmers in NES was positive, with crop rotation, minimum soil tillage, use of certified seeds and herbicides being the most commonly adopted methods. However, water harvesting, modern irrigation systems, and composting are relatively uncommon practices. While the adoption of CSA practices is an important step towards sustainable agricultural production, it is crucial to provide support to farmers to ensure that the costs associated with their implementation do not become prohibitive.

Furthermore, 73% of the assessed farmers rely on full or supplementary irrigation methods to cultivate their crops. A small percentage of farmers have adopted modern irrigation systems, while the remaining majority rely on traditional methods. Artisan aquifers and water wells are the primary sources of irrigation for farmers, followed by river water and irrigation channels. However, the low levels of rainfall have severely impacted farmers, leading to significant challenges in accessing water for irrigation. Additionally, the rising fuel prices and the associated increase in the operational costs of pumping water for irrigation have also posed significant challenges for wheat crop production.

Storage Capacity

The majority of the farmers that require storing their wheat grains for later sale or for using them as retained seeds reported having access to storage facilities, with home storage being the most common. Furthermore, 58% of the silos in Northeast Syria were fully or partially operational in October 2022, with a combined maximum storage capacity of 874,000 MT of wheat. The total wheat production for the 2021/2022 season in Northeast Syria was 470,000 MT, which represents only 54% of the maximum storage capacity of operational silos across the region. There are variations in wheat production and storage capacity across different governorates, with some having excess storage capacity and others having insufficient storage capacity.

8. Recommendations and Implications for FSL Programming

Based on the findings of the "Wheat-Flour to Bread Market Assessment", iMMAP Food Security and Livelihood unit suggests the following recommendations:

- **Promote climate smart agriculture (CSA) practices:** Although the general attitude of farmers towards implementing CSA activities was generally positive, farmers should be provided with further training and support in implementing CSA activities such as water harvesting, modern irrigation systems, and composting. This will help overcome the limited application of these practices due to the farmers' lack of expertise and knowledge.
- **Establish or support testing laboratories for wheat seed and grain analysis:** Establishing or supporting testing laboratories for wheat seed and grain analysis is crucial to increase the accessibility and availability of reliable testing services. This will enable traders to verify the quality of the wheat they trade, ensuring the availability of high-quality wheat seeds and grains in the market. This, in turn, will improve the wheat production yield of farmers and the quality of the locally milled flour used in the wheat-flour to bread value chain.
- **Address water scarcity and support irrigation systems:** To address water scarcity, organizations should invest in water conservation and management, given that water is a limiting factor for wheat production in NES. It is recommended to scale-up support towards the rehabilitation of irrigation systems, linking this with efficient systems for water delivery to wheat production. This will help overcome the challenges farmers face in irrigated wheat production and improve the productivity of irrigated lands.
- **Improve knowledge sharing and establish guidance units for wheat seed varieties:** To enhance knowledge sharing and guidance on wheat seed varieties in NES, it is recommended to organize workshops and training sessions for farmers. This should be complemented by close coordination with agricultural extension services to disseminate information on the types and varieties of wheat seeds available. The information should include the characteristics of seeds, such as yield, disease resistance, and drought tolerance, to enable farmers to make informed decisions based on their specific needs and environmental conditions. Through this approach, organizations can help farmers to choose the most appropriate wheat seed varieties that will lead to better production outcomes.
- **Establish/improve wheat storage facilities :** To enhance farmers profit margin and valorize their produces, it is recommended to establish or improve wheat storage facilities. Such facilities will increase farmers' market access, especially outside the harvest season, allowing them to store their grains when demand is low and sell them at better prices when it increases. Wheat storage will also improve the food security situation in NES ensuring a study supply for consumption all year long. Proper storage facilities will also reduce material and economic losses due to spoilage and pests.

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