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TITLE: Cooperative needs For indepth assessments report (additional questionnaire)-Mapping

Executive summary

This report provides a detailed examination of the key challenges faced by agricultural cooperatives in Rwanda, focusing on five critical areas that impact their operations and growth. Each chapter will explore a specific issue, including storage, agricultural subsidies, contractual agreements, insurance, and land utilization, to highlight the structural and financial barriers hindering the development of these cooperatives

Major issue, especially for horticulture cooperatives, which lack proper facilities, affecting product quality and market stability. Maize and Irish potato cooperatives have invested in storage, but financial constraints force many to rely on immediate sales rather than long-term storage solutions. Despite using modern storage bags and drying facilities, significant gaps persist, especially in horticulture.

Agricultural subsidies, which are essential in reducing costs and improving productivity. Cooperatives, especially in maize farming, depend heavily on subsidies for seeds, fertilizers, and chemicals. However, many are dissatisfied with the level and timing of support, calling for expanded financial and mechanization subsidies. Only 21% of cooperatives securing pre-planting contracts. Horticulture cooperatives have the highest engagement, while maize and Irish potatoes lag. Challenges include price fluctuations, delayed payments, and verbal agreements, leading to market risks. Strengthening contract enforcement and communication could help. The Agricultural insurance, which is underutilized, with only 36% of cooperatives covered. Drought and flooding are the most insured risks, while fire and theft coverage is low. Cooperatives prefer seasonal insurance but face barriers like high costs, mistrust, and slow claim processing. Land utilization, including land ownership versus leasing. Crop rotation, especially cereals followed by legumes, is widely practiced, but limited crop diversity and knowledge hinder adoption.

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Chapter1: Background and rationale of the assessment

1.1. Introduction

Rwanda is a landlocked country in Eastern Africa with a total population of 13.5million as per (NISR 2024),It is one of the fastest growing economies in Africa with a GDP growth of 10 percent in 2023.(as of MINICOFIN2024). However, nearly 40% of Rwanda's population lives below the poverty line. Despite tremendous progress made by the post-genocide generation, 38.2% of Rwandans still live below the poverty line and the country ranks 161 out of 193 countries on the United Nations' 2024 Human Development Index[1].There is a strong need for inclusive economic transformation, focusing on creating productive jobs for more than 200 000 young Rwandans entering the labour force every year (MINECOFIN, 2023), in order to implement this initiative Rwanda work different stakeholders in multifaceted component of the economy playing a critical role in shaping food systems, employment, and economic growth.

1.2. Significance for need assessment

Youth and women seem to face challenges that limit their capacity to engage in productive and business activities. access to land, market, financial services are among other key burden for youth and women interested in starting farming. Also, limited skills and knowledge remain an obstacle for agripreneurship and employment, whether on- or off-farm, as well as a general perception that youth are less dependable. At the same time, many youths are not attracted to the agriculture sector, nor to farming in particular, due to the image of hard work, low wages and traditional livelihoods and lower return to investment in addition to that youths and women are perceived as riskier clients for financial institutions while at the same time often lacking collateral.

Agricultural cooperatives are integral to Rwanda's economic development, especially within the maize, Irish potato, and horticulture value chains and offer many opportunities for youth and women to participate in profitable agripreneurship. Despite their importance, the cooperatives faces numerous challenges that hinder its full potential. To address these obstacles and promote systemic growth, CDP along with partners Scope insight conducted a comprehensive assessment across 150 cooperatives in nine districts, as part of the AGRA-funded project "RW 2023 007 02: Unlocking Youth Employment Opportunities through Systematic Agriculture Transformation." The evaluation aimed to assess the operational, financial performance, enabling environment, external risks, sustainability, internal management and market challenges faced by cooperatives.

The scope assessment measured the Organizational Maturity using a scoring system (1 to 5), to classifies the cooperative's level of professionalism, offering guidance for potential investors and partners. In order to offer evidence-based recommendations for policy improvement and growth. CDP also includes an additional assessment of cooperative needs in areas such as storage capacity, agricultural subsidies, contractual agreements, insurance, and land utilization, with the goal of identifying key challenges and providing actionable insights for policy development.

[1] https://hdr.undp.org/sites/default/files/Country-Profiles/MPI/RWA.pdf

1.3 Goals of assessment

The goal of this assessment is to evaluate the challenges and needs of agricultural cooperatives in Rwanda's maize, Irish potato, and horticulture value chains. It aims to identify gaps in areas such as storage capacity, access to agro-subsidies, insurance, and land utilization, uncovering barriers that hinder cooperative growth. The study seeks to provide recommendations that improve cooperative operations, financial sustainability, and market competitiveness. By examining key aspects like infrastructure, contractual agreements, and agricultural insurance, the assessment aims to inform policy changes that support agricultural transformation. Ultimately, the goal is to empower cooperatives, boost productivity, and contribute to youth employment and economic growth in Rwanda's agricultural sector

The assessment was conducted on the 150 cooperatives with only one refuse the consent

Table 1:Value chains under the assessment

Value chains	Freq.	Percent	Cum.
Maize	74	50	50
Irish potatoes	39	26	76
Horticulture	36	24	100.00
Total	149	100.00	

The study assessed 149 cooperatives across the mentioned district 50% of them was in maize value chain ,26% in Irish potatoes and 24% in horticulture value chain as illustrated in table1.

The total member of cooperatives was 21229 made of 16980women and 4641 youths as per

Table 2:number of members in cooperative assessed

	District in the assessment	male	female	youth
1	Rwamagana within 15 cooperatives assessed	**1029**	**1284**	**214**
2	Gatsibo within 15 cooperatives assessed	1888	1697	570
3	Nyagatare within 30 cooperatives assessed	1338	1275	319
4	Bugesera within 15 cooperatives assessed	2854	2280	606
5	Gasabo within 15 cooperatives assessed	562	756	60
6	Rubavu within 15 cooperatives assessed	3903	2146	1076
7	Nyabihu within 15 cooperatives assessed	5418	3692	1204
8	Musanze within 15 cooperatives assessed	1318	769	194
9	Kamonyi within 15 cooperatives assessed	2919	3081	398
	Total 150 cooperatives assessed	**21229**	**16980**	**4641**

The report is organized as follows:

Chapter 1 discuss the Introduction and rationale of the assessment.

Chapter 2 discuss the methodology used to conduct the assessment

Chapter 3 discusses key findings of over all assessment

Chapter 4general conclusion and recommendation provided.

Chapter2.METHODOLOGY FOR COOPERATIVES NEEDS ASSESSMENT

2.1. Research Design

This assessment employed a mixed-methods research approach, integrating both quantitative and qualitative techniques to assess the challenges and needs of agricultural cooperatives in Rwanda. A mixed-methods approach was essential to ensure a comprehensive understanding of cooperative operations, access to agro-subsidies, contractual agreements, agricultural insurance, and land utilization. The combination of quantitative and qualitative data provided a holistic view of the cooperatives' conditions, ensuring that both statistical trends and lived experiences were captured.

2.2. Target Population and Sampling:

The study focused on 149 agricultural cooperatives across nine districts in Rwanda, covering three primary agricultural value chains: maize (50%), Irish potatoes (26%), and horticulture (24%) as per table1. These cooperatives were selected based on their composition of women, youths and operating in the value chain of maize, Irish potatoes and horticulture. A purposive sampling technique was used to ensure the inclusion of cooperatives that represent a range specified and geographic diversity.

2.3. Data Collection Methods

The data collection process was structured but mainly focused on primary data sources from cooperatives. Primary data collection involved the use of structured questionnaires administered to cooperative leaders and members to gather detailed quantitative and qualitative information on storage capacity, access to subsidies, contract agreements, insurance uptake, and land utilization. Additionally, key informant interviews were conducted with cooperative managers to officer insights into systemic challenges affecting their specific cooperatives. Focus group discussions were also held with cooperative members, particularly focusing on youths and women to capture diverse experiences and perspectives. Field observations were undertaken to assess infrastructure conditions, cooperative governance structures, and the practical challenges cooperatives face.

2.4. Data Analysis

Data analysis was conducted using both quantitative and qualitative techniques. Quantitative data were analysed through statistical methods, employing descriptive statistics to summarize key variables such as storage facility ownership, access to Agro-subsidies, and contract participation. Cross-tabulation and comparative analysis were applied to examine differences across the three value chains, while graphical representations such as bar charts, pie charts, and tables were used to visualize findings effectively.

2.5. Ethical Considerations

Ethical considerations were rigorously adhered to throughout the data collection process. Where Informed consent was obtained from all participants except one, ensuring that they were fully aware of the study's objectives and their voluntary participation. Confidentiality was maintained by anonymizing responses to protect participant identities, and the assessment was conducted in accordance with institution ethical guidelines. These measures ensured that the assessment upheld the highest standards of integrity and participant protection.

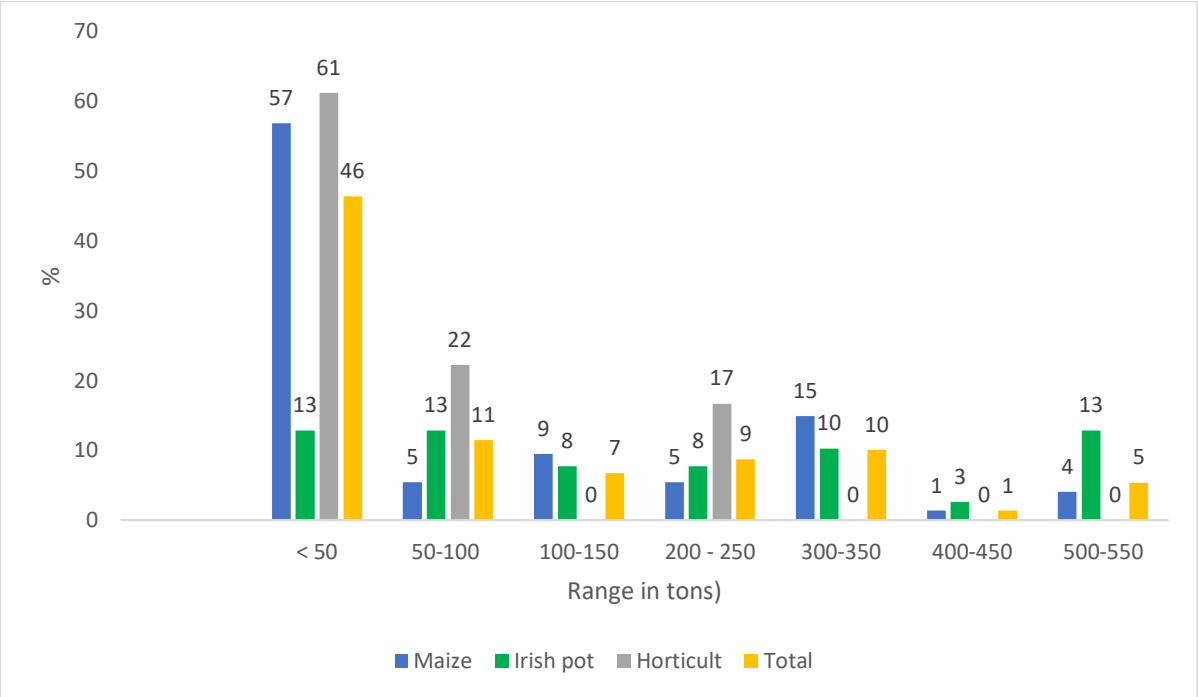
Chapter 3 discussions of findings

3.1: Cooperative Operations and Storage Practices

This part explores the storage practices of cooperatives, analysing existing storage facilities, their capacities, handling methods, and the challenges faced in maintaining produce quality. It also examines the measures cooperatives implement to mitigate post-harvest losses. This analysis is critical for identifying operational gaps and formulating recommendations aimed at improving cooperative efficiency, reducing losses, and enhancing market readiness.

3.1.1. All cooperatives production capacity range.

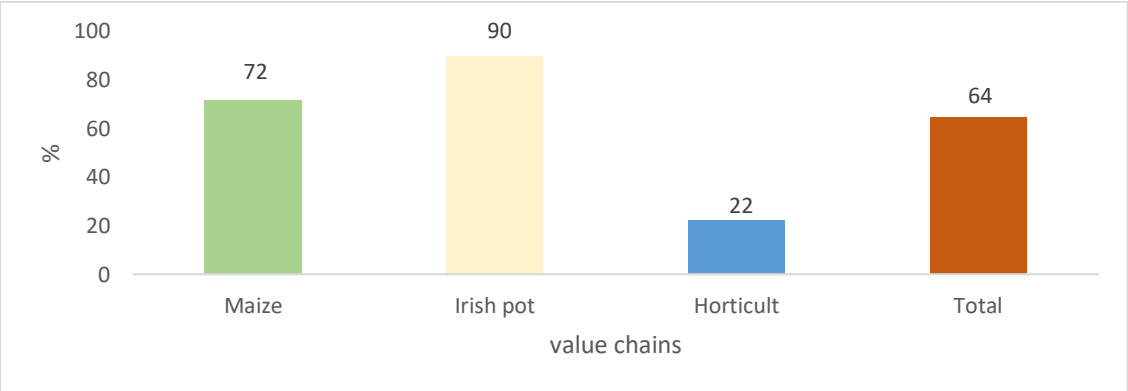
Figure 1: ***Cooperative Production ranges in Metric Tons***



The results in figure1 shows that most cooperatives produce less than 50tones, with cooperatives specialising in maize and horticulture leading in this range. Irish potatoes have a unique distribution across all levels suggesting some large production levels in this value chain.

3.1.2. cooperatives storage ownership level

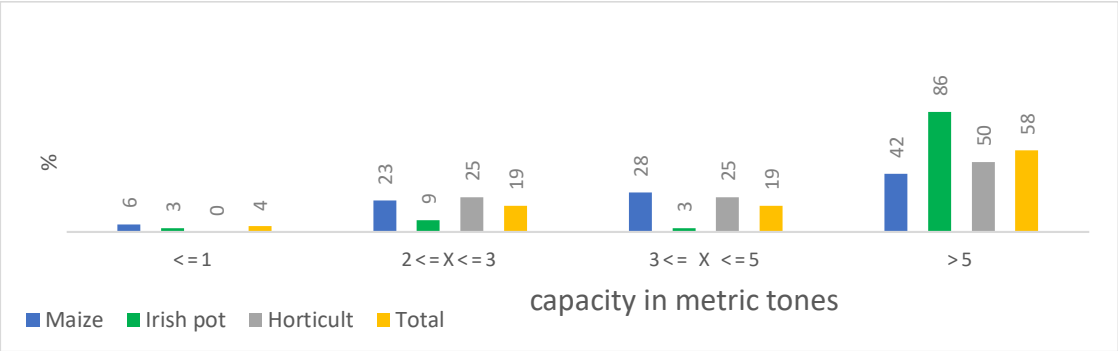
Figure 2: ***cooperative owning storage facilities***



Among the cooperatives involved in maize, Irish potatoes and horticulture value chains assessed, as appeared in table1. the data in figure2 indicate varying ownerships of storage facilities. Specifically, with 72% meaning 53 out 74 of maize cooperatives, 90% meaning 35 pout of 39 of Irish potato cooperatives, and 22% meaning 8out of 36 of horticulture cooperatives have storage infrastructure. This indicates that horticulture cooperatives face the most significant challenge in terms of storage. Similarly, Irish potato cooperatives have an even higher rate of storage access suggesting that the majority of cooperatives in this sector have taken measures to secure proper storage solutions. The data highlights a critical gap in storage infrastructure within the horticulture sector compared to maize and Irish potatoes potentially affecting product quality, shelf life, and market stability**.**

3.1.2.1 The capacity of storage facility among those who have them.

Figure 3: ***available storage facilities capacities in metric tones***



Among the cooperatives that have storage facilities as specified in the figure2.

The figure3 shows that there is significant variation in storage capacity, reflecting the different needs and investment levels across these value chains.

In the maize value chain 6% of them have storage facilities with capacity of less than 1 ton (1,000 kg), and 23% of them also has storage facilities of capacities ranging between 1 ton and 2 tons, while 29% have slightly larger storage facilities with capacities between 3 tons and 5 tons respectively. The largest portion of maize cooperative or 42% have storage facilities of capacities exceeding 5 tons, suggesting that a considerable number of these cooperatives have invested in substantial storage infrastructure to support their production and market demands.

Only 3% of Irish potato cooperatives have storage capacities below 1ton while 9% have facilities that range between 1 ton and 2 tons. Similarly, 3% have storage capacities between 3 tons and 5 tons, 86% have storage facilities with capacities exceeding 5tons, this indicates that the Irish potatoes cooperatives have made significant investments in large storage facilities, which are essential for maintaining the longevity of their perishable produce.

In the horticulture sector, storage facilities capacity is distributed somewhat differently. Unlike maize and Irish potato cooperatives, no horticulture cooperative has a storage capacity of less than 1 ton. A quarter (25%) of these cooperatives have storage capacities between 1 ton and 2 tons, and another 25% fall within the 3-ton to 5-ton range. Meanwhile, 50% of horticulture cooperatives with storage facilities have capacities exceeding 5 tons, suggesting that while the number of horticulture cooperatives with storage facilities is relatively low as the figure2. demonstrate, those that do have them tend to invest in larger storage capacities.

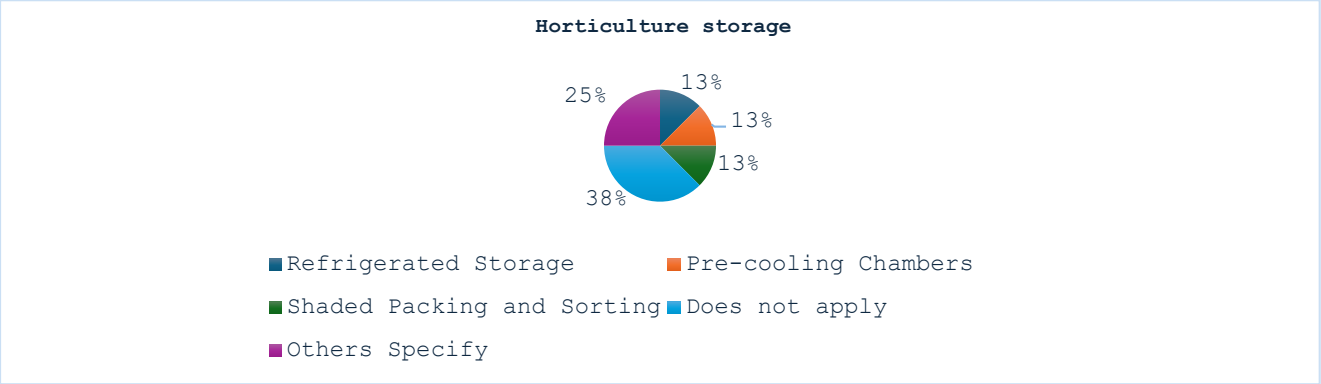
Looking on over all average most cooperatives have storage facility with capacity of greater than 5Tones (58%). Signifying that where storage capacity is available it is of large capacity.

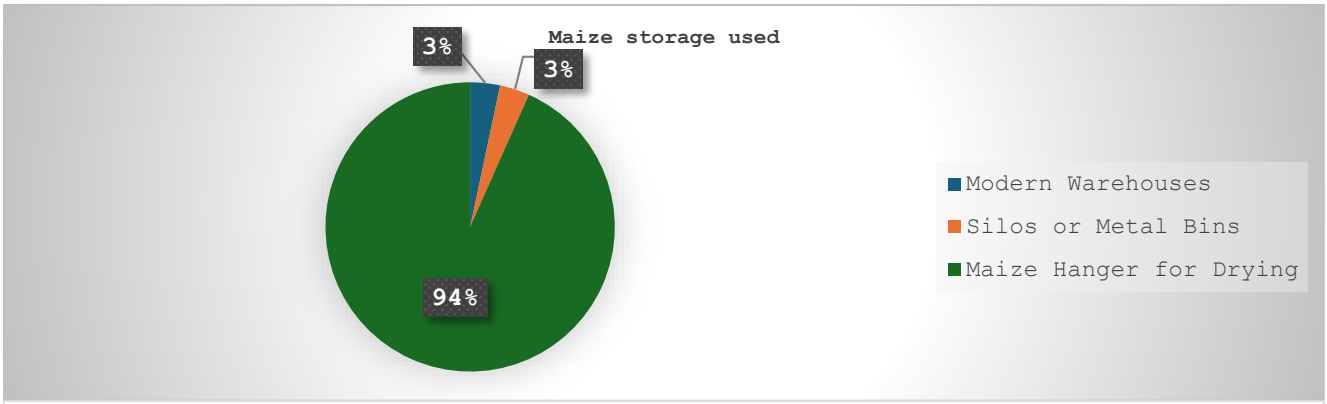
3.1.2.2Reason behind some cooperative lack storage facilities

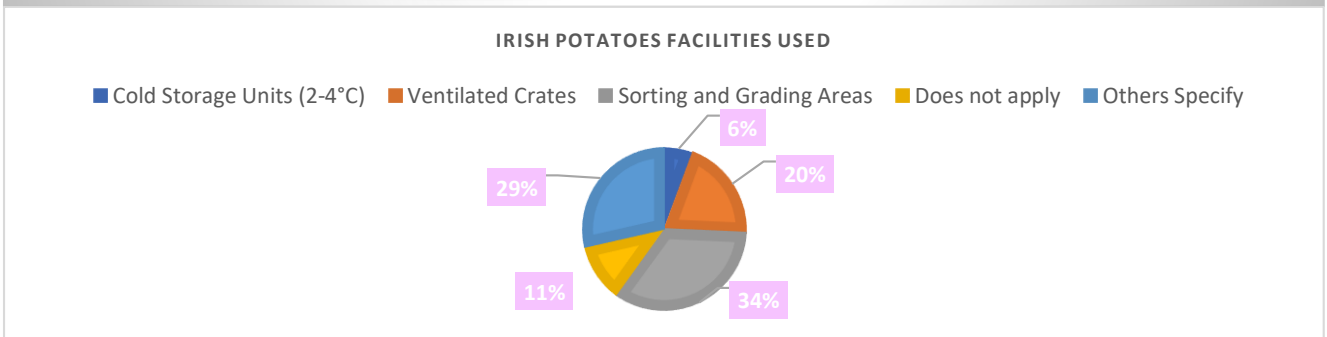
The primary reasons described during assessment as the reason that some cooperatives lack storage facilities is limited financial capacity. Suggesting that cooperatives cannot afford to construct or equip storage facilities due to a lack of funds.
Some also mention that their production levels are still low, making large storage investments unnecessary at their stage. Additionally, some cooperatives prioritize immediate market supply, meaning they harvest and sell their produce right away, eliminating the need for long-term storage. This is particularly relevant for perishable products such as in Horticulture value chains and they suggested that storage may not be practical. Others lease storage spaces or rely on members' homes for temporary storage. A few cooperatives have drying facilities but not storage units, indicating that they have taken some steps in post-harvest management but still lack proper storage. Others mention that storage is in their plans for the future, but financial constraints have delayed implementation.

3.1.3 Most storage facilities used by cooperative according to their value chains among who have storage facilities.

figure 4:types of storage facilities by value chain







The figure4 Represent the types of storage facilities that are used per value chain. For horticulture value chain (such as Fruits Vegetables, Herbs, Spices, Flowers and Ornamental Plants) Relies heavily on proper storage to maintain the freshness and quality. According to the data, horticulture cooperatives using refrigerated storage account for 13%, while pre-cooling chambers (13%) and shaded packing and sorting areas (13%) are also utilized at the same rate. However, 38% reported that the specified storage facilities do not apply to their operations, meaning they rely on other storage methods. Additionally, 25% specified using other storage methods beyond those listed. Refrigerated storage in horticulture is particularly beneficial due to its ability to extend shelf life, maintain optimal temperature conditions, and reduce spoilage. This is especially crucial for fruits, vegetables, and flowers, which are highly perishable and require controlled environments. Pre-cooling chambers serve as an important initial step in removing field heat, which helps slow down the deterioration process before storage or transport. Shaded packing and sorting areas provide a cost-effective way to prevent direct sun exposure, reducing water loss and preserving the external quality of horticultural produce.
The fact that 38% of respondents indicated that specified storage facilities do not apply to them suggests that alternative storage methods are widely used, though not explicitly identified in the data. The efficient storage solutions could further enhance profitability, reduce post-harvest losses, and improve market flexibility for horticultural farmers. Looking at cooperative sin maize value chain, the data indicates that the majority (94%) of maize storage relies on maize hangers for drying, while only 3% use silos or metal bins, and another 3% use modern warehouses. The widespread use of maize hangers for drying is likely due to their simplicity and cooperative (farmers used it in group and as shared asset) and effectiveness in reducing moisture content as well as aflatoxin.
In Rwanda, maize drying hangers are made of corrugated iron sheet roof and partial walls, concrete floor, and fitted with rows of metal bars from which maize on the cob is hung using the husk (In local language mean GUSHARIKA). These hangers allow the maize to dry under natural conditions so as to achieve the moisture content required for safe storage in hermetic technologies. Later Hermetic storage technologies (HST) using silos or metal bins provide better protection against pests, maintain consistent quality and allow for long-term storage. However, their low adoption rate suggests that cost and accessibility remain barriers to widespread usage. Similarly, modern warehouses, despite offering advantages such as bulk storage, controlled conditions, and improved handling, are used minimally among all visited cooperatives.
According to study by Benimana, Ritho and Irungu (2023), the Hermetic storage technologies (HST), such as silos, cocoons, and hermetic grain bags, have proven effective in reducing post-harvest losses by preserving grain quality and preventing mold growth. These technologies create low-oxygen and high-carbon dioxide conditions that naturally eliminate insects and microorganisms, making them a chemical-free alternative to pesticides for maize storage and Rwanda's annual estimated postharvest losses of maize is 16.3% in 2023.

The storage facilities used for Irish potatoes vary significantly, with sorting and grading areas (34%) being the most common, followed closely by cold storage units (29%). Additionally, ventilated crates (20%) are used, while 11% of respondents indicated that storage facilities do not apply to their operations, and 6% use other storage methods.

Sorting and grading areas are crucial for ensuring uniformity in quality and size, which helps in standardizing market prices and meeting buyer requirements. By separating potatoes based on quality, farmers can reduce waste and increase the value of their produce. The significant

use of cold storage (29%) highlights the importance of temperature control in preventing sprouting, maintaining freshness, and reducing weight loss due to dehydration.
Cold storage is especially beneficial for potatoes intended for extended market distribution or processing industries. Ventilated crates, though used by 20%, it provides a simple yet effective way to improve airflow around stored potatoes, reducing the risk of fungal infections and bruising. The fact that respondents indicated that specified storage facilities do not apply to them suggests that alternative storage methods are widely used, though not explicitly identified in the data. Additionally, those who reported using other storage methods indicates that cooperatives may be adopting a mix of traditional and modern approaches to suit their needs. Expanding access, a research gap on the most used storage facilities that make higher economic impact for the cooperatives in Rwanda.

3.1.4. Strategies Cooperatives Use to Overcome Storage Challenges and Minimize Perishability and Post harvest losses.

The cooperatives have among others some measures in place used in addressing storage challenges to minimize perishability and post-harvest losses. These strategies encompass improved storage facilities policies, efficient harvesting methods, market-driven approaches, and collaboration with stakeholders.

Maize value chain: One of the most significant measures cooperatives take is the establishment of improved storage facilities. They invest in the construction of modern warehouses and hangars storage before the produce is sent to markets. To further safeguard the produce, while tarpaulins serve as protective covers against harsh weather conditions at individual levels. Beyond storage, cooperatives emphasize proper harvesting and handling techniques to ensure produce remains in the best possible condition. Timely harvesting at optimal maturity is essential in preserving quality. Maize is harvested after reaching maturity when its moisture content generally ranges from 30 % to 34 %, while the optimum moisture for storage is around 14–15 % as demonstrated by (Gumus and Ketebe, 2013).

Proper drying methods, such as hanging maize in hangars, further reduce moisture levels near the range and was regarded as their most preferred strategy.

Irish potatoes and Horticulture value chain

Immediate sorting after harvest is far most strategies used by farmers in cooperatives to reduce perishability before selling and it plays a critical role in eliminating defective items that could affect the overall quality. Sorting and selecting only the best quality produce helps prevent contamination from spoiled Irish potatoes**.** Efficient transportation and distribution strategies further support cooperatives in Irish potatoes to minimizing perishability, Cooperatives suggested that the use of appropriate transport means ensures safe movement of Irish potatoes to harvest collection centres as well as markets. The cooperatives farmers use wooden pallets to prevent direct contact with moisture-prone floors in the store rooms. But also, the adoption of a harvest-on-demand approach is also used in Irish potatoes, in which farmers only harvest when buyers are available, significantly reduces the duration produce remains in storage this enable immediate sale there by minimizing spoilage risks.

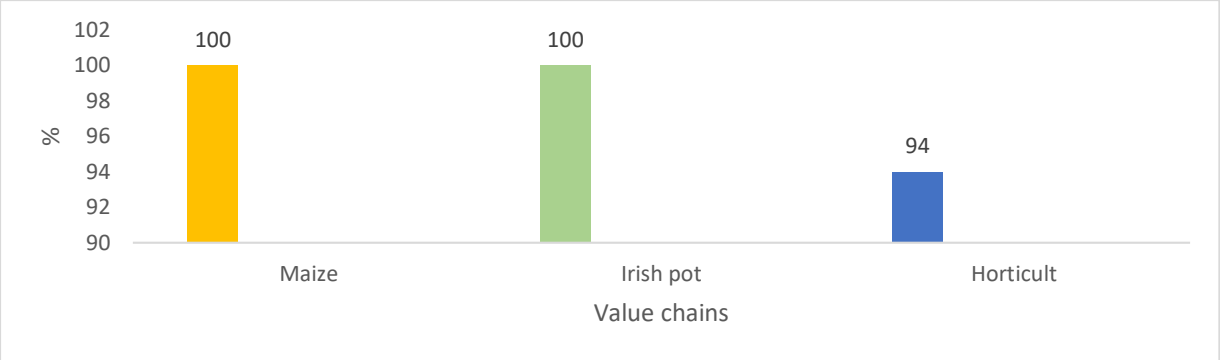
Another crucial aspect of cooperative as suggested in horticulture and Irish potatoes value chain is their efforts in training and capacity building of their members about proper handling of produce. Regular training sessions are provided to cooperative members on best practices for storage and handling. Farmers are educated on the importance sorting and proper packaging to maintain the quality of their produce. Furthermore, cooperatives engage in collaborations

with stakeholders, including government agencies and non-governmental organizations to secure better storage solutions and quick market . Financial assistance from these partnerships enables cooperatives to build modern storage facilities and improve logistics. Market expansion and quick sales strategies are among most used when a cooperative have no storage facilities and it also help them to reducing perishability. Cooperatives most in horticulture prefer Selling directly to wholesale buyers, processors, and export markets thus helps them to create steady demand for harvested crops.

3.2 Optimizing Agri-Subsidy Access Across the Cooperative Value Chain

3.2.1. Cooperatives in Need of Agro-Subsidies

Figure 5:cooperatives that need Agro-subsidies in %



Almost all cooperatives involved in maize and Irish potato farming require subsidies to support their operations. In contrast where 6% of cooperatives within the horticulture sector do not need any subsidies, indicating that these cooperatives in horticultural cooperatives are less dependent on financial support compared to those in maize and Irish potatoes. This open room for investigation the level of satisfaction of available subsidies across all value chain identified in the figure6 below

3.2.1.2. Satisfaction Levels in the Agricultural Value Chain and Assessing Key Areas of Agro-Subsidy Needs

Figure 6:level of subsidies satisfactions to support Agri-activities in %

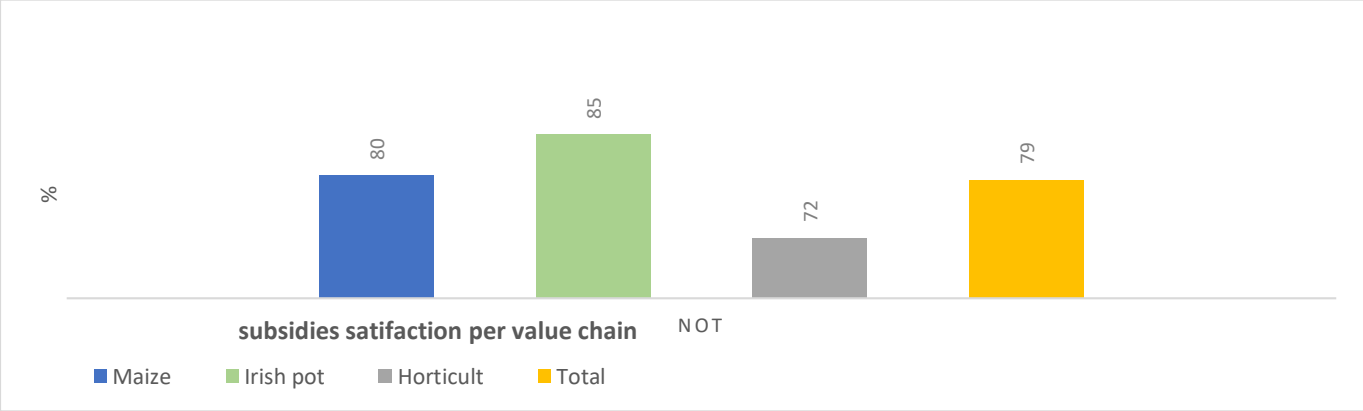
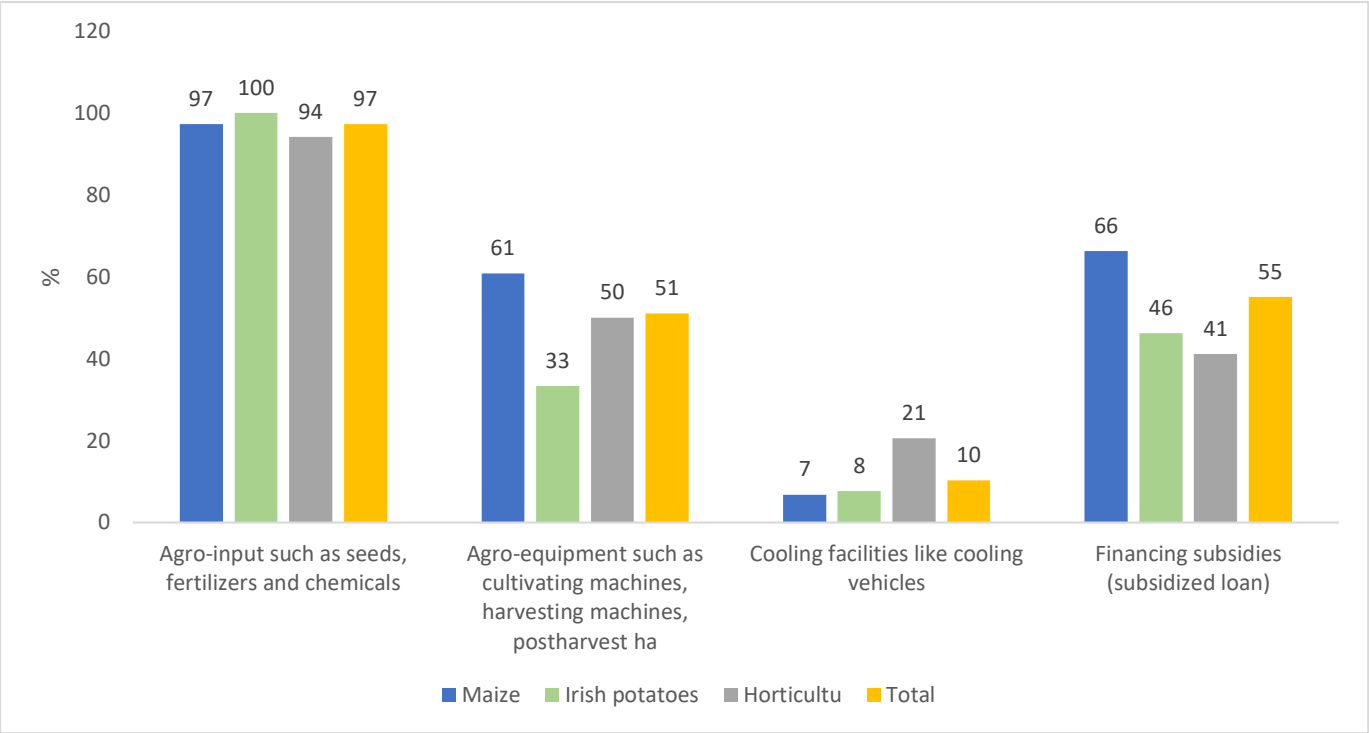


Figure 8 illustrates the level of satisfaction with subsidies across different value chains. The 79% It indicates over all that most cooperatives are dissatisfied with the existing subsidy policies, highlighting a critical gap. This insight helps identify where improvements in subsidy allocation can be made to better support cooperatives.

3.2.1.3 Areas where subsidies are most wanted

Figure 7:Where Agro-subsidies needed at most per each value chain in %



The results indicate that Agro-input subsidies (seeds, fertilizers, and chemicals) are the highest priority across value chains, with 97% of maize cooperatives and 100% of horticulture cooperatives and 94%in horticulture cooperatives requiring subsidies at most in this area.

In contrast, the demand for subsidized Agro-equipment (cultivating machines, harvesting machines, and post-harvest handling facilities) varies, with 61% of maize cooperatives, 33% of Irish potato cooperatives, and 50% of horticulture cooperatives identifying it as a need. Financing subsidies or subsidized loans are also crucial but differ across sectors, with 66% of maize cooperatives, 46% of Irish potato cooperatives, and 41% of horticulture cooperatives requiring financial support. Lastly, subsidized cooling facilities (such as cooling vehicles) are most needed by 21% of horticulture cooperatives, while demand is lower for maize (7%) and Irish potatoes (8%) cooperatives.

The data in the **figure6** indicate that the level of cooperatives not satisfied by available subsidies provided in their value chain. The overwhelming need for Agro-input subsidies (seeds, fertilizers, and chemicals) across all value chains highlights the fundamental role of these inputs in agricultural productivity. Since almost all cooperatives in maize and Irish potatoes require input subsidies, it suggests that without them, production levels would be significantly compromised, the result in **figure 7** show that most of them are not satisified by available subsidies at over 80%.

Meanwhile, the lower but still substantial demand for agro-equipment subsidies shows that mechanization remains a challenge, particularly for maize and Irish potato cooperatives.

The variation in demand for financial subsidies or subsidized loans across different cooperatives implies that capital availability differs between value chains.

Maize cooperatives show the highest need for financial subsidies (subsidised loan),likely due to the large-scale nature of maize farming and its associated costs. Irish potato and horticulture cooperatives also require financial assistance, but the lower percentage suggests that either their cost structures are different or they have alternative financing options.

The relatively low demand for cooling facilities among maize and Irish potato cooperatives compared to horticulture cooperatives reflects differences in post-harvest handling needs. Horticultural products are more perishable, necessitating refrigeration and cooling systems to maintain quality. The lack of sufficient cooling infrastructure could be a major barrier to market expansion for horticulture cooperatives, limiting their ability to reach distant markets.

Given the widespread reliance on subsidies, the level of satisfaction with existing support mechanisms is crucial. If cooperatives find current subsidies insufficient, it suggests a need for policy adjustments, this is shown by majority of cooperatives in figure 9 suggesting that the subsidies allocations are not sufficient. The effectiveness of subsidies should be assessed not just in terms of quantity but also accessibility and timeliness, ensuring that cooperatives receive support when they need it most.

3.2.1.4. Challenges in Accessing Subsidies Within the Value Chains

Agricultural cooperatives face significant challenges due to inadequate subsidies, as highlighted in Figure6 that they are not satisfied, One of their primary needs is increased financial support for essential Agro-inputs, including high-quality seeds, fertilizers, and pesticides. These inputs are crucial for maintaining productivity, yet their affordability and timely availability remain a persistent issue. Without sufficient fertilizer, key crops such as maize and Irish potatoes fail to reach optimal yields, while access to climate-adapted seeds could significantly improve agricultural performance.

Beyond agro-inputs, cooperatives emphasize the need for subsidies in acquiring modern farming equipment. Advanced machinery such as cultivating and harvesting tools, irrigation systems, and post-harvest handling facilities are prohibitively expensive, making it difficult for farmers to adopt efficient and scalable agricultural practices. The lack of support in these areas limits productivity and competitiveness.

Despite the availability of subsidy programs, many cooperatives struggle to access them due to a lack of adequate information. A significant number of cooperatives remain unaware of the exact value and scope of subsidies available as government and financial institutions often fail to provide timely and comprehensive details.

Timeliness is another major concern. In many cases, subsidies for essential inputs such as seeds, fertilizers, and pesticides arrive late sometimes after the planting season has already begun. This delay reduces their effectiveness, forcing farmers to either seek expensive alternatives or suffer production losses.

Financial constraints further hinder farmers from benefiting from subsidies. Many programs require beneficiaries to make an initial payment before receiving support or top up, which poses a significant challenge for cooperatives with limited financial resources.

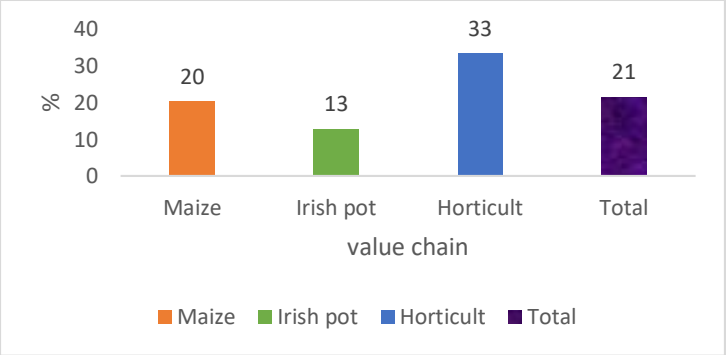
Market instability adds another layer of difficulty. The fluctuating costs of agricultural inputs mean that even subsidized products can remain unaffordable. This unpredictability complicates production planning and reduces the overall impact of subsidy programs designed to boost agricultural output.

Based on the result and challenges expressed by the cooperatives , there complementarity with the study done by Uwaramutse, Towo and Machimu,(2022),Where they describe the stratification of government service delivery including subsidies on difference agricultural items where they found that groups of farmers complain about the high cost of agricultural inputs compared to the income generated from selling Irish potatoes as well as other crops. One of the farmers in a FGD, elaborated on the issue, saying that: "agricultural inputs are available to the market, but they are costly; in future, only large farmers will afford them. Our co-operatives fail to help us get the inputs at a reasonable price. As a result, we incur losses, and some farmers have shifted to other crops. This caption indicates that even though agricultural inputs are available to farmers, their cost is still higher than the revenue generated for some farmers. Usually, smallholder farmers join co-operatives with the expectation to get inputs at a lower price than other sources.

3.3. Cooperative Market Strategies

3.1 Contract-Based Cultivation

Figure 8:Cooperatives cultivate based on agreement with buyers (%)



Contract farming plays a crucial role in securing reliable markets for agricultural cooperatives, Among the cooperatives assessed, the horticulture sector leads in contract-based cultivation, with 33% of cooperatives securing agreements with buyers before planting. This structured approach enables horticultural farmers to align production with market demand, reducing post-harvest losses since the produce is already accounted for before harvesting. In contrast, maize cooperatives have a lower rate of pre-planting contracts, with only 20% securing agreements in advance. This highlights the need to encourage more maize cooperatives to adopt contractual farming as a means of stabilizing their market access and financial planning.

The Irish potato sector records the lowest percentage of pre-planting contracts, standing at just 13%. Given the perishable nature of Irish potatoes, the absence of pre-arranged buyers increases the risk of post-harvest losses and financial instability for farmers.

Across all value chains, only 21% of cooperatives secure contracts with buyers before planting. While this figure10 represents progress, it underscores the need for wider adoption of contract farming to enhance agricultural sustainability and market stability.

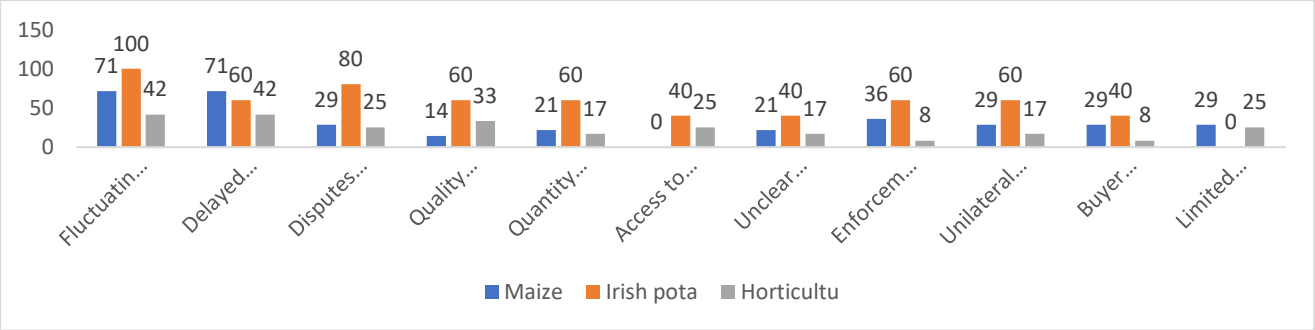
The cooperatives assessed suggested that their Contracts play a vital role in defining key transaction terms, including pricing, specific quantities, and timely supply commitments as well as quality measures. By adhering to contractual agreements, cooperatives ensure a steady flow of produce to buyers, creating a predictable and structured trading environment. Some contracts are seasonal, providing consistent market access during peak production periods, while others span multiple cycles.

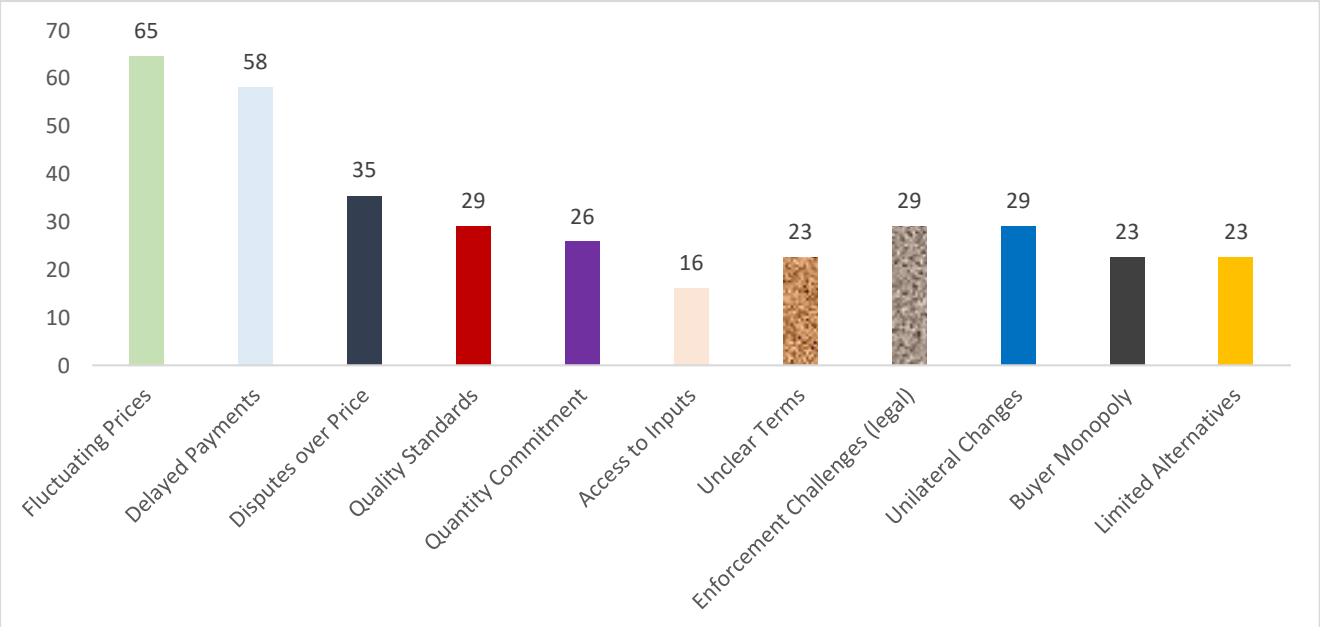
While some formalize contracts in writing, others rely on verbal commitments with buyers, Additionally, some cooperatives have signed Memorandums of Understanding (MoUs) with buyers, establishing formal agreements that guide their business transactions. Certain contracts also include transportation provisions, ensuring that produce is delivered according to the agreement. Payments are structured based on contractual terms, ensuring fair and timely compensation for cooperatives.

To facilitate contractual agreements and improve market access, some cooperatives collaborate with institutions such as the Rwanda Agricultural Board. These structured partnerships help cooperatives secure stable incomes, mitigate market risks, and enhance financial planning. By fostering clear agreements on pricing, quantity, and delivery, contract farming benefits both farmers and buyers, ensuring a more efficient and sustainable agricultural sector.

3.3.3 Challenges in implementation or honoring the contract.

Figure 9:How specific challenges affect the overall cooperative in honoring the contracts with buyers in %





Contracts play a crucial role in ensuring stability and predictability in agricultural profits. However, among all cooperative assessed many cooperatives face challenges in implementing and honoring these agreements due to various factors, including pricing and payment issues, quality and quantity commitments, legal and contractual concerns, and market power imbalances. One of the major challenges is Price fluctuations which make it difficult for cooperatives to honor contracts as the agreed-upon prices may not reflect real market conditions. When market prices rise, cooperatives may incur losses for more profit opportunity

, making it difficult to supply produce at the contracted buyers or sometimes changes or sell to others thus breaching the contract themselves, this issue affects 65% of cooperatives assessed, with the impact being highest in Irish potatoes (100%), followed by maize (74%) and horticulture (42%). Additionally, delayed payments from buyers create financial strain on cooperatives, affecting 58% of them. The issue is particularly severe in maize (71%) where most buyer fear to meet agreed date of payments, Irish potatoes (60%), and horticulture (42%). Another major concern is disputes over pricing adjustments, where disagreements arise due to factors such as produce quality of produces. This problem affects 35% of cooperatives, with the highest prevalence in Irish potatoes (80%), followed by maize (29%) and horticulture (25%).Cooperatives also struggle with quality and quantity commitments agreed up before while Buyers often impose strict quality standards that farmers may find difficult to meet due to limited resources or lack of advanced technology. As a result, 29% of cooperatives fail to meet quality requirements, with the highest impact in Irish potatoes (60%), followed by horticulture (33%) and maize (14%). Similarly, meeting quantity commitments can be difficult due to factors such as crop failure and adverse weather conditions. 25% of cooperatives struggle to fulfill quantity obligations, with challenges being most severe in Irish potatoes (60%), horticulture (33%), and maize (21%). When buyers change the agreed quantity, cooperatives often fail to adjust accordingly, leading to further difficulties but also farmers sometimes fail to meet agreed quantity and quality. Another key challenge is input commitment, some contracts require farmers to use specific inputs such as seeds, fertilizers, and pesticides specified by buyers. However, issues arise when these inputs used are of poor quality or are not readily available for farmers to use them. 16% of cooperatives report difficulties in meeting input requirements. This challenge is particularly significant in Irish potatoes (40%) and horticulture (25%), where access to buyer-quality inputs requirement is a major concern. Legal and contractual issues also contribute to contract implementation challenges. In many cases, contract terms are unclear or too complex, making it difficult for farmers to fully understand their obligations. This issue affects 22% of cooperatives. Moreover, weak legal enforcement makes it difficult for farmers to seek redress when contract disputes arise. 29% of cooperatives report challenges with legal enforcement, with legal framework weaknesses affecting 36% of maize cooperatives, 60% of Irish potato cooperatives, and 8% of horticulture cooperatives. Specific to contract ambiguities, 21% of maize cooperatives, 40% of Irish potato cooperatives, and 17% of horticulture cooperatives struggle with unclear terms, further complicating contract enforcement. In some cases, buyers make unilateral changes to contract terms during the growing season, leaving farmers with little recourse. This issue affects 29% of cooperatives, with the highest prevalence in Irish potatoes (60%), followed by maize (29%) and horticulture. These changes create uncertainty for farmers and make it difficult for them to plan effectively. Another significant challenge is market power imbalance, where buyers hold more negotiating power than cooperatives. This imbalance forces farmers into unfavorable contracts that are difficult to honor. 23% of cooperatives face this issue. Additionally, limited alternatives in the market mean that farmers have few options when negotiating contracts. This issue affects 40% of Irish potato cooperatives, 29% of maize cooperatives, and 8% of horticulture cooperatives. However, Irish potato cooperatives appear to have more market flexibility, as they can find alternative buyers when contract obligations are not met. In contrast, 29% of maize cooperatives and 25% of horticulture cooperatives lack alternative buyers, making them more vulnerable to unfair contract terms.

3.3.4. Strategies to Improve Contract Farming as suggested by most Cooperatives

Contract with farmers is an essential approach for enhancing agricultural productivity and ensuring a stable income for farmers, especially within cooperatives. To improve contract farming, various strategies have been suggested by cooperatives in assessment, focusing on

aspects like better communication, reliable markets, and maintaining high-quality standards to benefit both farmers and buyers, their strategies are summarised most here below

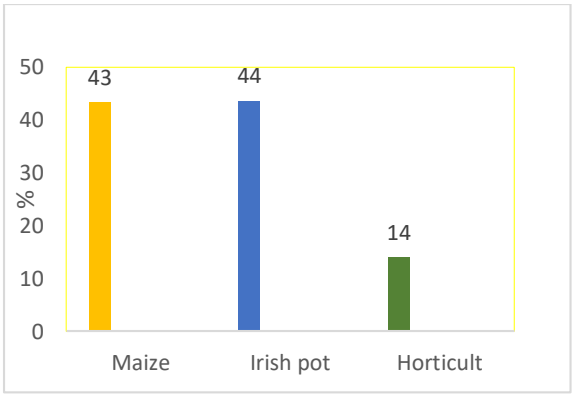
1. Improving Product Quality by Use high-quality seeds and fertilizers to ensure good and consistent yields and perform quality checks before sending produces to the buyers.
2. Establishing Trustworthy Agreements with Buyers by Drafting clear written contracts that outline processes, pricing, and payment terms and both side have part in drafting the contracts and Ensure contracts are legally supported.
3. Timely Delivery of Produce there by Using reliable methods to prepare and deliver products on time as per the contract and have clear Plan efficient logistics to avoid delays.
4. Expanding Market Access most cooperatives suggested that Expanding contracts with multiple buyers to reduce the risk of relying on a single buyer but also Establishing long-term agreements with key buyers.
5. Maintaining Good Communication with Buyers by holding regular discussions with buyers to align on their needs and what the cooperative provides and Respond to buyer and farmers queries promptly and professionally
6. Providing training in partnership with traders' bodies to improve contract management and understanding to enhance members how to build good working relationships with buyers.
7. Market Research to Track buyer demands and conduct research on market needs to ensure products retain value
8. Agriculture Insurance by Implementing insurances to safeguard the farming activities and mitigate risks

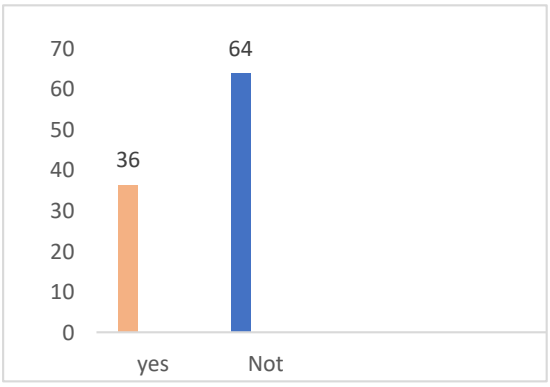
3.4: Cooperative Access to and Utilization of Insurance in Agricultural Value Chains

3.4.1 Accessing and Utilizing Agricultural Insurance in Cooperatives Across Value Chains

Many cooperatives in the maize, horticulture, and Irish potato sectors lack agricultural insurance within their value chains, making them vulnerable to risks that hinder growth and sustainability. Among the cooperatives assessed, only 43% in the maize value chain, 44% in Irish potatoes, and 14% in horticulture have insurance, that indicate 64% of all cooperatives have no insurance coverage for their crops per figure10.

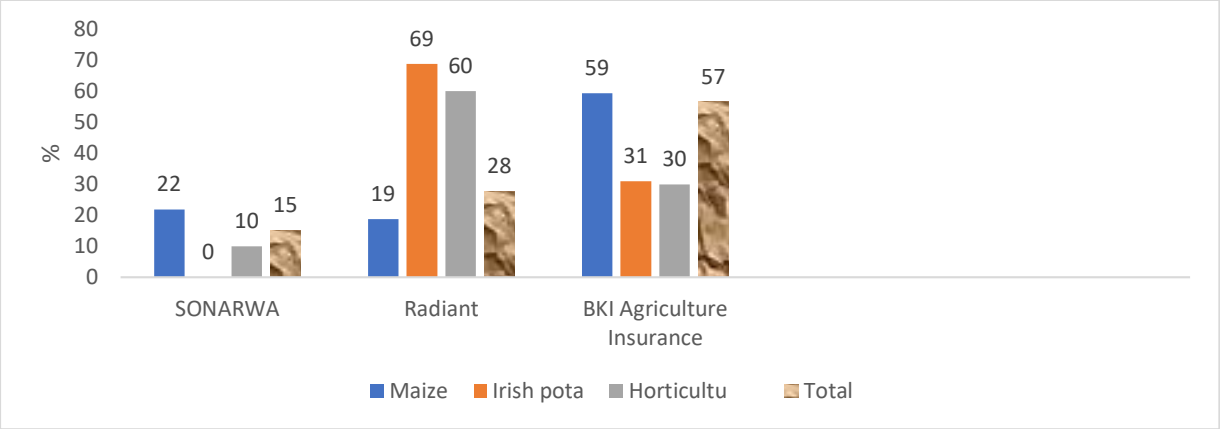
Figure 10:Agri-insurance preferences within cooperatives in %





3.4.1.2. Preferred Insurance Providers for Cooperatives Across Agricultural Value Chains

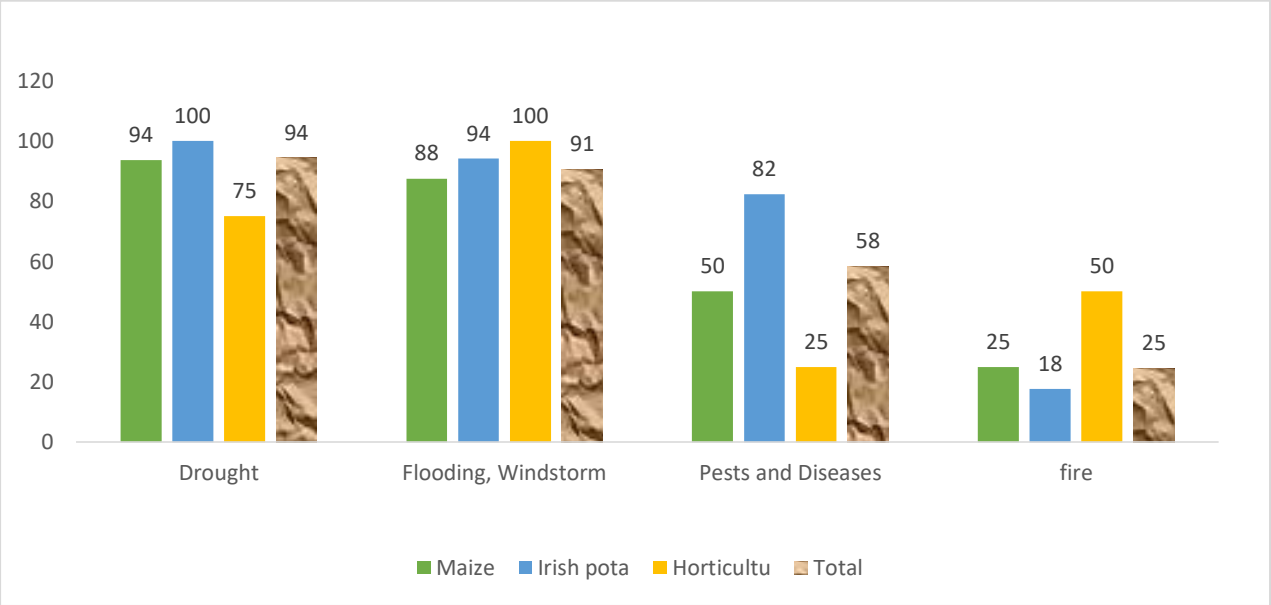
Figure 11:insurance provider among the cooperatives in %



Among the cooperatives assessed, those involved in the maize value chain who have insurance show a distinct distribution of insurance providers. Specifically, 22% of these cooperatives use SONARWA, 19% opt for Radiant, and the majority, 59%, are covered by BK Agriculture Insurance. In the Irish potato value chain, a different pattern emerges. Of the 44% of cooperatives in this sector that have insurance, none (0%) choose SONARWA, while a significant portion, 69%, use Radiant. The remaining 31% have opted for BK Agriculture Insurance. For those involved in the horticulture value chain, only 14% of cooperatives have insurance. Among them, 10% use SONARWA, 60% use Radiant, and 30% choose BK Agriculture Insurance. Overall, across all value chains, 36% of the cooperatives surveyed have insurance. The distribution among these cooperatives is as follows: 15% use SONARWA, 28% use Radiant, and the largest group, 57%, have their insurance with BK Agriculture Insurance.

3.4.1.3. Insurance Schemes and Coverage Across Agricultural Value Chains for Cooperatives

Figure 12:Insurance Schemes Coverage in%



Among the cooperatives assessed, the figure10 shows that 36% have insurance coverage for their crops, which translates to 56 out of 150 cooperatives. In order to understand how various risks are managed across different the targeted value chain, including maize, Irish potatoes, and horticulture. The insurance coverage highlighted in figure12. above details reveal significant insights into the preferences and practices of these cooperatives in mitigating potential losses.

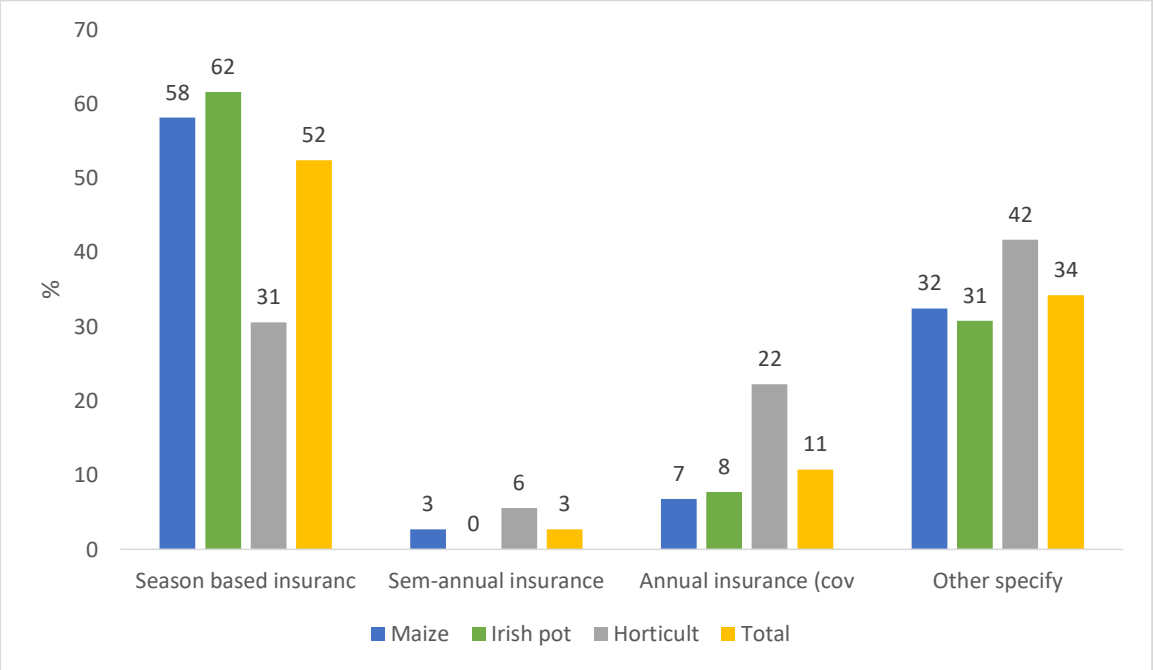
One of the most prominent risks covered is drought, with 100% of cooperatives in the Irish potato value chain ensuring coverage against it. This is likely because Irish potatoes are particularly susceptible to water shortages, however this create ambiguity that most cooperative in north dos not have problems of draught and thus most insurance provide choose risks that is less likely to happen. For maize, 94% of cooperatives have drought insurance, which is also critical, as droughts can significantly reduce maize yields. In contrast, 75% of cooperatives in horticulture have drought coverage, which may reflect a lower perceived risk of drought for certain horticultural crops, or a lower priority in the cooperative's insurance strategy. When it comes to natural disasters, flooding and windstorms are insured by a high percentage of cooperatives. Specifically, 88% of cooperatives in the maize value chain have coverage for flooding and windstorms because they operated mostly in marshlands while 94% in Irish potatoes and 100% in horticulture are similarly insured. This high coverage for flooding and windstorm risks suggests that these cooperatives recognize the serious threat these events pose to their crops, especially in areas prone to extreme weather conditions.

In terms of coverage for pests and diseases, the distribution is more varied. 50% of cooperatives in the maize value chain have insurance for pests and diseases, likely due to the common threats these factors pose to maize production. In Irish potatoes, 82% of cooperatives are insured against pests and diseases, which may indicate a higher vulnerability to these issues in that value chain. In contrast, only 25% of horticultural cooperatives have coverage for pests and diseases, which could be due to the varied nature of horticulture crops and the possibly lower perceived risk from pests compared to others and as they use green houses that are less likely

to meet with pests. Regarding fire insurance, the coverage is relatively low across the value chains. Only 25% of maize cooperatives have fire insurance, with 18% in Irish potatoes and 50% in horticulture. This reflects a lower prioritization of fire risk, which may be less common or more controllable in these agricultural settings but valuable in horticulture because of greenhouses. Looking at the overall picture, irrespective of the specific value chain, some key trends emerge. Drought is covered by 94% of all cooperatives, showing a clear recognition of its importance as a risk factor. Similarly, flooding and windstorm are insured by 91% of cooperatives, underscoring the awareness of the dangers posed by extreme weather events. However, insurance for fire remains relatively low, with only 25% of cooperatives taking measures to cover this risk, These statistics highlight that, while there is considerable insurance coverage for the more predictable and impactful risks like drought and flooding, cooperatives are less focused on insuring for more specific threats like fire.

3.4.1.4: Cooperatives Insurance models

Figure 13:Cooperative insurance models per value chain (%)

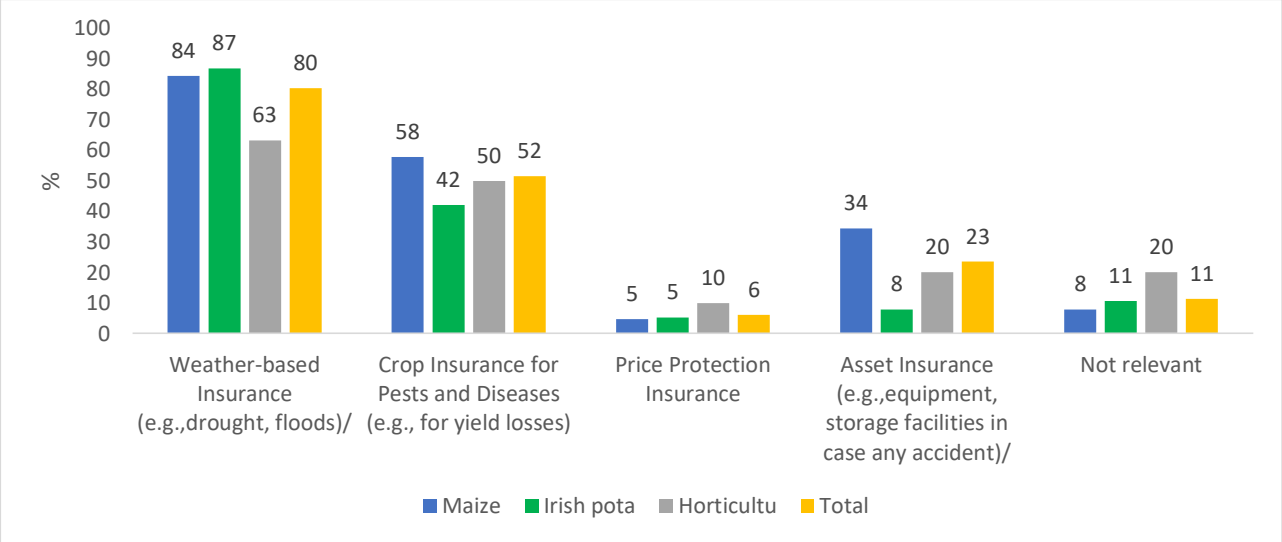


Based on the results from the assessment as in the figure13, all value chain has different preference of which on how insurance would be most issued , with most preference being seasonal based , with 58 % of maize cooperative ,62 % for Irish potatoes cooperative and 31% for horticulture cooperatives respectively, with also more portion of cooperative indicate other

factors may be considered more than season, Sem-annual or yearly based which indicating that horticulture cooperative does not matter on season ,they would prefer having insurance based on different factors . the overall preference is season based with 52% of cooperative and consideration of other factors at 34%.

3.4.1.5 Risks need to be insured Among Cooperatives

Figure 14:Risk need to be insured among cooperatives in (%)

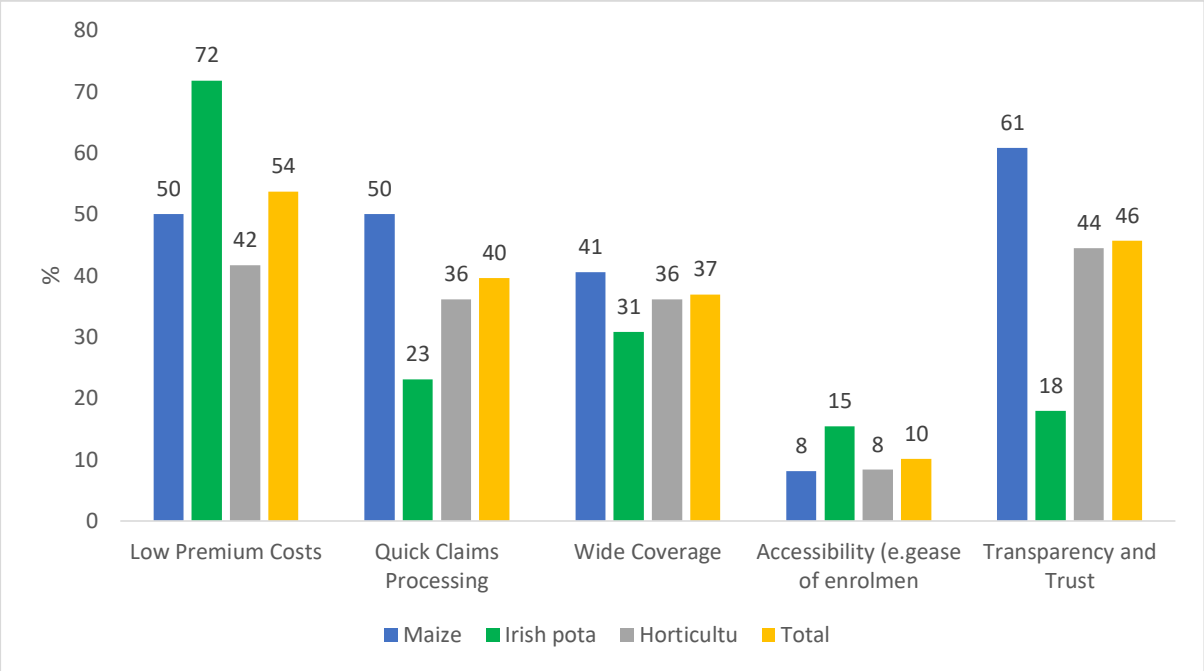


Weather risks appear as the most factors which affect most cooperative and causing loss is the most cooperative choices to covered by insurances with ranging from Weather-based Insurance (for drought, floods) at 87% in Irish potatoes,84% in maize, 63% for horticulture cooperatives,

Crop Insurance for Pests and Diseases (e.g., for yield losses) at 50%for horticulture, 58% for maize ,42% Irish potatoes. Asset Insurance (e.g., equipment, storage facilities in case any accident), 38% for maize cooperatives ,8% for Irish potatoes, and 20% in horticulture, over all regardless of value chain all cooperative would have weather-based insurance as at 80% and as well as crop insurance for pest and diseases at 52%.

3. 4.1. 6 Key Aspects of an Insurance Policy Considered Most Important by Cooperatives

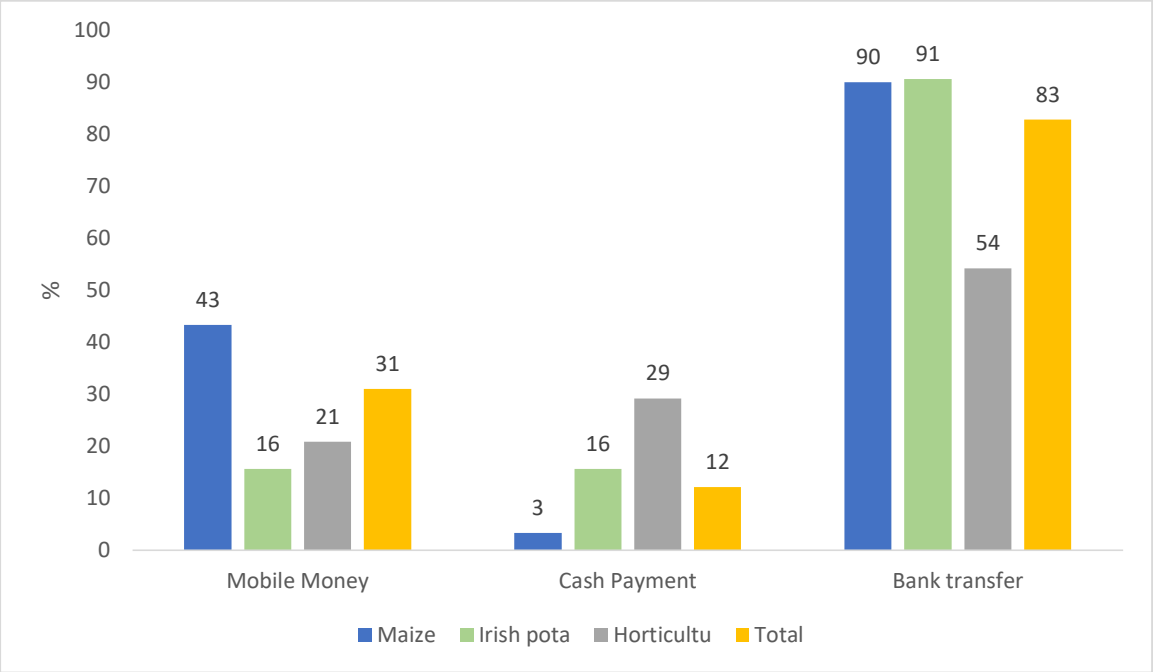
Figure 15:Factors Favouring Cooperatives' Adoption of Insurance in Agricultural Value Chains in %



Based on the responses, all cooperatives prefer low premiums at 54% and transparency at 46%, among other factors. However, these preferences vary across different value chains. Low premiums are the most crucial factor for Irish potato cooperatives as it at 72%,50% for maize and 42% for horticulture respectively, while transparency being the primary concern for maize cooperatives as it at 61%. This is largely due to the fact that many cooperatives face challenges with insurance providers failing to comply with their needs in a timely manner. Additionally, claim verification plays a significant role, with 50% of maize cooperatives, 36% in horticulture, and 23% in Irish potatoes emphasizing the need for a faster losses' verification process. These findings suggest that accelerating claim verification, ensure transparency and lower premium would encourage more farmers to engage with insurance.

3.4.1.7 Type of payment method preferred for insurance

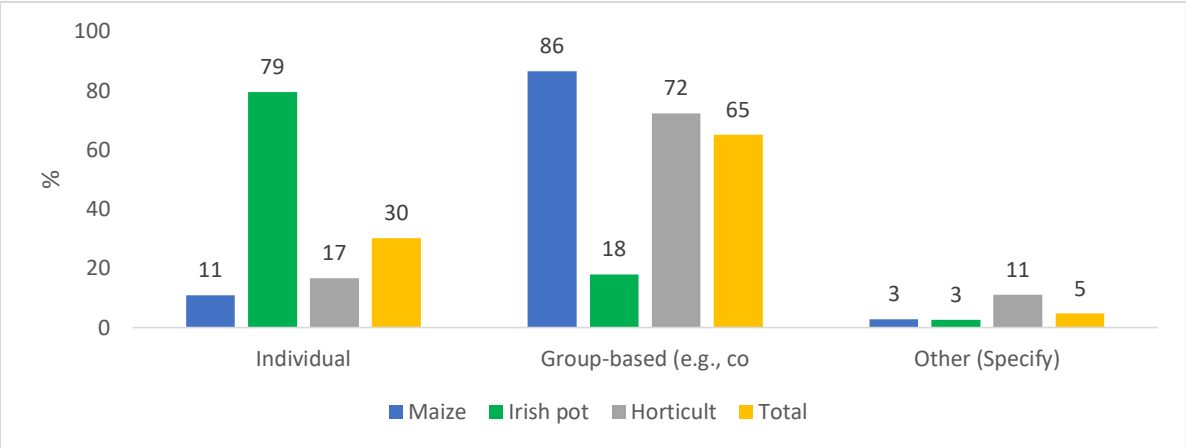
Figure 16:Type of payment method for insurance (%)



Across all value chains, bank transfers are the most trusted method for paying insurance, preferred by 90% of maize cooperatives, 91% of Irish potato cooperatives, and 54% of horticulture cooperatives. Additionally, 43% of maize cooperatives also favor mobile money for its speed and accessibility. Overall, 83% of cooperatives prefer bank transfers, while 31% use mobile money. This indicate that Reliable and accessible payment methods enhance insurance adoption, ensuring timely premium payments and reducing financial barriers for farmers.

3.4.1.8 Preference over an individual or group-based insurance policy

Figure 17:Cooperatives' Preference for Individual vs. Group-Based Insurance Policies in %



Paying for insurance requires well-structured awareness to ensure farmers make informed decisions. Among the assessed cooperatives, preferences for individual versus group-based insurance vary by value chain. In the Irish potato value chain among the assessed, 79% of cooperatives prefer individual insurance, with only 18% favouring group-based coverage. This

reflects the fact that most farmers in this sector manage their farms independently and need to assess risks at an individual level. Conversely, in maize cooperatives, 86% of respondents Favor group-based insurance. This preference is driven by the cooperative model, where members collectively pool funds, increasing their bargaining power and making insurance more affordable and accessible. Similarly, 72% of horticulture cooperatives also prefer group-based insurance, highlighting the benefits of shared responsibility and enhanced negotiation capacity within cooperatives. Overall, across all cooperatives, 65% prefer group-based insurance, demonstrating the importance of collective risk management in agricultural financing.

3.4.1.8.1 Reasons Behind the Preference for Individual Payment Policies in Cooperatives

Several reasons highlighted as the decision for individual insurance in all value chains (maize, Irish potatoes, and horticulture).

1. individual Farmers has to recognize that risks is more to affect them individually As farmers livelihood are highly dependent on the productivity of their crops, having insurance helps them avoid severe losses.
2. there are significant challenges in providing uniform insurance coverage within a cooperative. Some members may not have the resources to ensure their crops or may not fully understand the concept of insurance. Due to the varied land sizes and individual farming practices, it becomes difficult for cooperatives to offer a collective insurance scheme. Since farmers individually manage their land and resources, the costs of insurance premiums also vary, depending on the land size or personal financial capabilities. This discrepancy in understanding and access to insurance means that some farmers may not be able to participate, which creates inequality in protection across the cooperative.

3.4.1.8.2: Reasons Behind the Preference for Group Payment Policies in Cooperatives

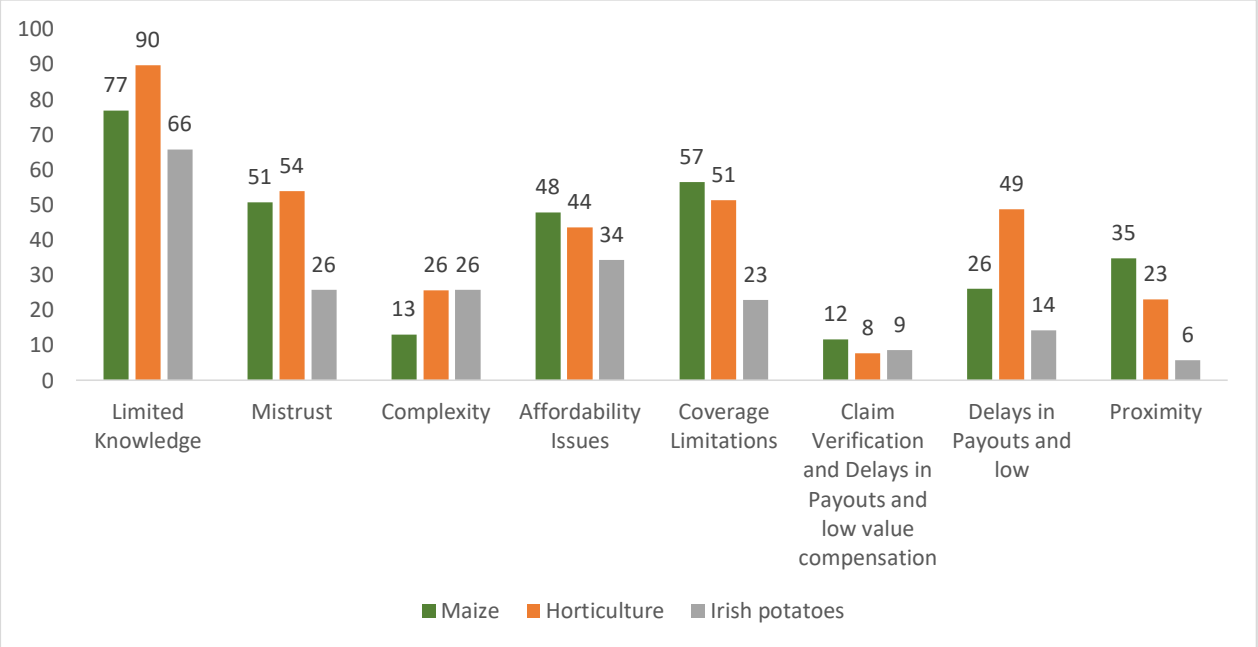
One of the reasons among other is that collective payment in cooperatives plays a crucial role in ensuring that every member is covered and protected from the risks that may arise from farming activities. there is a possibility to spread the risks across the group, making it easier to ensure all members where members share the benefits of being covered collectively, and the risks are mitigated as a group, this applies most in horticulture cooperatives (fire insurance).

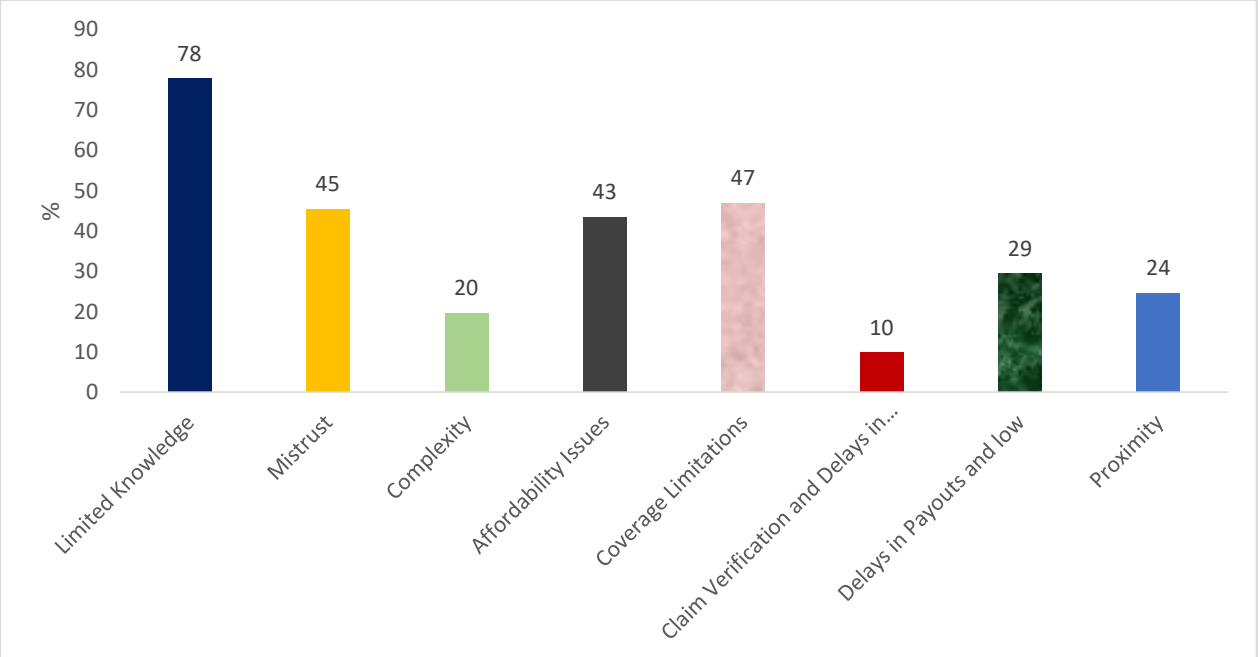
Simplicity in Payment and Administration: Group-based insurance allows for a streamlined payment process. Since all members contribute together as insurance premium are collected before administration of payment to farmers for next seasons, it simplifies the payment system, making it easier for the cooperative to manage. Additionally, this method is more convenient for farmers because the payment is handled collectively, reducing individual burdens. Farmers most cooperative assessed find it easier to make one collective payment rather than managing separate insurance payments on an individual basis. Easier Access to Financial Support and Markets: One of the key advantages of group-based insurance is the cooperative's ability to attract buyers and access markets more easily. Buyers often prefer buying and signing contract to groups rather than individuals, especially when the cooperative shows a collective effort and responsibility. By presenting a unified front it makes it easier to find markets for the products, as larger quantities can be sold to buyers or traders who prefer bulk purchasing. Ensuring Comprehensive Coverage for All Members: Group-based insurance guarantees that every member of the cooperative is covered. Since cooperatives aim to protect all their members equally, this type of insurance ensures that everyone benefits from the security it provides. For instance, if one member experiences a loss due to an accident or crop failure, the cooperative's collective insurance covers them, ensuring that no one is left behind. However, this is less likely

happen. Protection Against Common Risks: Working together as a cooperative means that members face similar agricultural risks, such as adverse weather conditions, pests, or diseases. Group-based insurance cover these shared risks, such as crop failure due to bad weather or the spread of pests across the land. Simplified Communication as it is easier for the cooperative to keep track of who is insured and ensure that everyone pays their share. The group can also help to collectively handle claims or follow up on insurance matters, making the entire process more transparent and manageable.

3.4.2. Challenges cooperatives face in adopting agricultural insurance in relation to their value chain

Figure 18: Most challenges in adopting insurance specific to value chain (%) and regardless to value chain (%)

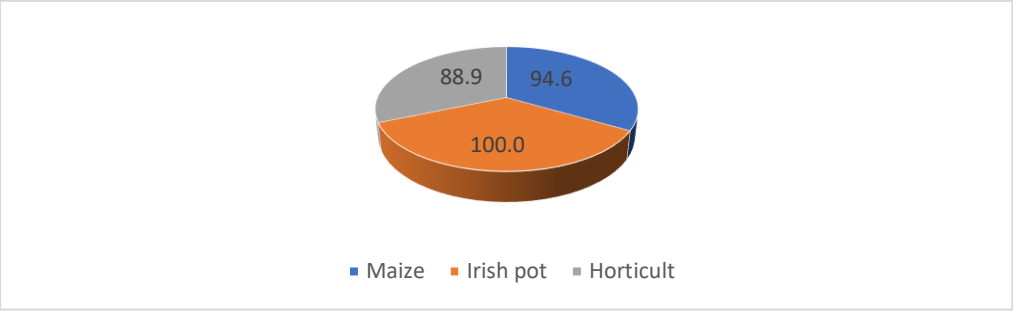




Limited Knowledge plays significant challenge faced by farmers is their lack of understanding of how agricultural insurance works and its potential benefits. Across all assessed cooperatives, 78% of farmers report facing difficulties due to insufficient knowledge of agricultural insurance. This is the most significant barrier. When analyzed by crop, the highest percentage of farmers with limited knowledge is in horticulture (90%), followed by maize (77%) and Irish potatoes (66%). Lack of Trust in Insurers: A prevalent issue is farmers' mistrust of insurers, which discourages enrollment. Many farmers fear delayed or denied claims. Overall, 45% of farmers cite mistrust as a major barrier to adopting insurance, indicating skepticism about the effectiveness and reliability of insurance services. This issue is particularly prominent in maize (51%) and horticulture (54%), while Irish potatoes have a lower rate of mistrust (26%). Addressing concerns about the credibility and fairness of insurance schemes will be crucial to improving adoption. Complexity of Insurance Products: The complexity of insurance products makes it difficult for farmers to fully understand terms, conditions, and claim procedures. Overall, 20% of farmers struggle with these complexities, with horticulture (26%) and Irish potatoes (26%) facing the greatest challenges. This suggests that insurance processes may be perceived as difficult to navigate, particularly in these sectors. Simplifying the insurance process could help mitigate these challenges. Affordability Issues where High premiums present a significant barrier for farmers, with 43% of farmers overall indicating that they struggle with the affordability of insurance. Maize (48%) and horticulture (44%) farmers are particularly affected by the cost, compared to Irish potatoes (34%). Making premiums more affordable could alleviate this barrier and encourage broader participation in insurance schemes. Coverage Limitations: Some insurance policies exclude critical risks, such as pests or diseases, leaving farmers vulnerable. Overall, 47% of farmers face challenges due to limited coverage options. Maize (57%) and horticulture (51%) farmers are most affected by these coverage limitations, while Irish potatoes (23%) face fewer challenges. Tailored insurance products that address the specific needs of different crops would be beneficial. Claim Verification, Delays, and Low Compensation Verifying losses, especially in remote or large farming areas, can be time-consuming and costly. Consequently, insurance providers may struggle to determine whether a farmer has experienced an insured risk. Ten percent of farmers report issues with claim verification and delays in payouts. This is most noticeable among maize farmers (12%) and horticulture farmers (8%). Additionally, 29% of farmers across all crops experience delays in payouts and low compensation. Proximity to Insurance Providers: A significant number of farmers face challenges in accessing insurance services due to the geographical distance of insurance providers from their farming areas. Twenty-four percent of farmers overall encounter issues related to the accessibility of insurance services. Maize farmers (35%) are most affected by geographical distance, while horticulture (23%) and Irish potatoes (6%) are less impacted. This highlights the need for improved outreach and availability of insurance services in rural areas.

3.4.3 The Need for Training on Agricultural Insurance Policies Among Cooperatives

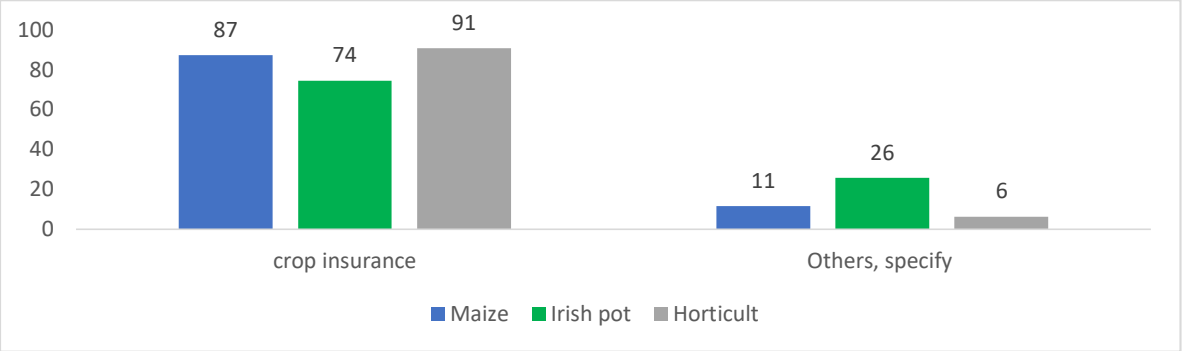
Figure 19:Cooperatives that need insurance tailored training in %



Overall, the cooperatives assessed expressed a strong interest in receiving additional training on agricultural insurance as indicated by result pie above.

3.4.4. Need additional training specific within agriculture in general

Figure 20:Specific agriculture in general in%

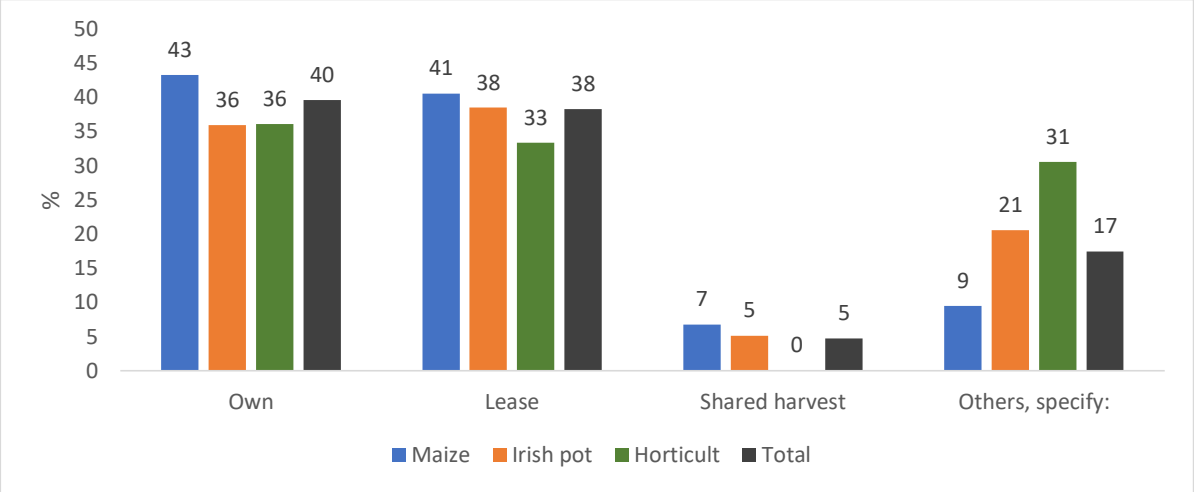


The data reveals the percentage of farmers across different value chains who need training in various areas of agricultural insurance. For livestock insurance, very few farmers require training with just 1% of maize farmers and 3% of horticulture farmers expressing the need for this type of insurance training, while no Irish potato farmers indicated a need chich create most ambiguous this level of perceptions mean while this intervention is available. In terms of crop insurance, a much larger proportion of farmers seek training, with 87% of maize farmers, 74% of Irish potato farmers, and 91% of horticulture farmers showing interest. This highlights crop insurance as the most critical area for training across all value chains. Additionally, other training needs were specified by a smaller percentage of farmers, with 11% of maize farmers, 26% of Irish potato farmers, and 6% of horticulture farmers expressing interest in areas beyond livestock and crop insurance. Overall, the data suggests that training in crop insurance is the highest priority for farmers, while livestock insurance is less of a concern. The variety of other training needs, especially in the Irish potato sector, points to additional areas of interest that could benefit farmers.

3.5: Cooperative land utilization

3.5.1 Method of land Ownership

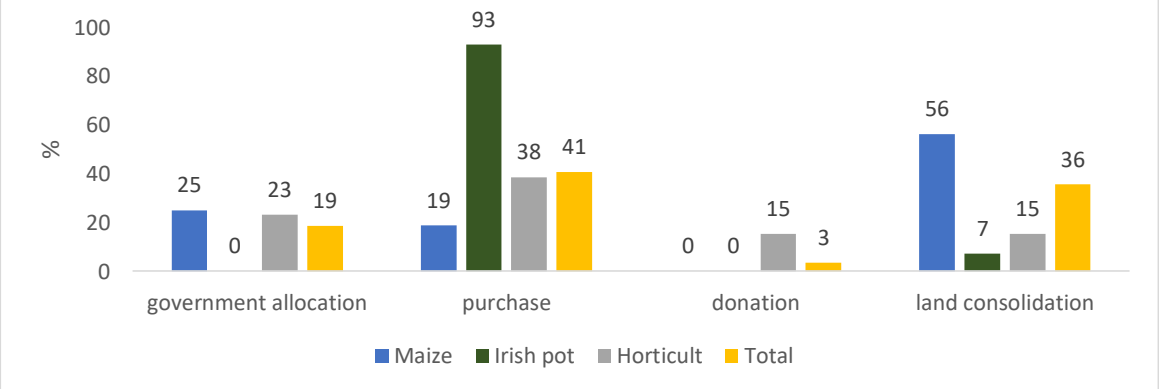
Figure 21:land ownership among the cooperatives in %



For land ownership, 43% of maize farmers own their land, while 36% of Irish potato farmers and 36% of horticulture farmers report owning their land. This indicates that a significant proportion of farmers across all crops own the land they farm on, with maize farmers slightly leading in this area. In terms of leased land, 41% of maize farmers lease land, followed by 38% of Irish potato farmers and 33% of horticulture farmers. This suggests that leasing is a common practice among farmers in all sectors, particularly for maize and Irish potatoes.7% of maize farmers and 5% of Irish potato farmers engage in this type of land arrangement, while no horticulture farmers report using shared harvest agreements. This suggests that shared harvests are a less common practice, especially among horticulture farmers. Finally, other land ownership arrangements are notable for Irish potato and horticulture farmers, with 21% of Irish potato farmers and 31% of horticulture farmers reporting this arrangement, compared to just 9% of maize farmers. This indicates that Irish potato and horticulture farmers may use more diverse or less conventional land arrangements. Overall, the data reflects that ownership and leasing are the most common land arrangements across all crops, with less frequent use of shared harvests or other arrangements, particularly in horticulture.

3.5.2. Means of Acquiring land

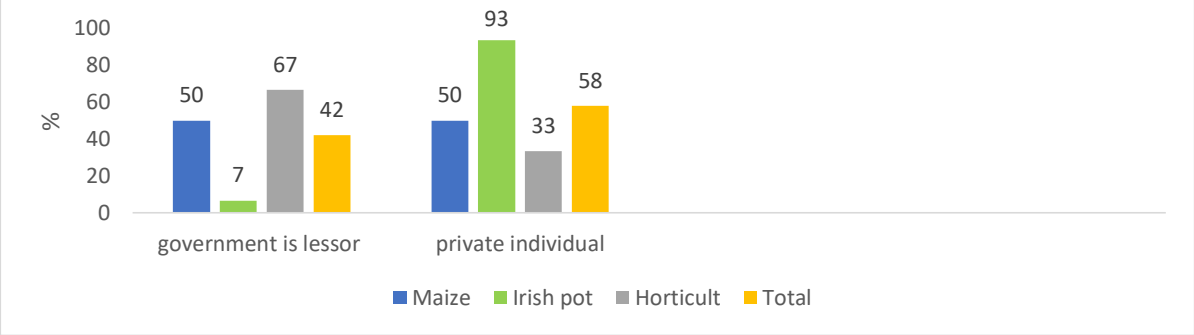
Figure 22:how cooperatives acquired land in %



For maize farmers in visited cooperatives, 25% acquired their land through government allocation, while 19% purchased their land. A significant portion of maize farmers, 56%, acquired their land through land consolidation. No maize farmers reported acquiring land through donation or other means. Regarding the Irish potato farmers, the predominant method of land acquisition is purchase, with 92.86% of farmers acquiring land this way. This is by far the most common method, compared to 7.14% who obtained land through land consolidation. No Irish potato farmers reported acquiring land through government allocation, donation, or other means. For horticulture farmers, 23.08% acquired their land through government allocation, and 38.46% purchased their land. 15.38% obtained their land through donation, and 15.38% through land consolidation. A smaller portion, 7.69%, reported other means of land acquisition. Across all crops, land consolidation stands out as a key method, with an overall 35.59% of farmers acquiring their land this way. Purchase is the second most common method, at 40.68% overall. Government allocation is the least common, with only 18.64% of farmers acquiring their land this way. It shows that purchasing and land consolidation are the most common ways that cooperatives acquire land, with notable differences between crops. Irish potato farmers primarily purchase their land, while maize and horticulture farmers show a more varied approach, including land consolidation and government allocation.

3.5.2.1: To whom cooperative lease land

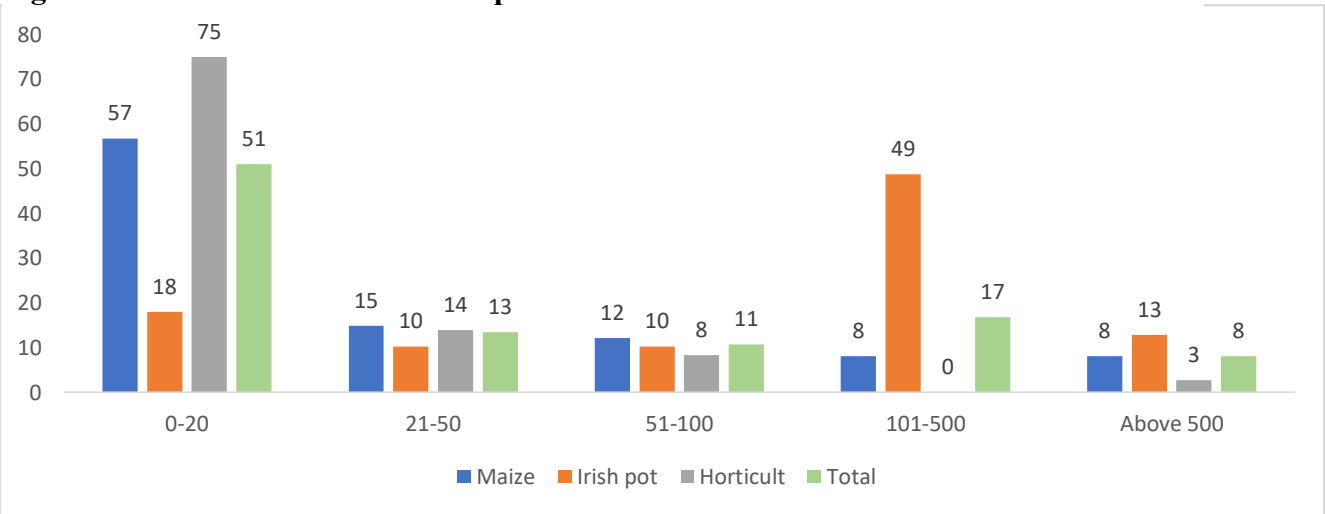
Figure 23:where cooperatives lease the land in %



For maize farmers, the lessor is split equally between government and private individuals, with 50% of maize farmers leasing land from each. This indicates a balanced reliance on both government and private individuals for leased land. For Irish potatoes cooperatives,the majority of land is leased from private individuals, with 93% of farmers reporting this as their source of leased land. Only 7% of Irish potato farmers lease land from the government, indicating a clear preference for private individuals as lessors. For horticulture farmers, 67% lease land from the government, while 33% lease from private individuals. This suggests that government land leases are more common in the horticulture sector compared to private land leasing. Overall, across all crops, private individuals are the lessors for 58% of all cooperatives which depends on leased land, while government provides the land for 42% of leases. This indicates a broader reliance on private individuals for leased land, with government leases being more common in the horticulture sector and equally distributed among maize farmers.

3.5.3: Cooperatives land sizes

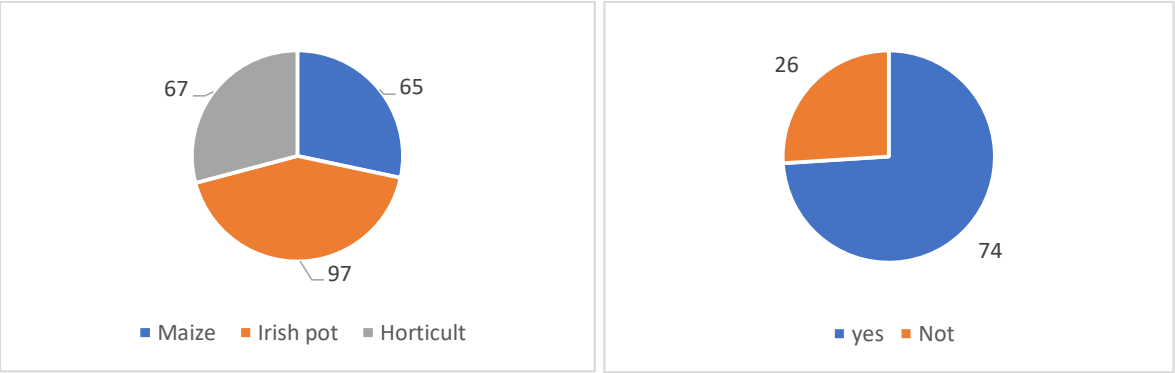
Figure 24:land size available for cooperatives use in %



The overview of the available land sizes for cooperatives involved in maize, Irish potato, and horticulture farming. For maize cooperatives the majority of cooperatives have 0-20 hectares of land, with 57% of cooperatives falling into this category. Smaller percentages of cooperatives have larger land sizes: 15% of maize cooperatives have 21-50 hectares, 12% have 51-100 hectares, and 8% have between 101-500 hectares. Only 8% of maize cooperatives have land exceeding 500 hectares. For Irish potato farmers, the largest portion of cooperatives, 49%, have 101-500 hectares of land, which is a significantly higher proportion compared to maize and horticulture. 18% of Irish potato cooperatives have 0-20 hectares, and smaller percentages have other land sizes: 10% have 21-50 hectares, 10% have 51-100 hectares, and 13% have over 500 hectares. For horticulture farmers, the majority of cooperatives (75%) have 0-20 hectares of land. A smaller portion, 14%, have 21-50 hectares, while 8% have 51-100 hectares. There are no horticulture cooperatives with land in the 101–500-hectare range, but 3% have land larger than 500 hectares. Overall, the data indicates that for all cooperatives, 0-20 hectares is the most common land size category, with 51% of cooperatives across the three sectors in this range. Irish potato cooperatives stand out for having a larger proportion of land in the 101–500-hectare range, while maize and horticulture cooperatives tend to have smaller land sizes. The presence of cooperatives with very large land sizes (above 500 hectares) is relatively low across all crops.

3.5.4 cooperatives land legal ownership

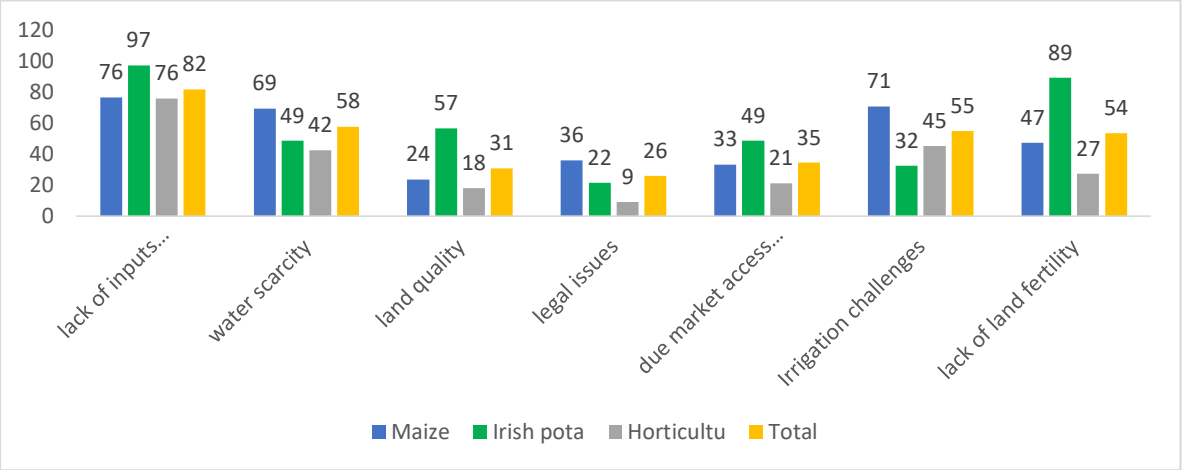
Figure 25:Figure39: cooperative with land legal ownership in %



The assessment revealed the percentage of cooperatives with legal ownership or agreements for land use across different crops. For maize cooperatives, 65% have legal ownership or agreements for land use, while 35% do not. For Irish potato cooperatives, 97% have legal ownership or agreements, with only 3% lacking such arrangements. For horticulture cooperatives, 67% have legal ownership or agreements for land use, and 33% do not. Overall, 74% of cooperatives across all value chains have legal ownership or agreements for land use, while 26% do not. This shows that the majority of cooperatives have formal arrangements for land use, with Irish potato cooperatives having the highest proportion with such agreements.

3.5.5. Main challenges cooperative faces in utilizing the land effectively

Figure 26:Key Factors That Hinder Effective Land Use in %

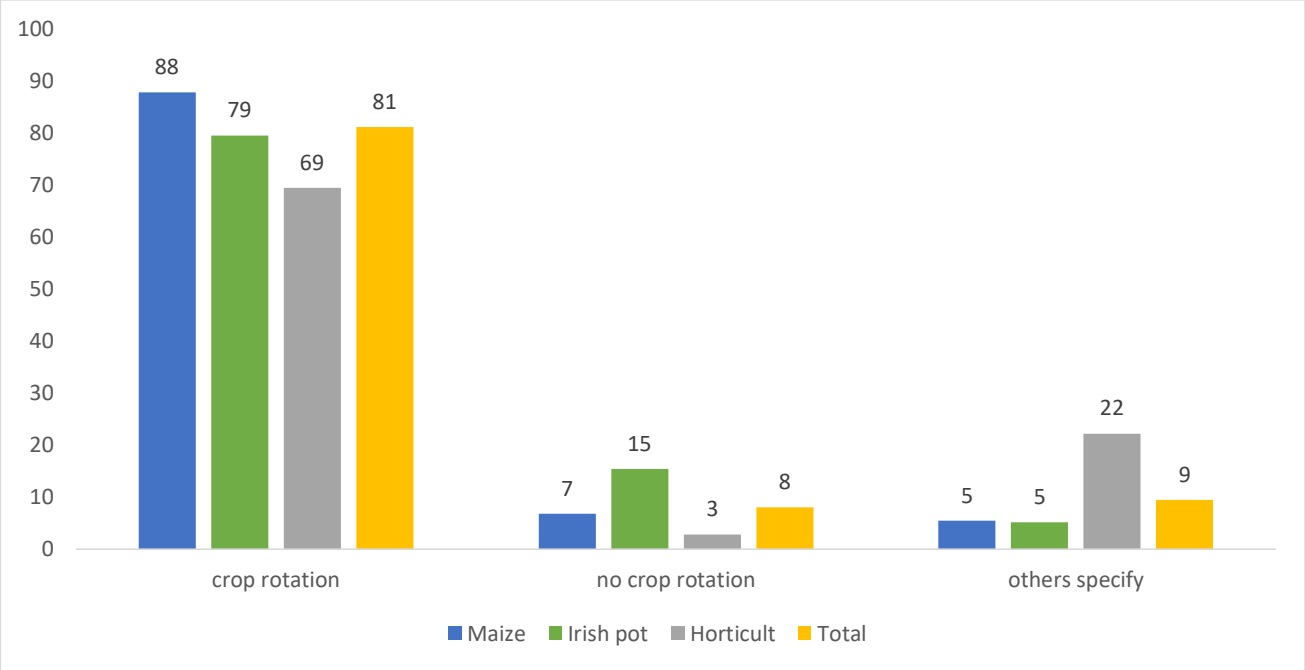


The data reveals the main challenges faced by cooperatives in utilizing land effectively across different crops (maize, Irish potatoes, and horticulture), as well as the overall challenges experienced by all cooperatives, regardless of the crop. For maize cooperatives, the most significant challenge is lack of inputs (seeds, fertilizers, chemicals, etc.), with 76% of cooperatives reporting this issue. Other major challenges include water scarcity (69%), irrigation challenges (71%), and lack of land fertility (47%). Legal issues (36%) and market access issues (33%) also pose challenges, but to a lesser extent. Land quality (24%) is a relatively smaller concern for maize farmers. For Irish potato cooperatives, the biggest challenge is also lack of inputs, with 97% of cooperatives citing it as an issue. This is followed by lack of land fertility (89%), water scarcity (49%), and market access issues (49%). Irrigation challenges (32%) and land quality (57%) are significant as well, while legal issues (22%) are less of a concern. For horticulture cooperatives, the most pressing challenge is lack of inputs, with 76% of cooperatives reporting difficulties in accessing necessary resources. Water scarcity (42%), irrigation challenges (45%), and market access issues (21%) are also notable challenges. Land quality (18%) and legal issues (9%) are less of a concern for horticulture farmers compared to other crops. When looking at the data for all cooperatives, the main challenge across the board is again lack of inputs (seeds, fertilizers, chemicals, etc.), reported by 82% of cooperatives. This is closely followed by water scarcity, affecting 58% of cooperatives, and irrigation challenges, which impact 55%. Lack of land fertility is also a major concern, affecting 54% of cooperatives. Market access issues are reported by 35%, while land quality is a challenge for 31% of cooperatives. Legal issues are the least reported, with 26% of cooperatives experiencing them. the challenges faced by cooperatives in utilizing land effectively are similar across the different crops, with lack of inputs, water scarcity, and irrigation challenges being the most significant obstacles. Land fertility also stands out as a

critical concern, particularly for Irish potato cooperatives. Market access issues, land quality, and legal issues play smaller but still important roles.

3.5.6 practice crop rotation

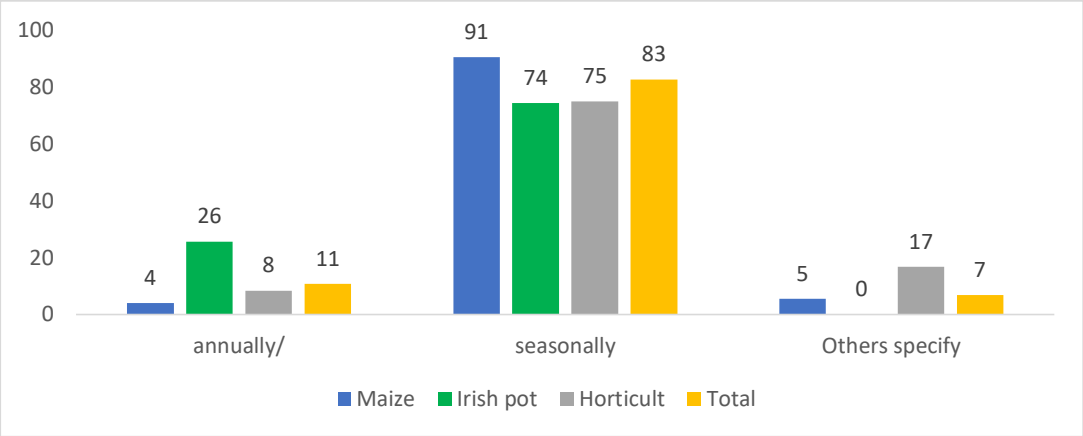
Figure 27:cooperative practicing crop rotation in %



The data reveals the land use crop rotation practices across different cooperatives as in assessment (maize, Irish potatoes, and horticulture) as well as the overall practices across all value chains. For maize cooperatives, most practice crop rotation, with 88% of cooperatives doing it. A small proportion, 7% do not do crop rotation, while 5% report other unspecified practices. Notably, For Irish potato cooperatives, 79% use crop rotation, while 15% practice land use rotation for fertility reasons. 5% of Irish potato cooperatives report other practices, but again, 0% engage in fallowing. This indicates that crop rotation is the predominant method for land use in Irish potatoes. For horticulture cooperatives, 69% practice crop rotation, 15% do not do crop rotation and 22% report other practices, suggesting a more diverse approach to land use in horticulture. Across all value chains, 81% of cooperatives practice crop rotation, indicating its widespread adoption as the primary method of land and 9% report other unspecified practices. crop rotation is the most widely used practice across all crops.

3.5.6.1. How Often crop rotation Practiced

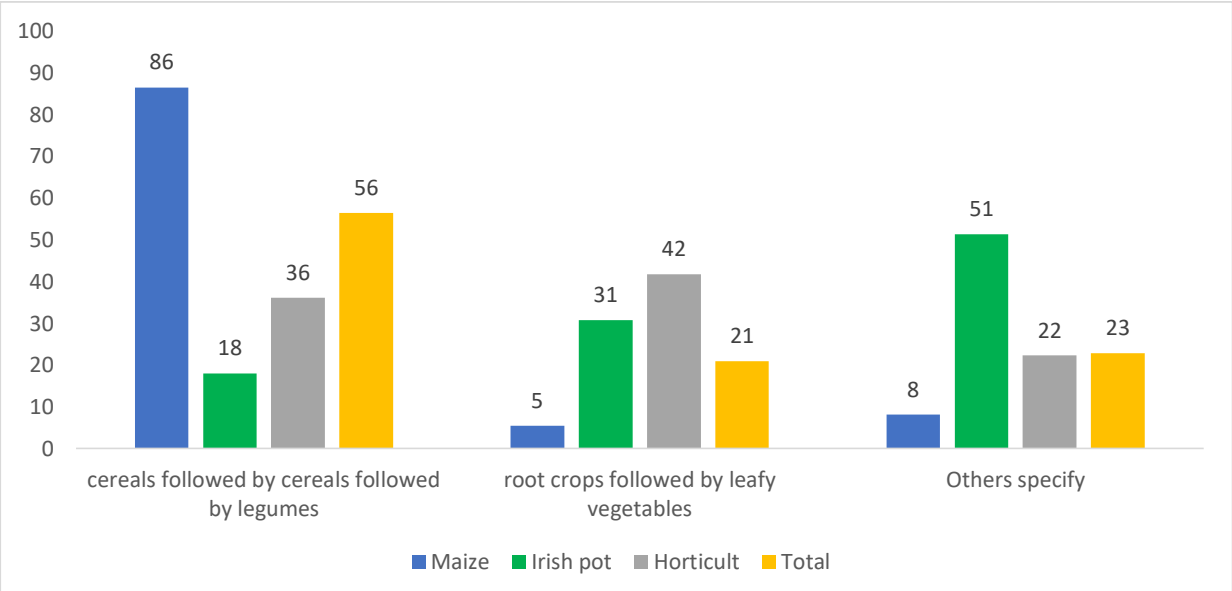
Figure 28:Agri-period when crop rotation is made in %



For maize cooperatives, the most common frequency for crop rotation is seasonally, with 91% of cooperatives adopting this approach. This indicates that maize farmers tend to rotate their crops with each growing season. Only 4% of maize cooperatives rotate crops annually, and 5% follow other unspecified practices. For Irish potato cooperatives, 74% practice crop rotation seasonally, while 26% rotate crops annually. No Irish potato cooperatives report using other practices. For horticulture cooperatives, 75% rotate crops seasonally, and 8% rotate crops annually. Additionally, 17% of horticulture cooperatives report using other unspecified rotation frequencies. Across all value chains, 83% of cooperatives practice crop rotation seasonally, which is the predominant method of rotation. 11% rotate crops annually, while 7% use other unspecified rotation practices. seasonal crop rotation is the most widely practiced frequency across all crops and cooperatives, reflecting a common approach to maintaining soil fertility and managing pest cycles. While a small percentage of cooperatives rotate crops annually, this is less common, and a few cooperatives report using other, unspecified frequencies for crop rotation**.**

3.5.6.2: Patterns of Crop Rotation

Figure 29:crop rotation pattern among the cooperatives in %

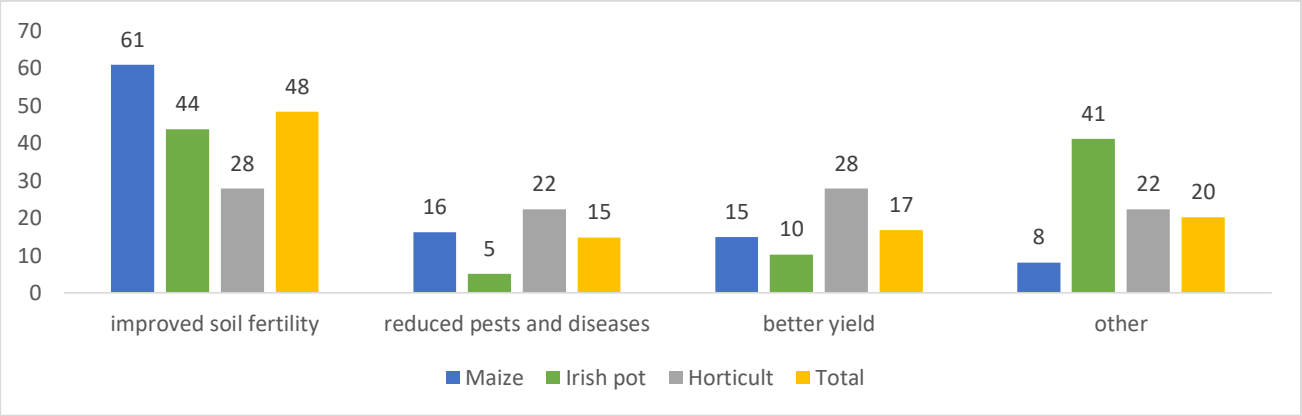


For maize cooperatives, the most common crop rotation pattern is cereals followed by legumes, with 86% of cooperatives adopting this approach. This suggests a preference for alternating cereal crops with legumes to improve soil fertility and manage pest cycles. A small proportion, 8%, follow other unspecified crop rotation patterns. For Irish potato cooperatives, the most common crop rotation pattern is root crops followed by leafy vegetables, with 31% of cooperatives practicing this method. 18% of Irish potato cooperatives do cereals followed by legumes pattern, while 51% report using other unspecified crop rotation patterns, indicating a more varied approach to crop rotation in Irish potato farming. For horticulture cooperatives, 42% use the root crops followed by leafy vegetables rotation pattern, 22% of horticulture cooperatives use other unspecified crop rotation methods.

Across all value chains, the most common crop rotation pattern is cereals followed by legumes, used by 56% of cooperatives. 21% follow the root crops followed by leafy vegetables pattern, while 23% report using other unspecified rotation patterns. Cereals followed by legumes is the most widely used crop rotation pattern, particularly for maize. Irish potato and horticulture cooperatives show a more diverse range of rotation patterns, with a significant proportion using root crops followed by leafy vegetables. This indicates that cooperatives tend to adopt crop rotation strategies that suit their specific crop needs and local conditions, with a notable variation in approaches between the different crops.

3.5.6.3 crop rotation and the productivity of the land

Figure 30:Cooperative Insights on How Crop Rotation Affects Land Use in %

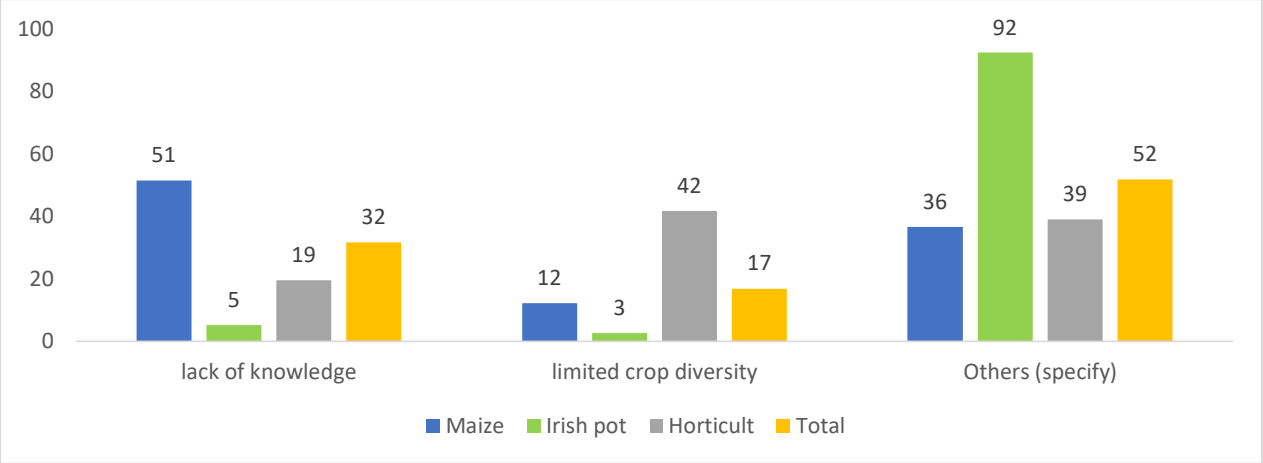


The graph above provides a clear overview of how crop rotation has impacted land productivity for maize, Irish potatoes, and horticulture cooperatives, as well as the overall effects across all value chains. For maize cooperatives, the most significant impact of crop rotation is an improvement in soil fertility, with 61% of cooperatives reporting this benefit. 16% note a reduction in pests and diseases, while 15% observe better yields. Additionally, 8% report other unspecified benefits of crop rotation. For Irish potato cooperatives, 44% report that crop rotation has led to improved soil fertility, while 41% mention other benefits, indicating a diverse range of positive impacts. A smaller percentage, 5%, note a reduction in pests and diseases, and 10% experience better yields. For horticulture cooperatives, 28% cite improved soil fertility as a key benefit of crop rotation. 22% report a reduction in pests and diseases, and 28% highlight better yields. An additional 22% of horticulture cooperatives mention other unspecified benefits. Across all value chains, 48% of cooperatives report that crop rotation has improved soil fertility, making it the most widely observed effect. 15% have seen a reduction in pests and diseases, and 17% report better yields. Furthermore, 20% mention other unspecified benefits, emphasizing the varied advantages of crop rotation. Crop rotation predominantly enhances soil fertility across all crops, with maize cooperatives experiencing

the greatest improvement. While reductions in pests and diseases and increases in yield are also observed, a significant number of cooperatives, particularly in Irish potatoes and horticulture, report other positive effects. This suggests that crop rotation offers multiple benefits that enhance land productivity in diverse ways.

3.5.7. the reasons for not practicing crop rotation your cooperative faces

Figure 31:Common Reasons for Not Practicing Crop Rotation in the Cooperative in %

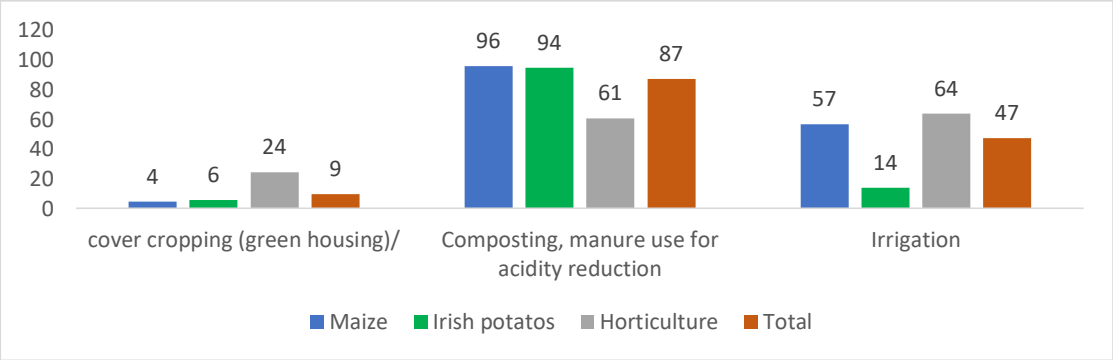


The challenges that cooperatives face for not practicing crop rotation, specifically among maize, Irish potatoes, and horticulture, For maize cooperatives, the primary challenge is lack of knowledge of which best suit crop that can follow the outgoing one ,with 51% of cooperatives citing this as the main reason for not adopting crop rotation. A smaller percentage, 12%, report limited crop diversity as a barrier to implementing crop rotation, while 36% mention other unspecified challenges. For Irish potato cooperatives. For horticulture cooperatives, 42% face challenges due to limited crop diversity, making it difficult to rotate crops effectively. 19% cite lack of knowledge as a barrier, and 39% report other unspecified challenges Across all value chains 17% face challenges due to limited crop diversity, and 52% report other unspecified reasons.

Over all in cooperatives, the limited crop diversity observed is primarily attributed to factors such as crop performance and weather dependence and or the cultivation of a single crop over extensive areas, are often favoured due to their high yields and uniformity.

3.5.8. Alternatives that cooperative use to improve soil fertility and land health

Figure 32: cooperative uses to improve soil fertility and land health in%



The Cooperatives in the study expressed Among the techniques employed to increase their soil fertility and health among other but not limited to cover cropping, composting and manure use for acidity reduction, and irrigation are the most widely adopted methods.

These alternatives vary in their usage depending on the crop, with maize, Irish potatoes, and horticulture each benefiting from these practices to different extents. One of the methods used by cooperatives is cover cropping (green housing), However, the adoption of this technique is relatively low across the cooperatives. The highest adoption rate is found in horticulture, where 24% of farmers practice cover cropping. Overall, 9% of cooperative across all assessed use cover cropping. This suggests that while the practice is beneficial for improving soil health, its adoption may be limited by factors such as crop-specific requirements.

Another widely used method for improving soil fertility is composting and manure use for acidity reduction. This practice is the most commonly employed by farmers in the cooperatives, with 96% of maize farmers utilizing compost and manure to improve soil fertility. A similar proportion, 94%, of Irish potato farmers also use this technique. In horticulture, 61% of farmers incorporate compost and manure to reduce soil acidity. Across all crops, 87% of farmers adopt this method, making it the most prevalent practice. The high adoption rate can be attributed to the effectiveness and accessibility of compost and manure as soil amendments, as well as farmers' familiarity with their positive impact on soil health.

Irrigation is another important practice used to maintain soil fertility, particularly in regions where water availability is a concern. 64% of horticulture farmers rely on irrigation to maintain optimal soil moisture levels and ensure healthy crop growth. Across all crops, 47% of farmers use irrigation as a supplementary method to support soil fertility and enhance productivity.

Chapter4.Conclusion and recommendations

4.1: Conclusion

The assessment of cooperative needs highlights key challenges and opportunities in agricultural productivity, financial sustainability, and market access. Storage infrastructure remains inadequate, particularly in the horticulture sector, with only 22% of horticulture cooperatives having storage facilities, compared to 72% for maize and 90% for Irish potatoes. Financial constraints force many cooperatives to prioritize immediate sales over long-term storage investments. Agricultural subsidies are essential, yet 97.3% of maize, 100% of horticulture, and 94.1% of Irish potato cooperatives require input subsidies. However, many report dissatisfaction due to insufficient and untimely distribution, particularly in mechanization and financial assistance. Contract farming is underutilized, with only 21% of cooperatives securing pre-planting contracts. Horticulture leads with 33%, maize follows at 20%, and Irish potatoes lag at 13%. Challenges include 65% of cooperatives facing price fluctuations and 58% experiencing delayed payments. Agricultural insurance adoption is low, with only 36% of cooperatives covered. Drought insurance is the most common, covering 94% of insured cooperatives, while fire and theft coverage remains low. Barriers include high costs, mistrust in insurers (45%), and delays in claims processing (29%). Land utilization varies, with 43% of maize, 36% of Irish potato, and 36% of horticulture cooperatives owning land. Key challenges include lack of inputs (82%), water scarcity (58%), and declining soil fertility (54%). 81% of cooperatives practice crop rotation, mainly cereals followed by legumes, though many struggle due to limited crop diversity. To improve cooperative sustainability, urgent interventions are needed in storage infrastructure, subsidy allocation, contract enforcement, insurance adoption, and sustainable land management. Addressing these gaps will enhance productivity, financial resilience, and long-term viability.

4.2. Recommendations

To enhance the sustainability of Rwanda's agricultural cooperatives, targeted interventions are needed in the maize, Irish potato, and horticulture value chains. Key focus areas include but not limited to improving storage, access to subsidies, contract farming, insurance adoption, and land utilization. Specifically In the maize value chain, investment in hermetic storage solutions and modern warehouses should be prioritized to reduce post-harvest losses. Expanding subsidies for mechanization and irrigation will boost productivity, while enforcing legally binding contracts can stabilize market access. Insurance policies must be made affordable and transparent to encourage adoption. Additionally, promoting composting and irrigation will improve land productivity. For Irish potatoes, increasing cold storage facilities and ventilated crates will enhance quality and shelf life. Financial institutions should offer credit for post-harvest infrastructure, while subsidies must ensure access to high-quality seeds and fertilizers. Stronger contract enforcement will protect farmers from price fluctuations and delayed payments. Tailored insurance coverage for pests, diseases, and weather risks will improve financial security. Cooperative land ownership should also be supported through subsidized loans. In the horticulture sector, refrigerated storage and pre-cooling chambers are essential to reduce spoilage. Targeted subsidies for greenhouse farming and irrigation infrastructure will improve resilience. Expanding contract farming with multiple buyers and designing insurance to cover perishable produce risks will strengthen the sector. Policymakers must enhance cooperative financing and improve subsidy efficiency. Investing in off-farm agro-processing and storage solutions will drive employment and value chain growth, ensuring long-term success for Rwanda's agricultural cooperatives.