



Assessment of Wheat Production and Marketing Systems in East Hararghe Zone of Oromia Region, Ethiopia

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Abstract: The study was undertaken in selected districts of East Hararghe Zone of Oromia Region, with objectives to assess and describe wheat production and marketing systems in the area. As sampling procedures, three stage sampling procedures were employed to select a total of 253 sample farmers. Primary data were collected from sampled households through a household survey, and the collected data were analyzed using descriptive statistics. On average about 0.48 hectares of land was allocated to wheat, and the average productivity of wheat was 20.87 quintals per hectare in the study area. The survey result also indicated that about 63.7%) of the farmers have used improved wheat seeds. Moreover, the survey result indicated that six major wheat-marketing channels were identified to deliver the product from producer to consumers in the study area. Diseases, shortage of improved seeds, timely unavailability of inputs, and lack of access to pesticides were found as the main constraints in the area. To address these constraints and to enhance wheat production and productivity in the area, recently released improved wheat varieties (rust resistant, adaptation and good yield potential) should be introduced and delivered to farmers to ensure increased wheat productivity, and research centers and Universities has been striving toward releasing improved wheat varieties. The extension system, Research centers and other stakeholders need to place a greater emphasis on improving availability of improved seeds, and dissemination of knowledge that will help the farmers in the access and use of inputs. The government gives emphasises to improving access to tractors and combine harvesters, and promotion of wheat row planters and small scale wheat threshers in the area.

Keywords: Wheat Production, Marketing System, Market Channels, East Hararghe

1. Introduction

Wheat (*Triticum aestivum* L.) is an important industrial and food grain which ranks second among the most important cereal crops in the world after rice and traded internationally [4, 13]. Wheat is one of the most important cereal crops grown in several African countries including Ethiopia, and demand for wheat is increasing in Africa and sub-Saharan countries because of income growth, urbanization and dietary diversification [14, 21]. In sub-Saharan African countries, wheat is also a strategic commodity which generates farm income and improves food security status [3, 16]. But in sub-Saharan countries including Ethiopia produce wheat only about 30% of their domestic

requirements, and the heavy dependence on imports and making the region highly vulnerable to a global market and wheat supply shocks [17].

In Ethiopia, wheat is one of the strategic cereal crops for the majority of Ethiopian's population, and it plays an important role in the development of the agricultural sector and improvement in the income levels and livelihood situations of the smallholder farmers of the country. In addition, wheat production and its marketing are increasingly becoming the means of livelihood for a million smallholder farm households in in the country and. the smallholder farmers are improving their way of life by growing and selling wheat produce so that the government promotes them to produce more for alleviating poverty [8, 7]. Moreover, in Ethiopia, wheat has been selected as one of the target crops

in the strategic goal of attaining national food self-sufficiency by producing it using rain fed and irrigation [2]. Even though the crop has a huge potential, only 20% of the total wheat production is sold, while 80% of its total production is used for consumption [1].

Ethiopia is the largest producer of wheat, ranking fourth next to teff, maize and sorghum in area coverage, and in 2019/20 production year about 1.78 million hectares of land was under wheat and the volume produced (53 million quintals) with average productivity of 29.70 quintals per hectare [6, 9]. Similarly, in East Hararghe Zone, wheat is among the most important cereal crops grown by smallholder farmers next to sorghum and maize, and it ranks third in area coverage after sorghum and maize, and it is a major source of livelihood for farm households in the Zone. In 2020 production year, about 1,705,517.66 hectares of land was under wheat and the volume produced (31 million quintals) in Oromia Region whereas in East Hararghe Zone the total area of land under wheat was 24,143.35 hectares and the volume produced was 527,273.95 quintals with average productivity of 21.84 quintals per hectare which is less than regional and national yield [9]... In Ethiopia in general and in the study area in particular, smallholder farmers are the dominantly wheat producer and accounts for more than 92% of the country. These farmers are characterized as subsistence oriented, low productivity, entirely dependent on the weather with little investment in irrigation and characterized by the traditional production and market systems. In addition, lack of sufficient mechanization services to growers are still remaining challenges to wheat farmers in the country [5].

East Hararghe Zone has favorable climate conditions for wheat production, and market opportunities, the farmers constrained by biophysical and socio-economic constraints, and there is also inadequate information on wheat production systems, and varieties grown by smallholder farmers in the Zone [15]. In addition, despite the increasing importance, and opportunities for increasing wheat production and productivity, there was an information gap on existing wheat production and marketing systems in the study area. Hence, this study was designed with the objectives to assess and describe wheat production and marketing systems in the study area.

2. Methodology

2.1. Description of the Study Area

The study was undertaken in wheat production potential districts of East Hararghe Zone of Oromia Region. The East Hararghe Zone is located at the eastern part of Oromia regional state and it is found about 525 km away from Finfine capital of the country. The zone lies between $7^{\circ}32'N$ to $9^{\circ}44'N$ and $41^{\circ}10'E$ to $43^{\circ}16'E$ and is demarcated by West Hararge Zone from the west, Bale Zone from the south, Somali regional state from the East and Southeast, and Dire Dawa administrative council from the North. East Hararge Zone has three major agro-ecologies namely lowland, midland and high land. The lowland accounts (67.76%) followed by midland (24.57%) and

highland (7.67%) agro-ecologies. East Hararghe zone lies within an altitude of 500 to 3405 meters above sea level. Agricultural production is the main means of livelihood of the residents of the zone, and it is characterized by a smallholder mixed farming system where crop production and livestock rearing are simultaneously practiced. The main crops produced in the area include sorghum, maize, wheat, barley, haricot bean, faba-bean, vegetables such as potato, onion, cabbage, carrot, pepper; fruits, coffee and chat are produced in the zone. Livestock husbandry is also dominated by cattle, sheep, goats, camels and donkeys [11].

2.2. Sampling Method and Sample Size

Three-stage sampling techniques were used to select representative districts, Kebeles and sample farm households. In the first stage, three districts (Gurawa, Chinaksen and Jarso) were purposively selected based on wheat production potential and accessibility from East Hararghe zone in with collaboration of Zonal experts. In the second stage, wheat-growing kebeles in each district were listed and identified. Once wheat-growing kebeles were identified, six kebeles from Gurawa and Jarso districts (three kebeles from each), and four kebeles from Chinaksen district were selected. This resulted in a total of ten wheat-growing kebeles being selected randomly from three districts. In the third stage, a total of 253 wheat producer farmers were selected randomly using probability proportional to the population size sampling technique. In addition, about 90 wheat producer farmers, experts and leaders of farmers' cooperatives were purposely selected also participated in this study through Key informant interviews (KII) and focus group discussions (FGDs) in the study area.

2.3. Sources of Data and Methods of Collection

The study used primary and secondary data sources to collect data. Primary data were collected through individual interviews using semi-structured questionnaires from selected wheat grower farmers. The primary data collected from farmers include demographic and socio-economic characteristics, an area under wheat production, nature of the production system, quantities produced and sold, sales price, sources of inputs, type of varieties used and their preferences and constraints and opportunities. In addition, key informant interviews and focus group discussions were held with wheat farmers, development agents and experts by using checklists to support primary data collected through individual interviews.

2.4. Method of Data Analysis

Descriptive statistics such as frequencies, percentages, means and standard deviations were used to examine the socioeconomic characteristics of wheat grower farmers, and wheat production and marketing systems of the study area. In addition, trend analysis, ranking and preferences were used to analyze wheat production status, farmers' varieties preferences, and wheat production and marketing constraints in the study area.

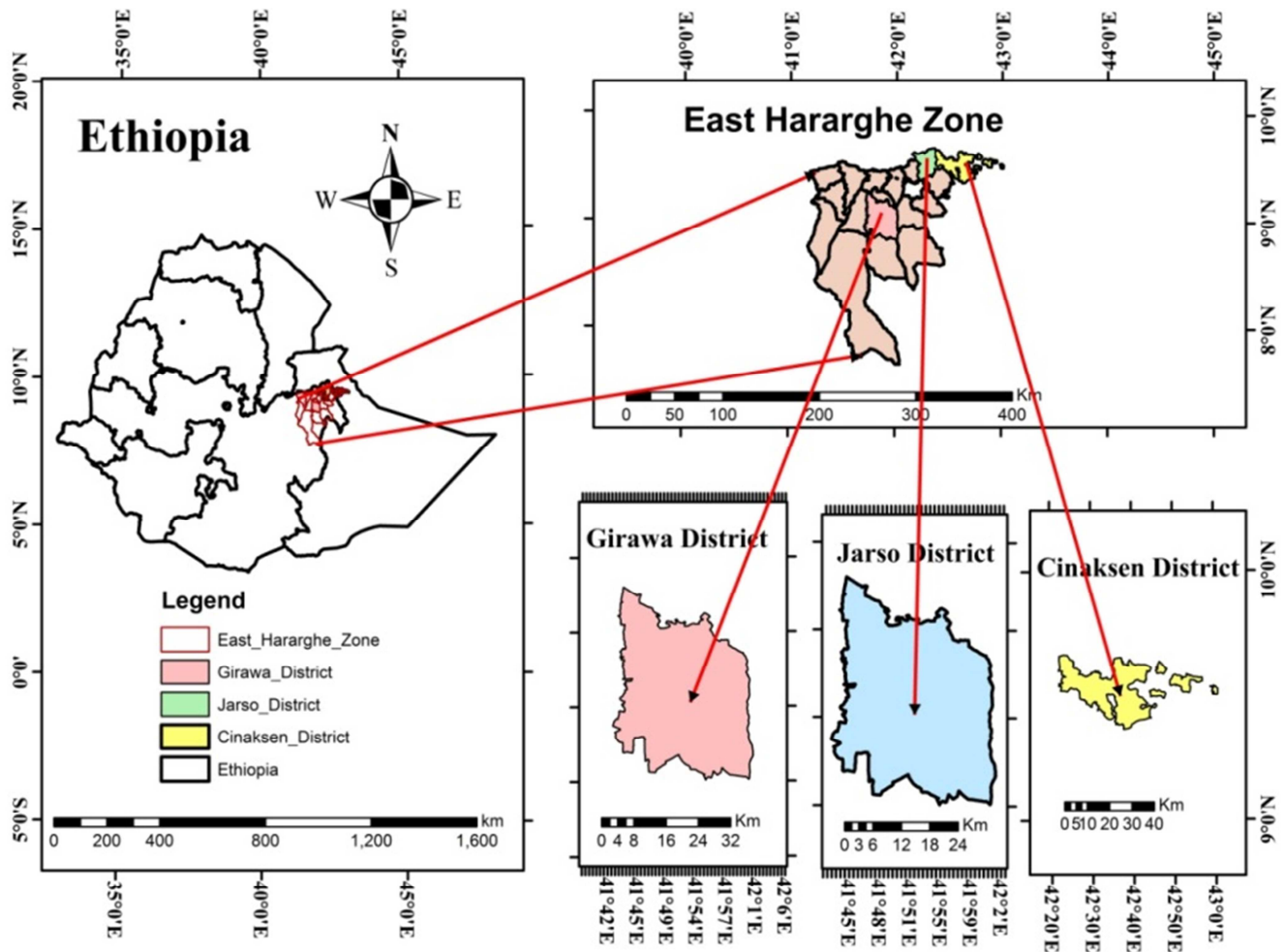


Figure 1. Location Map of study areas.

3. Results and Discussion

3.1. Socioeconomics Characteristics of Wheat Grower Farmers

The socioeconomic characteristics of wheat farmers in the study areas are presented in Tables 1 and 2. The survey result presented in Table 1 showed that the minimum and maximum age of the wheat grower farmers was 23 and 72 years respectively with a mean age of 39.24 years in the study area. There is also a significant difference among the sample wheat grower farmers in age at 1% significant level. The average wheat farming experience was 19.88 years and there is a significant difference among the households in

wheat farming experience at 5% significant level (Table 1). This shows that farmers in the study area have good experience in wheat production and this further indicates that wheat is largely produced by elder farmers in the area. As to family size, the survey result indicated that the average family size of sample wheat farmers was 7.10 persons with 86% of farmers having family sizes greater than 5 persons, and about 58% of total family members having an age of greater than 16 years. This shows that family size with age composition is important to wheat production activities which require more family labor. Concerning landholding of wheat grower farmers, landholding of the farmers was 0.125 and 6 hectares respectively with a mean of 0.693 hectares in the study area (Table 1).

Table 1. Summary of socioeconomic characteristics of sampled wheat grower farmers.

Variables	N = 253				
	Min.	Max.	Mean	Std. Dev.	t-test
Age of household head	23	72	39.24	10.99	6.50***
Experience in wheat farming	4	50	19.88	12.23	3.22**
Family size	2	12	7.10	3.29	8.49***
Total land holding	0.125	6	0.69	0.94	2.32**

Source: Own survey result, 2020, **, and *** indicates significance at 5% and 1% respectively

3.2. Wheat Production System

Wheat production in the study area is mainly for home consumption. The survey result in Table 4 indicated that on average about 0.48 hectares of land was allocated by sample grower farmers to wheat crop which is about 69.57% of their total landholding under wheat production in the study area (Table 2). This indicates that most farmers were operating by allocating more area to wheat to meet their wheat product requirements from their products and to ensure food security in

the study area. The result also indicates a significant mean difference among the sample households in land allocated to wheat production (Table 2). The average productivity of wheat was 20.87 quintals per hectare with a standard deviation of 10.39 in the study area. On the other hand, the report of the research [9] indicates that the average productivity of wheat was 21.84 quintals per hectare in the country. The average quantity of wheat produced per household was 13.40 quintals with a standard deviation of 6.40 in the study area (Table 2).

Table 2. Area allocated, production and productivity of wheat in 2019.

Variables	Min	Max	Mean	Std.D	t-test
Land allocated for wheat (ha)	0.13	6.0	0.48	0.22	3.6**
Average productivity (qt/ha)	10.0	36.0	20.87	10.39	6.4***
Wheat volume produced (qt/hh)	2.5	60	13.40	6.40	8.2***

Source: own survey result, 2020

Analysis of wheat production in the study area shows that the farmers produced an average of about 13 quintals, and the total wheat production in the study area was estimated to be 2183 quintals during 2019 production year. The largest proportion of the wheat produced was consumed at home in the study area. The study has shown that the majority (63.77%) of the wheat produce was consumed at home in 2019

production year in the study area (Figure 2). This indicates that wheat is mainly produced for home consumption purposes as part of the diet of the household to ensure household-level food security. About 30% of the wheat produced was sold to generate income during the same year. In addition, the wheat produces also stored/retained about 6.32% of the wheat produced stored for seed in the study areas.

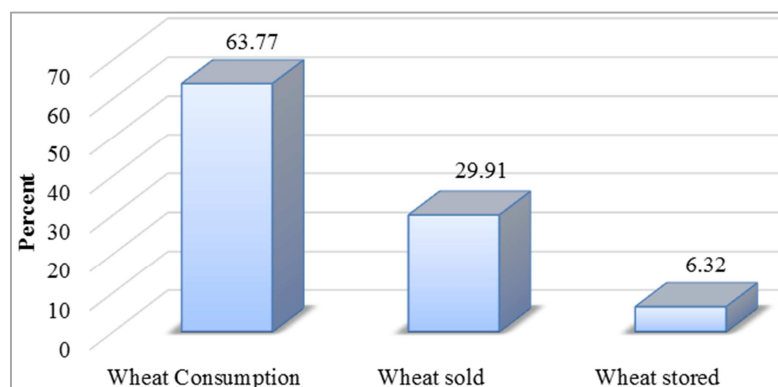


Figure 2. Wheat production and utilization in percent.

3.3. Wheat Management Practices

The survey result further indicated that about 50.20%, 26.48% and 23.32% of wheat producer farmers were used hand tillage, tractor and oxen plough methods for wheat land preparation, respectively. Land preparation using hand tillage is common in mid-highland areas. In these areas topography of the land was ragged, and the farmers owned a small plot of land and sowing of wheat is done after potato was harvested.

The survey result indicated that about 68.38% of the sampled wheat producer farmers on average ploughed their wheat land 2 times (ploughing 1 time before sowing and ploughing once for wheat seed covering whereas about 24.11% of wheat producer farmers on an average ploughed their wheat land 3 times (ploughing 2 times before sowing and ploughing once for wheat seed covering, and only 7.51%

of wheat farmers on an average ploughed their land once for sowing and covering of wheat seed in the study area. The result of the survey showed that the majority of the farmers have used recommended frequency of land ploughing for wheat in the study area. The survey result indicated that about 63.6% of the wheat farmers used row planting using the seed drill method, while 36.4% used the broadcast method for sowing wheat in the study area (Table 3). This indicated that row planting using the seed drilling method of sowing was found widely practiced among wheat producer farmers in the study area. Focus group farmers reported that the farmers used the broadcast method for sowing wheat crop previously, but nowadays, the majority of the farmers are adopting row planting for wheat in the area, and they also reported that broadcast and hand seed drill is common planting methods for wheat crop due to lack of row planter for wheat crop in the study areas.

Table 3. Method of wheat sowing in the study area.

Method of sowing	Frequency	%
Broadcast	92	36.4
Row planting using seed drill	161	63.6
Total	253	100

Source: own survey result, 2020

As to weeding/cultivation method and frequency: the farmers reported that different grass and broad-leaved species of weeds were established in wheat fields, and reducing wheat yield. Weed control using hand weeding in wheat fields is a common practice performed in the study area, and it is usually performed 2 to 3 times by hand in wheat fields. The result of the survey showed that about 64.82% of the farmers have performed 2 times weeding and inter-cultivation practices by hand and hand hoe for weed control, and fertilizer application, and 18.58% of wheat farmers have performed 3 times weeding and inter-cultivation in wheat fields whereas only 16.60% of wheat farmers have performed hand weeding and inter-cultivation once for controlling weeds and inter-cultivation in wheat fields in the area.

Improved seed use: wheat producer farmers in the study area use both improved and local wheat seeds. The result of

the survey as shown in table 4 the majority of the farmers (63.7%) who produced wheat were used improved wheat seeds, while, the remaining 36.3% of the wheat producers in the area, used local wheat seed (Table 4). Fertilizer use: the survey result indicated that the majority of wheat producer farmers in the study areas use inorganic fertilizer for the wheat crop. Out of sample wheat producer farmers, about 81% and 68.4% of them applied NPS and Urea fertilizers to their wheat fields, respectively (Table 4). However, the farmers in the study area apply varying fertilizer rates to wheat. The finding of Endale, K. [12] indicated that the use of inorganic fertilizers has shown an increase in Ethiopia recently despite having one of the lowest levels of application. Pesticides/herbicides: the survey result further showed that only 23.8% of sample wheat farmers used pesticides in their wheat fields for controlling wheat diseases and weeds, while the majorities (76.2%) of the farmers have not used any pesticides on their wheat fields but they reported wheat diseases as main challenging them in the area (Table 4). The farmers in focus group discussions were reported that lack of access to pesticides, high prices and the problem of knowhow of pesticide use in wheat production are the main limiting factors in the area.

Table 4. Input use (% respondents) for wheat in the study area.

N=253				
Response	Improved seed	Fertilizer (NPS)	Fertilizer (Urea)	Pesticides/herbicides
Yes	63.7	81.0	68.4	23.8
No	36.3	19.0	31.6	76.2

Source: own survey result, 2020

The survey result showed that on average, wheat producer farmers used the wheat seed of 160.92 kg/ha in the study area (Table 5). This is almost higher than the recommended rate (blanket) of seed per hectare which is 125 kg/ha for the area. The survey further indicated that the average amount of NPS

and Urea fertilizer application rate for the wheat was 95.87 kg and 45.27 kg/ha, respectively in the study area (Table 5). The result shows that the farmers used a low rate of fertilizers particularly use of urea less than recommended rate due to their financial affordability and access to fertilizers in the study area.

Table 5. Amount of seed and fertilizers used kg/ha in the study area.

Type of inputs	Minimum	Maximum	Mean	Std. Dev
Improved seed	100	250	160.92	45.48
Fertilizer (NPS)	50	100	95.87	34.25
Fertilizer (Urea)	20	50	45.27	29.04

Source: own survey result, 2020

Bread wheat type varieties were commonly grown by farmers in the study area. Table 6 shows the different wheat varieties grown by farmers in the study area. The dominant wheat varieties grown by the majority of the farmers in the study area were Danda'a, Pavon 76, Kekeba, Hidase and Kubsa, and based on the proportion of farmers growing these varieties Danda'a and Pavon 76 varieties were ranked as first and second whereas Kekeba, Hidase and Kubsa varieties were ranked as third, fourth and fifth, respectively in the study area. The survey result further indicated that based on the proportion of the farmers grown the varieties in the study area, Ogolcho and Kingbird varieties were ranked sixth and seventh followed by Senate, Digalu and Madawalabu

varieties, respectively in the area (Table 6).

Table 6. Wheat varieties grown and proportion of farmers in the study area.

Wheat varieties	Frequency	%	Rank
Ogolcho	20	12.19	6
Digalu	9	5.49	9
Danda'a	41	25	1
Madawalabu	6	3.66	10
Senate	10	6.10	8
Kingbird	14	8.54	7
Kubsa	26	15.85	5
Kekeba	34	20.73	3
Pavon 76	40	24.39	2
Hidase	30	18.29	4

Source: own survey result, 2020

Wheat seed source; the result indicated that the majority of the farmers (45.06%) wheat producers' farmers used seeds obtained from producers' cooperatives obtained wheat seeds from producers' cooperatives, and about 10.28%, 5.53%, 4.74% and 3.16% of wheat producer farmers used seeds from the Office of Agricultural and Natural Resource, NGOs, Research Center and University, respectively in the study area. In addition, the survey result indicates that about 17.79% of the wheat producer farmers used seeds retained from the previous harvest in the area, whereas about 11.07% and 2.37% of the farmers used seeds from other farmers and local markets, respectively in the study area (Table 7).

Table 7. Sources of wheat seed (% of respondents) in the study area.

Sources of inputs	Frequency	%
Agricultural Offices	26	10.28
Producers cooperatives	114	45.06
Research center	12	4.74
University	8	3.16
NGOs	14	5.53
Own stock/saved	45	17.79
Other farmers	28	11.07
Local market	6	2.37

Source: own survey result, 2020

The survey result indicated that only 26.5% of wheat farmers accessed and used tractor service in the area. Table 8 bellow shows that the farmers did not access and use wheat row planter and thresher in the study area. Regarding access to combine harvester and improved storage, the survey result shows that about 22.5% of wheat farmers used combine harvester, and 77.5% of the farmers used manual methods of harvesting and threshing in the area.

Table 8. Proportion of wheat farmers' access to machinery and other services.

A Access to farm machineries	Frequency	%
Accessed to tractor service (yes)	67	26.5
Accessed to row planter (no)	253	100
Accessed to combine harvester (yes)	57	22.5
Accessed to small wheat thresher (no)	253	100
Accessed to improved storage (no)	232	91.70

Source: own survey result, 2020

3.4. Production Cost and Benefit of Wheat Producers

The result of the net benefits analysis indicates that wheat production was profitable with 699.15 birrs per quintal and on average much higher than the average unit cost of production (450.85 Birr/qt) in the study area (Table 9).

Table 9. Cost and benefit of wheat production in the study area.

Variables	Mean	Std. Dev
Produce (qt)	20.87	6.40
Average selling price (Birr/qt)	1150	1500
Production cost (Birr/qt)	450.85	1580
Revenue (Birr)	28174.5	23500
Net benefit (Birr/qt)	699.15	-

Source: own survey result, 2020

3.5. Wheat Production and Marketing Constraints

Diseases, insects, weeds, shortage of improved seeds, poor quality of seeds, lack of pesticides, timely unavailability of inputs, lack of access to pesticides and drought were found as the main wheat production constraint in the study area. Out of the total of sample wheat producers, about 77.17% of them reported that wheat diseases as the major constraint faced by farmers and it ranked first in the study area. This is related to the continued use of rust susceptible wheat varieties, lack of use of recently released rust resistant wheat varieties, and lack of access to pesticides were aggravated the problem of diseases in the area. The farmers who participated in the focus group discussion reported that lack of access to seeds of diseases resistant wheat varieties, lack of access to chemicals and farmers' lack of awareness of the use of chemicals also aggravated the infestation of diseases to wheat production in the study area.

The result of the survey also shows that shortage of access to seeds of improved wheat varieties with (73.64%) was identified as the second most important constraint to wheat production followed by quality insects (57%) and erratic rainfall distribution (55.91%) in the study area (Table 10). The farmers who participated in the focus group discussion reported that the limited availability and affordability of improved wheat seeds that are tolerant to diseases were mentioned as the most important reasons for the farmers not using improved seeds in the area. Furthermore, the results of the survey revealed that weeds infestation and lack of timely availability inputs were also regarded as major constraints of wheat production by 53.36% and 41.34% of the farmers respectively in the area (Table 10). The result of the survey further showed that land shortage and soil fertility problems were perceived by the farmers as important constraints to wheat production while they ranked at a lower level in the study area (Table 10).

Regarding wheat marketing constraints, about 59.84% of sampled farmers in the area had high prices of agricultural inputs such as seeds and fertilizers considered the most important constraint to the wheat marketing system followed by the low price of wheat in the area (Table 10).

Table 10. Proportion of farmers indicating wheat production and marketing constraints.

	Frequency	%	Rank
Main wheat production constraints (N=253)			
Diseases	196	77.17	1
Insects	143	56.52	3
Weeds	135	53.36	5
Shortage of improved seeds	187	73.64	2

	Frequency	%	Rank
Lack of timely availability of inputs (seed, fertilizers)	105	41.34	6
Drought/erratic rainfall distribution	142	55.91	4
Land shortage	85	33.68	7
Soil fertility problem	80	31.50	8
Main marketing constraints			
High input price (seeds, fertilizers and pesticides)	152	59.84	1
Low price of wheat grain	78	30.71	2
Brokers interference	69	27.17	3

Source: own survey result, 2020

4. Conclusion and Recommendations

The study was undertaken in wheat production potential districts of East Hararghe Zone of Oromia Region, with objectives to assess and describe wheat production and marketing systems, and identify wheat production and marketing constraints and opportunities in the area. As a sampling procedure, three-stage sampling procedures were employed to select a total of 253 sample farmers. Primary data were collected from sampled households through a household survey using questionnaires, and the collected data were analyzed using descriptive statistics. The mean age and wheat farming experience of the farmers were 39.24 and 19.88 years respectively in the study area.

The average family size of sample wheat farmers was 7.10 persons with 86% of farmers having family sizes greater than 5 persons, and about 58% of total family members having ages greater than 16 years. On average about 0.48 hectares of land was allocated by sample grower farmers to wheat crop which is about 69.57% of their total landholding under wheat production in the study area. The average productivity of wheat was 20.87 quintals per hectare, and the average quantity of wheat produced per household was 13.40 quintals in the study area. Out of the total sample of wheat producers, about 77.17% of them reported that wheat diseases as the major constraint faced by farmers and it ranked first in the study area. Shortage of access to seeds of improved wheat varieties (73.64%) was identified as the second most important constraint to wheat production followed by insects (57%) and drought/erratic rainfall distribution (55.91%) in the study area. Furthermore, the results of the survey revealed that weeds infestation and lack of timely availability inputs were also as major constraints of wheat production by 53.36% and 41.34% of the farmers respectively, in the area.

Based on the finding of this study the following recommendations are given: Diseases are the most severe problem facing the farmers in the production of wheat. To address this, recently released improved wheat varieties (rust-resistant, adaptation and good yield potential) should be introduced and delivered to farmers to ensure increased wheat productivity. Research centers should be devoted to agronomic research on wheat, particularly, the development and release of disease-resistant high yielding wheat varieties. The government has been striving toward releasing improved wheat varieties to respond to disease and increase production. Research centers and other relevant stakeholders need to

place a greater emphasis on improving the availability and use of improved seeds. Introduction and promotion of recommended fertilizer rates and agronomic recommendations can improve the production and productivity of wheat in the study area. To address shortage of improved seeds, strengthening farmers' cooperatives in quality seed production through capacity building and facility support, improving cooperatives farmers' knowledge in quality seed production through training that engages in wheat seed production, and increasing farmers bargaining power through cooperatives. Extension service will need to be strengthened to facilitate the dissemination of knowledge and improved agronomic practices that will help farmers in the production, and deliver improved wheat agronomic practices, disease management and input use such as fertilizer recommendations to recommendations. The government gives emphasis to improving access to tractors and combine harvesters, and the development and promoting of wheat row planters and threshers in the area.

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