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Understanding Groundnut Seed Access, Usage and Preferences amongst smallholder farming households in the Central region of Malawi.

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Key Messages

- A study was conducted to understand farmers' choices and preferences on groundnut seed.
- CG7 and Chalimbana are the most used groundnut varieties, grown by 70% and 16% of the surveyed farmers, respectively.
- Apart from recycling seed, farmers also purchase groundnut seeds from uncertified sources or informal seed markets.
- Results from the seed choice experiment indicate that farmers have strong preferences for groundnut seeds that are certified, drought tolerant, and high yielding.
- The key recommendations include promoting new, certified seeds over to recycled seeds; develop seed varieties that are drought tolerant and higher yielding; promote best seed practices in seed planting by strengthening extension services.

Introduction

Groundnut is an important crop in Malawi for both food and for the market. When compared with other crops such as soya and sunflower, groundnuts have the highest share of smallholder farmers producing the crop using household production data from the 2009/10, 2012/13, 2015/16 and 2018/19 seasons[1]. Thus, Groundnut is a commodity that is well-placed to address the Government of Malawi's strategy of diversifying away from Tobacco into higher value alternatives for smallholder farmers. Generally, farmers are already responding to growing market opportunities as production volumes and area dedicated to groundnut production in the 2021/22 season increased by 8% and 6% respectively from the previous season[2].

However, one important constraint in the development of Malawi's groundnut value chain is limited uptake of certified seed with improved characteristics such as high yield potential, resistance to pests and diseases, tolerance to drought, and early maturity. While there are several improved seed varieties that have been developed specifically for Malawi, access to those varieties remains low as farmers often choose to recycle their seed from older varieties rather than to purchase new seeds. Although legumes can be recycled for up to three successive seasons, the use of recycled seeds beyond three years leads to lower productivity, production volumes, and greater susceptibility to aflatoxin contamination,

pests and diseases[3]. Understanding farmer groundnut seed choices, preferences, demand and the factors affecting uptake of seed by farming households will help seed breeders and seed companies decide which traits to select to maximize market share and increase groundnut productivity and value. This policy brief documents groundnut seed usage by smallholder farmers in Malawi, and analyses what the farmers are willing to pay for certified seed.

Data Sources

The study uses primary data gathered from 444 farming households randomly selected from nine extension planning areas (EPA) in Malawi's two key groundnut production areas, namely Lilongwe and Kasungu Agricultural Development Divisions (ADDs). The nine EPAs include Bembeke, Chileka, Nthondo, Manjawira, Mvera, Chipala, Chulu, Chiosya, and Mkanda. Research has shown that the share of smallholders growing tobacco in Lilongwe and Kasungu ADDs is declining and farmers are diversifying into other high-value crops such as groundnut[4]. The survey was conducted in 2022 and collected information on farming household characteristics (see Table 1), production history, production challenges faced, seed usage, sources of seed, and seed preferences.

The predominant farming household heads were male, comprising 80% of the sample, with an average household head age of 45.34 years, and the average household size was 5. The majority of the household heads reported having no formal educational qualification (about 76%), followed by primary school education certificate (13%), the Junior Certificate of Education (7%), and the Malawi School Certificate of Education (4%). Data shows that 22% of the smallholder farmers interviewed reported having accessed extension services. On average, farming households cultivated 3.20 acres of land, with 0.91 acres dedicated to groundnuts, making up 28% of the total land allocated for this crop. On average, farming household heads had over 6 years of experience in farming.

Table 1: Summary characteristics of smallholder farmers (n=444)

Variable	Mean	SD
Farming household head is male	0.80	0.40
Age of farming household head	45.34	15.12
Household size	4.94	2.06
Highest qualification attained by farming household head		
None	0.76	0.43
Completed primary school	0.13	0.34
Junior Certificate of Education (JCE)	0.07	0.25
Malawi School Certificate of Education (MSCE)	0.04	0.19
Access to extension services	0.22	0.41
Land cultivated in 2022 (Acres)	3.20	2.15
Area planted groundnut (Acres)	0.91	1.08
Experience (years)	6.14	3.27

Note: SD represents standard deviation

Source: Computed from survey data

Groundnut seed background

Malawi's seed structure and key stakeholders

The seed structure in Malawi involves many stakeholders, namely the plant breeders, research stations and institutions responsible for research, and development of new varieties of seeds; seed companies responsible for multiplication,

distribution and marketing of seed; and the Government of Malawi which has the national mandate of regulating the seed industry to ensure that farmers have access to quality seed. This complex structure with varying incentives at different levels can create bottlenecks in developing and use of new seed technologies[5].

Classification and Quality Assurance of Seed

In Malawi, seed is categorized into three classes: Breeders' seed, Basic or foundation seed, and Certified seed. Breeders' seed represents the initial stage, where seeds are directly produced by the originating plant breeder at research stations (e.g., Chitedze, Bvumbwe, Lifuwu and Lunyangwa Research stations), research institutions (e.g., LUANAR, ICRISAT), and farmers associations. Basic or foundation seed is then generated from Breeders' seed, serving as the source for further multiplication. Finally, certified seed, is what is made available to stallholder farmers for planting after undergoing rigorous inspection and testing.

Groundnut Seed Recycling and Variety Attributes

According to groundnut production guidelines, farmers may save some of the certified seed harvest for use as seed in subsequent seasons but it must be stored in shell until shortly before planting. However, in order to achieve optimum production, seed should be recycled for a maximum of three years[6].

The groundnut seed varieties in Malawi are Baka, CG 7-14, Chalimbana, Chalimbana 2005, Chitala, Kakoma, Nsinjiro and Mphatso with the respective potential yields of 1500kg/ha, 1500-2500kg/ha, 1500kg/ha, 2500kg/ha, 2000kg/ha, 1500kg/ha and 2000kg/ha. The maturity period for all varieties ranges from 95 days to 150 days.

Main groundnut seed varieties planted

Table 2 presents information on the varieties of groundnuts that farmers reported to have cultivated during the 2021/22 season in Lilongwe and Kasungu ADDs.

Table 2: Main seed varieties planted by groundnut farmers

Variable	Mean	SD
CG7	0.74	0.44
CG9	0.04	0.20
Chalimbana	0.19	0.39
Nsinjiro	0.04	0.20
Other seed varieties	0.08	0.27

Source: Computed from survey data

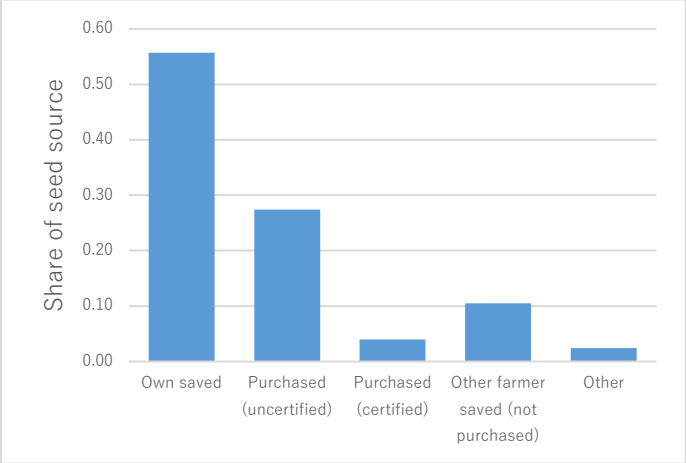
The main varieties grown included CG7 (grown by 70% of the farming households), followed by Chalimbana (16%) and CG9 and Nsinjiro grown by 4% of the farmers each. The prevalence of CG7 could be due to a number of factors which include its adaptation to all agro-ecological areas and high-yield potentials of up to 2500 kg/ha. CG9 and Nsinjiro are resistant to rosette disease and perform well in mid-altitude areas.

Sources of seed planted

Figure 1 shows that 56% of smallholder farmers interviewed engage in the practice of using recycled seed, where groundnuts stored from previous harvests are planted. Additionally, 27% of the farmers reported purchasing uncertified seeds, suggesting a significant reliance on informal seed markets. A smaller proportion of farmers, namely 4%, reported purchasing certified seeds,

suggesting some recognition of the need to use improved varieties.

Figure 1: Sources of seed planted by farmers



Source: Computed from survey data

Sources of groundnut seed purchased or obtained

Table 4 shows the share of smallholder farmers that purchased or obtained groundnut seed in 2021/22 season, either certified or uncertified seed from multiple sources such as input retailers, other farmers, traders and non-governmental organisations (NGOs). A majority of the farming households (87%) purchased uncertified groundnut seeds compared to only 13% who purchased or obtained certified seeds. Of the households that purchased or obtained certified seed, the most common source was NGOs (6%), followed by traders (4%).

Table 4: Sources of purchased groundnut seed (n = 140 households)

Seed source	Certified	Uncertified	Total
Input retailer	3%	2%	5%
Other farmers	1%	54%	54%
Trader	4%	31%	35%
NGOs	6%	0%	6%
Total	13%	87%	100%

Source: Computed from survey data

Major challenges reported by farmers in 2021/22

Table 3 shows that pests and diseases were a major challenge affecting farmers during the 2021/22 season. Irregular rainfall patterns were another challenge, with 48% of farmers reported to have faced little or no rainfall and intermittent rainfall, respectively. However, farmers also reported to have faced challenges related to unavailability of seed and high prices of seed, likely a factor contributing to the use of recycled seed.

Table 3: Share of farmers facing challenges in 2021/22 growing season

Major shocks or challenges	Mean
Pests and diseases	0.71
Irregular rain patterns	0.48
Seed unavailable	0.05
High seed prices	0.09
Other challenges	0.28

Source: Computed from survey data

Groundnut seed rate per acre

Table 5 provides information on the quantity of seed planted per acre compared to the recommended quantities for groundnut production across various varieties. On average, farmers planted about 25 kgs/acre of CG7, CG9 and Nsinjiro seed varieties, below the recommended range of 32-40 kgs/acre. Similarly, Chalimbana was planted at a rate of 20.19 kgs per acre, below the recommended ranges. Other varieties with low seed rate include CG11, Kakoma, Mphatso and other mixed varieties.

Table 5: Groundnut seed rate per acre

Variable	Mean	SD	Recommended
CG7	24.80	9.68	32-40
CG9	25.75	7.18	32-40
Chalimbana	20.19	11.66	32-40
Nsinjiro	24.49	10.27	32-40
Other varieties	18.49	11.89	n/a

Source: Computed from survey data

Farmer preferences for seed

To better understand farmer preferences for groundnut seed characteristics, we conducted a choice experiment where farmers were asked to state their preference among two groundnut variety options with experimentally varied characteristics. Each farmer made 5 stated choices across different pairs of groundnut seeds. Results from the choice experiment reveal that farmers have strong preferences for seeds that are drought tolerant, higher yielding, and certified – each attribute increases the probability of farmers choosing that seed by at least 10% (Table 6).

Table 6: Groundnut seed attribute impacts on choice probabilities, choice experiment results

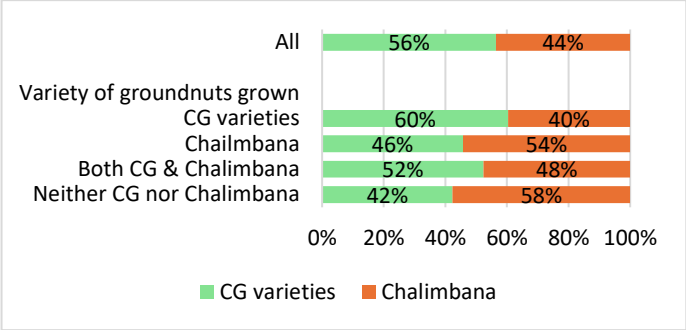
Attribute effects on choice probability		
Drought tolerant seed	15%	***
Yield potential - increase of 7 bags/acre	13%	***
Certified seed	10%	***
Seed rate - increase of 10 kg/acre	-2%	*
Time to maturity- increase of 20 days	1%	
Price - increase of 1000 MWK/kg	4%	***

Note: Results are from an alternative specific conditional logit estimation of choice experiment results. Significance levels: *** p<0.01; ** p<0.05; * p<0.10.

Source: Computed from survey data

Overall, farmers show preference for CG varieties over Chalimbana, and farmers were more likely to select the seed varieties that they are currently growing (Figure 2). But overall, farmers show a willingness to switch between CG and Chalimbana variety types based on other seed attributes in the choice experiment. Suggesting that farmers are not 'locked' into specific varieties and may be willing to change varieties if better alternatives are available.

Figure 2: Seed variety choice shares in choice experiments, by variety of grown



Source: Computed from survey data

Recommendations

Four key policy suggestions emerge from the study. Firstly, there is a need to promote the use of certified seeds among smallholder farmers by highlighting the benefits and advantages of such seeds which include higher yields and resilience to climate variability. Secondly, implementing measures to improve access to high quality seed and discourage the use of recycled seeds is important for the development of seed sector. This can be achieved by improving seed multiplication rates, facilitating access to credit, and strengthening market linkages to incentivize increased production for market. Thirdly, best practices in groundnuts farming should be promoted by strengthening extension services and training programs to educate farmers on recommended seed storage, planting practices,

including providing practical demonstrations and on-farm support to reinforce learning. Finally, the seed sector governance should be strengthened by enhancing regulatory oversight and enforcement mechanisms to monitor and regulate informal seed markets. This may include strengthening collaboration between government agencies, agricultural extension services, and seed sector stakeholders to ensure compliance with quality standards while at the same time safeguarding the interests of smallholder farmers in accessing quality seeds.

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