

Socioeconomic Characteristics of Smallholder Rice Production in Ethiopia

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Research Report 100



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Ethiopian Institute of Agricultural Research**

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Preface

The preparation of this report was initiated because of the increased need for information about the characteristics of rice production and its producers in Ethiopia for the design of effective research and development interventions. The emerging importance of rice in the country is well recognized following the approval of the national rice research and development strategy in 2010 by the Ministry of Agriculture. The purpose of the survey was to document the characteristics of rice producers by rice agro-ecology in terms of their socio-demographics and production characteristics mainly in terms of types of rice varieties grown, seed management, applied agronomic practices, land allocation, productivity and production levels, and major perceived production constraints among others.

Accordingly, the report is organized into ten major sections. The first section presents the methodology applied in conducting the survey. The second section deals with the distribution of rice producers by major rice ecologies. The next two sections present the socio-demographic and economic characteristics of rice producers followed by two sections deal with the types of rice varieties grown along with farmers' rice seed management and the agronomic practices applied. The two sections that follow deal with estimates of rice area allocated, production and productivity levels, and amount of paddy rice milled and sold. Before the conclusions, the main purposes of rice production along with the perceived challenges and constraints in rice production are presented.

We would like to express our appreciation for the technical and financial support provided by AfricaRice, which is a leading pan-African rice research organization committed to improving livelihoods in Africa through strong science and effective partnerships. We would also like to thank Dr Aliou Diagne and Dr Ali Toure at AfricaRice for the support provided. We appreciate also the financial support we received from EIAR/JICA FRG II project. We are also grateful for the supervisions, enumerators, data-entry, and verification colleagues and to all smallholder rice producers who have shared their precious time during the data collection.

We hope that the information presented will serve as a baseline and reference material for rice researchers, development workers, and advocates of the implementation of the national rice research and development strategy.

The authors

Introduction

In recognition to its importance, the Government of Ethiopia (GoE) has developed national strategy for rice research and development to guide the integrated and focused promotion of the rice sector in the effort to ensure food security in the country (MoARD, 2010).

Consumption of imported rice has recently increased tremendously which boosted rice cultivation locally. The increased demand for rice in the local market is creating conducive environment for farmers and investors to produce more rice; which again led to acquisition and development of additional rice farms in different parts of the country.

The Central Statistical Agency (CSA) is mandated to collect, compile and disseminate statistical data on agricultural production and related issues. CSA conducts agricultural sample surveys to provide data on crop area and production for the private peasant holdings, state farms, and private investors' farms for the *belg* and *meher* seasons. The CSA design surveys and determine sample sizes based on distribution of the major crops and no attention is given to rare crops such as rice. For this reason, when samples are drawn rice area and production were not targeted and measured only from the households visited. Since the sampling approach gives emphasis to major crops and rice-growing areas are different from other crops due to its agro-ecological suitability, very few rice-producing areas are included in the sample that obviously does not represent rice farming community in the country. This approach creates a downward bias and rice crop area and production are highly under estimated.

Unpopularity of the crop in the past has made statistics on rice production, productivity, and area coverage not to be well known. Generating statistics, therefore, on various aspects of rice sector has paramount importance.

This study was conducted to generate information on characteristics of rice producers, production area, production, productivity levels and prioritized production and marketing constraints. Specifically, the study was designed to provide statistical data and information about

- The socio-demographic characteristics of rice producing households;
- Rice producers' knowledge, experience and productivity constraints;
- Characterizing producers knowledge and use of *kebele* level rice varieties;

- Access, management and availability of rice seed;
- The status of rice production and production management; and
- Major challenges of rice production and marketing

Methodology

Scope and limitations

The survey covered all regions of the country except Afar and Gambella, which were not reported for having household level rice producing activity until 2010. For the purpose of this survey, the survey population was stratified into weredas, which had household level rice production. The National Rice and Development Strategy of Ethiopia (MoARD, 2010) has identified the weredas indicated in Table 1 as having household level rice production activity. The geographical distribution of the weredas is depicted in Figure 1.

Table 1. Woredas with household level rice production in 2009

Region	Zone	Woreda
Tigray	Western Tigray	L/ Koraro, Tsegede, Tselemt, Welqayit, Humera
Amhara	South Gonder	Fogera, Dera, Libo_Kemkem
	North Gonder	Metema
	West Gojam	North Achefer
Oromia	Jimma	Shebe
	Illu Ababora	Chewaqa, Dedessa, Borecha, Bedelle, Darimu
Somali	Gode	Gode, Kelafo
Benishangul Gumuz	Metekel	Pawe
	Assosa	Bambasi, Assosa
SNNPR	Kaffa	Gimbo
	Bench Maji	Gura-Farda
	Sheka	Yeki
	Gamo Gofa	Boreda



Figure 1. Rice producing woredas of Ethiopia as of 2009

Sampling

The study population was considered all rice-producing households in the country with a target population of all rice-producing households in each of the 25 known rice producing woredas as indicated in Table 1. In this regard, woreda was the lowest reporting level for this survey. To generate zone, region, and country level estimates (strata), the estimates were inflated using the appropriate sampling design and the corresponding inflation factor.

For the overall sample size determination and sample allocation, the rice production and number of rice producing households by woredas reported in 2009 was used as a sampling frame. Household size and when possible list of rice producing households for each stratum were collected from each kebele agricultural office and aggregated to make the sampling frame for the corresponding strata. This household list and size data is used for sampling and weighting purpose. The constructed sampling frame was updated whenever it was necessary.

Single stage stratified sampling was used for this survey. Where, the strata are all known rice producing woredas all over the country. Elements of the population are rice-producing households in each stratum (woredas). For each stratum, the sample rice-producing households were selected using the sampling frame constructed for each woredas (stratum) employing systematic sampling procedure. Based on the sampling frame, sample size of 3705 rice

producing households were identified and the overall sample size was allocated proportionally to each of the stratum based on the stratum household size (Table 2). The required information then was generated using a pre-tested structured questionnaire prepared for the purpose.

Table 2. Distribution of rice producing households by region and woreda

Region	Zone	No. of sampled rice producing households
Amhara	Metema	139
	Fogera	1550
	Libo_Kemkem	701
	Dera	421
	North Achefer	33
Sub-total		2844
Tigray	L/Koraro	53
	Tsegede	12
	Tselemt	13
	Welqayit	9
	Qafta Humera	6
Sub-total		93
Benishangul Gumuz	Bambasi	30
	Kurmuk	9
	Pawe	8
	Assosa	5
Sub-total		52
Oromia	Chewaqa	142
	Dedessa	78
	Borecha	41
	Bedelle	37
	Darimu	3
	Shebe	36
Sub-total		337
Somali	Gode	35
	Kelafo	77
Sub-total		112
SNNPR	Yeki	14
	Boreda	14
	Gura-Farda	262
	Gimbo	11
	Misha	1
Sub-total		302
Grand total		3705

Field survey

Field team organization

The data collection was done in four rounds. In each round, the survey team was composed of 13 members grouped into two teams. Each of the team was composed of five enumerators and one team leader and there was one overall coordinator. One car for each team was assigned starting from the date of deployment to the end of data collection. Each team was responsible to conduct both village and producer level survey of those sites they were assigned

Field team recruitment and training

The field team members were recruited based on formal criteria that can address well the interest of the research. The enumerators and supervisors who had related experience and attachment with CSA were recruited. Three days training was given for the field staffs in order to have correct and uniform understanding of the concepts, ideas, and instructions on how to fill each entry in the questionnaires.

Data collection

Data collection activity was conducted with one official, who can facilitate conditions from each of the study villages or localities. During the data collection, there was strong supervision with field supervisors and as well from the researchers. Some on-field data editing were made by supervisors, the coordinator and as well by the researchers.

Data editing, coding, verification and entry

Edited questionnaires were fully verified and checked for consistency before data entry. After data entry, automated data cleaning was conducted. Data entry was conducted using CSPro software. The entered dataset, which was in CSPro format, was exported to SPSS for further processing and analysis.

Data processing and report writing

Data processing, analysis, and report writing activities were handled by the country research team. The team was composed of three researchers: one statistician, one agricultural economist, and one GIS expert.

Producers and Ecologies

The number of smallholder rice producers in the country for 2010 is estimated to be 64,886. From the total smallholder rice producers, 94.1 % are male headed and the remaining 5.9 % are female headed. This result shows that rice farming in Ethiopia, like most agricultural activities, is households engaged in rice production are dominantly male headed. During the survey in all regions, except Afar and Gambella, there was household level rice production. The three main rice-producing regions were Amhara, Oromia, and SNNPR having 76, 14.9, and 5.2% of the country rice producers, respectively. Almost 75% of the rice producers are found in South Gonder Zone of Amhara followed by 18.8% in Ilu Ababora Zone of Oromia and 3.6% in Bench Maji Zone of SNNPR

In 2010, 94.3% of the rice ecology under practice was rain-fed followed by upland rain-fed and irrigated with 4.6 and 1.1%, respectively. The irrigated rice ecology is being practiced only in Somali region. In Tigray Region, 68.8 % of the rice ecology is upland rain-fed while the remaining is lowland rain-fed. For Amhara, Oromia, and Benishangul Gumuz, more than 92 % of the ecology is lowland rain-fed while the rest is upland rain-fed. This indicates that rice production in Ethiopia is dominated by rain-fed (Table 3).

Table 3. Distribution of rice producers in 2010

Region	Zone	Rice producers		Producers by rice agro-ecologies					
				Irrigated		Upland rain-fed		Lowland rain-fed	
		No of producers	%	No of producers	%	No of producers	%	No of producers	%
Tigray	Western Tigray	1,216	1.9	0	0.0	836	68.8	380	31.3
	Total	1,216	1.9	0	0.0	836	68.8	380	31.3
Amhara	South Gonder	48,705	75.1	0	0.0	1,457	3.0	47,247	97.0
	North Gonder	601	0.9	0	0.0	587	97.7	14	2.3
	West Gojam	40	0.1	0	0.0	0	0.0	40	100.0
	Total	49,345	76.0	0	0.0	2,044	4.1	47,301	95.9
Oromia	Jimma	696	1.1	0	0.0	18	2.6	679	97.4
	Illu Ababora	8,956	13.8	0	0.0	0	0.0	8,956	100.0
	Total	9,652	14.9	0	0.0	18	0.2	9,634	99.8
Somali	Gode	731	1.1	731	100.0	0	0.0	0	0.0
	Total	731	1.1	731	100.0	0	0.0	0	0.0
Benishangul Gumuz	Metekel	340	0.5	0	0.0	0	0.0	340	100.0
	Assosa	210	0.3	0	0.0	40	19.0	170	81.0
	Total	550	0.8	0	0.0	40	7.3	510	92.7
SNNPR	Kaffa	574	0.9	0	0.0	44	7.7	530	92.3
	Bench Maji	2,335	3.6	0	0.0	16	0.7	2,319	99.3
	Sheka	429	0.7	0	0.0	0	0.0	429	100.0
	Gamo Gofa	54	0.1	0	0.0	0	0.0	54	100.0
	Total	3,392	5.2	0	0.0	61	1.8	3,331	98.2
Total	Male	61,027	94.1	598	1.0	2,820	4.6	57,609	94.4
	Female	3,860	5.9	133	3.5	179	4.6	3,547	91.9
	Total	64,886	100.0	731	1.1	2,999	4.6	61,156	94.3

Demographic Characteristics

Age

The national average age of rice producers was 40 years while the average age across the rice ecologies was 40 years for irrigated, 44 years for upland and 40 years for lowland rain-fed. The average age of female producers was 37 years while 41 years was that of males. The average rice producer's age across region is 48, 41, 36, 40, 41, 39 years for Tigray, Amhara, Oromia, Somali, Benishangul Gumuz, and SNNPR Regions, respectively (Table 5). This result depicts that on the average upland rice producers' are aged by 4 years as compared to producers in the other ecologies. Moreover, female rice producers were on the average younger by 4 years as compared to their male counterparts.

Table 4. Average age of rice producers in 2010

Region	Zone	Age (years)		Average age by rice agro-ecologies					
		Mean	SD	Irrigated		Upland rain-fed		Lowland rain-fed	
				Mean	SD	Mean	SD	Mean	SD
Tigray	Western Tigray	48	10	.	.	47	9	51	11
	Total	48	10	.	.	47	9	51	11
Amhara	South Gonder	41	14	.	.	43	15	41	14
	North Gonder	45	10	.	.	45	10	49	5
	West Gojam	45	13	.	.	.	.	45	13
	Total	41	14	.	.	43	14	41	14
Oromia	Jimma	38	10	.	.	35	0	38	10
	Illu Ababora	35	10	.	.	.	.	35	10
	Total	36	10	.	.	35	0	36	10
Somali	Gode	40	16	40	16	.	.	.	.
	Total	40	16	40	16	.	.	.	.
Benishangul Gumuz	Metekel	35	7	.	.	.	.	35	7
	Assosa	52	13	.	.	51	12	52	13
	Total	41	13	.	.	51	12	40	13
SNNPR	Kaffa	42	18	.	.	58	0	41	18
	Bench Maji	36	13	.	.	22	4	36	13
	Sheka	47	14	.	.	.	.	47	14
	Gamo Gofa	53	13	.	.	.	.	53	13
	Total	39	15	.	.	48	16	39	14
Total	Male	41	14	41	15	44	13	40	14
	Female	37	16	35	19	45	8	36	16
	Total	40	14	40	16	44	13	40	14

Distribution of household members by sex

In terms of the distribution of household members by sex, 54.2 % of the members of rice producing households were male and the remaining 45.8 % were females. With the exception of Benishangul Gumuz, the sex distribution of the regions is almost similar. In Benishangul Gumuz, about 65 % of household members were constituted by male population (Table 5).

Table 5. Distribution of household members by sex

Region	Zone	Sex				Total
		Male		Female		
		No.	%	No.	%	
Tigray	Western Tigray	4,064	54.2	3,432	45.8	7,496
	Total	4,064	54.2	3,432	45.8	7,496
Amhara	South Gonder	131,215	53.7	113,211	46.3	244,426
	North Gonder	1,598	53.0	1,418	47.0	3,016
	West Gojam	125	56.6	96	43.4	221
	Total	132,938	53.7	114,724	46.3	247,662
Oromia	Jimma	2,000	56.0	1,571	44.0	3,571
	Illu Ababora	29,333	55.9	23,097	44.1	52,430
	Total	31,333	55.9	24,669	44.1	56,002
Somali	Gode	3,766	57.3	2,804	42.7	6,571
	Total	3,766	57.3	2,804	42.7	6,571
Benishangul Gumuz	Metekel	978	69.7	425	30.3	1,403
	Assosa	803	59.5	546	40.5	1,349
	Total	1,780	64.7	971	35.3	2,751
SNNPR	Kaffa	1,458	46.5	1,679	53.5	3,137
	Bench Maji	5,567	54.5	4,654	45.5	10,221
	Sheka	1,286	58.4	914	41.6	2,200
	Gamo Gofa	186	51.5	175	48.5	361
	Total	8,496	53.4	7,422	46.6	15,918
Total		182,378	54.2	154,023	45.8	336,401

Family size

The national average family size of rice producing household is 5 persons; however, in this survey it was found that 11 persons for the irrigated ecology and 5 persons for both for upland and lowland rain-fed ecologies. The average rice producing household size across the surveyed regions was 6, 5, 6, 11, 5, and 5 persons for Tigray, Amhara, Oromia, Somali, Benishangul Gumuz, and SNNPR, respectively (Table 6). This result indicates the considerable variability of rice producing households in family size across regions.

Table 6. Average family size of rice producing households in 2010

Region	Zone	Family size		Average family by rice agro-ecologies					
				Irrigated		Upland rain-fed		Lowland rain-fed	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Tigray	Western Tigray	6	2	.	.	6	2	7	2
	Total	6	2	.	.	6	2	7	2
Amhara	South Gonder	5	2	.	.	5	2	5	2
	North Gonder	5	2	.	.	5	2	5	2
	West Gojam	6	2	.	.	.	.	6	2
	Total	5	2	.	.	5	2	5	2
Oromia	Jimma	6	2	.	.	7	0	6	2
	Illu Ababora	6	2	.	.	.	.	6	2
	Total	6	2	.	.	7	1	6	2
Somali	Gode	11	4	11	4	.	.	.	.
	Total	11	4	11	4	.	.	.	.
Benishangul Gumuz	Metekel	4	2	.	.	.	.	4	2
	Assosa	6	2	.	.	6	2	7	2
	Total	5	2	.	.	6	2	5	2
SNNPR	Kaffa	6	1	.	.	6	0	6	1
	Bench Maji	5	2	.	.	4	0	5	2
	Sheka	6	2	.	.	.	.	6	2
	Gamo Gofa	7	1	.	.	.	.	7	1
	Total	5	2	.	.	5	1	5	2
Total	Male	5	2	11	4	5	2	5	2
	Female	5	2	11	3	5	2	4	2
	Total	5	2	11	4	5	2	5	2

Marital status

In 2010, 93.9 % of the rice producers were married while 1.2, 2.5, 2.1 and 0.4 % of the rice producers being Bachelor/spinster, widow/widower, divorced and separated, respectively. In terms of matrimonial status, male producers were found in better side as compared to female rice producers. The proportion of married males (96.8%) was more than two fold of that of females (44.5%). The proportion of widowed females (29.1 %) was 30 fold that of males (0.9%) as well the percentage of divorced females (19.9 %) was 20 times that of males (1.1 %) (Table 7). In every region, at least 90 % of the rice producers were found married

Table 7. Distribution of rice producers by matrimonial status

Regions	Zone/sex	% of rice producers				
		Married	Bachelor /Spinster	Widow/ widower	Divorced	Separated
Tigray	Western Tigray	89.9	0	5.3	4.8	0
	Total	89.9	0	5.3	4.8	0
Amhara	South Gonder	93.8	0.8	2.7	2.3	0.5
	North Gonder	93.2	0	3.8	3	0
	West Gojam	100	0	0	0	0
	Total	93.8	0.8	2.7	2.3	0.5
Oromia	Jimma	97.4	2.6	0	0	0
	Illu Ababora	95.6	1.6	1.6	1.2	0
	Total	95.7	1.7	1.5	1.1	0
Somali	Gode	95.3	4.7	0	0	0
	Total	95.3	4.7	0	0	0
Benishangul Gumuz	Metekel	100	0	0	0	0
	Assosa	100	0	0	0	0
	Total	100	0	0	0	0
SNNPR	Kaffa	76.9	23.1	0	0	0
	Bench Maji	92.1	3.6	1.1	3.2	0
	Sheka	100	0	0	0	0
	Gamo Gofa	93.3	0	6.7	0	0
	Total	90.5	6.4	0.8	2.2	0
Sex	Male	96.8	1.1	0.9	1.1	0.2
	Female	44.5	3.5	29.1	19.9	2.9
Total		93.9	1.2	2.5	2.1	0.4

Educational status

About 60 % of the rice producers were illiterate while 15.7 % of the producers can only read and write. The proportion of rice producers reported with primary, junior, and senior high school, preparatory, TVET, and college was 13.8, 4.8, 2.3, 0.3, and 0.3 % respectively. About 2.6 % of the producers have also attended religious educations. The illiteracy rate was as high as 69.6 % in Amhara Region; while the lowest was 12.3 % in Somali Region. In terms of education, males were better off as compared to their female counterparts. About 81 and 52 % of females and males respectively were illiterate while 16.3 % of males and 5.3 % of females only can read and write in at least one language. 14, 4.9, 2.3 % of males and 6.9, 3, 1 % of females have attended primary, junior and senior high school education (Table 8).

Table 8. Distribution of rice producers by educational level

Region	Zone /sex	% of rice producers									
		Illiterate	Read/ write only	Religious	Primary	Junior high school	Senior high school	Preparatory	TVET	Tertiary	Other
Tigray	Western Tigray	40.2	21.6	0.6	13.8	13	5.3	0	6	0	0
	Total	40.2	21.6	0.6	13.8	13	5.3	0	6	0	0
Amhara	South Gonder	69.8	13.7	2.7	10.6	2.2	0.9	0.1	0	0	0
	North Gonder	57.1	21.8	0.8	11.3	5.3	3	0.8	0	0	0
	West Gojam	66.7	12.1	6.1	12.1	3	0	0	0	0	0
	Total	69.6	13.8	2.7	10.6	2.3	0.9	0.1	0	0	0
Oromia	Jimma	30.8	28.2	0	20.5	13	7.7	0	0	0	0
	Illu Ababora	26.6	22.3	1.2	28.2	15	5.6	0.5	0.5	0.3	0.1
	Total	26.9	22.7	1.2	27.6	15	5.7	0.5	0.5	0.3	0.1
Somali	Gode	12.3	12	13.8	9	13	27	7	6.1	0	0
	Total	12.3	12	13.8	9.0	13	27	7	6.1	0	0
Benishangul Gumuz	Metekel	12.5	25	0	12.5	13	25	13	0	0	0
	Assosa	52.7	22.2	0	14.6	7.3	3.2	0	0	0	0
	Total	27.8	23.9	0	13.3	11	17	7.7	0	0	0
SNNPR	Kaffa	30.8	30.8	7.7	15.4	7.7	7.7	0	0	0	0
	Bench Maji	49.6	14.3	4.6	17.5	9.6	3.6	0.7	0	0	0
	Sheka	40	33.3	6.7	20	0	0	0	0	0	0
	Gamo Gofa	53.3	26.7	6.7	6.7	0	0	6.7	0	0	0
	Total	45.2	19.7	5.5	17.3	7.9	3.8	0.6	0	0	0
Sex	Male	59.2	16.3	2.7	14	4.9	2.3	0.3	0.3	0	0
	Female	80.7	5.4	1.6	6.9	3	1	0.8	0	0	0.6
Grand total		60.4	15.7	2.6	13.6	4.8	2.3	0.3	0.3	0	0.1

Other economic activities

Crop production is major economic activity of the rice producing community. It was the first major economic activity for 96 % of the rice producers. Crop production is the first major economic activity for 98 and 48 % of male and female rice producers, respectively. About 47.4 % of female rice producers have reported household chores being their first main activity. In general, rearing, commerce and labor was also reported as the first major economic activity by 0.5, 0.2, and 0.2 % of the rice producing community. The distribution of rice producers by economic activity was different across regions. Crop production was reported as the first major economic activity by 88, 95, 99, 87, 100, and 99 % of Tigray, Amhara, Oromia, Somali, Benishangul Gumuz, and SNNPR rice producers, respectively. Livestock rearing was also reported as the first major economic activity for 0.6, 0.1, and 3.5 % of Amhara, Oromia, and Somali rice producers. For other activities like Commerce, Handicraft, Casual labor 1% reported as major economic activity (Table 9).

Table 9. Distribution of rice producers by main economic activity (2010)

Region	Zone/ sex	% of rice producers				
		Crop	Rearing	Forestry	House chores	Others
Tigray	Western Tigray	88	0	0	5.3	6.6
	Total	88	0	0	5.3	6.6
Amhara	South Gonder	95	0.6	0.1	3.6	0.8
	North Gonder	96	1.5	0	3	0
	West Gojam	100	0	0	0	0
	Total	95	0.6	0.1	3.5	0.8
Oromia	Jimma	100	0	0	0	0
	Illu Ababora	99	0.1	0	0	0.8
	Total	99	0.1	0	0	0.7
Somali	Gode	87	3.5	0	0.9	8.3
	Total	87	3.5	0	0.9	8.3
Benishangul Gumuz	Metekel	100	0	0	0	0
	Assosa	100	0	0	0	0
	Total	100	0	0	0	0
SNNPR	Kaffa	100	0	0	0	0
	Bench Maji	98	0	0	0	2.2
	Sheka	100	0	0	0	0
	Gamo Gofa	100	0	0	0	0
	Total	99	0	0	0	1.4
Sex	Male	98	0.5	0	0.2	0.8
	Female	48	0.2	0	47.4	4.5
Total		96	0.5	0	2.8	1.1

Economic Characteristics

Major crops

The five most important crops grown by rice producers in 2010 were rice, sorghum, maize, tef, and millet as 85.8, 5.1, 4.6, 1.2, and 1 % of the producers respectively. About 95, 54, 80.1, and 79 % of the rice producers from Amhara, Oromia, Benishangul Gumuz, and SNNPR Regions' were producing rice as major crop, respectively. This confirms that rice is a major crop for these rice-producing areas in respective region.

Table 10. First most important crops for rice producing areas (2006-2010)

Crops	% of rice producers						Total
	Tigray	Amhara	Oromia	Somali	Benishangul Gumuz	SNNPR	
Rice	22.6	95	54	23.4	80.1	79	85.8
Sorghum	49.7	0.7	22.5	2.8	9.9	3.2	5.1
Maize	1.2	1.3	15	49.9	6.8	14.5	4.6
Tef	22.4	1	0	1	1.6	0.1	1.2
Millet	0	1.4	0	0	0	0	1
Chick pea	0	0.2	2.6	0	0	0	0.6
Sesame	3.5	0.2	0.8	8.4	0	0.3	0.5
Peanut	0	0	1.3	0	0	1.6	0.3
Coffee	0	0	0	0	0	1.1	0.1
Wheat	0	0.1	0	0	0	0	0.1
Tomato	0.6	0.1	0	0	0	0	0.1
Onion	0	0	0	11.6	0	0	0.1
Other	0	0.1	3.8	2.8	1.6	0.3	0.6

For Tigray and Somali Regions rice producers, sorghum and maize are the major crops, which accounts for 49.7 and 49.9 % of producers, respectively. Rice was the second major crop for both Tigray and Somali Regions rice producers with 22.6 and 23.4 % of the rice producers producing it as a major crop. In Tigray region, the proportion of rice producers producing tef and rice as a major crop was somehow balanced (Table 10).

Major income sources

In general, crop production is reported to be the first income source of rice producers followed by livestock rearing. About 90% of rice producers reported crop to be their major income source and only about 6% of reported livestock as their main income source. The data in Table 11 indicates the distribution along with the regional difference in income source for rice producers.

Table 11. Major income sources for rice producers

Income sources	% of rice producers						Total
	Tigray	Amhara	Oromia	Somali	Benishangul Gumuz	SNNPR	
Crop	96.4	89.2	93.3	86.9	83.6	81	89.5
Livestock rearing	0.6	7.3	1.9	5.6	0	3.1	6.1
Handicraft	0	3.4	4.6	4.6	11.6	14.8	4.2
Forest	0	0	0	1	3.2	0.5	0.1
Commerce	0	0	0.1	1.8	1.6	0.3	0.1
Salary	3	0	0	0	0	0.3	0.1

Annual income

The nominal average annual income of rice producers disaggregated as income from rice, other agricultural produce and non-agricultural sources during 2008, 2009 and 2010 estimated is presented in Table 12). The average total income was estimated for the period 2010-2008 as 17,082.53, 15,838.95, 16,151.46 birr, respectively; while income from rice production for the same period was 9538, 8807, 9233 birr. In general, about 56 % of the annual income for rice producers was derived from rice and the other 41 % was from non-rice agricultural products .This implies that the income from the non-rice agricultural activity is below 3 % of their average annual income (Table 12).

The annual average income for rice producers of Tigray Region for the period 2008-2010 was consistently increasing. The computed average annual income for the period was 14,219.96, 18,136.95, and 29,154.63 birr, respectively. The Region has registered the second highest average annual income per rice producing household. The contribution of rice to the annual income has increased from 3.42 % in 2008 to 37.84 % in 2010 (Table 13). Amhara is the biggest rice-producing region of the country. The annual average income of rice producers from this region was the third highest in the country. The contribution of rice to the average annual income of producers in the region is the highest among regions with about 61% in 2010. The average annual income of rice producers in Somali Region is high. This is partly because of the high off-farm income and high income from non-rice produces. Somali region rice producer's income derived from the rice is also above the national average as well it is above from the rest of the regions. Rice contributes about 27 % of the annual income for rice producers of Somali Region. The current rice production in Somali Region is project based and rice producers get technical and financial support from these projects (Table 13).

Table 12. Rice producer's average nominal annual income by source (Birr)

Region	Agricultural income						Nonagricultural income			Total income		
	2010		2009		2008		Year			Year		
	Rice	Other produce	Rice	Other produce	Rice	Other produce	2010	2009	2008	2010	2009	2008
Tigray	11,033	15,815	1,880	14,204	461	12,306	2,307.08	2,052.83	1,452.35	29,154.63	18,136.95	14,219.96
Amhara	11,218	6,993	10,595	6,516	11,224	6,688	166.23	167.20	149.15	18,377.13	17,278.54	18,061.46
Oromia	2,419	5,853	1,732	5,487	2,092	4,516	579.99	427.53	378.05	8,852.55	7,645.89	6,986.41
Somali	13,966	22,475	16,767	21,152	15,262	21,533	20,668.98	21,136.16	18,834.94	57,109.78	59,055.29	55,630.61
Benishangul Gumuz	2,110	8,984	2,263	6,996	2,332	8,473	1,539.88	1,529.90	1,228.64	12,633.87	10,788.86	12,034.40
SNNPR	5,042	4,931	4,932	4,663	3,649	4,346	204.21	201.92	181.02	10,176.48	9,796.21	8,176.07
Total	9,538	7,056	8,807	6,566	9,233	6,511	488.57	465.95	406.79	17,082.53	15,838.95	16,151.46

Table 13. Contribution of rice, other agricultural produces, and off-farm sources to the income of rice producers

Region	Agricultural income						Nonagricultural income		
	2010		2009		2008		Year		
	Rice	Other produce	Rice	Other produce	Rice	other produce	2010	2009	2008
Tigray	37.84	54.25	10.37	78.32	3.24	86.54	7.91	11.32	10.21
Amhara	61.04	38.05	61.32	37.71	62.14	37.03	0.90	0.97	0.83
Oromia	27.33	66.12	22.65	71.76	29.94	64.64	6.55	5.59	5.41
Somali	24.45	39.35	28.39	35.82	27.43	38.71	36.19	35.79	33.86
Benishangul Gumuz	16.70	71.11	20.98	64.84	19.38	70.41	12.19	14.18	10.21
SNNPR	49.55	48.45	50.35	47.60	44.63	53.16	2.01	2.06	2.21
Total	55.83	41.31	55.60	41.45	57.17	40.31	2.86	2.94	2.52

Varieties, Seed and Seed Management

Use of Released Rice Varieties

Since 1998 when the first rice variety was released in the country a 20 improved varieties are released, of which 13 varieties are upland type and the rest 7 are irrigated type varieties (MoA, 2011).

Respondents identified three types of local rice varieties namely X-Jigna, white rice, and red rice and nine improved varieties namely, Gumara, NERICA-1, NERICA-2, NERICA-3, NERICA-4, Suparica-1, Shebelle, Gode-1 and Hoden. The local variety X-Jigna is the most dominant local variety mainly in Tigray and Amhara. The other two local varieties are named following their color and are found in Oromia, Benishangul Gumuz, and SNNPR.

The trend in the use of improved varieties shows a considerable increased since to 2007 and their use varies over years. Farmers also use a combination of varieties. For instance, in Amhara Region, more than 70% of the farmers used four types of improved varieties and a local variety X-Jigna (Table 14).

Table 14. Distribution of respondents by rice variety grown (percentage of respondents)

Region	Variety	Type	Cropping year			
			2010	2009	2008	2007
Tigray	X-Jigna	Local	1.9	7.5	96.2	1.9
	NERICA-3	Improved	99.3	44.4	14.5	1.6
Amhara	X-Jigna	Local	99.6	98.4	93.6	89.8
	Gumara	Improved	98.7	94.7	78.7	71.2
	NERICA-3	Improved	100.0	72.7	54.5	22.7
	NERICA-4	Improved	82.2	77.0	46.4	15.8
	Suparica-1	Improved	70.0	60.0	60.0	25.0
Oromia	X-Jigna	Local	90.9	84.2	71.2	57.3
	White rice	Local	100.0	81.9	67.4	26.0
	Gumara	Improved	85.5	58.4	44.1	36.1
	NERICA-2	Improved	100.0	100.0	100.0	0.0
	NERICA-3	Improved	85.1	70.9	59.6	40.6
	NERICA-4	Improved	93.5	84.9	58.6	46.5
	Suparica-1	Improved	97.2	88.4	69.7	27.5
Somali	NERICA-1	Improved	48.8	80.1	98.0	91.6
	NERICA-2	Improved	43.5	79.4	97.8	89.4
	NERICA-3	Improved	33.3	100.0	100.0	100.0
	Shebelle	Improved	32.8	50.0	75.8	71.8
	Gode-1	Improved	15.3	57.9	84.7	79.3
	Hoden	Improved	16.5	44.4	78.2	72.6
Benishangul Gumuz	White rice	Local	97.5	64.1	59.2	59.2
	Gumara	Improved	69.1	77.9	20.1	13.4
	Red rice	Local	71.7	71.7	47.2	37.7
	NERICA-3	Improved	100.0	97.0	97.0	97.0
	NERICA-4	Improved	72.8	63.0	85.9	54.4
	Suparica-1	Improved	100.0	100.0	100.0	100.0
SNNPR	White rice	Local	98.6	92.1	82.2	72.6
	Gumara	Improved	58.6	66.8	62.3	47.0
	Red rice	Local	86.1	90.7	70.5	70.5
	NERICA-3	Improved	100.0	100.0	100.0	100.0
	NERICA-4	Improved	54.5	43.6	30.9	21.8
	Suparica-1	Improved	100.0	86.0	72.0	30.1
National	X-Jigna	Local	98.6	97.3	93.1	88.4
	White rice	Local	98.8	87.5	76.9	60.9
	Red rice	Local	81.0	72.4	59.3	49.3
	NERICA-1	Improved	82.0	85.3	63.9	61.2
	NERICA-2	Improved	49.9	81.5	97.2	89.9
	NERICA-3	Improved	47.6	80.1	97.8	81.8
	NERICA-4	Improved	90.8	65.8	50.0	34.2
	Suparica-1	Improved	83.2	75.1	53.8	37.8
	Shebelle	Improved	96.9	88.0	70.2	28.7
	Gode-1	Improved	32.8	50.0	75.8	71.8
	Hoden	Improved	15.3	57.9	84.7	79.3
	Gumara	Improved	16.5	44.4	78.2	72.6

Note: percentage are more than 100% due to use of different varieties

Table 15. Distribution of respondents by seed source by variety and region in 2010 (percentage of rice producers)

Region	Variety	Farmer or relative from the village	farmer or relative from other kebele	NARS	Development project	BoA	NGO	Farmers organization	Local market	Other facility
Tigray	NERICA-3	48.5				51.5				
Amhara	X-Jigna	97.0	1.3	0.1		0.1			1.5	
	Gumara	98.2	1.8							
	Superica 1	93.8				6.3				
	NERICA-4	90.3	5.0	1.2		1.2			2.3	
	NERICA-3	84.2		10.5					5.3	
Oromia	X-Jigna	93.0	7.0							
	White rice	87.5	9.7			2.8				
	Gumara	74.7	19.8			1.8	1.7			1.9
	Superica 1	92.7	7.0						0.3	
	NERICA-4	96.4				3.6				
	NERICA-2	100.0								
	NERICA-3	96.0	1.0			3.0				
Somali	NERICA-2	4.8		95.2						
	NERICA-3			100.0						
	NERICA-1	4.5	1.4	94.0						
	Shebelle			100.0						
	Gode-1			100.0						
	Hoden			100.0						
Benishangul Gumuz	White rice	78.9		15.0		3.1		3.1		
	Gumara	75.6	8.1		8.1				8.1	
	Red rice	91.9				8.1				
	Superica 1	100.0								
	NERICA-4	100.0								
	NERICA-3	72.2		24.1		3.8				
SNNPR	White rice	93.0	3.7		0.4	0.4		0.4	1.1	
	Gumara	89.4	7.7							
	Red rice	100.0								
	Superica 1	100.0								
	NERICA-4	72.6	3.4			20.6		3.4		
Total		93.3	2.4	1.9	0.0	1.0	0.0	0.0	1.2	

Sources of rice seed

Table 15 presents the distribution of rice producers by source of seed for the different varieties of rice. Accordingly, the dominant sources of seed are farmers and relatives within a village followed by the national research systems -NARS (Table 15).

Commercial behavior of producers in rice seed

The commercial behavior of producers in rice seed was assessed in terms of the use of own seed, buying and or selling to other producers for the different types of rice varieties by region for 2008-2010. The result indicate that though the proportion of farmers using own seed is high, there is an increasing trend in buying and selling as the proportion of farmers who buy rice seed has increased from 10.6 in 2008 to 14.4% in 2010 and who sell seed increased from 12.5 in 2008 to 14.2% in 2010 at national level (Table 16).

At regional level, there is considerable variability following the use of different varieties. In Tigray, following the shift from use of the local variety X-Jigna to improved NERICA variety, the proportion of rice producers using own seed for the local variety has declined considerably over years. The proportion of rice producers using own seed for NERICA has increased from about 6% in 2008 to about 60% in 2010. Similarly, the proportion of rice producers that bought the seed of NERICA 3 variety has increased from 3% in 2008 to about 57% in 2010. In Amhara regions, the proportion of rice producers that use own seed is much higher for local varieties compared to improved varieties, which linked with higher proportion of farmers buying and limited proportion selling seed. Like in the case of Amhara, more farmers use own seed for local varieties compared to improved varieties in Oromia. In addition, there is an increased trend in the proportion of rice producers buying seed for improved varieties except NERICA-2.

Table 16 Commercial behavior of producers in rice seed by variety 2008 - 2010 (%age)

Region	Variety	Own seed			Buy			Sell		
		2010	2009	2008	2010	2009	2008	2010	2009	2008
Tigray	X-Jigna	1.9	7.5	45.3	0.0	0.0	7.5	0.0	0.0	0.0
	NERICA-3	59.0	16.8	6.0	56.7	18.5	3.0	1.4	0.0	0.0
Amhara	X-Jigna	93.9	93.5	88.7	12.2	10.1	7.7	11.5	10.7	10.3
	Gumara	91.6	74.8	73.6	30.0	26.3	19.0	7.8	6.6	3.8
	Superica 1	62.5	37.5	20.8	29.2	12.5	25.0	0.0	0.0	0.0
	NERICA-4	68.1	62.3	31.1	19.5	21.4	17.4	1.0	1.0	0.0
	NERICA-3	50.0	50.0	22.7	45.5	31.8	22.7	9.1	9.1	4.5
Oromia	X-Jigna	84.1	73.0	53.3	9.6	8.0	17.0	9.5	11.0	14.1
	White rice	71.7	49.1	20.7	17.5	15.6	26.8	12.4	9.0	9.0
	Gumara	50.9	43.2	36.1	28.3	11.7	10.2	16.3	18.9	14.7
	Superica 1	84.6	70.4	44.1	17.2	14.0	23.1	30.4	25.4	18.5
	NERICA-4	51.6	43.9	25.0	13.3	7.7	10.5	15.3	7.7	10.3
	NERICA-2	50.0	50.0	0.0	0.0	50.0	50.0	50.0	100.0	50.0
	NERICA-3	66.6	56.6	38.9	17.7	11.0	18.4	21.6	16.2	13.4
Somali	NERICA-2	49.5	73.0	85.7	3.3	2.2	7.8	43.4	76.2	84.3
	NERICA-1	54.5	75.1	82.4	4.2	4.5	6.6	47.0	78.4	85.9
	Shebelle	40.6	62.2	79.7	0.0	4.0	4.0	32.3	70.5	67.1
	Gode-1	28.5	52.8	88.5	0.0	0.0	6.0	17.0	58.3	82.1
	Hoden	28.8	64.4	88.4	0.0	6.4	0.0	18.2	56.8	68.6
Benishangul Gumuz	White rice	70.4	37.4	32.9	35.8	14.2	16.5	32.9	30.7	28.5
	Gumara	53.7	30.9	14.4	36.0	45.3	14.4	2.2	7.2	0.0
	Red rice	82.3	72.9	61.1	5.9	1.8	0.0	43.4	37.6	49.3
	Superica 1	33.3	33.3	33.3	0.0	0.0	0.0	0.0	0.0	0.0
	NERICA-4	7.9	25.1	25.1	29.0	3.9	0.0	0.0	0.0	0.0
	NERICA-3	75.0	75.0	75.0	0.0	0.0	0.0	25.0	25.0	25.0
SNNPR	White rice	74.5	73.7	68.2	29.0	18.7	17.9	22.9	17.4	15.1
	Gumara	45.0	45.4	37.3	6.1	6.9	11.6	3.1	0.7	1.4
	Red rice	64.3	70.3	70.3	23.8	0.0	5.9	11.9	11.9	11.9
	Superica 1	87.4	74.9	37.2	12.6	12.6	37.7	25.1	25.1	12.6
	NERICA-4	17.8	14.4	11.9	15.9	9.2	6.7	0.8	0.8	0.8
Total		85.3	82.2	74.5	14.4	11.1	10.6	14.2	13.5	12.5

Note: percentages do not add to 100 due to multiple responses.

Trends in rice seed price

The trend in rice seed price indicates that there is considerable variability across regions and over years. In national average price indicates that the price was higher in 2009 compared to 2008 and 2010 for the seed bought locally within and outside of the Kebele (Table 17).

Table 17. Seed price (birr per kg) in and out of the kebele by region

Region	Inside the kebele			outside the kebele		
	2010	2009	2008	2010	2009	2008
Tigray	6.92	6.99	6.41	7.07	6.98	6.91
Amhara	4.91	5.36	5.17	4.89	5.27	4.87
Oromia	3.22	3.09	2.90	3.33	3.06	2.72
Somali	15.95	12.36	10.36	16.32	12.81	10.68
Benishangul Gumuz	4.76	4.65	3.99	4.05	3.98	3.29
SNNPR	3.97	3.78	3.39	3.96	3.45	2.96
Total	4.80	5.14	4.96	4.95	5.16	4.73

The price for the different rice varieties was different. There is no clear indication of price difference among local and improved varieties. Among the improved varieties, NERICA-1, NERICA-2, Shebelle, Gode-1, and Hoden recorded the highest prices with increasing trend from 2008 to 2010 (Table 18).

Table 18. Seed price (birr/kg) in and out of the kebele by variety

Variety	Inside the kebele			Outside the kebele		
	2010	2009	2008	2010	2009	2008
X-Jigna	4.86	5.30	5.12	4.83	5.21	4.81
White rice	3.99	3.80	3.52	3.78	3.52	3.11
Gumara	3.94	4.02	3.54	4.07	4.21	3.70
Red rice	4.33	3.88	2.17	4.70	3.84	2.89
Superica 1	3.35	3.33	3.22	3.49	3.29	3.01
NERICA-4	4.17	4.71	4.27	4.19	4.46	3.92
NERICA-2	14.23	12.01	10.23	15.28	11.73	10.47
NERICA-3	4.76	4.09	3.63	4.62	3.79	2.97
NERICA-1	15.91	12.09	10.30	16.21	12.68	10.44
Shebelle	16.25	12.66	10.23	16.26	16.34	11.38
Gode-1	16.73	13.92	11.35	16.62	13.92	11.39
Hoden	16.93	13.60	10.75	16.91	13.60	11.43
Total	4.80	5.14	4.96	4.95	5.16	4.73

Variety and seed selection

Seed selection criteria

The most important criteria for seed selection are found to be panicle appearance, grain color and shape and crop stand. However, the priority criterion for seed selection is panicle appearance as reported by 71.3% of rice producing households, with considerable variability among regions (Table 19).

Table 19. Priority criterion for seed selection

Criteria	Region						Total
	Tigray	Amhara	Oromia	Somali	Benishangul Gumuz	SNNPR	
Panicle appearance	100.0	74.2	53.2	89.4	68.4	66.2	71.3
Grain color	0.0	12.9	27.7	7.8	23.9	23.6	15.3
Grain shape	0.0	5.6	7.2	0.0	3.9	3.0	5.6
Crop stand	0.0	7.0	2.7	2.9	1.9	3.4	6.1
Other	0.0	0.2	9.2	0.0	1.9	3.9	1.7

Cropping stage for seed selection

Majority of the rice-producing households select seeds from the preferred variety during harvesting stage (78.5%) followed by selection at heading stage of the rice crop (Table 20).

Table 20. Priority cropping stage for seed selection

Stage	Region						Total
	Tigray	Amhara	Oromia	Somali	Benishangul Gumuz	SNNPR	
Harvest	81.6	83.9	51.9	63.4	80.3	73.5	78.5
Heading	18.4	5.4	21.6	21.0	14.0	14.7	8.6
Level of mixture of paddies and select at onset cropping season	0.0	10.0	18.8	15.7	1.9	7.8	11.0
other	0.0	0.7	7.7	0.0	3.8	3.9	1.9

Rice seed management

The overall rice seed management practices are looked in terms of whether producers handling paddy fields differently when for seed, cropping stage for seed selection, seed drying and storage practices.

Additional handling of paddy for seed

The proportion of rice producers that undertake additional measures to the paddy field for seed is different across region with higher proportion in Somali, SNNPR, and Amhara and the lower proportions are recorded in Tigray with 45% and in Oromia with about 58% (Table 21). The additional measures are related with special engagement for the rice field planned to be used for seed starting from land preparation to harvesting.

Table 21. Additional measures of handling of paddy field for seed

Region	%age of rice producers with additional measures
Tigray	45.4
Amhara	76.5
Oromia	58.1
Somali	99.0
Benishangul Gumuz	50.1
SNNPR	79.3
Total	73.4

Seed drying practices

Rice seed is normally dried open in the air by spreading on a sheet or cleaned and leveled land. Table 22 presents the average number of days, rice producer's dry rice for seed. Except the estimate for Somali region, the average number of days of rice drying for the different regions is from two to three days with national average of three days. In Somali Region, the average number of days is estimated to be one week (seven days).

Table 22. Seed drying practices

Region	Number of days to dry seeds before conservation	
	Mean	SD
Tigray	2	2
Amhara	3	3
Oromia	2	2
Somali	7	2
Benishangul Gumuz	2	2
SNNPR	2	2
Total	3	3

Seed storage practices

As indicated in Table 23, majority of rice growing households (about 54%) store rice seed with grain rice at grain store. The rest about 45% of respondents stores at the corners of farmers' house or kitchen.

Table 23. Rice Seed place of storage (proportion of respondents)

Place of storage	Region						Total
	Tigray	Amhara	Oromia	Somali	Benishangul Gumuz	SNNPR	
At grain store	64.8	58.9	38.5	35.7	41.4	36.6	54.4
At a corner in the house	31	37	37.7	61.5	39.1	48.9	37.9
At a corner in the kitchen	0	3.9	23.8	2.9	19.5	13.3	7.4
Other	4.2	0.2	0	0	0	1.3	0.3

The store ventilation condition for rice seed as reported by the respondents is presented Table 24. About 19% of the rice producers reported that they store rice seed in a condition where there is no any ventilation.

Table 24. Proportion of respondent's by seed storage ventilation

Store ventilation condition	Region						Total
	Tigray	Amhara	Oromia	Somali	Benishangul Gumuz	SNNPR	
Exposed to air	69.2	35.1	79.8	65.7	76.2	72	44.7
Not exposed to air but good ventilation	0	19.3	17.2	3.8	11.9	15.7	18.3
Poor ventilation	17.7	22.9	0.9	26.7	6.5	1.8	18.4
No ventilation	13.1	22.7	2.2	3.8	5.4	10.4	18.6

In order to keep the seed stored dry, respondents undertake different measures. With difference across regions, about 76% of the rice producers attempt to keep dry the storage premises, about 12% occasionally dry rice seeds outside of the storage premises, and about 7% reported that they continually expose rice seeds to a source of heat (Table 25).

Table 25. Measures to keep seed dry (% of respondents)

Measures	Region						Total
	Tigray	Amhara	Oromia	Somali	Benishangul Gumuz	SNNPR	
Always taking measures to keep storage premises dry	85.9	76	74.7	100	63.1	72.3	75.9
Occasionally drying rice seeds	4.4	12.9	6.7	0	4.9	10.6	11.5
Continually exposing rice seeds to a source of heat	0	8.9	0.5	0	0	3.5	7.1
Others	9.8	2.2	18.1	0	32.1	13.6	5.4

With considerable differences across regions, the main measures reported to be undertaken to prevent the attack of insects at rice seed are related with chemical application (63% of respondents) and prevention of insects from intrusion to the storage premises (11% of respondents). Interestingly, about 16% of respondents reported that they do not take any measure as they believe that rice seed cannot be attacked by insects (Table 26).

Table 26. Measures to prevent insect attacks to rice seed (% of respondents)

Measures	Region						Total
	Tigray	Amhara	Oromia	Somali	Benishangul Gumuz	SNNPR	
Application of chemicals	69.6	64.6	56.7	99	57.5	40.2	62.5
Prevention of insects from intrusions	2.8	13.1	3.4	1	10.3	7.8	11.1
No measure because of belief that insects do not cause damage to the quality of seed	8.8	19.1	5.9	0	4.9	6.2	16.0
Others	18.9	3.2	33.9	0	27.3	45.7	10.4

Agronomy

Seed rate

The average seed rate per hectare at national level was 171.35 and 173.25 kilograms in 2010 and 2009, respectively. The maximum region-wise seed rate

applied was in Amhara that was 205.02 and 201.36 kilograms in 2010 and 2009 cropping seasons (Table 27). The average seed rate by variety was found to be different across varieties. The maximum seed rate estimated was for X-Jigna that is 203.73 and 199.85 kilograms in 2010 and 2009. The lowest seed rate is estimated for the local variety red rice, which was 63 kilograms in 2010 and about 77 kg/ha in 2009 (Table 28).

Table 27. Rice seed rate by region (kg/ha)

Region	Seed rate 2010		Seed rate 2009	
	Mean	SE	Mean	SE
Tigray	97.45	1.94	104.27	2.20
Amhara	205.02	0.29	201.36	0.31
Oromia	88.60	0.76	88.98	0.79
Somali	104.60	1.29	102.79	1.14
Benishangul Gumuz	49.09	1.87	53.68	2.32
SNNPR	97.33	1.02	100.15	1.05
Total	171.35	0.34	173.72	0.34

Table. 28 Rice seed rate by variety (kg/ha)

Variety	2010		2009	
	Mean	SE	Mean	SE
X-Jigna	203.73	0.30	199.85	0.32
White rice	98.75	1.21	105.98	1.26
Gumara	122.97	1.94	123.40	2.04
Red rice	62.97	2.99	76.60	3.07
Superica-1	85.00	0.88	86.41	0.90
NERICA-4	91.01	2.31	86.21	2.30
NERICA-2	103.08	2.27	98.13	1.98
NERICA-3	91.58	1.74	93.59	1.94
NERICA-1	101.48	1.92	101.85	1.73
Shebelle	104.79	0.80	98.11	0.75
Gode-1	103.78	1.12	121.44	1.12
Hoden	96.31	0.87	84.98	6.53
Total	171.35	0.34	173.72	0.34

Fertilizer application

The application of chemical fertilizer in rice production is very low as about 82% of the rice producers reported that they do not apply any fertilizer to their rice fields. Considerable number of rice producers in Tigray (about 81%), Somali (76%), and Oromia (about 36%) reported that they apply both Urea and DAP on rice fields (Table 29).

Table 29. Fertilizer application in rice production (% of respondents)

Region	Urea	DAP	Both	Compost	Do not use
Tigray	4.1	1.5	81.3	0.0	13.1
Amhara	2.3	0.6	1.5	0.4	95.2
Oromia	10.8	4.6	36.2	0.4	48.0
Somali	13.5	0.0	76.0	0.0	10.5
Benishangul Gumuz	31.0	2.9	17.0	0.8	48.4
SNNPR	6.0	1.8	20.5	0.2	71.5
Total	4.5	1.4	11.5	0.3	82.3

The use of fertilizer for the different varieties varies by variety, which is highly associated with the area of production and popularity of the different varieties in respective areas. For instance, the popular rice varieties in Somali regions Shebelle, Gode-1, and Hoden get both Urea and DAP (Table 30).

Table 30. Fertilizer application in rice production by variety (% respondents)

Variety	Fertilizer				
	Urea	DAP	Both	Compost	Do not use
X-Jigna	2.8	0.6	2.4	0.4	93.8
White rice	10.4	3.1	28.7	0.1	57.7
Gumara	22.0	2.7	8.0	0.1	67.2
Red rice	0.0	3.2	9.2	2.4	85.1
Superica 1	5.1	5.2	44.0	0.7	44.9
NERICA-4	4.5	0.5	15.3	0.0	79.7
NERICA-2	14.0	0.0	78.4	0.0	7.6
NERICA-3	7.2	4.1	49.8	0.0	38.9
NERICA-1	18.1	0.0	70.7	0.0	11.2
Shebelle	11.1	0.0	88.9	0.0	0.0
Gode-1	0.0	0.0	100.0	0.0	0.0
Hoden	0.0	0.0	100.0	0.0	0.0
Total	4.6	1.4	11.6	0.4	82.1

Weeding

Rice producing households dominantly weed three times over the production season. About 85% of the respondents reported that they weed three times followed about 14% of respondents that weed only two times (Table 31). There exists regional difference in the frequency of weeding. In SNNPR and Tigray, about 30% and 23% of rice producers undertakes weeding activities two times over the production season, whereas in Somali and Benishangul-Gumuz less than three % of the respondents reported that they weed two times. Less than a % of respondents in Amhara, Oromia, and SNNPR undertake weeding activity four times. In the rest region, weeding is performed three or less times.

Table 31. Weeding frequency by regions (% of respondents)

Region	Weeding frequency			
	One	Two	Three	Four
Tigray	0.6	24.7	74.7	0.0
Amhara	0.5	12.3	86.6	0.6
Oromia	2.6	16.3	81.0	0.2
Somali	1.3	0.8	97.9	0.0
Benishangul Gumuz	0.9	2.8	96.3	0.0
SNNPR	3.2	30.3	66.3	0.2
Total	1.0	13.8	84.7	0.4

The time required for the first weed is higher than the second followed by the third round of weeding. On average, a household requires 134 hours for the first weeding, 102 hours for the second weeding, and 77 hours for the third weeding of a ha of rice field (Table 32). There is considerable variability in the time required for weeding across region, which may be associated with the difference in the level of weed infestation and type of weeds.

Table 32. Percentage distribution of respondents' average weeding hours per respondent by weeding round

Region	First weeding	Second weeding	Third weeding
Tigray	174	128	94
Amhara	135	101	70
Oromia	114	95	130
Somali	42	35	22
Benishangul Gumuz	87	102	85
SNNPR	210	157	97
Total	134	102	77

Cultivated Area, Production and Productivity

Cultivated area

The average cropped area per rice producer at national level was 0.74 and 0.76 hectares in 2010 and 2009, respectively. The total cultivated area at national level has increased from 45,873.96 in 2009 to 49,020.97 hectares in 2010. The rice cultivated area in 2010 across regions was 742.29, 38008.78, 5001.30, 1498.11, 343.21 and 3427.28 hectares in Tigray, Amhara, Oromia, Somali, Benishangul Gumuz and SNNPR regions, respectively. The cultivated area has increased in 2010 as compared to 2009 by about 7% nationally with considerable difference across regions (Table 33).

Table 33. Estimated rice cultivated area in ha

Region	Cropped area in 2010			Cropped area in 2009			Increase	
	Mean	SE	Total	Mean	SE	Total	Hectare	%
Tigray	0.88	0.02	742.29	0.4	0.01	170.71	571.58	334.83
Amhara	0.78	0	38008.78	0.79	0	36931.66	1077.12	2.92
Oromia	0.46	0	5001.3	0.47	0.01	3999.39	1001.91	25.05
Somali	1.19	0.03	1498.11	1.12	0.02	1258.58	239.53	19.03
Benishangul Gumuz	0.6	0.02	343.21	0.67	0.03	299.57	43.64	14.57
SNNPR	0.95	0.01	3427.28	1	0.02	3214.06	213.22	6.63
Total	0.74	0	49020.97	0.76	0	45873.96	3147.01	6.86

In 2009, the Amhara Region share of the national cultivated area was about 81 %. Though the total national cultivated area has increases by 7 %, this share has decreased to 78 % in 2010. The area covered by rice producing regions excluding Amhara has also increased from 8942.3 hectare in 2009 to 11012.19 hectares in 2010 and this is about 23 % increases. The 23 % increase in the national cultivated area share of regions, excluding Amhara, shade some light that rice production is expanding in other regions at a reasonably good pace (Table 33).

In terms of land allocation for the different rice varieties, X-Jigna was the dominant variety in both 2010 and 2009, which covers about 80 and 77 % of the national rice area coverage in 2009 and 2010 production seasons. During the 2010 cropping season, the four dominant varieties in terms of area coverage

were X-Jigna, White rice, Superica-1, Gumara and NERICA-3 each with 37896.33, 3412.27, 3072.54, 1079.22 and 1371.24 hectares respectively. The area coverage of all varieties except Red rice has increased from year 2009 to 2010. Area coverage of NERICA varieties namely, NERICA -4, NERICA -2 and NERICA -3 have boost notably in 2010 as compared to 2009 cropping season with 36.55, 36.75 and 151.53 % increase respectively (Table 34).

The proportion of respondents cultivating rice in 2010 on 0-0.25, 0.25-0.5, 0.5-0.75, 0.75-1 and above 1 hectare were estimated at 27.9, 21.6, 18.1, 17.6, and 14.9 %, respectively (Table 35). This implies that about half of the respondents were planting rice on below half hectare of land as well only 14.6 % of the respondents were cultivating rice over a hectare of land. About 25 % of the respondents from Somali region were enjoying over a hectare of rice land and the other 28 % of the respondents from this region were also in a position to get over 0.75 hectares of rice land. Except in Amhara, 50 % of the respondents from all other regions were farming rice on below 0.25 hectares of land. As rice is a new crop to Ethiopia, this small rice farm may indicate that most of these respondents might have been testing performance of rice in their environment and as well farming conditions (Table 36). In 2010, X-Jigna, White rice, NERICA-2 and NERICA-1 were cultivated on over a hectare of land per producer by 16.3, 26.2, 26.3 and 36.7 % of the respondents, respectively.

Table 34. Rice area allocated per producer

Variety	Cropped area in 2010			Cropped area in 2009			Increase	
	Mean	SE	Total	Mean	SE	Total	Hectare	%
X-Jigna	0.78	0.01	37896.33	0.79	0.00	36867.54	1028.79	2.79
White rice	0.98	0.01	3412.27	1.07	0.02	3129.15	283.12	9.05
Gumara	0.42	0.01	1079.72	0.47	0.01	896.43	183.29	20.45
Red rice	0.33	0.01	69.88	0.56	0.08	137.07	-67.19	-49.02
Superica-1	0.47	0.01	3072.54	0.49	0.01	2655.71	416.83	15.70
NERICA-4	0.42	0.01	499.12	0.46	0.02	359.98	139.14	38.65
NERICA-2	1.16	0.04	598.4	0.87	0.02	437.58	160.82	36.75
NERICA-3	0.62	0.01	1371.24	0.38	0.01	545.15	826.09	151.53
NERICA-1	1.58	0.07	768.12	1.36	0.04	714.12	54.00	7.56
Shebelle	0.75	0.08	104.79	1.17	0.11	86.75	18.04	20.80
Gode-1	0.78	0.04	82.18	0.79	0.05	24.26	57.92	238.75
Hoden	0.60	0.10	66.38	0.55	0.06	20.21	46.17	228.45
Total	0.74	0.01	49020.97	0.76	0.00	45873.96	3147.01	6.86

Table 35. Proportion of respondents by size of rice area cultivated in ha

Region	Cropped area in 2010					Cropped area in 2009				
	≤ 0.25	> 0.25 and ≤ 0.5	>0.5 and ≤ 0.75	>0.75 and ≤ 1	> 1	≤ 0.25	> 0.25 and ≤ 0.5	>0.5 and ≤ 0.75	>0.75 and ≤ 1	> 1
Tigray	49.4	14.6	3.3	11.8	20.9	83.2	11.7	3.6	1.5	.0
Amhara	16.9	22.0	24.5	20.4	16.2	19.4	21.1	23.0	21.5	15.1
Oromia	58.4	26.4	3.5	5.1	6.6	66.5	20.7	3.3	4.7	4.7
Somali	39.1	8.3	.0	28.0	24.5	18.1	11.1	1.0	44.0	25.7
Benishangul Gumuz	69.6	8.8	.0	17.3	4.3	69.8	12.9	.0	12.9	4.3
SNNPR	45.9	14.8	2.6	18.4	18.3	50.4	13.1	5.2	16.0	15.2
Total	27.9	21.6	18.1	17.6	14.8	31.6	20.0	17.3	18.1	13.1

Table 36. Proportion of respondents by area in ha allocated for the different rice varieties

Variety	Cropped area in 2010					Cropped area in 2009				
	≤ 0.25	> 0.25 and ≤ 0.5	>0.5 and ≤ 0.75	>0.75 and ≤ 1	> 1	≤ 0.25	> 0.25 and ≤ 0.5	>0.5 and ≤ 0.75	>0.75 and ≤ 1	> 1
X-Jigna	16.8	22.0	24.4	20.4	16.3	19.4	20.9	23.0	21.6	15.1
White rice	24.9	18.6	4.1	26.4	26.2	31.3	18.2	4.7	22.8	23.0
Gumara	70.0	18.5	4.5	3.7	3.3	72.3	15.4	7.2	2.7	2.4
Red rice	65.1	32.1	.0	2.8	.0	54.0	40.5	.0	2.8	2.8
Superica-1	54.5	27.7	4.1	6.4	7.2	62.4	22.5	2.9	6.5	5.8
NERICA-4	80.2	13.2	1.2	2.9	2.5	87.2	7.4	1.0	3.5	.9
NERICA-2	31.1	13.4	.0	29.2	26.3	27.8	18.5	1.0	43.6	9.1
NERICA-3	56.7	18.9	2.7	9.0	12.7	77.5	16.2	2.6	2.0	1.8
NERICA-1	37.5	3.1	.0	21.8	37.6	15.5	4.6	.0	37.9	41.9
Shebelle	53.5	8.3	.0	29.8	8.3	15.1	30.7	7.3	23.5	23.5
Gode-1	28.9	11.9	.0	53.6	5.5	.0	41.2	.0	58.8	.0
Hoden	55.5	39.3	.0	.0	5.3	48.8	17.1	.0	34.1	.0
Total	27.8	21.6	18.1	17.6	14.9	31.5	20.0	17.3	18.1	13.1

Cultivated area by agro-ecology and variety

Table 38 and Table 37 present the area allocated for rice by variety, agro-ecology, and region. In Tigray, upland rain fed rice agro-ecology dominates followed by lowland rain fed. In Amhara region, lowland rain fed rice ecology is very important with a total land allocation of about 36,600 ha followed by upland rain fed rice ecology with about 1400 ha in 2010. In Oromia, the dominant rice agro-ecology is lowland with a total land allocation of about 5000 ha. Similarly, lowland rain fed rice ecology dominates also in SNNP with about 3,400 ha in 2010. It is only in Somali region that there is irrigated rice ecology under smallholder farmers' condition and it is estimated that the total land allocated in 2010 was about 1500 ha.

In terms of rice varieties, the most important varieties in lowland and upland rain fed rice ecology are the local X-Jigna, local white rice, Superica -1, Gumara, and NERICA varieties. For irrigated rice ecology, the important varieties are NERICA 1 and 2, Shebelle, Gode 1, and Hoden (Table 37).

Table 37. Rice cropped area by agro ecology and variety in ha

Region	Lowland rain fed						Upland rain fed						Irrigated					
	2010			2009			2010			2009			2010			2009		
	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE
X-Jigna	36,638.13	0.78	0.00	35,673.10	0.79	0.00	1,258.20	0.89	0.02	1,194.44	0.87	0.02	.	.	.	.	.	.
White rice	3,402.32	0.98	0.01	3,119.19	1.08	0.02	9.96	0.46	0.09	9.96	0.46	0.09	.	.	.	.	.	.
Gumara (IAC-164)	1,079.72	0.42	0.01	896.43	0.47	0.01	.	.	.	.	.	.	.	.	.	.	.	.
Red rice	51.35	0.34	0.02	118.54	0.63	0.10	18.52	0.32	0.01	18.52	0.32	0.01	.	.	.	.	.	.
Superica-1	3,046.45	0.47	0.01	2,629.47	0.49	0.01	26.09	0.26	0.01	26.23	0.32	0.02	.	.	.	.	.	.
NERICA-4	379.43	0.47	0.02	245.23	0.57	0.03	119.70	0.32	0.01	114.75	0.32	0.01	.	.	.	.	.	.
NERICA-2	121.76	1.25	0.08	24.35	0.50	0.00	.	.	.	.	.	.	476.64	1.14	0.05	413.23	0.91	0.03
NERICA-3	602.82	0.47	0.01	389.83	0.37	0.01	768.41	0.83	0.02	155.33	0.41	0.01	.	.	.	.	.	.
NERICA-1	.	.	.	.	.	.	.	.	.	.	.	.	768.12	1.58	0.07	714.12	1.36	0.04
Shebelle	.	.	.	.	.	.	.	.	.	.	.	.	104.79	0.75	0.08	86.75	1.17	0.11
Gode-1 (BG-90-2)	.	.	.	.	.	.	.	.	.	.	.	.	82.18	0.78	0.04	24.26	0.79	0.05
Hoden (MTU-1001)	.	.	.	.	.	.	.	.	.	.	.	.	66.38	0.60	0.10	20.21	0.55	0.06
Total	45,321.98	0.74	0.00	43,096.15	0.75	0.00	2,200.88	0.76	0.01	1,519.23	0.67	0.01	1,498.11	1.19	0.03	1,258.58	1.12	0.02

Table 38. Rice cropped area by agro ecology and region in ha

Region	Lowland Rain fed						Upland Rain fed						Irrigated					
	2010			2009			2010			2009			2010			2009		
	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE
Tigray	2.72	0.19	0.02	38.00	0.29	0.02	739.56	0.89	0.02	132.71	0.44	0.01	.	.	.	.	.	.
Amhara	36,582.57	0.78	0.00	35,574.94	0.79	0.00	1,426.21	0.73	0.01	1,356.71	0.72	0.01	.	.	.	.	.	.
Oromia	4,996.84	0.46	0.00	3,999.39	0.47	0.01	4.46	0.25	0.00	.	.	.	.	.	.	.	.	.
Somali	.	.	.	.	.	.	.	.	.	.	.	.	1,498.11	1.19	0.03	1,258.58	1.12	0.02
Benishangul Gumuz	337.58	0.64	0.02	294.77	0.71	0.03	5.63	0.14	0.00	4.80	0.14	0.00	.	.	.	.	.	.
SNNPR	3,402.27	0.95	0.01	3,189.05	1.01	0.02	25.01	0.48	0.03	25.01	0.48	0.03	.	.	.	.	.	.
Total	45,321.98	0.74	0.00	43,096.15	0.75	0.00	2,200.88	0.76	0.01	1,519.23	0.67	0.01	1,498.11	1.19	0.03	1,258.58	1.12	0.02

Distribution of farmers by rice land size and agro-ecology

The distribution of rice farmers by size of rice land indicates that there is considerable difference across the three rice ecologies, where in irrigated ecology more farmers cultivate less than a quarter of a hectare and more than one hectare compared to lowland and upland rain fed rice ecology (Table 39).

Table 39. Percentage distribution of producers by agro-ecology and rice acreage

Crop year	Area category	Agro ecology			Total
		Lowland rain fed	Upland rain fed	Irrigated	
2010	<=0.25	27.4	33.0	39.1	27.9
	> 0.25 and <=0.5	21.9	21.4	8.3	21.6
	>0.5 and <= 0.75	18.8	11.0	0.0	18.1
	>0.75 and <= 1	17.4	16.3	28.0	17.6
	> 1	14.5	18.3	24.5	14.8
2009	<=0.25	31.0	50.0	18.1	31.6
	> 0.25 and <=0.5	20.2	18.6	11.1	20.0
	>0.5 and <= 0.75	17.8	12.0	1.0	17.3
	>0.75 and <= 1	18.0	10.2	44.0	18.1
	> 1	13.0	9.2	25.7	13.1

Production by region and variety

On the average, 22 and 21 quintals of paddy were produced per household during 2010 and 2009 cropping seasons. The total national volume of production during 2010 and 2009 cropping seasons were estimated to be 1,465,658 and 1,265,306 quintals of paddy. This does not include commercial rice production in the country at medium and large-scale farmers. The 2010 cropping season production has increased by 200,352 quintals of paddy as compared to 2009 cropping season production. This is an evidence for 15.8 % increase in the national volume of paddy rice production (Table 40).

Table 40. Production of paddy per household and region in quintals

Region	Quantity of paddy produced 2010			Quantity of paddy produced 2009			Increment	
	Mean	SE	Total	Mean	SE	Total	Quintal	%
Tigray	25	1	20,798	7	0	3,095	17,703	571.99
Amhara	25	0	1,214,889	23	0	1,083,531	131,358	12.12
Oromia	11	0	114,836	10	0	86,843	27,993	32.23
Somali	34	1	42,273	36	1	41,274	999	2.42
Benishangul Gumuz	12	0	6,563	8	0	3,106	3,457	111.30
SNNPR	18	0	66,300	15	0	47,455	18,845	39.71
Total	22	0	1,465,658	21	0	1,265,306	200,352	15.83

The 2010 cropping season volume of production by region was 20798, 1214889, 114836, 12273, 6563, and 66300 quintals as produced by Tigray, Amhara, Oromia, Somali, Benishangul Gumuz and SNNPR respectively. In all the regions, the production level in 2010 has increased as compared to 2009 in 571.9, 12.12, 32.23, 2.42, 111.3, and 39.71 % in Tigray, Amhara, Oromia, Somali, Benishangul Gumuz, and SNNPR, respectively. This result may be considered as an indicator for existence of considerable expansion of rice production in Tigray and Benishangul Gumuz Regions (Table 40).

Table 41. Production of Paddy per household and variety in quintals

Variety	Paddy produced 2010			Paddy produced 2009			Increment	
	Mean	SE	Total	Mean	SE	Total	Quintal	%
X-Jigna	25	0	1,212,585	23	0	1,082,994	129,591	11.97
White rice	19	0	65,746	16	0	44,100	21,646	49.08
Gumara	9	0	23,459	8	0	16,228	7,231	44.56
Red rice	10	0	2,086	7	0	1,617	469	29.00
Superica-1	12	0	77,094	11	0	60,204	16,890	28.05
NERICA-4	8	0	8,810	7	0	5,553	3,257	58.65
NERICA-2	34	1	15,698	31	1	15,730	-32	-0.20
NERICA-3	16	0	32,873	8	0	12,459	20,414	163.85
NERICA-1	45	2	21,201	44	1	23,321	-2120	-9.09
Shebelle	20	1	2,813	27	2	2,201	612	27.81
Gode-1	20	2	2,161	15	2	463	1,698	366.74
Hoden	11	1	1,131	12	2	435	696	160.00
Total	22	0	1,465,658	21	0	1,265,306	200,352	15.83

All the varieties except NERICA-1 and NERICA-2 have shown an increase in volume of production in 2010 as compared to 2009 cropping season. However,

the average volume of production per household for NERICA-1 and NERICA-2 was the highest in both years compared to other rice varieties. In terms of the contribution to total rice production the local variety X-Jigna and the improved variety Superica 1 are the dominant varieties at national level (Table 41).

Production by agro-ecology and variety

Linked with the size of land allocated more rice is produced in lowland rain fed rice agro-ecology with an estimated total paddy production of about 1.2 million quintals in 2009 and 1.4 million quintals in 2010. In upland rice ecology, the estimated total paddy production was about 62 thousand quintals with average productivity level of 21 q/ha in 2010. In irrigated rice ecology, the estimated paddy production was about 42 thousand quintals with productivity levels of 34 q/ha (Table 42). The trend in production and productivity indicates that there is increase in the level of productivity in lowland and upland rain fed rice ecology whereas in the irrigated ecology the estimates indicated that there is a decrease on average (Table 43).

The estimated productivity level in lowland ecology has increased from the average 21 q/ha in 2009 to 22 q/ha in 2010. In the upland rice ecology, the productivity level has increased from 18 q/ha in 2009 to 21 q/ha in 2010. In the irrigated rice ecology, the average productivity level has decreased from 36 q/ha in 2009 to 34 q/ha in 2010.

The productivity levels achieved in the different regions are considerably different within rice ecologies and across ecologies. The highest productivity level in the lowland rice ecology was achieved in Amhara (25 q/ha) in 2010 followed by SNNP (19 q/ha) and Oromia (11 q/ha). On the other hand, higher productivity level in upland rice ecology was achieved in Tigray with average productivity level of 25 q/ha in 2010.

In terms of variety, X-Jigna gave the highest yield both in lowland and upland rice ecologies with 25 q/ha and 27 q/ha in 2010, respectively. In the irrigated rice ecology, NERICA 1 gave the highest productivity level with 45 q/ha in 2010 (Table 43).

Table 42. Paddy produced by agro-ecology and region in quintal

Region	Lowland rain fed						Upland rain fed						Irrigated					
	Quantity of paddy produced						Quantity of paddy produced						Quantity of paddy produced					
	2010			2009			2010			2009			2010			2009		
	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	S.E
Tigray	100	7	0.82	265	2	0.19	20,697	25	0.69	2,830	8	0.50	.	.	.	.	.	.
Amhara	1,174,655	25	0.08	1,045,778	23	0.08	40,234	21	0.44	37,754	20	0.43	.	.	.	.	.	.
Oromia	114,782	11	0.09	86,843	10	0.10	54	3	0.00	.	.	.	.	.	.	.	.	.
Somali	.	.	.	.	.	.	.	.	.	.	.	.	42,273	34	0.81	41,274	36	0.79
Benishangul Gumuz	6,376	12	0.48	2,840	8	0.28	187	5	0.64	267	8	1.95	.	.	.	.	.	.
SNNPR	65,659	19	0.27	47,152	15	0.24	641	12	1.37	303	6	0.25	.	.	.	.	.	.
Total	1,361,572	22	0.07	1,182,878	21	0.07	61,813	21	0.36	41,153	18	0.37	42,273	34	0.81	41,274	36	0.79

Table 43. Paddy produced by agro ecology and Variety in quintal

Region	Lowland rain fed						Upland rain fed						Irrigated					
	Quantity of paddy produced						Quantity of paddy produced						Quantity of paddy produced					
	2010			2009			2010			2009			2010			2009		
	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE	Total	Mean	SE
X-Jigna	1,174,577	25	0	1,047,240	23	0	38,008	27	1	35,753	26	0	.	.	.	.	.	.
White rice	65,385	19	0	43,811	16	0	361	17	3	289	13	3	.	.	.	.	.	.
Gumara (IAC-164)	23,459	9	0	16,228	8	0	.	.	.	.	.	.	.	.	.	.	.	.
Red rice	1,693	11	1	1,369	7	0	393	7	0	248	4	0	.	.	.	.	.	.
Superica-1	76,796	12	0	59,870	11	0	297	3	0	334	4	0	.	.	.	.	.	.
NERICA-4	6,994	9	0	4,147	10	1	1,816	5	0	1,406	4	0	.	.	.	.	.	.
NERICA-2	731	15	0	877	18	0	.	.	.	.	.	.	14,968	36	1	14,854	33	1
NERICA-3	11,937	10	0	9,336	9	0	20,937	23	1	3,123	8	0	.	.	.	.	.	.
NERICA-1	.	.	.	.	.	.	.	.	.	.	.	.	21,201	45	2	23,321	44	1
Shebelle(IR688059-76-3-3-3-2)	.	.	.	.	.	.	.	.	.	.	.	.	2,813	20	1	2,201	27	2
Gode-1 (BG-90-2)	.	.	.	.	.	.	.	.	.	.	.	.	2,161	20	2	463	15	2
Hoden (MTU-1001)	.	.	.	.	.	.	.	.	.	.	.	.	1,131	11	1	435	12	2
Total	1,361,572	22	0	1,182,878	21	0	61,813	21	0	41,153	18	0	42,273	34	1	41,274	36	1

Productivity levels by region and variety

The national average productivity level of 2010 and 2009 cropping seasons were estimated at 32.4 and 31.25 q/ha, respectively. This shows an improvement of 0.9 q/ha on the average productivity level of 2010 as compared to 2009 cropping season. The highest productivity level, 34.43 q/ha, was recorded for Amhara while the lowest productivity level, 24.6 q/ha, was recorded for Benishangul Gumuz in 2010 cropping season (Table 44).

Table 44. Paddy rice productivity levels (q /ha) by region

Region	2010		2009	
	Mean	SE	Mean	SE
Tigray	25.83	0.44	16.51	0.65
Amhara	34.43	0.09	31.89	0.10
Oromia	33.10	0.26	32.98	0.32
Somali	33.42	0.46	36.98	0.70
Benishangul Gumuz	24.60	1.11	15.27	1.41
SNNPR	23.89	0.33	19.37	0.29
Total	33.42	0.08	31.25	0.09

The 2010 productivity level of varieties was assessed and the maximum and the minimum productivity levels estimated were 40.03 and 24.89 q/ha, estimated for the varieties Shebelle and NERICA-4 respectively (Table 45).

Table 45. Paddy rice productivity levels (q/ha)

Variety	2010		2009	
	Mean	SE	Mean	SE
X-Jigna	34.55	0.09	32.04	0.10
White rice	26.20	0.39	22.32	0.48
Gumara	27.77	0.42	22.27	0.38
Red rice	29.34	1.07	21.36	0.91
Superica-1	34.32	0.36	34.07	0.42
NERICA-4	24.89	0.61	17.01	0.52
NERICA-2	34.91	0.70	40.82	1.12
NERICA-3	28.50	0.49	29.28	0.69
NERICA-1	32.79	0.59	35.60	0.93
Shebelle	40.03	1.81	32.56	2.20
Gode-1	26.52	2.11	17.84	2.10
Hoden	26.24	1.21	27.81	2.99
Total	33.42	0.08	31.25	0.09

Productivity levels by agro-ecology and variety

The trend indicates that higher yields are achieved in lowland rain fed and irrigated rice ecologies compared to upland rain fed rice ecology. In 2010, the average national yield was 34 q/ha in lowland rain fed, about 27 q/ha in upland rain fed, and about 33 q/ha in irrigated rice ecologies (Table 46).

Table 46. Productivity by agro-ecology and region

Region	Lowland rain fed				Upland rain fed				Irrigated			
	2010		2009		2010		2009		2010		2009	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Tigray	46.46	8.34	9.23	0.86	25.47	0.41	19.61	0.78	.	.	.	.
Amhara	34.68	0.09	32.07	0.10	28.51	0.45	27.45	0.40	.	.	.	.
Oromia	33.14	0.26	32.98	0.32	12.00	0.00	.	.	.	.	.	.
Somali	.	.	.	.	.	.	.	.	33.42	0.46	36.98	0.70
Benishangul Gumuz	24.08	1.15	11.39	0.32	31.46	4.21	58.85	15.15	.	.	.	.
SNNPR	23.90	0.34	19.49	0.30	23.24	0.71	12.66	0.16	.	.	.	.
Total	33.70	0.09	31.33	0.10	27.48	0.33	26.53	0.43	33.42	0.46	36.98	0.70

Yield levels across the different rice ecologies indicates that rice varieties give better yields in lowland rain fed compared to upland rain fed and similarly, the yield levels also vary for the different varieties in each rice ecology (Table 47).

Table 47: Paddy produced by agro ecology and region

Region	Lowland Rain fed				Upland Rain fed				Irrigated			
	2010		2009		2010		2009		2010		2009	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	S.E	Mean	S.E
X-Jigna	34.59	0.09	32.03	0.10	33.24	0.46	32.28	0.46	.	.	.	.
White rice	26.11	0.39	21.90	0.44	39.52	6.06	.	.	.	.	.	.
Gumara (IAC-164)	27.77	0.42	22.27	0.38	.	.	.	.	.	.	.	.
Red rice	32.29	1.35	23.73	1.13	21.52	0.99	13.67	0.12	.	.	.	.
Superica-1	34.60	0.37	34.38	0.42	16.05	2.12	13.36	0.93	.	.	.	.
NERICA-4	28.33	0.67	18.48	0.77	17.94	1.16	15.27	0.67	.	.	.	.
NERICA-2	30.00	0.00	36.00	0.00	.	.	.	.	35.49	0.78	41.33	1.24
NERICA-3	32.08	0.79	33.22	0.87	23.91	0.41	18.31	0.67	.	.	.	.
NERICA-1	.	.	.	.	.	.	.	.	32.79	0.59	35.60	0.93
Shebelle (IR688059-76-3-3-3-2)	.	.	.	.	.	.	.	.	40.03	1.81	32.56	2.20
Gode-1 (BG-90-2)	.	.	.	.	.	.	.	.	26.52	2.11	17.84	2.10
Hoden (MTU-1001)	.	.	.	.	.	.	.	.	26.24	1.21	27.81	2.99
Total	33.70	0.09	31.33	0.10	27.48	0.33	26.53	0.43	33.42	0.46	36.98	0.70

Paddy Rice Milled and Sold

The amount of rice sold varied considerable across region and the average proportion of paddy sold from the total paddy produced was about 20% at national level in both 2010 and 2009. The proportion of milled rice of the total paddy produced varied across region and the average proportion of paddy milled from the total paddy produced was about 59% in 2010 and 62% in 2009 at national level. The highest proportion of paddy milled was recorded in Somali region with 87% followed by Amhara with 64%, and Benishangul-Gumuz with 43% (Table 48).

The average amount of paddy produced per household is estimated to be 21 quintals in 2009 and 22 quintals in 2010. The quantity of paddy sold per household was on average 4 quintals in 2009 and 5 quintals in 2010 whereas the quantity of milled rice sold per household is 4 quintals in 2009 and 2010 (Table 49).

Table 50 presents the amount of paddy produced, sold, milled, and milled rice sold for the different varieties. The result indicates that there is a considerable variability among the different varieties. For some varieties the amount of paddy sold is higher than the amount milled rice sold like for Gumara, superica-1, NERICA 4, NERICA 3, whereas for other varieties the amount paddy sold is smaller than the amount milled rice sold like for NERICA 2 and NERICA 1 (Table 50).

Table 48. Paddy produced, sold, milled and milled paddy sold in quintals by region

Region	2010								2009							
	paddy produced	paddy sold		paddy milled		milled rice sold		paddy produced	paddy sold		paddy milled		milled rice sold			
		Amount	Amount	%	Amount	%	Amount		%	Amount	Amount	%	Amount	%	Amount	%
Tigray	20,798	15,943	77	2,250	11	286	1	3,095	2,051	66	656	21	7	0		
Amhara	1,214,889	188,214	15	776,793	64	259,317	21	1,083,531	181,441	17	721,172	67	246,568	23		
Oromia	114,836	47,932	42	26,456	23	2,126	2	86,843	36,479	42	14,468	17	519	1		
Somali	42,273	5,059	12	36,665	87	9,271	22	41,274	4,536	11	34,493	84	13,654	33		
Benishangul Gumuz	6,563	270	4	2,808	43	183	3	3,106	148	5	1,189	38	0	0		
SNNPR	66,300	37,563	57	12,926	19	1,166	2	47,455	24,598	52	9,786	21	1,135	2		
Total	1,465,658	294,981	20	857,899	59	272,349	19	1,265,306	249,252	20	781,765	62	261,884	21		

Table 49. Average paddy produced, sold, milled and milled paddy sold in quintals per household by region

Region	2010								2009							
	paddy produced	paddy sold		paddy milled		milled rice sold		paddy produced	paddy sold		paddy milled		milled rice sold			
		Amount	Amount	%	Amount	%	Amount		%	Amount	Amount	%	Amount	%	Amount	%
Tigray	25	19	77	3	11	0.34	1	7	5	72	1	21	0.0	0		
Amhara	25	4	15	16	64	5.32	21	23	4	17	15	67	5.3	23		
Oromia	11	5	42	3	23	0.20	2	10	4	42	2	17	0.1	1		
Somali	34	4	12	29	86	7.84	23	36	4	11	31	86	12.8	35		
Benishangul Gumuz	12	0	4	5	43	0.32	3	8	0	5	3	38	0.0	0		
SNNPR	18	10	57	4	19	0.32	2	15	8	52	3	21	0.4	2		
Total	22	5	20	13	59	4.16	19	21	4	20	13	62	4.3	21		

Table 50. Paddy produced, sold, milled and milled paddy sold in quintals by variety

Variety	2010								2009							
	paddy produced	paddy sold		paddy milled		milled rice sold		paddy produced	paddy sold		paddy milled		milled rice sold			
		Amount	Amount	%	Amount	%	Amount		%	Amount	Amount	%	Amount	%	Amount	%
X-Jigna	1,212,585	190,080	16	770,946	64	257,688	21	1,082,994	182,306	17	717,476	66	245,322	23		
White rice	65,746	35,422	54	13,161	20	1,086	2	44,100	22,787	52	9,427	21	1,120	3		
Gumara	23,459	4,701	20	12,492	53	2,386	10	16,228	3,924	24	7,811	48	1,085	7		
Red rice	2,086	559	27	1,047	50	4	0	1,617	470	29	987	61	0	0		
Superica-1	77,094	36,041	47	13,002	17	768	1	60,204	27,219	45	7,013	12	375	1		
NERICA-4	8,810	2,365	27	2,614	30	805	9	5,553	1,083	20	1,014	18	327	6		
NERICA-2	15,698	760	5	14,454	92	3,666	23	15,730	982	6	13,702	87	5,546	35		
NERICA-3	32,873	20,753	63	7,241	22	342	1	12,459	6,927	56	2,667	21	0	0		
NERICA-1	21,201	2,121	10	18,883	89	4,082	19	23,321	2,738	12	19,360	83	6,704	29		
Shebelle	2,813	778	28	2,004	71	719	26	2,201	634	29	1,360	62	771	35		
Gode-1	2,161	1,011	47	1,276	59	390	18	463	6	1	415	90	347	75		
Hoden	1,131	389	34	778	69	414	37	435	176	40	399	92	286	66		
Total	1,465,658	294,981	20	857,899	59	272,349	19	1,265,306	249,252	20	781,631	62	261,884	21		

Purpose of Rice Production

Respondents were asked how they used the rice they produced in 2010 and 2009 cropping seasons. In 2010, 27.4, 68.7, 2.2, and 1.7 % of the respondents have reported that they use what they produced only family consumption, and sale, for sale only and for other purposes respectively. While in 2009, 26.9, 67.5 1.8, and 3.8 % of the respondents have reported that, what they produced was used for family consumption only, family consumption and sale, for sale only and for other purposes respectively (Table 51).

Table 51. Distribution of rice producing households by main purpose of rice production

Region	2010				2009			
	Consumption only	Consumption and sale	Sale only	Other	Consumption only	Consumption and sale	Sale only	Other
Tigray	48.1	47.8	2.9	1.2	38.2	26.2	8.7	26.9
Amhara	20.3	76.7	1.9	1.2	22.6	73.7	1.6	2.1
Oromia	48.1	48.5	2.3	1.1	41.1	53.7	.6	4.7
Somali	46.8	38.7	7.2	7.2	34.6	37.2	9.4	18.9
Benishangul Gumuz	75.3	15.3	.0	9.4	75.0	3.0	.0	22.0
SNNPR	33.4	55.1	4.6	6.9	31.3	55.9	3.6	9.3
Total	27.4	68.7	2.2	1.7	26.9	67.5	1.8	3.8

Major Constraints in Rice Production

The major constraints in rice production are in order to their importance (Table 52).

- water management related problems, which are related to the late onset, early session, heavy rainfall, shortage of rain, drought and/or water lodge and flood;
- soil related problem that are associated with soil fertility depletion, salinity, and/or siltation;
- weed;
- insect pests;
- disease;
- input related such as seed fertilizer, labor chemical and water pumps; and
- market related.

Table 52. Distribution of respondents by priority rice production constraint (% of respondents)

Constraint	Tigray	Amhara	Oromia	Somali	Benishangul Gumuz	SNNPR	Total
Water related problem	28.3	40.1	5.3	1	0	7.9	32.1
Weed	34.9	25.5	20.4	12.9	20.9	37.5	25.6
Insect, pest and wild life	34.5	19.4	56.3	20.6	61.7	21.5	24.1
Soil related problem	2.3	7.5	2.7	2.9	0	0.7	6.2
Disease	0	2.3	13.9	0.6	12.6	31.2	5.6
Crop nature	0	4.2	1	0	0	0	3.3
Input related problem	0	0.3	0	34.9	3.9	0.5	1.6
Market related	0	0.6	0.4	27.1	1	0.7	1.6

Conclusions

As relatively new crop to the country, much is not known about rice production and the characteristics of its producers. This national survey was conducted to fill this gap especially in terms of characterizing rice production and its producers.

It is expected that the report will serve as a baseline and reference material for rice researchers, development workers and advocates of the implementation of the national rice research and development strategy.

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