Wheat Seed Security Assessment

Northeast of Syria

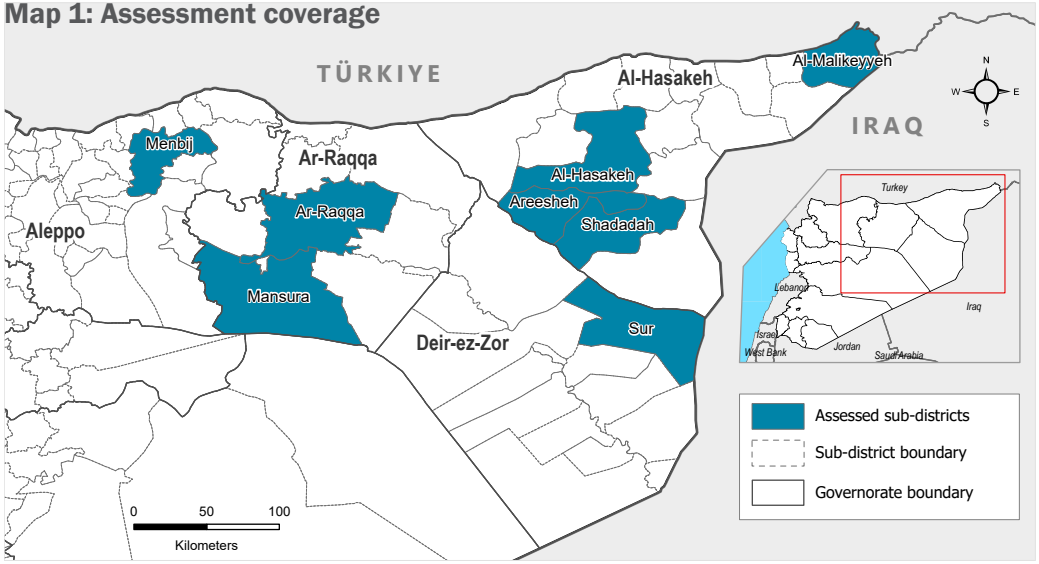
April 2022

INTRODUCTION

Wheat is a strategic crop in Syria and critical for food security. Although Syria's wheat production has been significantly reduced throughout the period of conflict since 2011, 2021 saw the level of wheat production diminish to an unprecedented level as a result of economic and environmental stresses, including drought.[1,2] In Northeast Syria (NES) specifically which is the primary agricultural region within the country, the population is highly reliant on agriculture for livelihoods and consumption. In NES wheat production in 2021 was approximately 400,000 tons, 42% of 2020 production levels.[3] The Wheat Appeal published by NES Forum in July 2021 reported that almost 1.8 million individuals in NES are at risk of emergency levels of food insecurity due to poor harvests.[4]

Wheat seed quality and variety can have a significant impact on production levels. In addition, there can be a variety of barriers preventing access to seeds, including availability and cost.[5] As such, the NES Food Security and Livelihoods (FSL) Working Group identified a need to collect information on current agricultural, propogation and trade practices within NES, the level of availability of wheat seeds in markets, and the prevelance of seed quality issues.[6] This would ultimately support a deeper understanding of the factors impacting crop productivity in NES and in turn inform the response required to address these factors. Considering this, REACH, in collaboration with NES FSL working group partners, conducted interviews with farmers, traders, and seed multipliers between 25 April and 26 May, 2022 asking them about their practices challenges in the sector within the 2020/2021 and 2021/2022 wheat seasons.[7]

Map 1: Assessment coverage



KEY FINDINGS

- Drought was the top challenge reported by farmers.
- The dominant seed type planted by surveyed farmers was soft wheat, which requires less water compared to rain-fed hard wheat but is still vulnerable as a seed variety to drought conditions. Access to improved drought tolerent varieties is limited.
- As a result, most farmers reported lower than expected yields in the 2020/2021 wheat season.
- Seed traders' business has in turn been impacted by reduced wheat production levels as well as on-going price inflation in the context of rapid currency depreciation.
- The majority of farmers reported relying on private boreholes for irrigation of wheat crops and rely heavily on fuel for pumping water.
- Fuel shortages were also a key challenge reported by farmers, compounding the impacts of the drought on productivity.
- Farmers also highlighted reduced seed quality which can impact wheat production levels.
- Farmers reported facing issues with insufficient stocks of seeds, particularly those who access seeds from seed traders. Seed traders themselves reportedly lack capacity to store seeds.
- Overall, the findings indicate system-wide stressors and diminishing capacity to cope with them, which could imply on-going reduction in the quantity and quality future wheat crop production.

METHODOLOGY

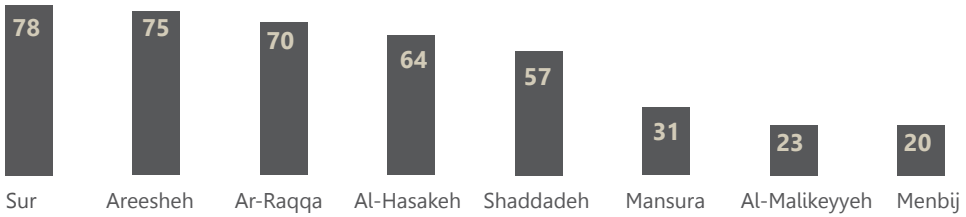
REACH, in collaboration with the NES FSL working group, conducted surveys and key-informant interviews with farmers, seed traders, and seed multipliers. Seed multipliers produce commercially viable quantities of quality seeds from a nucleus seed that has been genetically improved to be 'pure', i.e. without deformities. Data was collected by FSL partners who have extensive experience working on agricultural projects in NES. Data was collected between **25 April and 26 May, 2022** within sub-districts where partners had access and contacts (see Map 1). The sub-distcists included in the assessment was based on their location within particular agro-ecological zones (AEZs); these zone are defined according to average annual rainfall as a measure of agricultural suitability.

Data was collected through three different tools including:

- 418 structured **individual interviews (IIs) with randomly selected farmers** (sample was stratified by AEZ within each governorate and farmers were sampled to a 90% confidence interval using a 10% margin of error) in the sub-districts of Menbij, Mansura, Al-Hasakeh, Shaddadeh, Areesheh, Al-Malikeyyeh, Ar- Raqqa, and Sur;
- 21 **structured key-informant interviews (KIIs) with purposively selected seed traders** in Al-Hasakeh, Areesheh, Al-Malikeyyeh, Sur, Ar-Raqqa, and Quamishli sub-districts; and
- 9 **structured KIIs with purposively selected seed multipliers** in Al-Malikeyyeh and Ar-Raqqa sub-districts.

The results from surveys with farmers are only generalisable for the population from which the sample was taken (i.e. beneficiaries of humanitarian organisations). Partners selected the farmers from their beneficiary list who met all selection criteria set by the FSL working group. This included that farmers grew wheat on 10 or more dunums (one dunam is equal to 1,000 square metres). In addition, to be included in the assessment farmers had to have access to a permanent source of irrigation water at the time or in the 2020/2021 season.

Figure 1: Number of farmer surveys by sub-district



Results from the KIIs with seed traders and multiplers are indicative only. Partners were required to interview at least three trader KIs in each sub-district that are either large wholesalers or retailers selling wheat seeds, and have knowledge of the seed trade in their sub-district. Partners interviewed three KIs in Al-Hasakeh, Al-Malikeyyeh, Areeshesh, and Sur sub-districts, and six KIs in Ar-Raqqa sub-district.

In addition, partners were required to interview a minimum of three seed multiplier KIs who were either members of a committee related to seed multiplication in the sub-district or were large seed multipliers with substantial knowledge about seed propagation in their sub-district. Partners interviewed six KIs in Ar-Raqqa, three in Al-Malikeyyah, and one KI in both Al-Hasakeh and Menbij sub-districts.

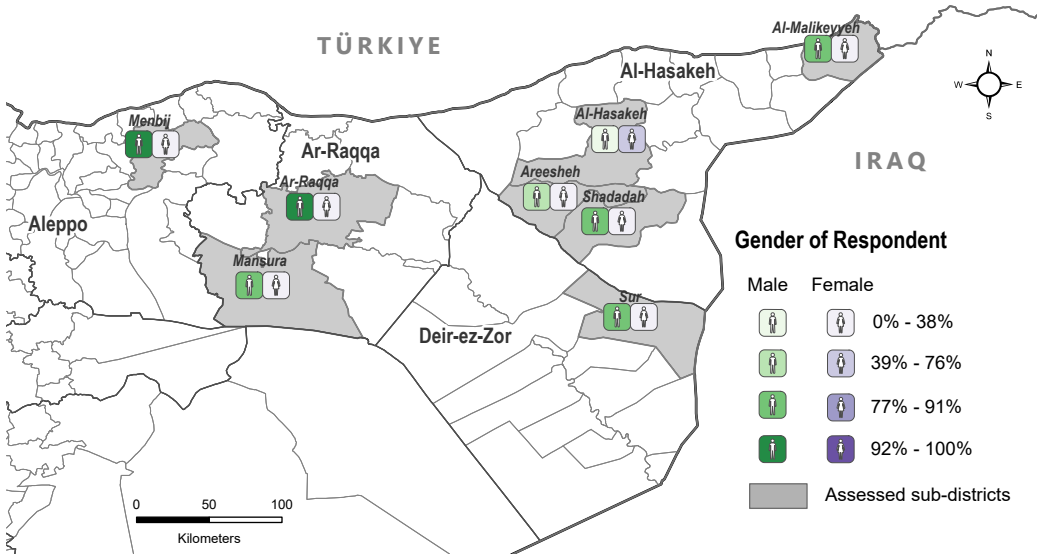
LIMITATIONS

The results of this assessment should be viewed with the following limitations in mind. Firstly, the sample for the assessment was taken from list of farmers that are beneficiaries of humanitarian organisations (receiving cash or in-kind goods) known by FSL partners. Therefore, any data or information in this report that is only generalisable specifically for this population group at the sub-district level. Further, this meant that not all locations in NES were included in the sampling frame nor were all farmers, seed multipliers, or seed traders within an assessed area.

Additionally, the information provided in this report on seed varieties, types, or qualities is based on the respondents' (whether farmers, trader KIs, or seed multiplier KIs) own knowledge and perceptions; such reports may therefore not be precise in all cases. Surveys with representatives of seed multiplers in Al-Hasakeh and Menbij sub-districts were limited as data collection partners were not able to identify the minimum number of KIs (three). In these cases they were only able to collect data with one KI for each sub-district which could impact the extent to which the information is indicative of the situation in these locations.

Furthermore, respondents might feel more or less inclined to share their actual experiences based on the expected effect they might have on their business or on humanitarian programming. Lastly, data collection was conducted by muliple partners. Even though all enumerators received the same training, some might have had more previous experience and might therefore have been better able to produce higher quality data.

Map 2: Gender of surveyed farmers [n=418]



AGRICULTURAL PRACTICES

Proportion of farmers growing wheat

Wheat is the most dominant crop cultivated in NES (Figure 2), with all farmers interviewed reporting that they cultivated wheat in the 2021/2022 season. The results showed that surveyed farmers have been cultivating wheat for 19 years on average. Surveyed farmers were predominantly men (81%), as shown in Map 2.

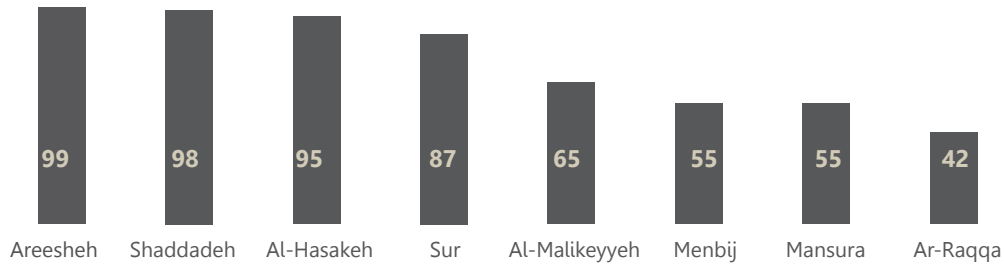
Figure 2: Farmers reporting cultivating wheat, barley, corn/maize in the 2021/2022 season in selected locations (as % of surveyed farmers) [n=418]*

* Respondents could select multiple answers, therefore findings might exceed 100%

Types of wheat cultivated

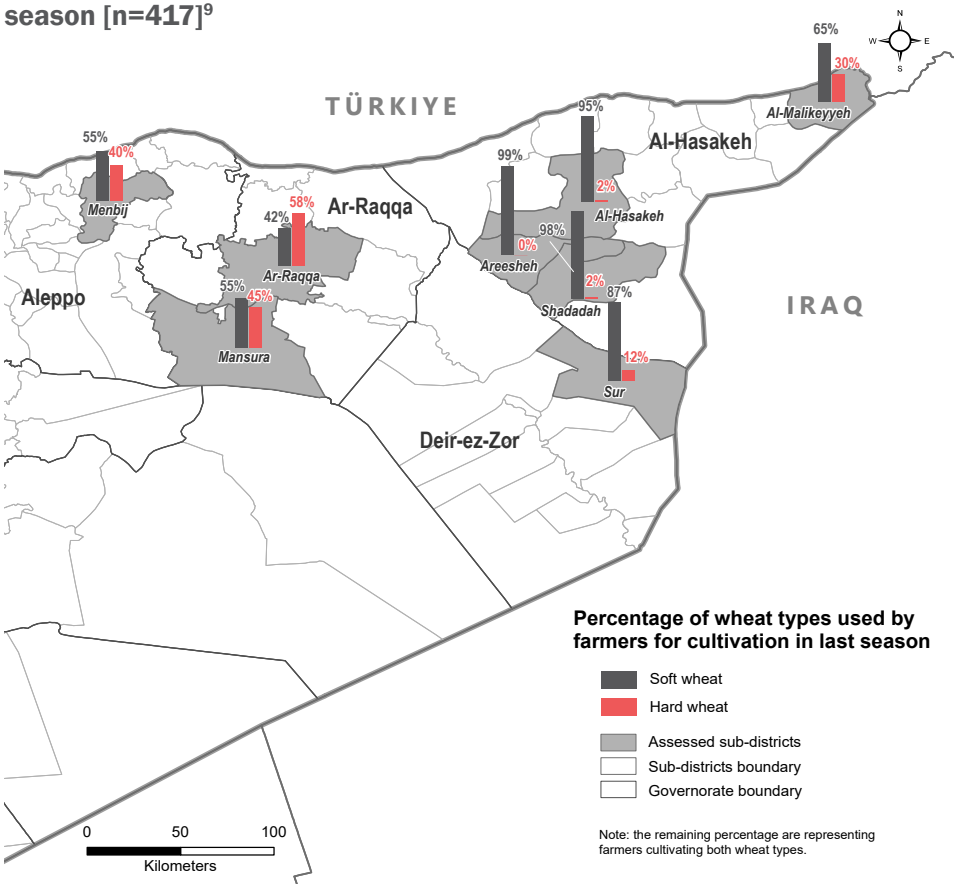
There were fourteen wheat seed varieties included in the assessment which can be broadly categorised into two main types: soft wheat (bread wheat), and hard wheat (or durum wheat). Across the surveyed sub-districts, soft wheat varieties were most commonly cultivated during the 2020/2021 wheat season (see Map 3); 79% of surveyed farmers reported planting soft wheat seeds and soft wheat is exclusively cultivated in several sub-districts (Figure 3). Since hard wheat is grown mostly under rain-fed conditions, the water deficit conditions in NES impact its productivity and quality. Water needs for soft wheat are comparatively lower although they are still vulnerable to heat and drought stress.[8]

Figure 3: Cultivation of only soft wheat varities in the 2020/2021 season by sub-district (as % of surveyed farmers)



The results suggest that farmers' choice of seed is likely influenced by distribution from seed multiplication centres based on recommendations for the particular AEZ. Approximately half of seed multiplier KIs (45%) reported that only one type of seed was propogated by seed mulpitliers in the 2020/2021 season, which would impact farmers' access to one or the other variety. Seed multipliers in Al-Hasakeh sub-district for example, where soft wheat is overwhelmingly planted, reported exclusively propograting soft wheat varieties. Comparatively, in Ar-Raqqa, Menbij, and Al-Malikeyyah sub-districts where farmers reported planting both seed types, seed multipliers also propogated both types. For details on varieties used by seed traders and multipliers, see Annex 1.

Map 3: Type of wheat seeds planted by farmers per sub-district in the previous season [n=417][9]



Average land use

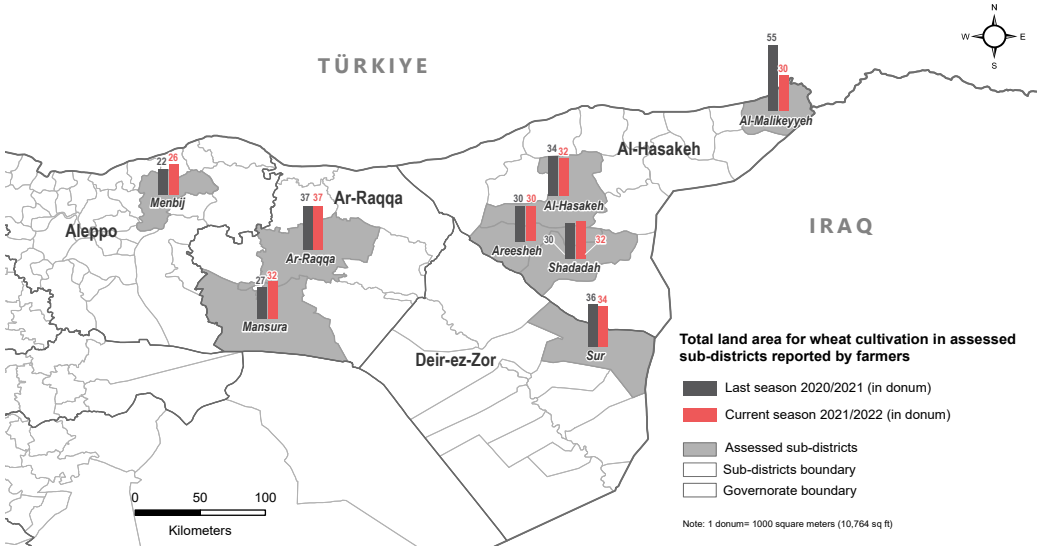
During the 2021/2022 season, farmers reported cultivating wheat on and average of 32 donums of land. Map 4 shows that farmers in each sub-district reported the average land area used for wheat cultivation for the 2021/2022 season was similar to that used in the previous season of 2020/2021. However, there was a considerable reduction (over 25%) of the average land area used in Al-Malikeyyeh sub-district in Al-Hasakeh governorate. This sub-district is located in AEZ 1 and is a critically important area for wheat production. Such a decrease of land used for wheat production as such has significant implications for food security across NES and Syria more broadly.

This was also the only sub-district in Al-Hasakeh governorate where a mix of both hard and soft wheat vaireties were planted by farmers, and propograted by seed multipliers. This potentially suggests that farmers relying on hard wheat varieties were less able to cope with the drought conditions compared to those planting soft wheat varieties that tend to require less water.

There are, modern drought tolerant varieties of hard wheat, including Cham 1, Cham 3, Cham 5, Cham 6, Hourani and Doma1. Notably 100% of surveyed farmers in Ar-Raqqa sub-distict and 75% of surveyed farmers in Sur reported purchasing Doma1 in the past give years, while access to other new drought tolerant varieties was generally low across the assessed sub-districts.

In general, there are potentially greater prospects for breeding climate-resilient varieties of hard wheat.[7] However, as the results on wheat seed quality on page 11 show, less than 30% of surveyed farmers reported that the wheat seeds they planted were improved (genetically modified to be more resilient to local environmental conditions), indicating market access to climate-resilient varieties in NES remains a challenge.

Map 4: % change in the area of land used for wheat cultivation between the 2020/2021 and 2021/2022 seasons



Irrigation practices

Farmers were asked about the source of water they used for irrigation in the 2020/2021 season, with the majority (70%) reporting relying on private wells/ boreholes (Figure 4). This was particularly the case in Al-Hasakeh governorate (Map 5) which has been particularly impacted by the combined effect of reduced rainfall and unreliable flow of water from Turkish controlled areas; such factors increase reliance on and depletion of underground water sources.[10]

In Al-Malikeyyeh sub-district however, 30% of farmers reported relying on rain-fed practices. As mentioned in the section on land use, this was also the key area where there was a notable reduction in land area used for wheat production between the 2020/2021 and 2021/2022 wheat seasons, highlighting the impact of the drought and increasngly erratic rain-fall patterns on wheat production.

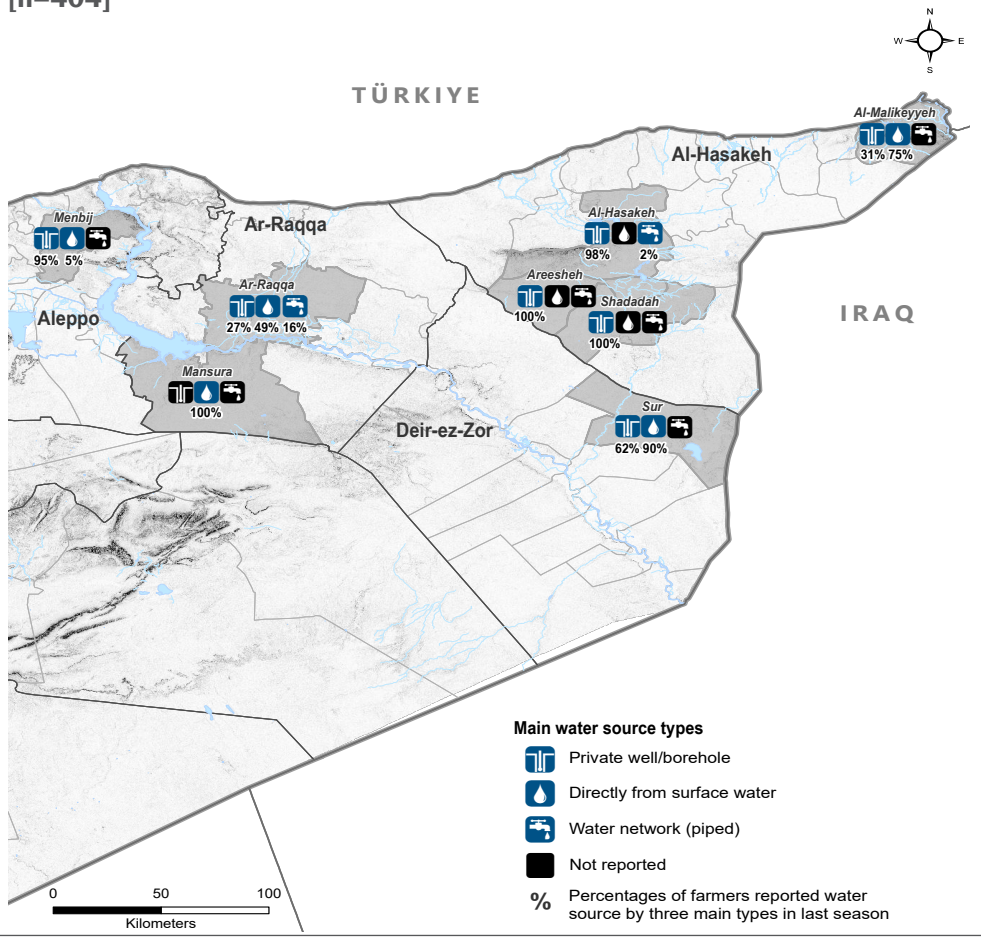
As Figure 4 below shows, sources for irrigation water were primarily private wells and boreholes, and to a lesser extent surface water, including lakes, rivers, or irrigation canals. In addition, farmers predominantly rely on surface irrigation systems while notable no farmers reported using drip systems (Figure 5); this potentially suggests production is impacted by water wastage from evaporation where drip irrigation systems ensure greater water saving and water productivity. The majority of farmers reported starting irrigation practices in November or December 2021 for the 2021/2022 wheat season.

Figure 4: Type of water source for wheat irrigation in the 2020/2021 season (as % of surveyed farmers) [n=404]*

* Respondents could select multiple answers, therefore findings might exceed 100%

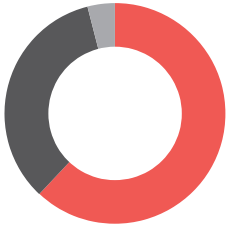
Figure 5: Type of irrigation system used in the 2020/2021 season (as % of surveyed farmers) [n=404]*

Map 5: % of reported water source for irrigated wheat in the 2020/2021 season [n=404]



PAST WHEAT SEASON (2020/2021) CHALLENGES

Figure 6: Farmers' expectations of yeilds from the 2020/2021 wheat season (as % of surveyed farmers) [n=417]



Lower than expected	62%
As expected	34%
Higher than expected	4%

The majority of farmers reported that their yeilds from the 2020/2021 wheat season were lower than expected (Figure 6). To contextualise this, farmers were asked what the primary challenges they faced were in their production in the previous 2020/2021 season, with **drought** being the most commonly reported challenge (83% of surveyed farmers). Drought impacts the availability of all water sources. In Menbij for example, farmers were impacted by both decreasing water levels in the Euphrates River, as well as decreasing groundwater levels.[11] Furthermore, during drought conditions the availability and affordability of drought-resistant wheat seed varieties are limited.

Decreased availability of water for irrigation was also attributed to **fuel shortages and unaffordability of fuel.** Manually refined diesel was the most commonly reported type of fuel used by farmers; 91% of the 400 farmers who reported needing fuel reported they rely on this type of fuel, sourced primarily from the local authorities and the local market. Of the farmers who reported increased operational costs as a key challenge, 86% reported that the cost of fuel was a key factor contributing to increasing operational costs.

Fuel is required to operate water pumps to extract groundwater, which farmers are increasingly dependent on in the context of reduced surface water levels. Where rainfall in the 2020/2021 season was low farmers should have irrigated their crops more often to maintain yield levels. The high cost of fuel limits their ability to do so, and even when farmers are able to purchase fuel, low groundwater levels prevent them from pumpng sufficient water for their needs. Given the high cost of fuel many farmers reduce the frequency of irrigation to their crops, or the area irrigated.

83% of surveyed farmers reported **drought** as a challenge
57% of surveyed farmers reported **shortage of fuel** as a challenge
54% of surveyed farmers reported **lack of fertilizers** as a challenge
31% of surveyed farmers reported **lack of seeds** as a challenge

In addition, fuel is often required to pump water from lower to higher levels. For example, although all farmers in Mansura sub-district reported using surface water for irrigation in the absence of irrigation canals, pumps were still required to move water from a lower to a higher elevation. As such, farmers in this sub-district were also impacted by increased fuel costs. Fuel in general is critical for harvesting, transporting, and milling of flour; as such, shortages impact each stage of the production cycle. Where a vast majority of flour used to produce bread in NES is sourced locally, fuel shortages significantly impacts the extent to which actors can maintain affordable production, which is passed onto consumers.[12]

In addition, the large majority of surveyed farmers (91%) also reported that the **cost of fertilisers** had increased, impacting their overall operational costs. Where farmers lack liquidity, the increasing cost of such inputs directly impacts production levels. Such findings from farmers in NES are in line with global trends on the impact of increasing fertilizer costs on agricultural production. This has considerable implications looking at a recent study that sought to quantify the potential outcomes of increasing agricultural input costs, notably fertilizer, on global food security.[13] Specifically the report found that the increasing cost of agricultural inputs combined with export restrictions from Ukraine could increase food prices by 60 to 100% in 2023, grossly impacting undernourishment and related deaths.

Each of these top three challenges identified by farmers are likely to persist in the context of climate change and the tripple water crisis affecting Syria, on-going currency depreciation and price inflation of key imported inputs such as fertilisers, and the worsening fuel crisis. This suggests future wheat crop yields will continue to decline in NES, particularly in years of erratic and low-rainfall, with significant implications for food security more broadly.

Table 1: Challenges reported faced by farmers by sub-district during the 2020/2021 wheat season [n=417]*

Sub-district	Sample size	Pests	Drought	Frost	Ground mice	Fires	Shortage of fuel	Lack of seeds	Lack of fertilisers	Lack of labour	Damaged irrigation systems	Movement restrictions	Increasing operational costs	None	Other
Menbij	20	5%	100%	0%	0%	5%	60%	0%	40%	5%	0%	20%	100%	0%	0%
Al-Hasakeh	64	20%	72%	6%	5%	6%	39%	14%	20%	3%	2%	0%	14%	0%	0%
Shadadah	57	0%	84%	14%	0%	2%	79%	28%	33%	4%	0%	0%	12%	0%	0%
Areesheh	75	0%	92%	3%	0%	0%	69%	41%	47%	1%	0%	1%	8%	0%	0%
Al-Malikeyyeh	23	39%	91%	0%	9%	0%	0%	0%	13%	0%	0%	0%	0%	0%	0%
Sur	78	41%	95%	3%	0%	3%	53%	33%	71%	0%	0%	0%	0%	0%	0%
Ar-Raqqa	69	33%	67%	1%	0%	0%	48%	42%	87%	10%	10%	4%	46%	1%	4%
Mansura	31	0%	65%	0%	0%	0%	90%	61%	100%	7%	23%	13%	48%	0%	7%

SEED TRADER METHODS AND PRACTICES

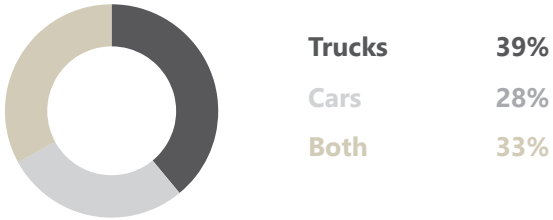
Storage of wheat seeds can protect from deterioration and is therefore important for seed quality, which in turn impacts overall wheat yields. The most common means of storage of wheat seeds were traders' own warehouses (78% of surveyed farmers) and shops (61% of surveyed farmers). Where the high cost of fuel was identified by farmers as a key challenge they face, this likely also challenges traders in summer months where room temperature should be managed to maintain seed quality and access to electricity from the public grid is intermittent, particularly in Al-Hasakeh governorate.

All KIs reported that seed traders store wheat seeds in woven polyethylene bags and sometimes in hessian sacks, and over half of KIs reported that these are kept on a concrete floor (Figure 8). In general, polyethylene bags are suitable for seed storage, although some rodents are able to chew through them, and long-term storage can still lead to poor germination and loss of productivity. The fact that more than half of trader KIs reported that seeds are commonly stored on concrete floors (Figure 8) is concerning given the difficulty of controlling moisture which can impact seed quality.

In general, traders use cars and trucks to transport wheat seeds (Figure 9), and trade of seeds largely occured locally within the sub-district (reported by 72% of seed trader KIs). The large majority of trader KIs (72%) reported such transportation is usually used for multiple purposes indicating important linkages with other trade actors and routes.

Figure 8: Traders' methods of storing seeds (as % of surveyed KI traders) [n=18]

Figure 9: Reported usage of transportation for wheat seeds (as % of KI traders)

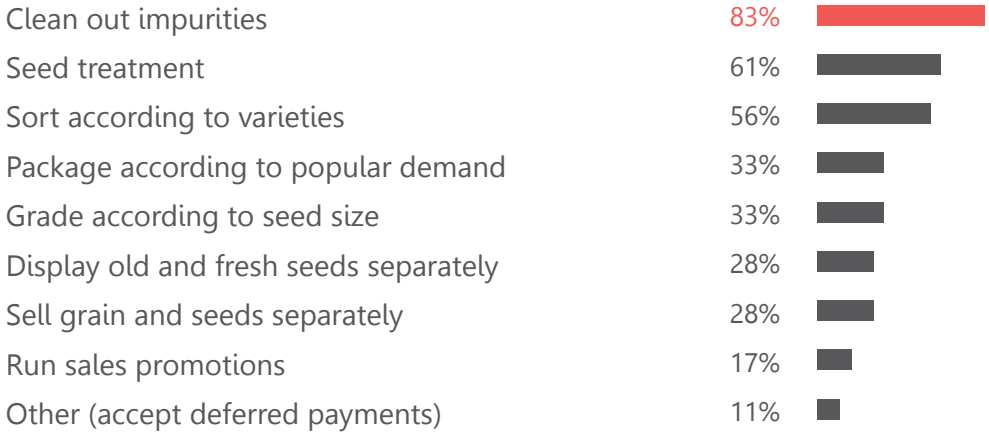


* Respondents could select multiple answers, therefore findings might exceed 100%

Furthermore, the results showed that seed traders in NES use a variety of equipment and methods to manage seed quality and increase seed sales, as shown in Figures 10 and 11. Equipment for seed screening and pest prevention were most commonly reported by KIs, in addition to methods to clean out impurities. This suggests that seed market actors are responding to seed quality concerns, which the results indicated was the primary concern reported by farmers (see page 11), although other factors such as storage of seeds on the floor and the capacity of traders to regulate the temperature and ventilation of their storage spaces may limit the effectiveness of such equipment and methods.

Figure 10: Equipment owned by seed traders (as % of KI traders) [n=18]*

Figure 11: Seed trader methods for increasing sales (as % of KI traders) [n=18]*

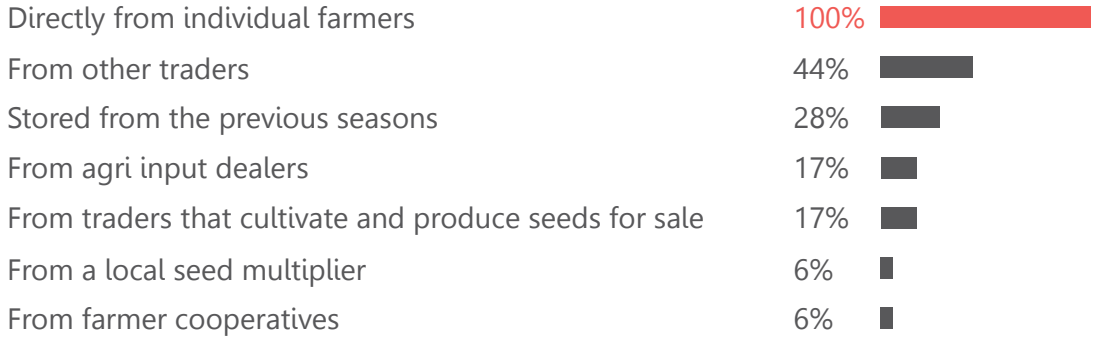


Trade practices

All trader KIs reported that seed traders mostly buy and sell their wheat seeds directly from and to individual farmers, as shown in Figures 12 and 13. This is because seed traders are not permitted to have contracts directly with the Agricultural Development Company (ADC) as farmers do. Such trade reportedly occurs across NES and is not necessarily confined to farmers within the immediate area. Specifically, almost half of KIs (44%) reported that traders also sell seeds to farmers in other sub-districts within the same district, other districts in the same governorate, and other governorates in the NES region. All KIs reported that seed multipliers did not export any part of their production to other countries in the 2020/2021 season. Taken together these findings point to the interconnectedness of markets in NES and the important role they play in sustaining the agriculture sector. Despite this, as the section on wheat seed availability shows, a large portion of surveyed farmers reported on seed shortages in the traders market to meet their needs (see page 9).

Figure 12: Traders' wheat seed customers (as % of surveyed trader KIs) [n=18]*

Figure 13: Traders' sources of wheat seeds (as % of surveyed trader KIs) [n=18]*



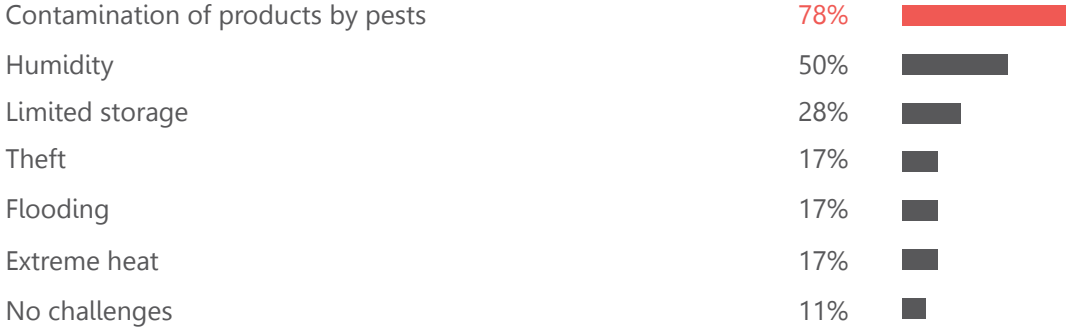
* Respondents could select more than one option and therefore percentages may not equal 100.

Furthermore, trader KIs reported that seed traders sell seeds stored from previous seasons as well as fresh seeds. Depending on how long seeds are stored for, this may also be a contributing factor to deteriorated seed quality. In general, the appropriate conditions for seed storage depend on the time period for which seeds are being stored. Where trader KIs reported seeds are often sold from previous seasons, training on seed storage could support improved packaging and protection from moisture and pests, which ultimately impacts germination. In NES, some traders are contracted by certain parties to provide seeds of specific varieties; any additional seeds stored would then be sold in the local market.

The results also indicated that seed multipliers in some areas reserve a portion of their production for sale exclusively to certain customers. For example, in Al-Hasakeh, Menbij, and Ar-Raqqa sub-districts, KIs reported that some seed multipliers sold a portion of their production exclusively to the local authorities. In Ar-Raqqa sub-district however, KIs reported that seed multipliers also reserved a portion of their production to the ADC while KIs in Al-Malikeyyeh sub-district reported that seed multipliers reserved part of their production for sale to farmers.

Other challenges varied depending on the location of traders. For example, flooding and theft were more commonly reported by KIs in Areesheh and Sur sub-districts, while extreme heat was more commonly reported by KIs in Al-Hasakeh and Areesheh sub-districts. Only 11% of KIs overall reported that traders do not face any issues.

Figure 14: Challenges faced by traders in storage of wheat seeds (as % of surveyed KI traders) [n=18]*



CHALLENGES FACED BY SEED TRADERS

The most common challenge faced by traders in storage of wheat seeds, reported by 78% of trader KIs (Figure 14), was contamination of products by pests such as rodents or insects. This was despite the fcat that over half of seed trader KIs reported that pest prevention equipment is commonly used by traders in their sub-district, potentially suggesting the equipment commonly used is not effective for the types of pests present. In addition, the reported high reliance on trucks and cars for transportation of seeds suggests seed traders' practices are sensitive to the high costs of transport and poor quality roads. This could potentially impact their ability to invest in other equipment or methods to manage contamination of their products.

When asked about what challenges traders faced in restocking wheat seeds in the 2020/2021 season (Figure 15), KIs reported most frequently on the lack of wheat production in the area and high inflation. In addition, fluctuations in the exchange rate between the cultivation period and production (approximately 7 to 8 months apart) put additional cost pressures on traders. This is because seed traders buy their inputs in USD and sell predominantly in SYP and traders may be constrained in the extent to which they are able to raise their prices enough to cover the cost of the USD for the initial purchase with inflation. Futher, in the process of transporting seeds, traders reportedly face additional challenges (Figure 16), most notably the high costs of transport (reported by 83% of KIs) and the poor quality of roads (reported by 72% of KIs).

* Respondents could select more than one option and therefore percentages may not equal 100.

Figure 15: Challenges faced by traders in restocking wheat seeds (as % of surveyed KI traders) [n=18]*

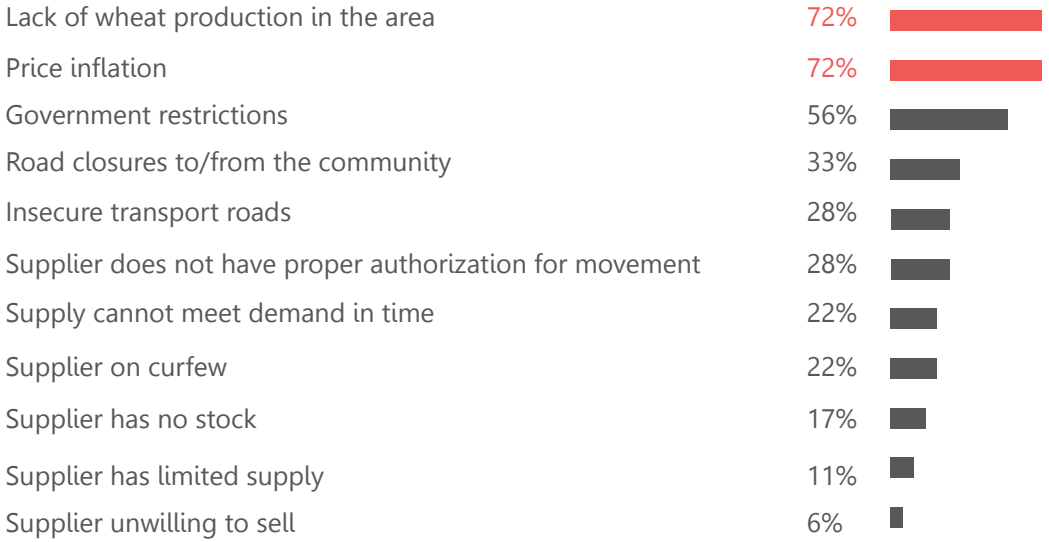
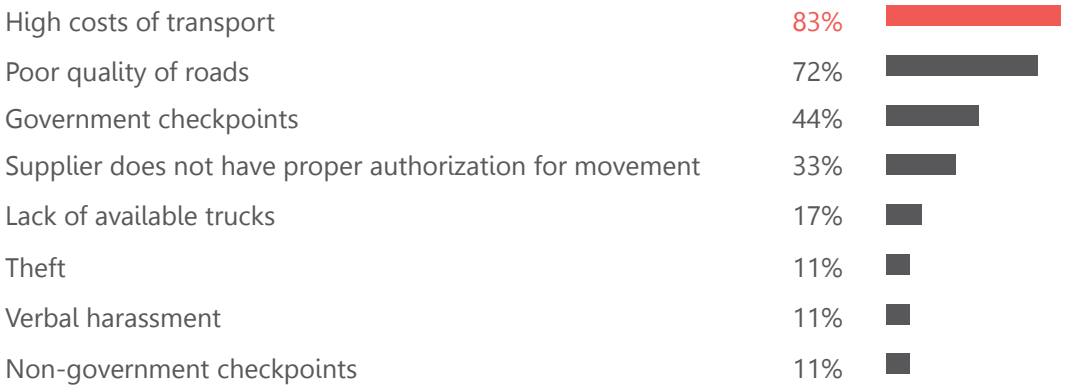


Figure 16: Challenges faced by traders in transport of wheat seeds (as % of surveyed KI traders) [n=18]*



* Respondents could select more than one option and therefore percentages may not equal 100.

WHEAT SEED AVAILABILITY

Sources and quantity of seeds obtained by farmers

The results showed that the majority of surveyed farmers primarily source wheat seeds from the informal sector. This is despite the fact that the ADC provides the majority of seeds for farmers in NES and is a key source for wheat seeds in particular. These findings are understood to reflect the fact that surveyed farmers were all beneficiaries of humanitarian organisations that themselves typically source seeds from the ADC.

Farmers in NES also tend to source a portion of their wheat seeds from local markets because of the services that seed traders provide. Most seed traders are using various methods and equipment to screen, clean, treat, sanitize and package wheat seeds (see Figures 10 and 11 on page 6). As such, seed traders in local markets act as a source for quality wheat seeds for farmers.

Table 2 below shows the average quantity of wheat seeds obtained by farmers in each sub-district during the 2020/2021. This was taken from 317 farmers (84% of surveyed farmers) who reported being able to recall the quantity of seeds they acquired in the 2020/2021 season. Overall, farmers reported sourcing an average of 1,279 kilograms of wheat seeds from a variety of sources.

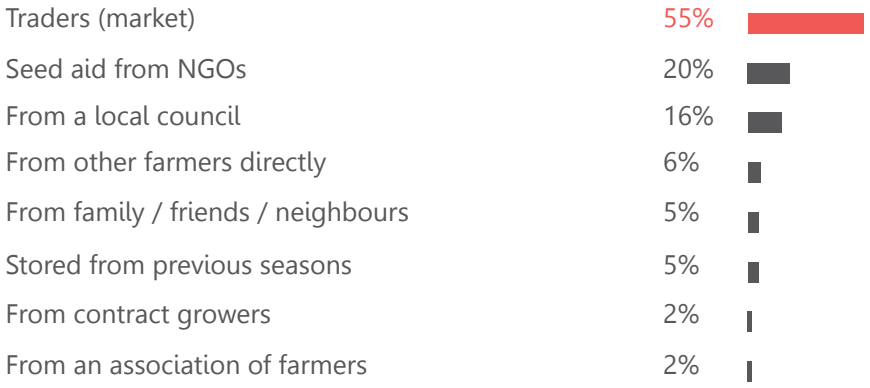
Table 2: Average quantity of wheat seeds acquired by farmers, 2020/2021 season [n=317]

Sub-district	Sample size	Mean (in kg)
Menbij	20	846.25
Al-Hasakeh	46	1408.91
Shaddadeh	36	1281.11
Areesheh	53	1430.66
Al-Malikeyyeh	15	1128.67
Sur	72	1057.15
Ar-Raqqa	51	1571.86
Mansura	24	1189.58

In addition, farmers were asked whether their suppliers were able to meet their needs in the 2020/2021 season with 35% of surveyed farmers reporting their suppliers had insufficient stocks. Figure 17 shows the specific sources that farmers identified as having insufficient supplies where over half of surveyed farmers reported on shortages from traders in the market. Such market shortages may increase farmer reliance on self-produced seeds stored from previous seasons, which could contribute to reduced yields due to reliance on generations of existing varieties.[12]

Further, in NES, farmers are expected to sow 25 kg of wheat seeds per donum (250 per hectare) as per recommendations from the Agricultural Working Group, and seed quantities are provided accordingly. However, as the results show, farmers cultivating irrigated wheat sowed approximately 300 to 350kg per hectare in the 2020/2021 season. This indicates that seeds provided by NGOs are generally not sufficient for farmers' needs.

Figure 17: Sources of wheat seeds with insufficient quantities (as % of surveyed farmers) [n=147]*



The large majority of farmers (87%) reported planting all the seeds they bought; 11% were unable to remember, and 2% reported planting only a portion of their seed supplies. Of the farmers who reported planting a portion of the seeds they bought, 60% reported that they stored the remaining seeds, 54% reported that they sold a portion of the seeds, and 4% reported that they used the remaining seeds as fodder for livestock or to produce bread.

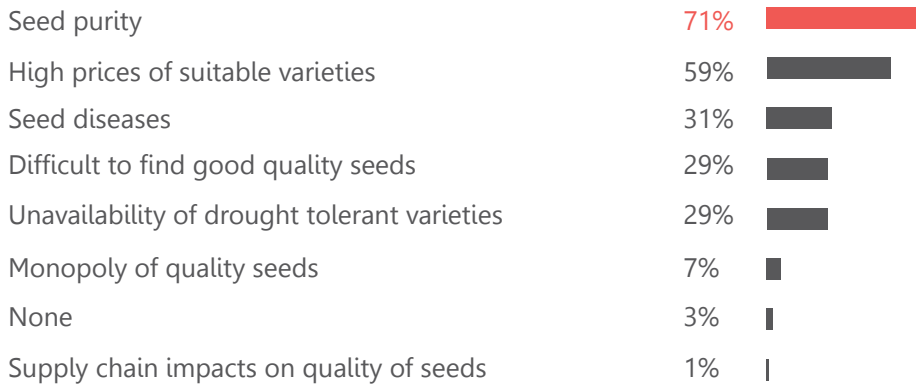
Furthermore, the offices of seed multiplication for the ADC target agricultural areas as defined by Agricultural Ecological Zones, with Zone 1 being the priority area. As such, there are a greater number of seed multiplication contracts in Zone 1 compared to elsewhere and therefore higher seed availability. This was reflected in the results whereby farmers in Zones 4 and 5 reported comparatively greater shortage of seeds.

WHEAT SEED ISSUES

Overall issues highlighted by farmers

In relation to the seeds farmers have had access to, the quality and price of seeds were the predominant concerns highlighted (Figure 18). The following sections will draw out some of the relevant findings on these key challenges identified by farmers, focusing on seed quality, cost, diseases, and access to desired varieties.

Figure 18: Primary concerns reported by farmers (as % of surveyed farmers) [n=417]*

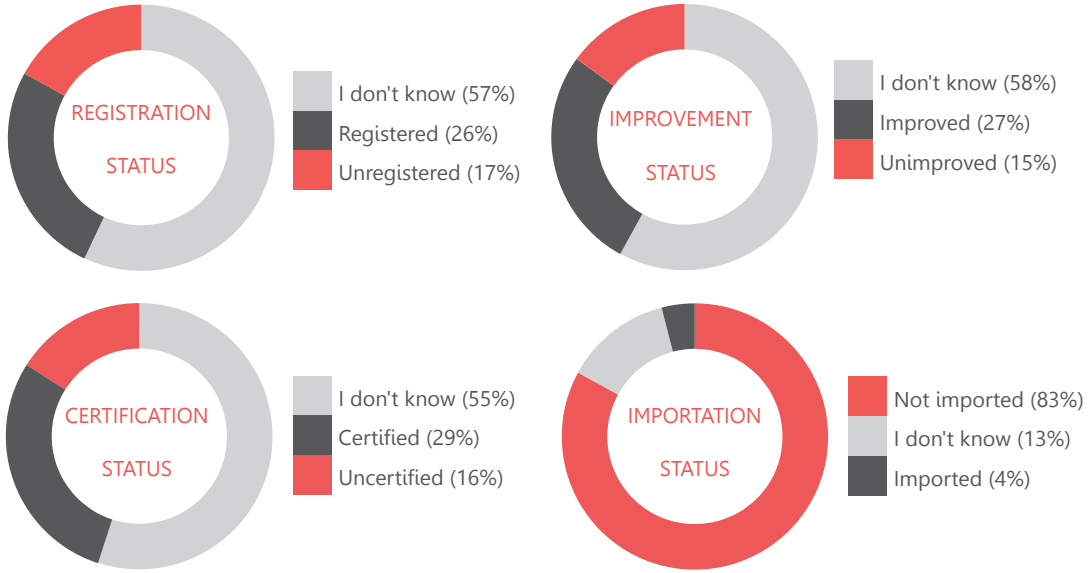


* Respondents could select more than one option and therefore percentages may not equal 100.

In this section

One component of the assessment was to ask respondents questions about every wheat seed variety that they sowed, multiplied, or sold, so long as they were able to recall this information. This section present this information providing an indication of prominant issues with wheat seeds in NES. If specific information for each variety is needed, please consult the NES Agricultural Working Group for the full HTML analysis.

Figure 19: Status of wheat seeds (as % of surveyed farmers [n=417]



Seed quality and purity

Seed purity was the most frequently reported issue by farmers. This comes in the context of gradually declining production of seeds in NES due to the ongoing drought as well as scaled back operations from the International Center for Agricultural Research in the Dry Areas (ICARDA), which is the entity responsible for providing seeds of improved quality. Considering this, the ADC have been working on maintaining the quality of available seed varieties and enhancing seed purity. This is particularly important given the lack of access to seed multiplication bodies or research centers to support improved seed quality in the region; this also impacts the availability of certified seeds in NES.

Figure 19 shows the reported status of the varieties used by farmers in the 2020/2021 wheat season.[14] Seed status was determined by four indicators selected by FSL partners to provide an indication of the quality of seeds used by farmers. Improved seeds are those that have been genetically modified to be resilient in the local environment. Registered seeds are those that have been inspected to meet particular standards and formally registered as such. Among those registered seeds, some are certified by a seed certifying agency to maintain variety purity and to be grown by farmers under specific conditions.

The results on seed status (Figure 19) indicated that the majority of farmers did not know the status of their seeds. Similarly, approximately a third of surveyed farmers did not know the varieties they used during the 2020/2021 season, indicating that there is room for improved awareness among farmers on seed varieties and improvement processes.

Across the seed status indicators (seed improvement, registration, and certification) just under a third of surveyed farmers reported positively that their seeds were improved (genetically modified to be more resilient), certified or registered. Taken together these findings suggest that access to higher quality seeds through seed improvement, registration, and certification processes in NES remains limited, and where available farmers are not broadly aware of them.

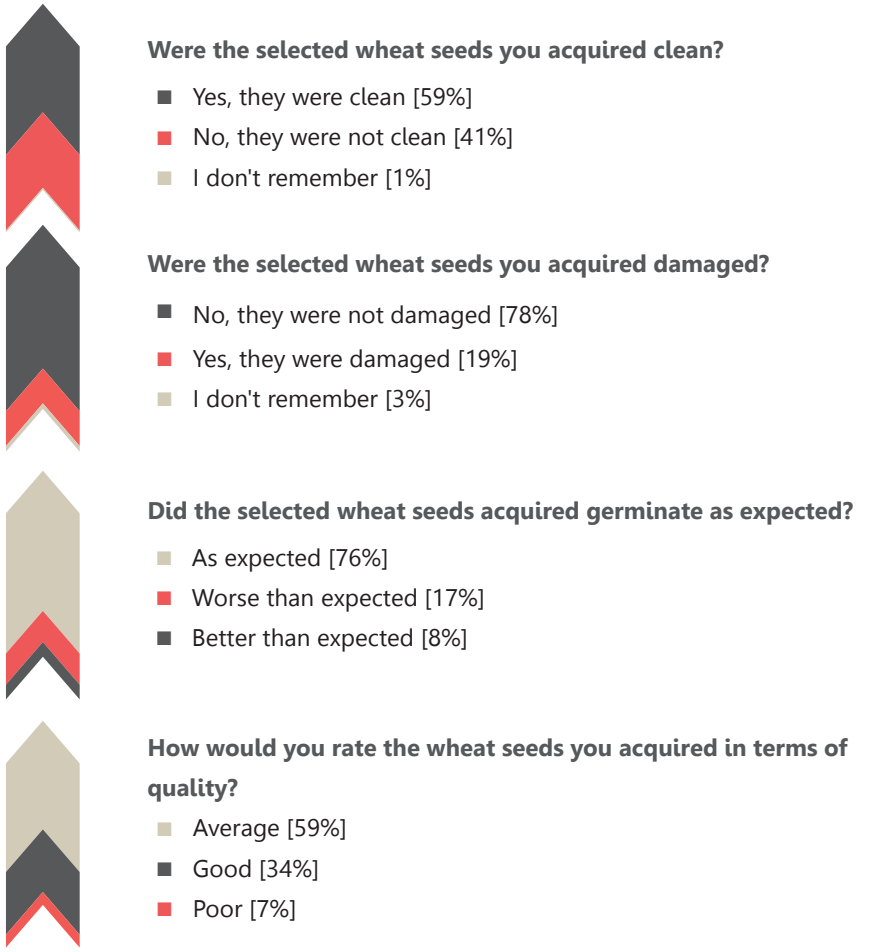
Looking at the results on seed quality as reported by seed multiplier KIs, respondents reported that wheat seed varieties within their sub-district are generally tested in a laboratory to ensure their quality. Furthermore, of the 42 seed multiplier KIs reporting on seed status (Figure 20), 62% reported that seeds used by seed multipliers in their sub-district are certified and less than a third reported that seeds are registered. These KIs reported that harvested seeds are primarily certified by the ADC, the local authorities, or the General Organization for Seed Multiplication (GOSM), which is the entity in charge of ensuring supplies of seeds for different crops and is an essential part of the agricultural production chain. A small number of KIs reported that seeds are only registered (not certified as well), and that the registration is mainly done by GOSM. In addition, a small number of respondents indicated that the varieties harvested are neither certified nor registered. Notably, only 7% reported that seeds were improved.

Finally, the majory trader KIs reported that there were none or they did not know of any registered wheat varieties that were available in the market in the 2020/2021 wheat season. Comparatively, some KIs reported that there were certified varieties available and some reported they were not available there were not, while the majority indicating they did not know. Again, this indicates that a large portion of key market actors in the wheat seed supply chain are not aware of formal processes to address seed quality issues.

Figure 20: Status of wheat seeds reported by seed multiplier KIs (as % of surveyed KIs) [n=42]

Figure 21 highlights that seeds in the 2020/2021 season tended to be of average quality and in line with farmers' expectations, with majority not being damaged but with impurities. Of the 295 farmer respondents, 85% reported that they would sow the variety they used again.

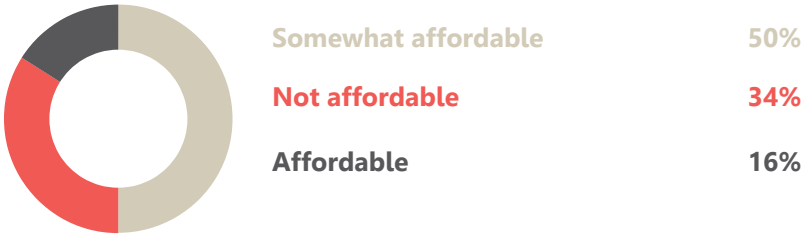
Figure 21: Quality of wheat seeds according to farmers (as % of surveyed farmers) [n=295]



Cost

Affordability of seed varieties was also identified by farmers as a key concern (see page 11). When asked specifically about affordability of seeds (Figure 22), the majority of farmers reported seeds were either somewhat affordable or not affordable, with only a small portion indicating seed prices were affordable. According to seed multiplier KIs (reported by 42 KIs who reported on the price for each variety sold to farmers in the 2020/2021 season[15]), the average price of seeds sold to farmers was 1148.21 SYP/kg. Furthermore, 28 seed traders reported on the price of different wheat seed varieties in the markets in the 2020/2021 season; the average reported price was 1274 SYP/kg. According to traders, the sale of wheat seeds usually peaks in October and falls in June, July and August.

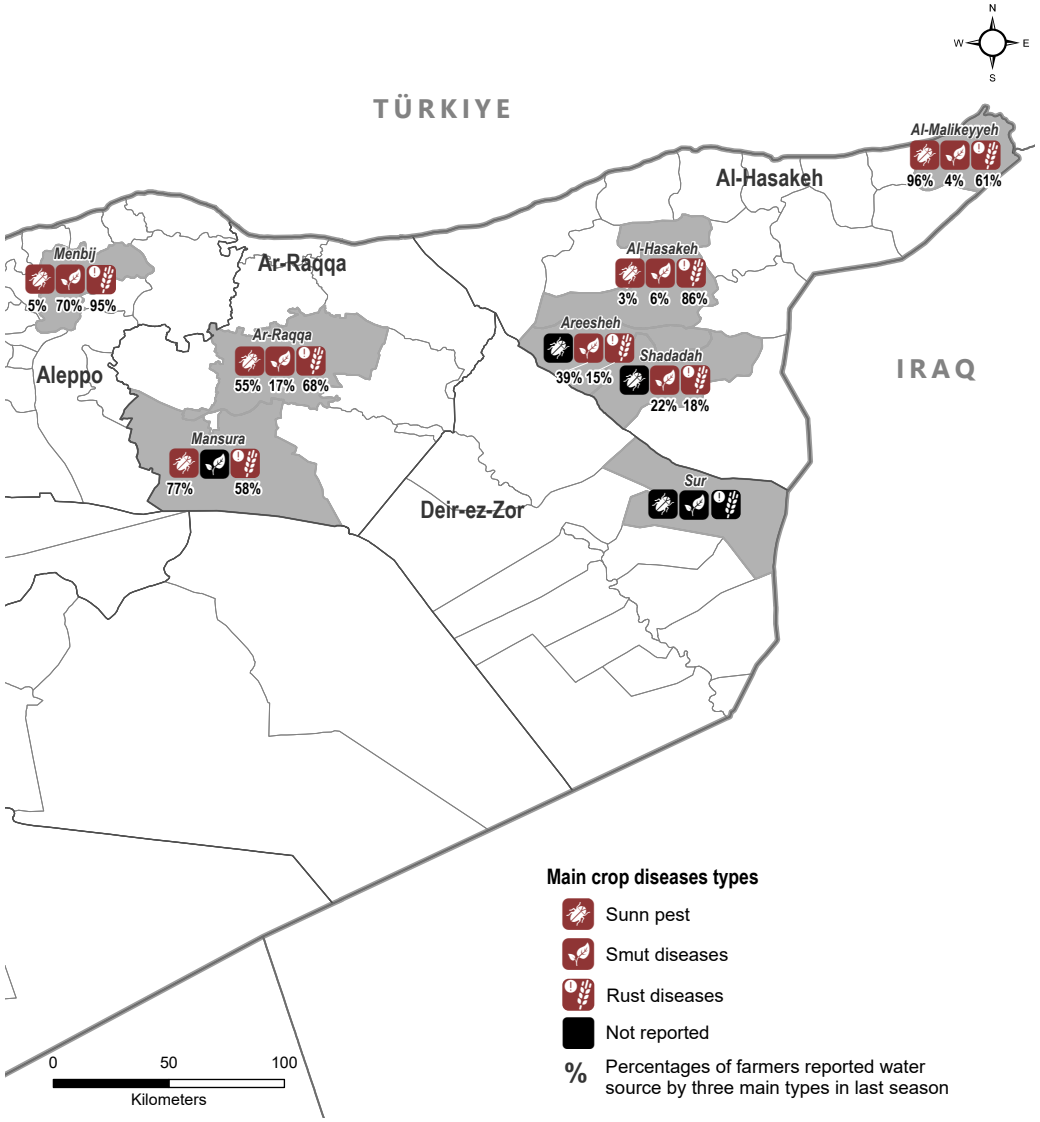
Figure 22: Seed affordability according to farmers (as % of surveyed farmers) [n=244]



Diseases

The third most commonly reported concern of wheat seed farmers was the presence of diseases (see page 11). Map 6 shows the top three types of wheat diseases that affected farmers' crops in the past three years. The most commonly reported disease was wheat rust disease, reported by 42% of surveyed farmers. In addition, 21% of surveyed farmers reported the presence of sunn pest diseases and 17% reported the presence of smut diseases. Soft wheat varieties, which majority of surveyed farmers reported planting, are reportedly more vulnerable to such diseases compared to hard wheat.[16] The prevelance of such diseases reportedly increased during the 2020/2021 season due to the warmer climatic conditions. The cost of pesticides and herbicides and employing skilled labor to apply chemicals inhibits farmers' ability to control pests and diseases.[17]

Map 6: Top three reported wheat crop diseases according to farmers by sub-district [n=417]



Further, 23% of farmers reported that they have not witnessed any type of wheat crop disease in their fields during the past three years, and most of these farmers were located in Areesheh and Shaddadah sub-districts. From the seed multiplier KIs, 11 reported on diseases in their sub-districts in the past three years. Of these, the most commonly reported disease was sunn pest, as shown in Figure 23.

Figure 23: Wheat crop diseases reported by seed multiplier KIs (as % of reporting KIs) [n=11]

Of the 319 farmers that reported the presence of at least one type of wheat crop disease, 67% reported sterilizing their wheat seeds.

34% reported using **Tebucanazol** as wheat sterilizater

31% reported using **Difenoconazol** as wheat sterilizer

21% reported using no wheat sterilizers[18]

14% preferred not to answer

2% reported using other wheat sterilizers[19]

Almost all KIs reported that pesticides are available in the local markets in their sub-district to manage diseases with the exception of one KI in Ar-Raqqa who reported that such pesticides are not locally available. Similarly, all but two KIs in Ar-Raqqa reported that seed multipliers treat their wheat seeds. Seed multipliers reportedly treat wheat seeds using Tebucanazol in Al-Hasakeh, Al-Malikeyyeh, and Ar-Raqqa sub-districts, and Difenoconazol in Menbij, Al-Malikeyyeh, and Ar-Raqqa sub-districts. These two products were reportedly available in local markets.

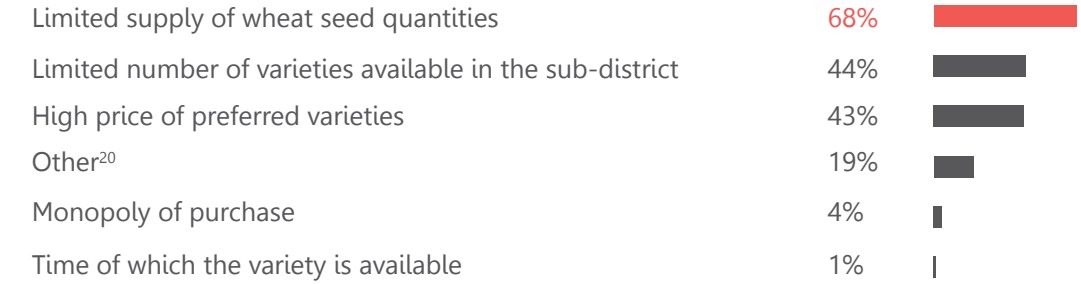
Access to desired varieties

The assessment found that access to seed varaities was not particularly impacted by monopolisation in the market. Monopolisation of specific varieties usually occurs when there is a new variety in the market or when some varieties are known to be performing better, or have been used for seed multiplication (due to higher drought tolerance for example). Monopolization is therefore usually dependent on the variety itself as opposed to availability.

89% of trader KIs reported that there were **no monopolized varieties of seeds** in markets in their sub-district

When asked about the access farmers have to the varieties of seeds they require, over half of surveyed farmers reported that they had adequate access to such varieties at the time of planting. Of the 180 farmers who reported not being able to access the required seed varieties, this was mostly due to limited supply of wheat seeds, as well as the high price of preferred varieties (Figure 24). With overall reduced harvest from the 2020/2021 wheat season, seeds are likely to continue to be difficult to source, and low seed quality as identified by farmers compounds this contributing to low germination rates.

Figure 24: Reasons farmers were unable to access the required seed varieties at the time of planting (as % of surveyed farmers) [n=180]*



* Respondents could select more than one option and therefore percentages may not equal 100.

CONCLUSION

This assessment, conducted in partnership with the NES FSL working group, aimed to assess key seed security indicators including availability, accessability and quality of wheat seeds through interviews with key market actors in the sector including farmers, seed traders, and seed multipliers. The results overall point to several stress factors that are impacting the wheat seed market system; these include drought, price inflation of key inputs such as fuel and fertilizers as well as the unaffordability of seeds themselves, limited availability of water for irrigation, limited seed supply and stocks, and seed quality issues. Several of these challenges are interlinked; for example limited fuel supply at increasing costs compounds the impacts of drought where farmers rely more heavily on private wells in times of reduced rainfall, which requires fuel for pumping water.

The assessment showed that overall such challenges resulted in lower than expected wheat yeilds in the 2020/2021 wheat season, and in one sub-district in Al-Hasakeh governorate a real reduction in land use for wheat. Where such challenges are in many cases likely to persist, particularly in relation to price inflation of key inputs, fuel shortages, and reduced rainfall, the implications for overall food security in Syria are alarming. Not only impacting directly the livelihoods of those market actors in the sector, rising prices of wheat staples amplify existing poverty and food insecurity. Taken together these findings suggest that increasing the purchasing power of populations in NES alone will not alone meaingfully address food insecurity, but rather interventions that address the availability and supply of seeds will be critical.

ENDNOTES

1. United Nations World Food Programme (WFP). (May 2021). Syria mVAM Bulletin #55.

2. Syria Direct. (May 2021). Northeast Syria's farmers brace for a catastrophic harvest amidst a severe water crisis.

3. NES Agriculture Working Group (AWG) & iMMAP. (October 2021) Crop Monitoring and Food Security Situation NES 2020/2021 Winter Season Post Harvest Overview

4. NES Forum. (July 2021). Wheat Appeal North East Syria - Effects of the water scarcity on food security.

5. COAR. January 2022. Syria Update- Syria's Wheat Crisis Foreshadows Famine.

6. Since this report will focus on the farmers survey results, and because the sub-districts where data collection for traders and seed multipliers differed from those for farmers, the report will only focus on the results related to the sub-districts where data collection with farmers took place.

7. The wheat season in NES normally starts with land preparation during the months of August to October, followed by planting during early November and late December, and lasts until harvest during June and July. [Current Season (2021/2022) is between August 2021 and July 2022, and Past Season (2020/2021) is between August 2020 and July 2021].

8. Phuke, R. M., Ambati, D., Singh, J. B., Prakasha, T. L., & Sai Prasad, S. V. (2022). Prospects of Durum Wheat in the Realm of Climate Change. In New Horizons in Wheat and Barley Research (pp. 485-506). Springer, Singapore.

9. Only 1% of farmers reporting using both types and this is not visually represented in the map. As such percentages shown in the map do not always equal 100%. Those sub-districts where farmers reported using both types of wheat included Menbij (5%), Al-Hasakeh (3%), Areesheh (1%), Al-Malikeyyeh (4%) and Sur (1%).

10. FAO, Special Report, FAO Crop and Food Supply Assessment Mission to the Syrian Arab Republic, December 2021

11. REACH. (April 2022). Briefing Note: Humanitarian Impact of Water Shortages in Northeast Syria.

12. Fadi Adleh and Diane Duclos, 2022, Key considerations: Supporting 'Wheat-to-Bread' Systems in Fragmented Syria

13. Peter Alexander, Almut Arneth, Roslyn Henry, Juliette Maire, Sam Rabin, and Mark D. A. Rounsevell (December 2022) High energy and fertilizer prices are more damaging than food export curtailment from Ukraine and Russia for food prices, health and the environment.

14. The status of the variety is based on 4 indicators: Variety Registration, Variety Improvement, Variety Certification, and Variety Importation. For more information on which seed varieties were reported according to status and source, please consult the analysis links attached to this factsheet.

15. This is not to be mistaken for the number of KIs. The total number of seed multiplier KIs was equal to 11. The number reported here represents the total number of responses across all varieties as a single KI could submit information for multiple varieties. Similarly, this is the case looking at the responses of traders on seed varieties.

16. iMMAP and NWS FSL Agriculture Working Group. (April 2022). The influence of Climate Change on Wheat Production A review study on Northeast Syria.

17. Other diseases reported were largely leaf miner worm and aphids; these were reported in Al-Malikeyyah sub-district.

18. These farmers might have received wheat seeds that are already sterilized because the seeds from traders or the Agricultural Development Company are mostly sold/distributed as sterilized seeds.

19. Other responses: Vitafix, Raxil Super, Herbicides, Broaded (fungicide), Decis (pesticide), Amistar, Zinet gold.

20. Other responses include: "Unknown varieties, Unclear/No classification process of seed varieties, Unavailability of pure seeds, Unknown varieties for farmer's seeds, There is a mix between varieties in markets."

Annex 1

Table 3: Type of wheat seeds propagated by seed multipliers across sub-districts [n=11]

Sub-district	#KIs	% of KIs reporting soft wheat	% KIs reporting hard wheat	% of KIs reporting both soft and hard wheat
Menbij	1	0%	0%	100%
Al-Hasakeh	1	100%	0%	0%
Al-Malikeyyeh	3	0%	0%	100%
Ar-Raqqa	6	16.70%	50%	33.30%

Table 4: Wheat varieties sold by wheat traders per sub-district [n=18]

Sub-district	#KIs	Duma 1	Duma 2	Duma 4	Duma 6	Cham 3	Cham 5	Cham 6	Cham 7	Cham 9	Bohouth 7	Bohouth 9	Bohouth 10	Bohouth 11	ACSAD65	Other*
Al-Hasakeh	3	0%	33%	0%	33%	0%	0%	0%	33%	0%	0%	0%	0%	0%	0%	67%
Areesha	3	0%	0%	0%	67%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Al-Malikeyyah	3	33%	33%	67%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sur	3	0%	0%	100%	33%	33%	0%	67%	0%	0%	0%	0%	0%	11%	0%	0%
Ar-Raqqa	6	50%	33%	0%	17%	0%	0%	17%	17%	0%	0%	0%	0%	0%	0%	17%

Table 5: Wheat varieties propagated by seed multipliers per sub-district [n=11]

Sub-district	#KIs	Duma 1	Duma 2	Duma 4	Duma 6	Cham 3	Cham 5	Cham 6	Cham 7	Cham 9	Bohouth 7	Bohouth 9	Bohouth 10	Bohouth 11	ACSAD65	Other*
Manbij	1	100%	0%	100%	0%	100%	0%	0%	100%	0%	100%	0%	0%	100%	0%	100%
Al-Hasakeh	1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Al-Malikeyyah	3	100%	100%	100%	100%	0%	0%	0%	100%	0%	100%	0%	0%	0%	100%	100%
Ar-Raqqa	6	33%	17%	33%	0%	67%	0%	0%	17%	0%	17%	17%	0%	33%	0%	0%

*The other varieties that were reported by seed multipliers were Tiger, Baran, Golan 2, and Dijla. For seed traders, the other varieties that were reported were Cham 1, and some responses were mixed.