HORTICULTURE POSTHARVEST PRACTICES IN RWANDA

2019

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Agribusiness Associates

Started by Mr. Gurbinder Singh Gill, Agribusiness Associates is an international development consulting firm focusing on overcoming the biggest challenges in the agricultural sector. The firm has special expertise in offering comprehensive solutions to the agribusiness sector for enterprise development. ABA has worked in public-private partnerships, seed industry, technology adoption, capacity building and providing strategic advisory services. Agribusiness Associates is the lead implementing partner for the 'Reducing Postharvest Losses in Rwanda' project.

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Executive summary

This report aims to assess the horticulture postharvest landscape in Rwanda and further understand traditional farmer practices. The study was conducted in three major agricultural regions of the country - Northern, Southern, and Eastern plus Kigali city. The study interviewed 211 farmers.

Important insights from the study are highlighted below:

1. In terms of marketing of produce: in the northern region 74.1% of produce was sold by farmers to wholesalers, 18.4% was for direct consumption by households, 5.3% was sold to intermediaries, and only 2.2% was sold directly the packhouse; in the eastern region, the majority of chili and tomato production (43.5%) was used for wholesales, 24.1% was used for intermediaries, 19.2% were exported; in the southern region, most of the production (63.4%) was used for wholesales, 24% was for intermediaries, and 12.5% was sold directly to consumers.
2. Postharvest management and storage data indicated that adoption of postharvest practices vary by region: in the northern region cereals and legumes (168 – 365 days) were stored for more days than fruits and vegetables (1 – 10 days); in the eastern region, after treatment chilies were stored for up to one year while tomatoes were stored only for 10 days; in the southern region, chili and green banana were stored for a maximum of 2 weeks and tomatoes for one month.
3. The number of days between harvests and selling was fewer for perishable products such as vegetables, tomatoes, and fruits and higher for imperishable crops. In the Eastern region, the average number of days between harvesting and selling for chili and tomatoes were 1-4 days; in the southern region, the average number of days between harvesting and selling for bananas, tomatoes, and chilies were 2-7 days, 2-6 days, and 1-3 days, respectively. The majority of the harvested crops in all three regions were of good quality. Grading of harvested crops before selling was performed at most of the locations and it helped in setting price per the quality of the harvest. Tomatoes and pineapple were the most graded crops and chilies were the least graded ones. A good percentage of farmers agree that the price of the harvest depends on grading, but the analysis showed that price was independent of grading. On the contrary, the average price of each sold crop is affordable to the buyers.
4. Study interviewed the status of postharvest crops consumption and processing; it was found that in all three regions a very high proportion (88% - 99%) of the harvest crops was sold in the market. The remaining proportion was distributed between fresh consumption, processing, and storage. The only discrepancy was banana growers in the southern region where 47.5% of the harvest was sold, 46.8% was consumed after being processed and the remaining was consumed fresh.
5. Another objective of the study was to analyze the predominant defects that led to lower prices of the crops. Chilies were affected by diseases, mold, bruising, malformation, and different color. These defects affected the pricing of chili. Similarly, tomatoes were affected by the disease, damages, black patches, malformation, and bruising. Damages by insects, rats, and birds as well as bad seeds was a concern in the southern region.

1. Introduction

In Rwanda, agriculture serves as the backbone of the economy and is crucial to its growth and reduction in poverty. The agriculture sector accounts for 39% of gross domestic production, 80% of employment and 63% of foreign exchange earnings (World Bank, Rwanda, 2014). Various estimates say that up to 40% of food is lost in the postharvest stage. While simple approaches exist to reduce postharvest losses such as improved handling of horticultural crops, there is no one isolated intervention that will prove effective at mitigating this issue. Postharvest management is a system-based challenge and requires an integrated innovation strategy that incorporates technological and financial innovations, capacity building across the value chain, enhanced market access and other elements to achieve impact at scale (Global Knowledge Initiative, 2014).

About 'Reducing Postharvest Losses in Rwanda' Project

The study was conducted by the 'Reducing Postharvest Losses in Rwanda' Project. Funded by Feed the Future Horticultural Innovation Lab, the Reducing Postharvest Losses in Rwanda project worked under the guidance of the Ministry of Agriculture and Animal Resources in Rwanda with implementing partners, Agribusiness Associates, Rwanda Agriculture and Animal Resources Board, National Agriculture Export Development Board and University of Rwanda – College of Agriculture and Veterinary Medicine. Our postharvest technical assistance partner is Postharvest Education Foundation.

The primary goal of the project is to increase food security in Rwanda, by reducing postharvest losses in horticulture. The specific project objectives are:

Objective 1: Gain understanding of post-harvest losses, constraints and opportunities in the four identified horticultural crop value chains

Objective 2: Determine the benefits of introducing improved postharvest practices and technologies in partnership with three institutions

Objective 3: Build entrepreneurial capacity in stakeholders across the value chain

The project identified postharvest losses and constraints in four key horticultural crops – tomatoes, green chilies, orange-fleshed sweet potatoes and green bananas. This study is the next step in further understanding the practices of farmers.

The study was conducted in three regions such as Northern, southern and Eastern plus Kigali City, the individual farmers and cooperatives of farmers were interviewed. The analysis of findings is given by region.

2. DATA ANALYSIS AND INTERPRETATION OF STUDY FINDINGS

2.1 Farmer Demographics

Distribution of farmers interviewed by location

North: In northern region, a total of 102 farmers were interviewed, with the highest number of respondents bring from Gakenke district followed by other districts where agriculture activities are concentrated. Only Musanze which has a big city area was represented by less than 10%.

Table 1: Number of Respondents in the North

District	Number	Percentage
Gakenke	40	39.2%
Gicumbi	27	26.5%
Rulindo	27	26.5%
Musanze	8	7.8%
Total	102	100%

East: In Eastern region (including Kigali city) a total of 39 farmers were interviewed, where most of the respondents were from Nyagatare district, followed by Ngoma, Bugesera and Kirehe districts.

Table 2: Number of Respondents in the East

District	Number	Percentage
Nyagatare	14	35.9%
Ngoma	10	25.6%
Bugesera	4	10.3%
Kirehe	4	10.3%
Gasabo	3	7.7%
Gatsibo	2	5.1%
Kayonza	1	2.6%
Kicukiro	1	2.6%
Total	39	100%

South: In the southern region, most of the sampled farmers were from Kamonyi district with 27.1% which also has the highest number of cooperatives.

Table 3: Number of Respondents in the South

District	Number	Percentage
Kamonyi	19	27.1%
Huye	10	14.3%
Muhanda	9	12.9%
Nyanz	9	12.9%
Nyaruguru	8	11.4%
Ruhango	8	11.4%
Gisagara	6	8.6%
Nyamagabe	1	1.4%
Total	70	100%

Distribution of interviewed farmers by gender

In the Northern Region, the gender of interviewed farmers is almost balanced. In Eastern and Southern Regions, majority of the respondents were male.
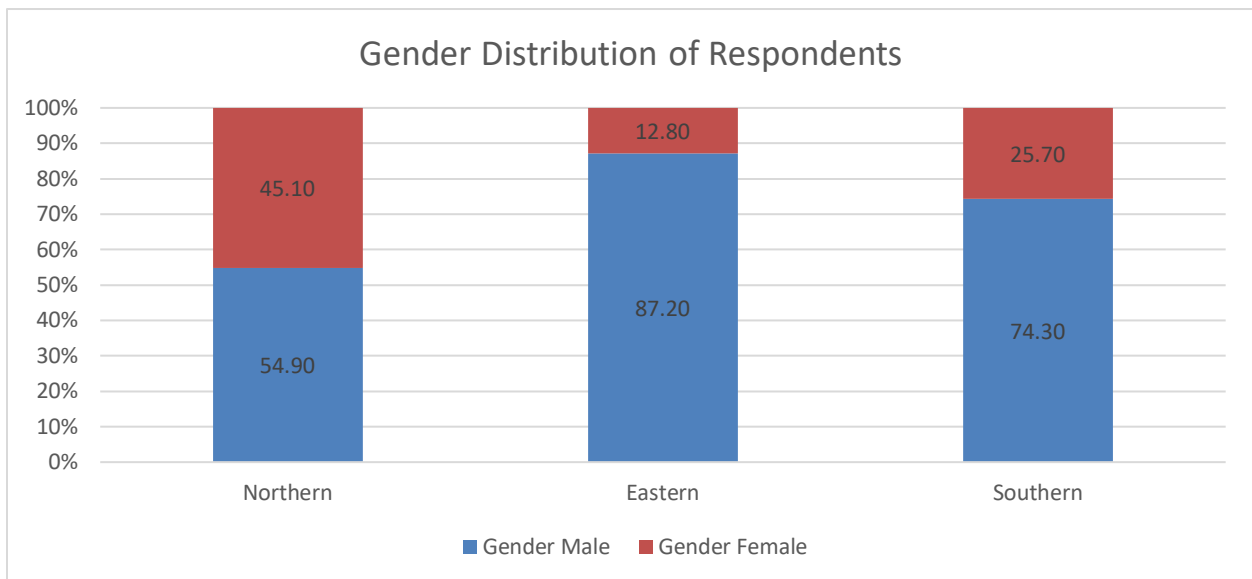
Figure 1: Gender distribution of respondents in all three regions

Distribution of Farmers by Family Status

Regarding family status, in the Northern Region most respondents live in extended family. On the other hand, in Southern and Eastern Regions most respondents live in nuclear family.

Figure 2: Family type in all three regions

2.2 Description of crops grown by interviewed farmers

In the Northern Region, findings indicate that the predominant crops grown in the northern region of Rwanda are beans, maize, green banana, tomatoes and orange fleshed sweet potatoes.

Percentage Distribution of Crops in Northern Region

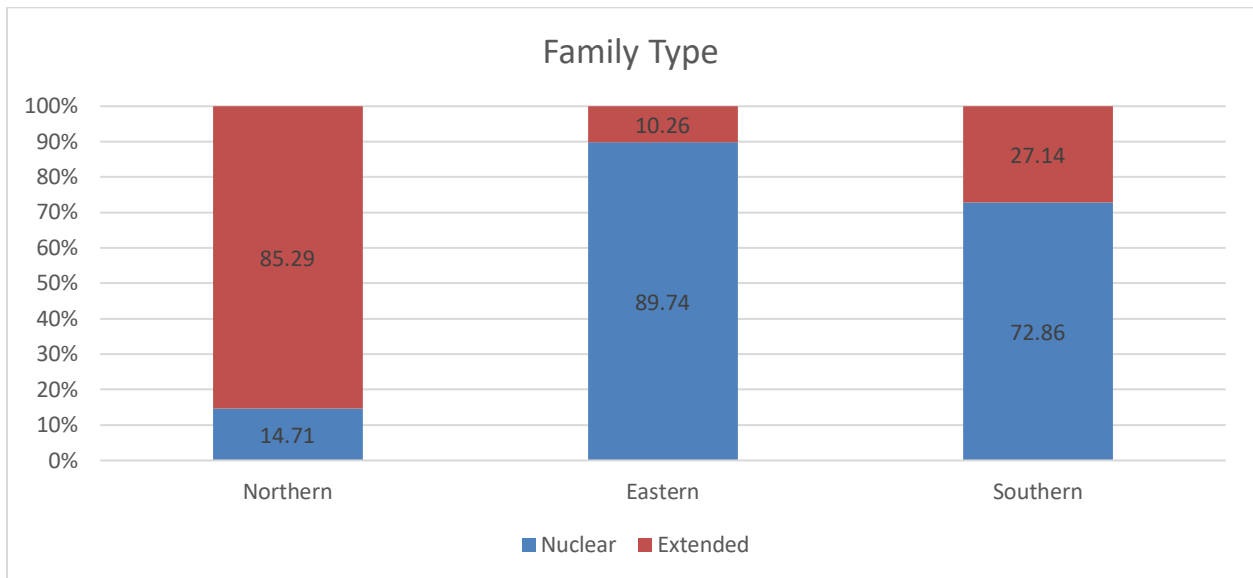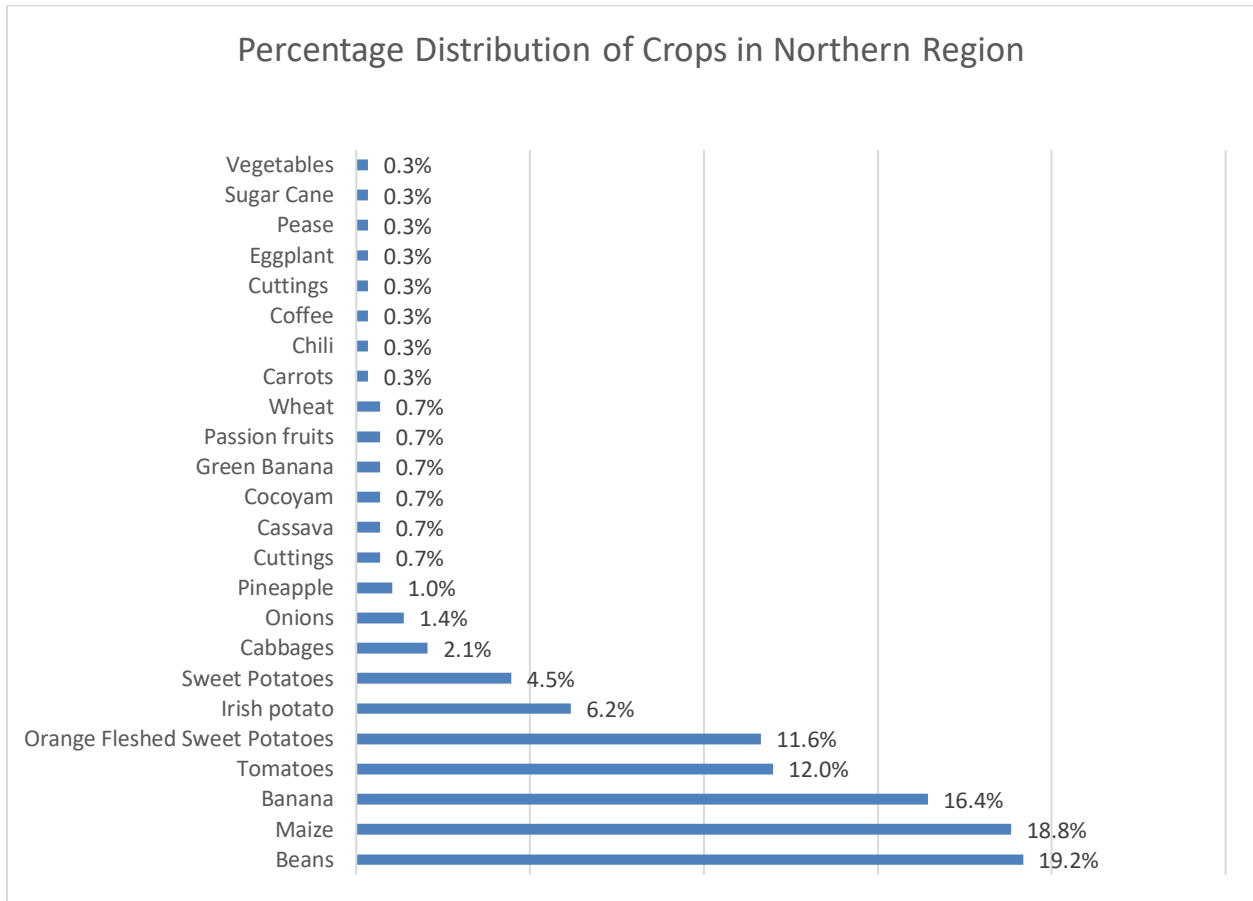| Crop	Percentage
Vegetables	0.3%
Sugar Cane	0.3%
Pease	0.3%
Eggplant	0.3%
Cuttings	0.3%
Coffee	0.3%
Chili	0.3%
Carrots	0.3%
Wheat	0.7%
Passion fruits	0.7%
Green Banana	0.7%
Cocoyam	0.7%
Cassava	0.7%
Cuttings	0.7%
Pineapple	1.0%
Onions	1.4%
Cabbages	2.1%
Sweet Potatoes	4.5%
Irish potato	6.2%
Orange Fleshed Sweet Potatoes	11.6%
Tomatoes	12.0%
Banana	16.4%
Maize	18.8%
Beans	19.2%

Figure 3: Distribution of crops - North

In the Eastern Region, the findings indicate that the predominant crops grown by the interviewed farmers are tomatoes and chilies.
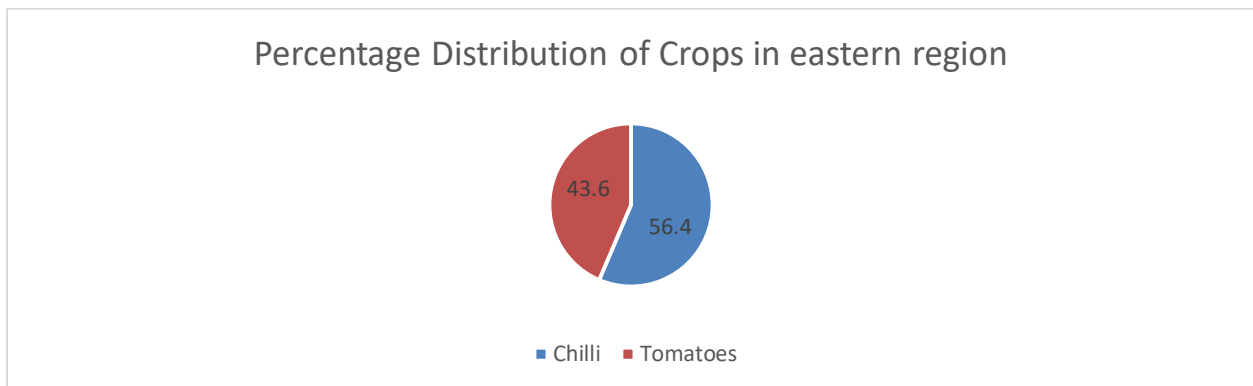
Percentage Distribution of Crops in eastern region

- Chilli: 56.4
- Tomatoes: 43.6

Figure 4: Distribution of crops - East

In the Southern region, the farmers interviewed grew tomatoes (48.1%), followed by 16.5% for green banana, and Chili with 15.2 %.

Distribution of % share of crops grown in southern agriculture region

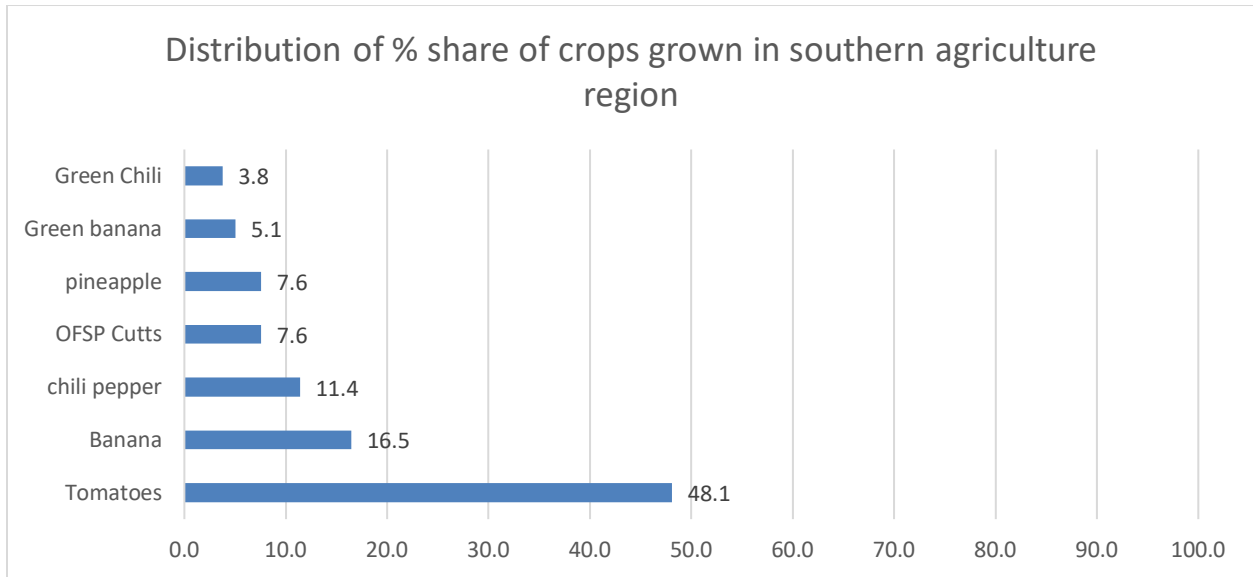| Crop	% share
Green Chili	3.8
Green banana	5.1
pineapple	7.6
OFSP Cutts	7.6
chili pepper	11.4
Banana	16.5
Tomatoes	48.1

Figure 5: Distribution of crops - South

Distribution of Produce Sold by Farmers to Different Market Actors

The study asked the farmers how much they sold to different market actors and how much was kept for home consumption.
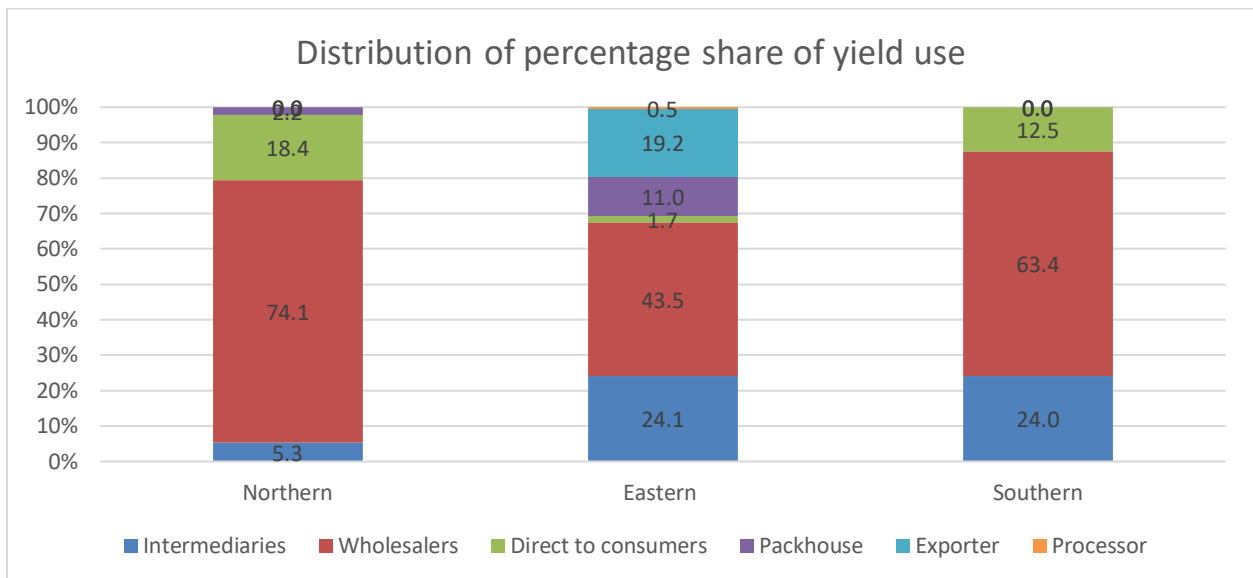
Distribution of percentage share of yield use

Market actor	Northern	Eastern	Southern
Processor	0.0	0.5	0.0
Exporter	2.2	19.2	0.0
Packhouse		11.0	
Direct to consumers	18.4	1.7	12.5
Wholesalers	74.1	43.5	63.4
Intermediaries	5.3	24.1	24.0

Intermediaries Wholesalers Direct to consumers Packhouse Exporter Processor

Figure 6: Distribution of Produce Sold by Farmers to Different Market Actors

The figure above illustrates that in the Northern region, 74.1% of reported yield was sold to wholesalers, 18.4% was used for direct consumption by households, 5.3% was sold to intermediaries and only 2.2 % was sold to pack houses.

In the Eastern region, the majority of chili and tomatoes production were sold to wholesales at 43.5%. 24.1% of the production were sold to intermediaries and 19.2% was exported.

In the southern region, most of the production was sold to wholesales at 63.4% while 24.0% of the production was used for intermediaries and 12.5% of them were sold directly to consumers.

2.3 Sales

Length between Harvest and Sales
The results in the table below indicate the average number of days between harvest and sales as reported by interviewed farmers. Farmers typically have to wait for a few days for buyers or for the right price before which they can sell their produce. However, there is a trade-off in waiting for too long as the produce starts to rot.

On average, tomatoes were kept for 2-3 days, chilies for 1-2 days, green bananas for 0-1 day and orange flesh sweet potatoes for 2-3 days.

Table 4: Duration between Harvest and Sales - North

Crop name	Average number of days
Peas	365
Beans	79
Onions	60
Orange Fleshed Sweet Potatoes	3
Tomatoes	3
Sweet Potatoes	2
Cocoyam	2
Passion fruit	2
Banana	2
Carrots	1
Cassava	1
Chili (seeds)	1
Eggplants	1
Pineapple	1
Cuttings	1
Irish potato	1
Cabbages	1
Coffee	0
Green Banana	0

Table 5: Duration between Harvest and Sales - East

Crop Sold	Average # of days
Chili	2
Tomatoes	2

Table 6: Duration between Harvest and Sales - South

Sold crops	Average # of days
Banana	2
Chili	1
Green banana	1
Orange Fleshed Sweet Potatoes	2
Pineapple	1
Tomatoes	3

Quality of Harvest

The quality of harvested crops can influence and be a cause of postharvest losses; medium and low quality of harvested crops tend to have more postharvest losses.
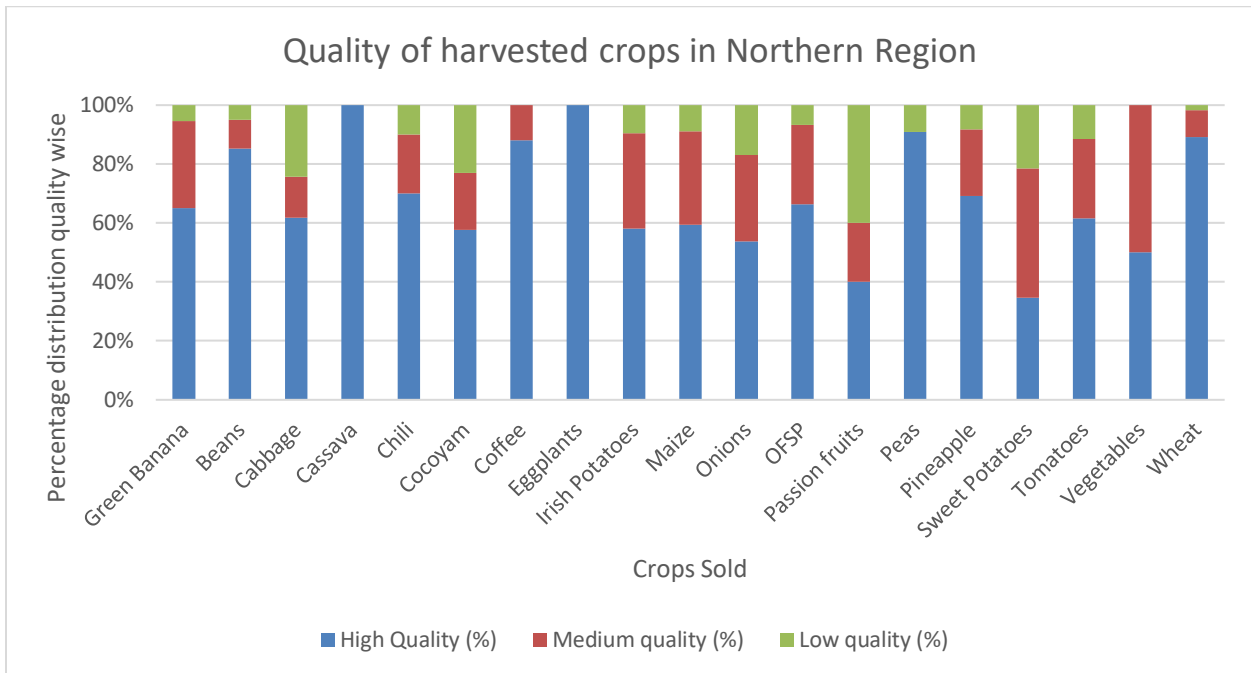
Figure 7: Harvest by Quality - North
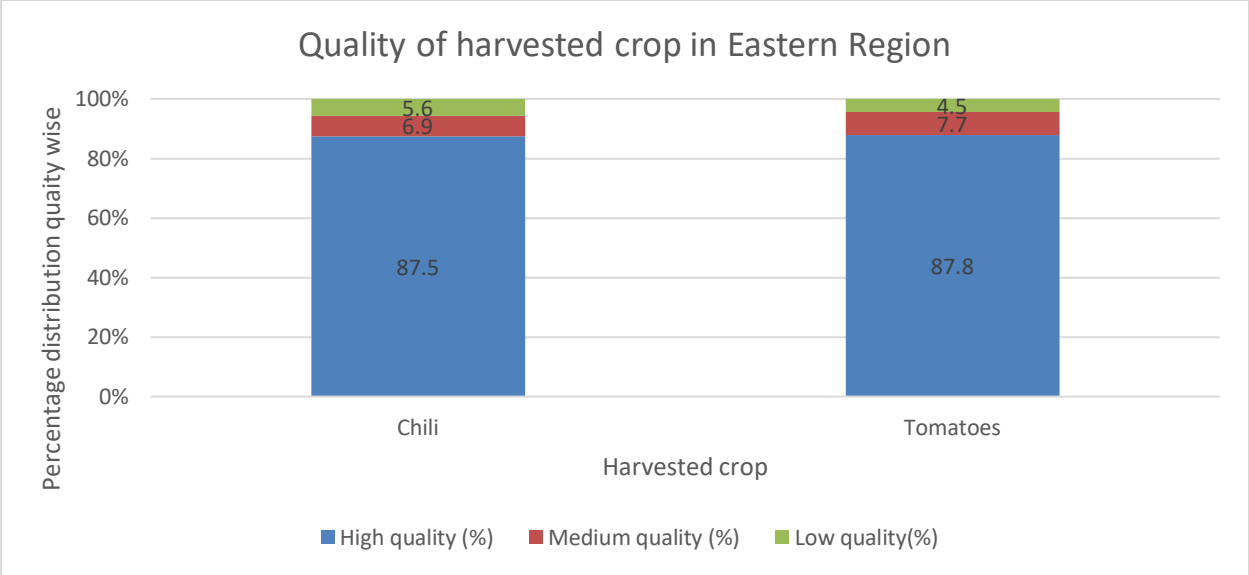
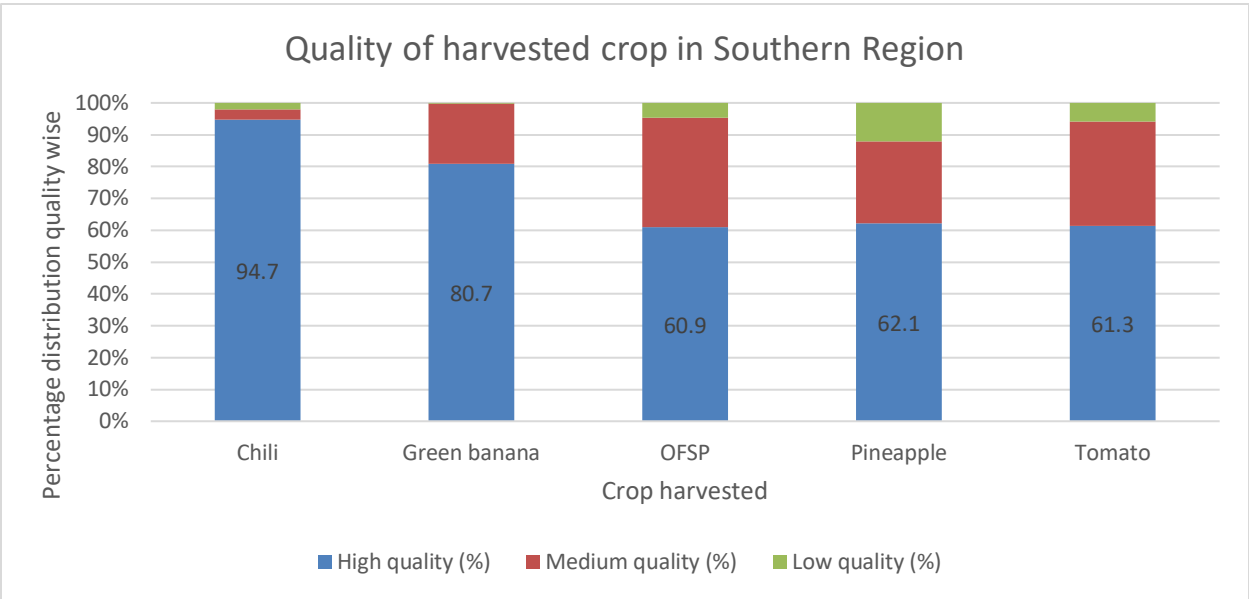**Figure 8: Harvest by Quality - East**

Figure 9: Harvest by Quality - South

Grading the harvested crops before sale

Grading of harvested crops before selling is a crucial tool that farmers can use to get a premium price for high quality produce. We interviewed the farmers and asked if they practiced grading. The results are mixed across the board, however the important crops in each region are usually the ones being graded
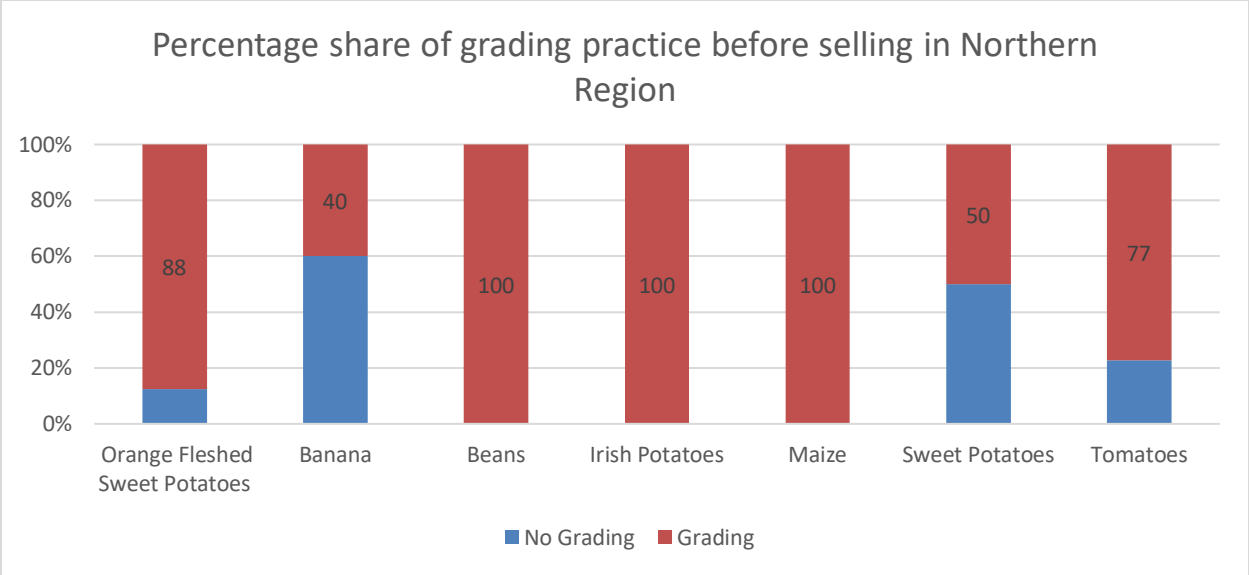
Figure 10: Grading practice - North

In the northern region, grading of harvested crops ranges between 40% to 100% as illustrated in the above figure. However, in crops such as bananas and sweet potatoes there are high percentages of farmers (40-50%) not grading their harvested crops.
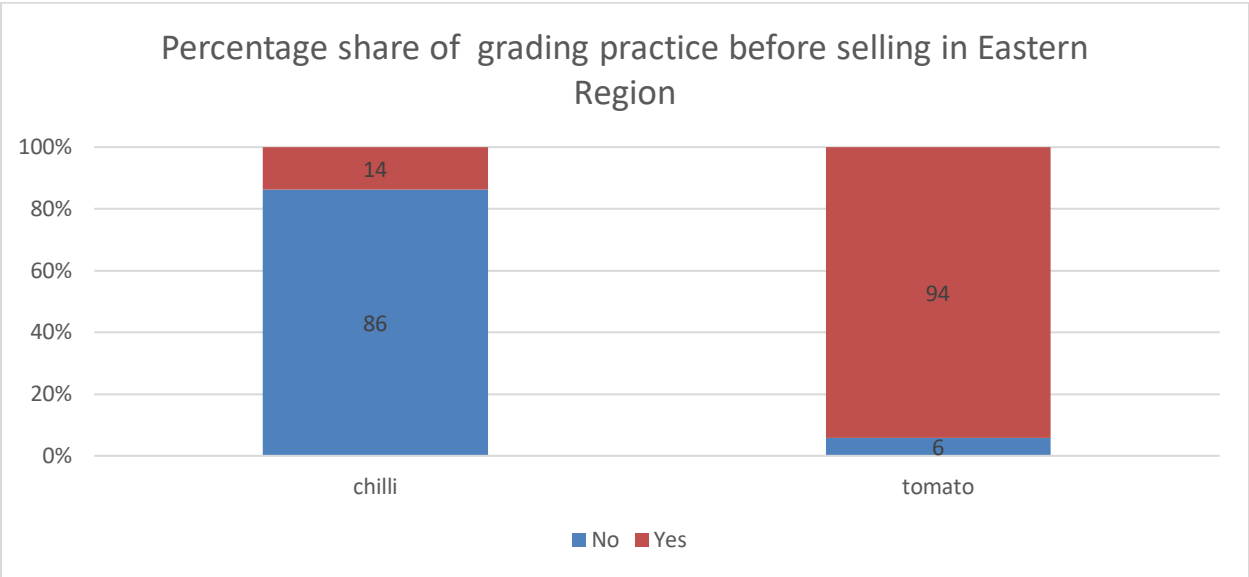

Figure 11: Grading practice - East

Figure above shows that 94% of tomatoes growers do grading before selling while only 6% did not grade. On the contrary, for chili only 14% grade before selling while the remaining percentage (86%) did not grade their produce.
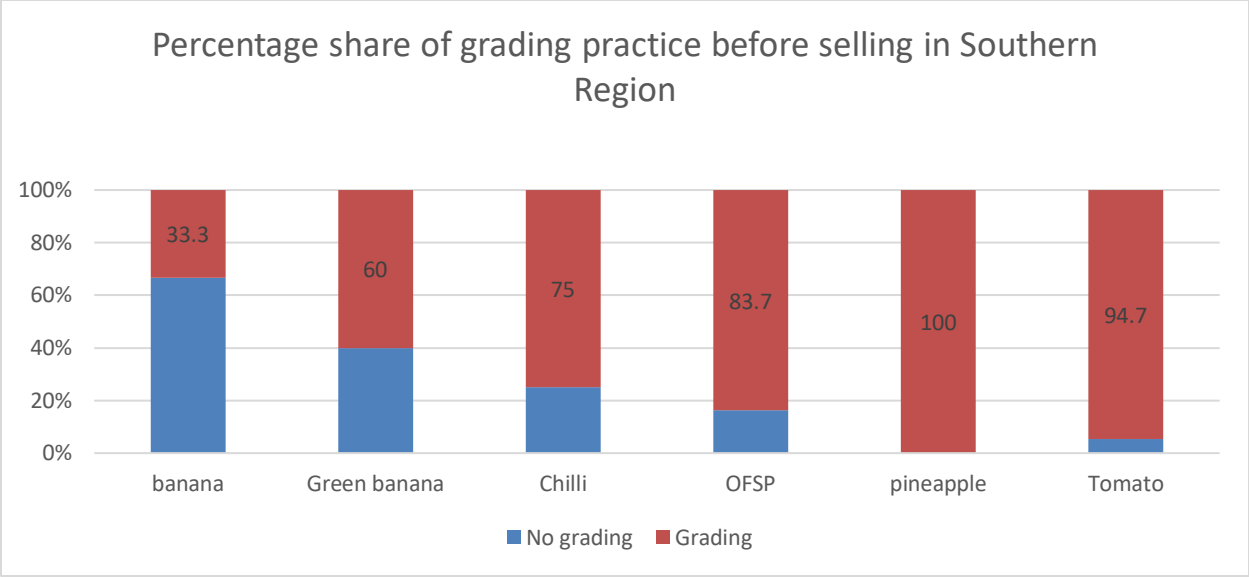
Figure 12: Grading practice - South

The analysis shows that 94.7% of tomatoes growers and 100% of pineapple growers in Southern Region do grading before selling. A quarter of Chili growers did not grade their production before selling.

Price of crops and grading practices

Respondents were asked whether they believed that grading had an impact on selling price.
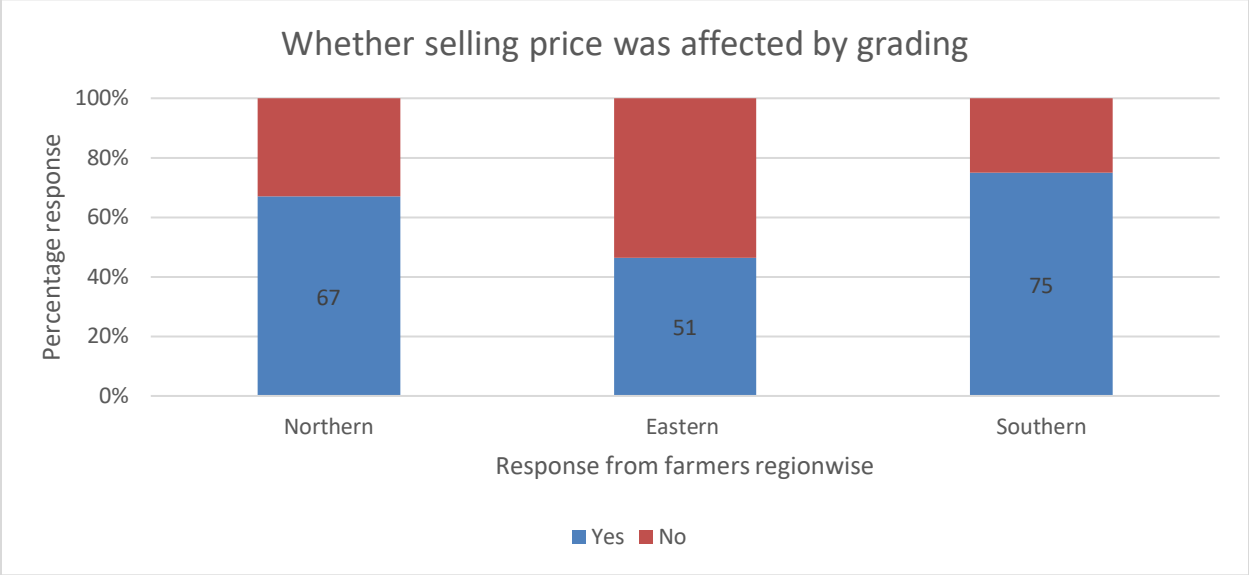

Figure 13: Farmer perspective - Is price affected by grading?

2.4. Farmers Practice: Crop Sales vs Home Consumption (Fresh, Processed or Stored)

The study asked the farmers how much of their harvest, they consumed fresh, how much did they process and how much did they keep for long-term storage. The findings indicate that the farmers sell their harvest rather than storing and processing.
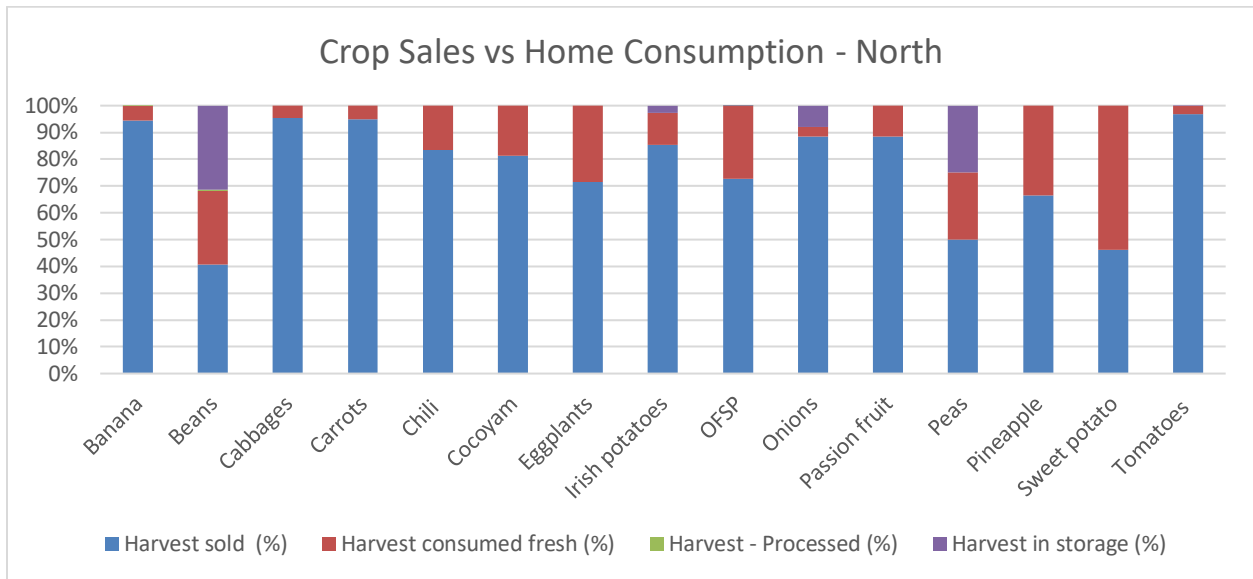

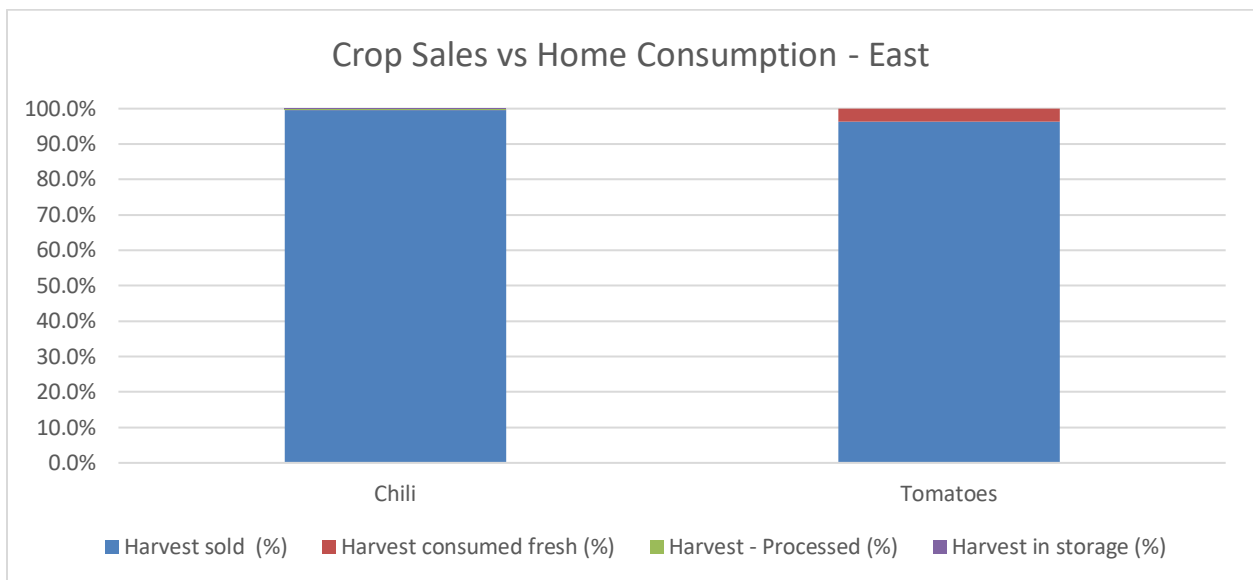**Figure 14: Crop Sales vs Home Consumption - North**
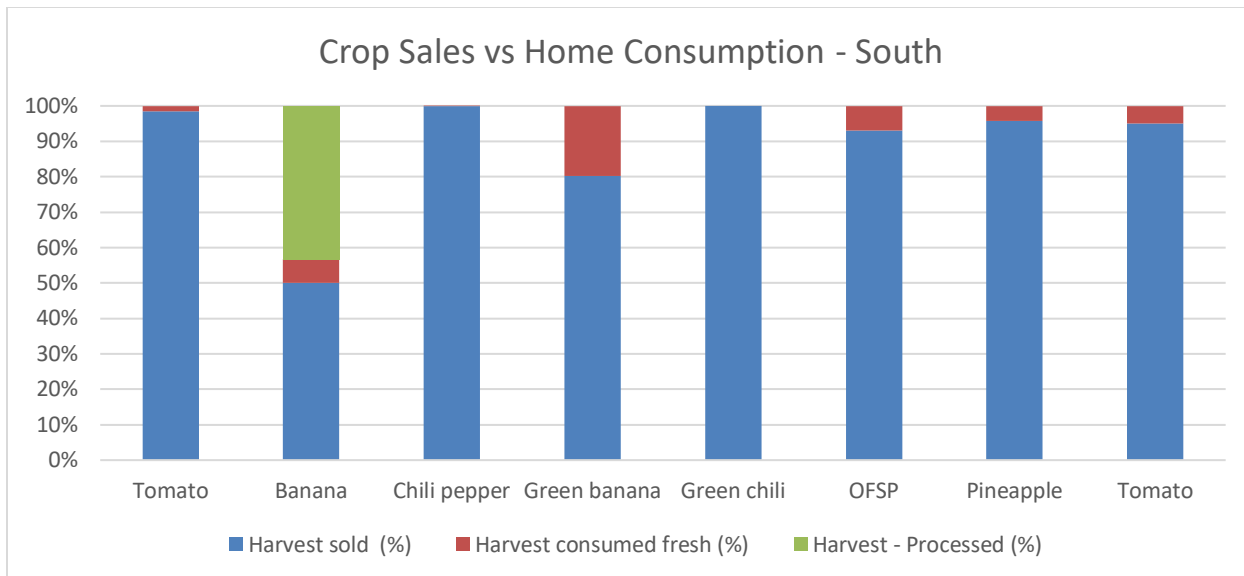

Figure 15: Crop Sales vs Home Consumption - East

Figure 16: Crops Sales vs Home Consumption - South

2.5. Predominant defects that lower price of crops

Types of defects

Several different types of defects such as decay, damage, pests and other lower the price of crops. In the North, pest damage, moisture loss and decays were common causes of defects.
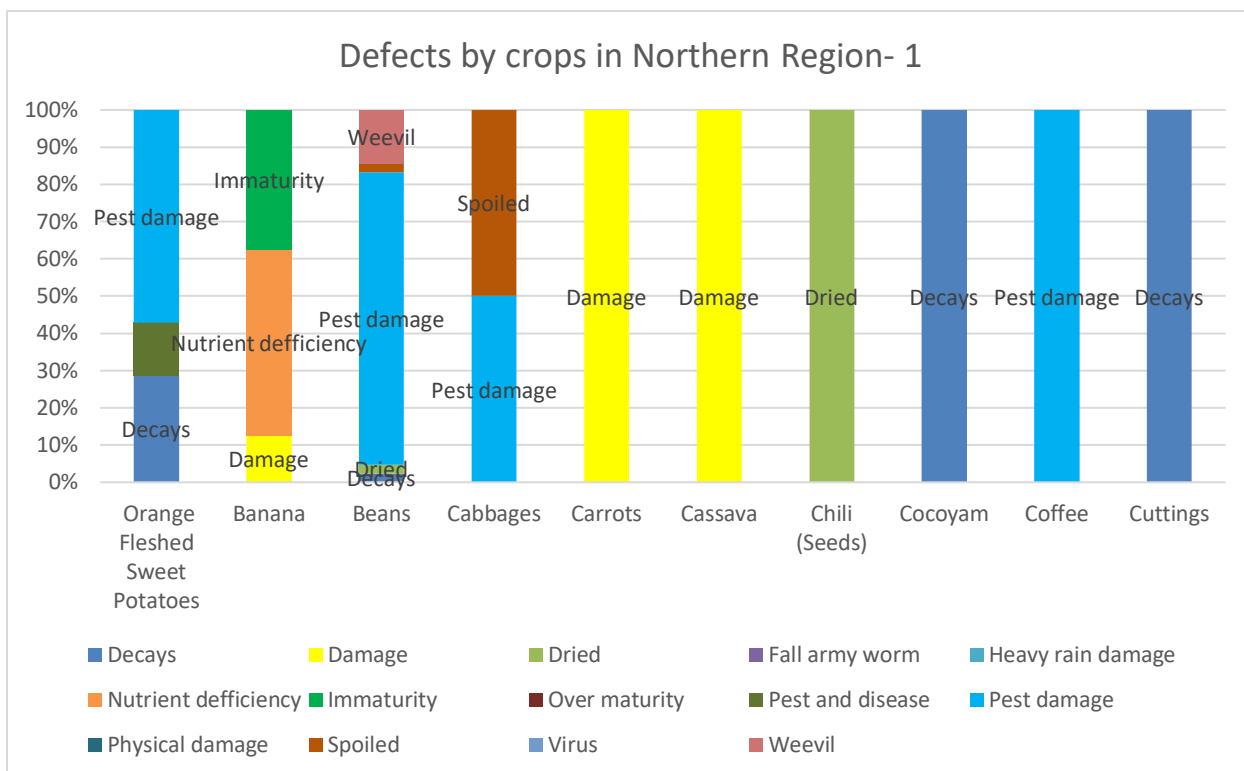

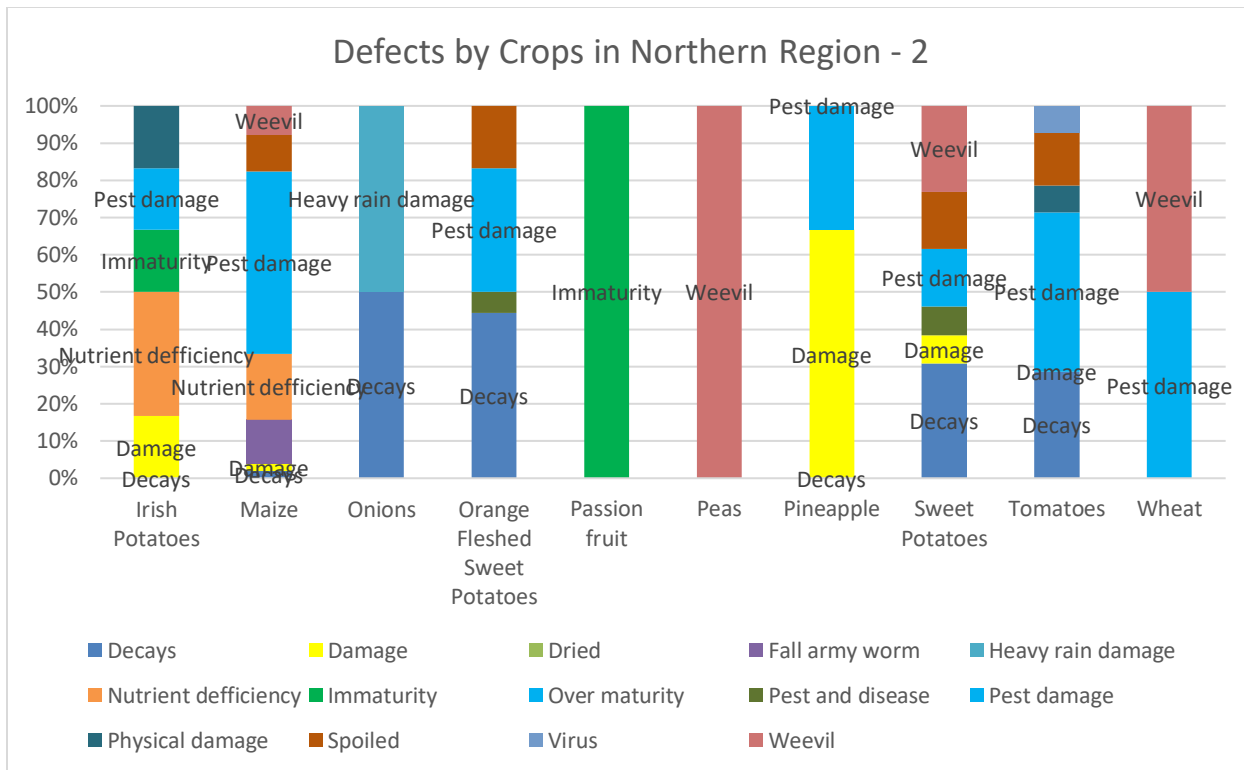Figure 17: Defects lowering prices of crops in North (1)

Figure 18: Defects lowering prices of crops in North (2)
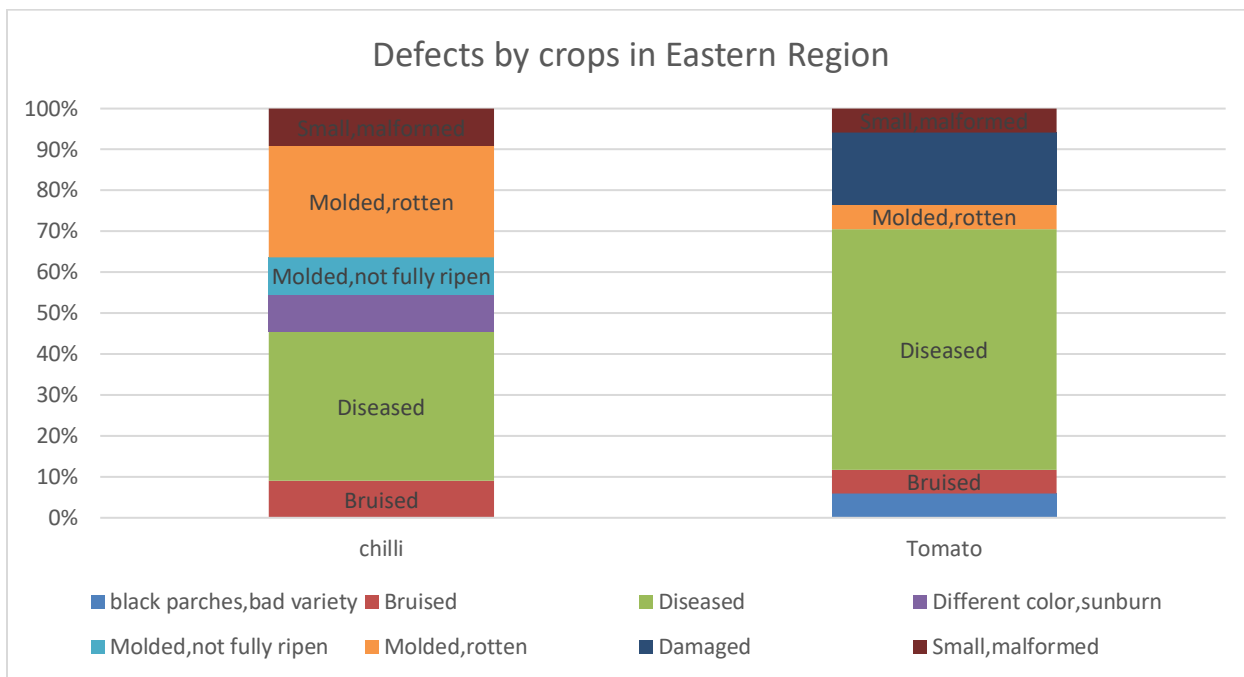
In the East, disease was a common cause of defects.

Figure 19: Defects lowering prices of crops in East

In the South, bad season, bad seeds and damages by pests were leading causes for defects.
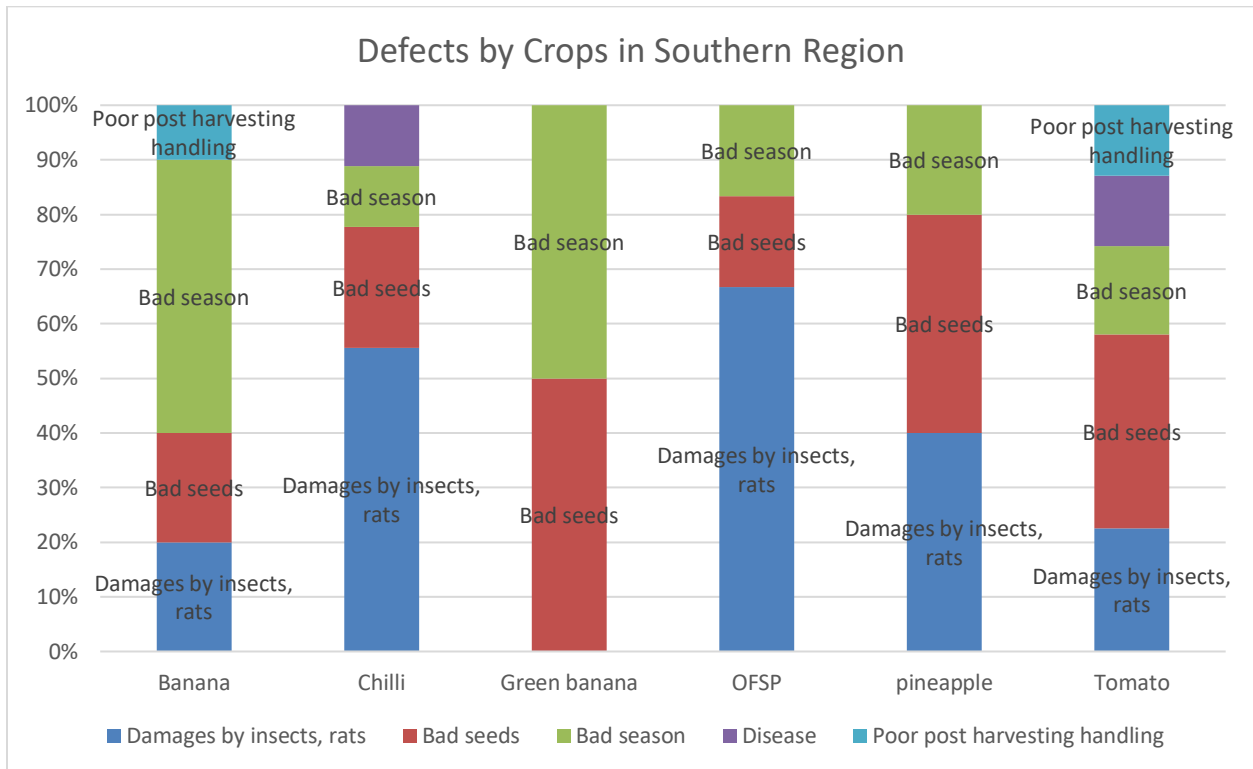
Defects by Crops in Southern Region

Figure 20: Defects lowering prices of crops in South

2.6. Postharvest Extension and When to Harvest
Providing extension services to farmers is very important for increasing their productivity.

Received training on Postharvest Management

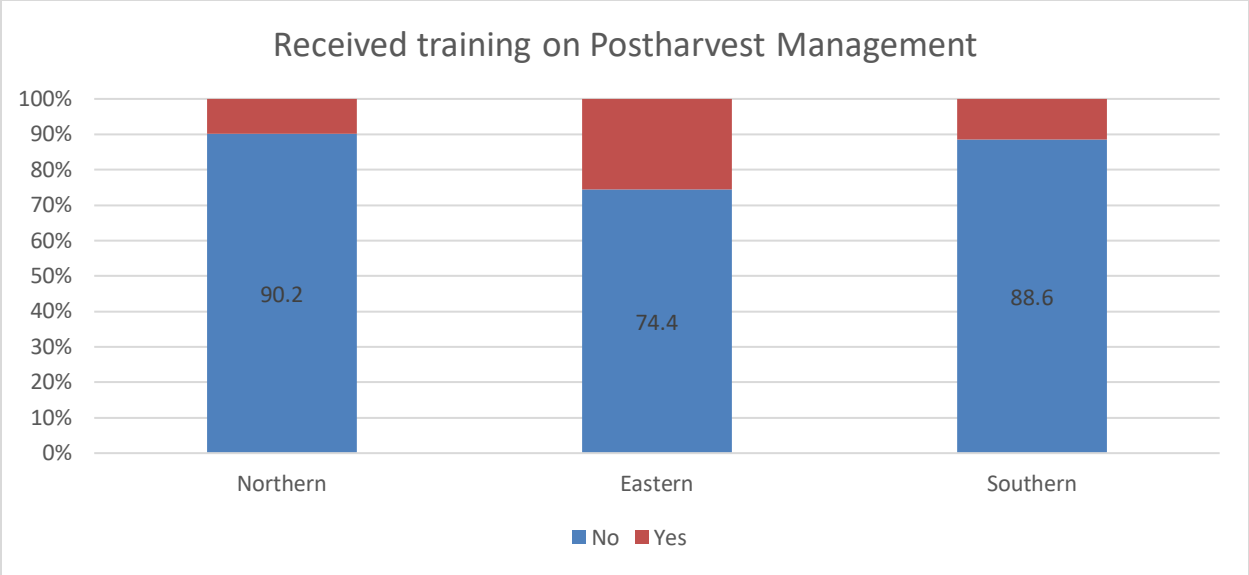|	Northern	Eastern	Southern
No	90.2	74.4	88.6

No ■ Yes

Figure 21: Received training on Postharvest Management Prior to Project Intervention

Source of knowledge to determine when to harvest

Regarding source of knowledge about when to harvest, most of the interviewed farmers reported that they used previous experience.
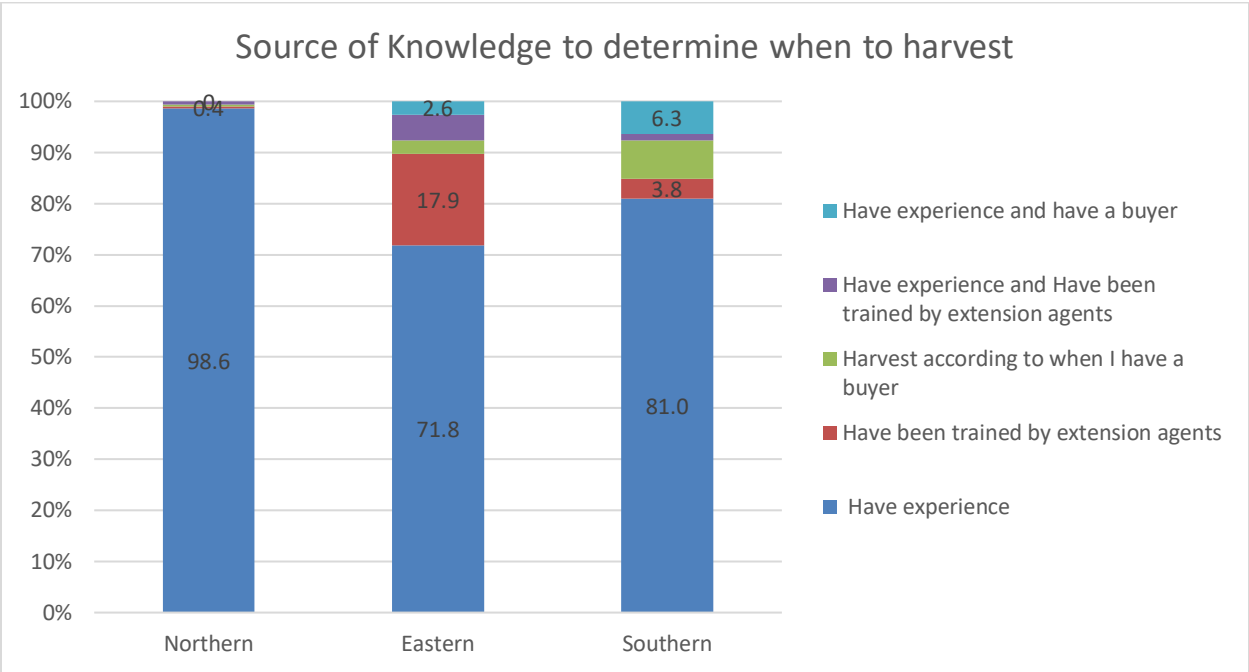

Source of Knowledge to determine when to harvest

Legend:
- Have experience and have a buyer
- Have experience and Have been trained by extension agents
- Harvest according to when I have a buyer
- Have been trained by extension agents
- Have experience

Figure 22: Source of Knowledge to determine post-harvest period

2.9. Investment Capacity of farmer

The study also investigated the access to finance, where the results indicate that nearly 60% of farmers reported being able to get a loan.
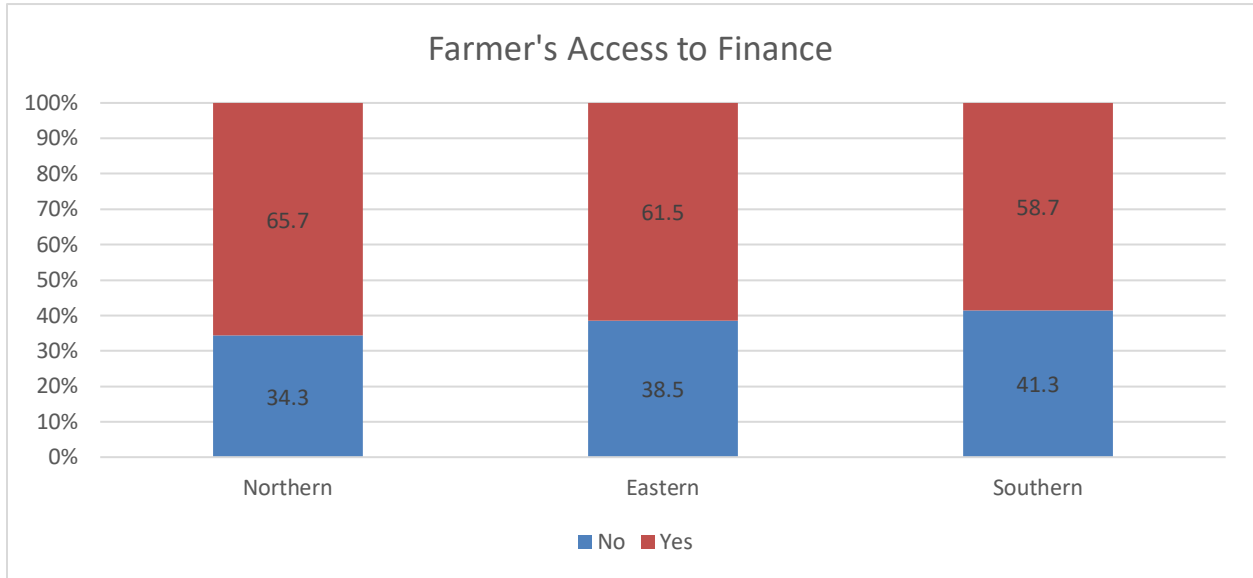

Figure 23: Farmers access to finance

The study found that the sources of financial access range from banks to businesses, own savings, cooperatives, production revenue, savings and lending groups.

Share of Farmers having current loan for farming

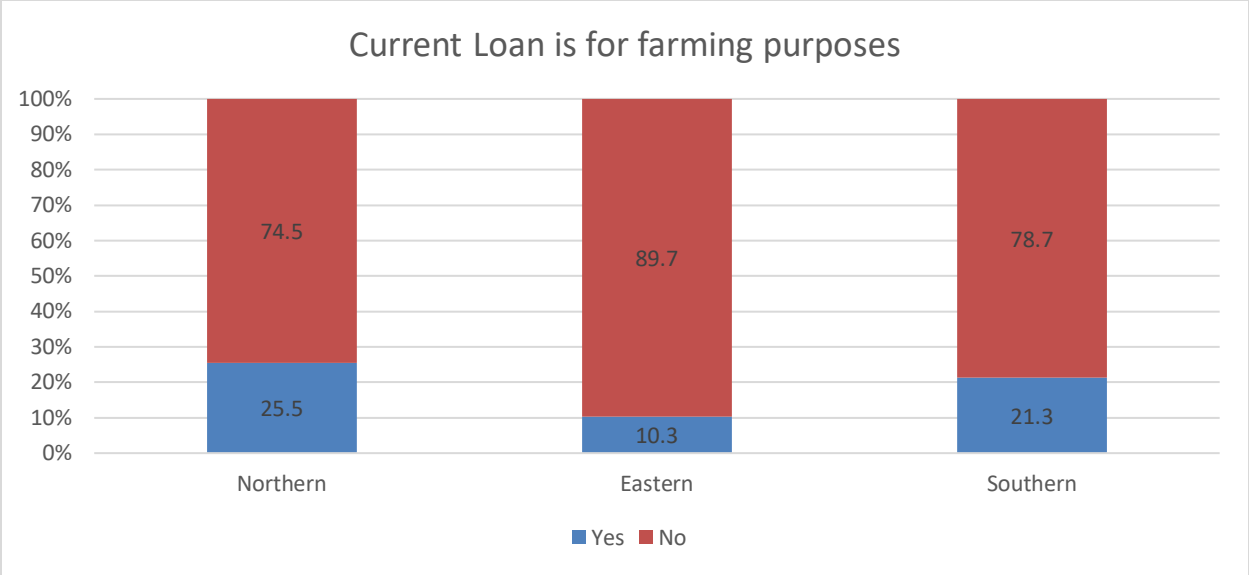Apart from understanding whether farmers have financial access, the study wanted to find how many of the current loans are specifically for farming activities.

Figure 24: Loan for Farming