



Original Research Article

Gender analysis of farmers' perception of improved haricot bean (*Phaseolus vulgaris L.*) varieties in the West Region of Cameroon

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The introduction of improved varieties of haricot bean has been viewed as a strategy to increase haricot bean production. Thus, recognising the perception of men and women of these varieties can contribute to increase production. The study sought to analyse farmers' perception of improved haricot bean varieties in the West region of Cameroon. A mixed-method was used in collecting data from six sub-divisions in the West region to evaluate men and women farmers' perception of improved varieties of haricot bean in 2019. Result reveals that farmer's desirable attributes of improved haricot bean varieties qualities were related to the fact that it was high yielding, highly tasteful, had good grain quality and size, diseases and drought-tolerant as well as accepted in the market. On the other hand, farmers did, not like varieties that are difficult to harvest, susceptible to excess rains, late-maturing and have low market demands. Thus, varieties which are not resistant to biotic and abiotic stress with low market demand should undergo a product replacement strategy to meet the desired attributes of men and women farmers.

Keywords: Farmers, perception, gender, improved haricot bean, attributes, Cameroon

INTRODUCTION

Haricot bean (*Phaseolus vulgaris L.*) is an important legume worldwide contributing 16.9% of protein and 7.3% calorie (Katungi et al., 2009). The above crop plays a significant role in the prevention of some human ailments such as diabetes, cancer and cardiovascular diseases (Xiong et al., 2019; Jukanti et al., 2016; Hayat et al., 2014). Women play a leading role in the production and processing of haricot bean in Africa (Snappe et al., 2019; Franke and de Wolf 2011). Haricot bean is rich in micronutrients (iron and zinc) and protein which is essential to the health and well-being of especially women and children (Haas et al., 2016). The crop also plays a vital role in improving the soil

through symbiotic nitrogen fixation (Wilker et al., 2019; Farid et al., 2017).

Most of the haricot bean production in Africa is dominated by resource-poor small-scale farmers who grow the crop in various inter-cropping mixtures with cereals and other major crops (Birachi et al., 2011). The estimated production is about 23, 816, 123 tons, covering a total of about 18 million ha, out of which 17% are in Africa (FAO, 2014). Haricot bean production fits in many farming systems, ranging from small-scale with limited technology in poor economies to large scale mechanized farming. However, haricot bean production and productivity

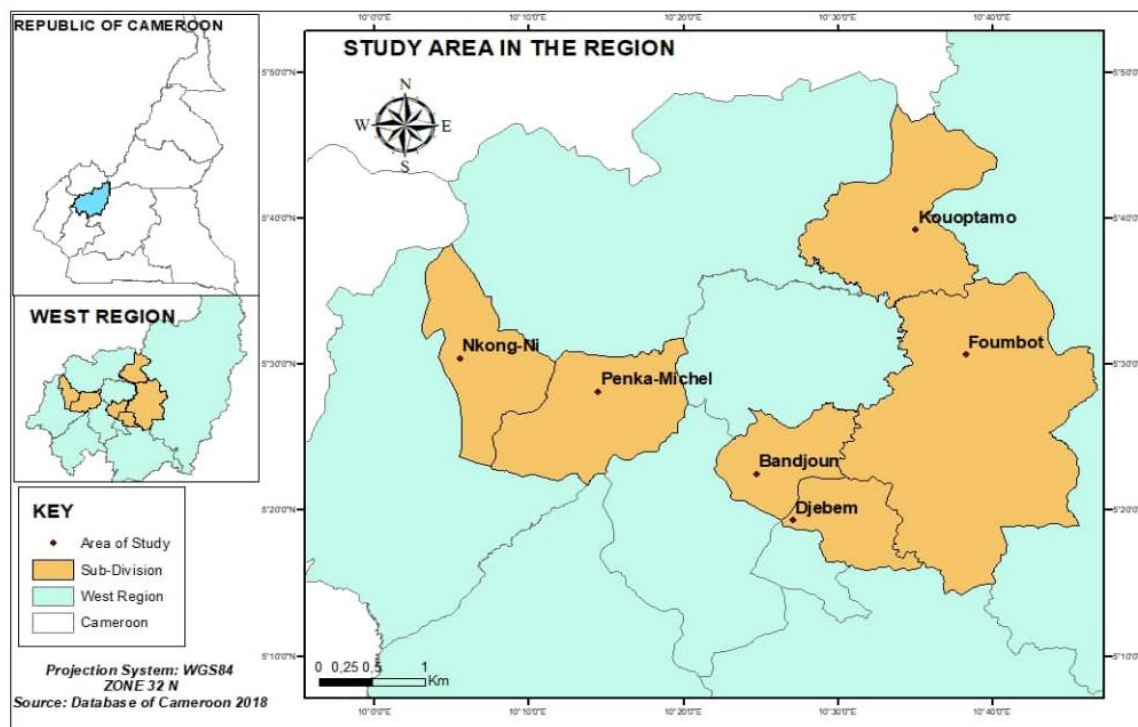


Figure 1: Study areas in the West region of Cameroon

potential have not been achieved due to several constraints including biotic (fungal, bacteria, viral diseases and insect pest) and abiotic (drought) stress. The demand for this crop is increasing as it slowly transforms from a traditional subsistence crop to a market-oriented crop (Buruchara et al., 2011). Approximately 40 percent of its production is marketed at a market value of over US\$ 452 million annually (Katungi et al., 2011; Buruchara et al., 2011; Ugen et al., 2012).

In Cameroon, haricot bean is one of the legume crops of choice, dominating food habits and dietary practices. It is also known to be an affordable source of protein, especially in areas where livestock products are high-price (Katungi et al., 2009). The crop is consumed both in the dry and snap bean form, hence making it the main subsistence crop for many women (Tambi et al., 2017). For example, in the last few years, domestic and international demands for haricot bean have increased especially towards neighbouring countries. Report from the Institute of National Statistics shows an increase in export values between the period of 2009 (1.183.2 tons) and 2010 (1.271.5 tons) to neighbouring countries such as Gabon, Equatorial Guinea, Central African and Nigeria (INS, 2017). This increase according to an earlier study by Siri et al. (2014) could be associated to increase in domestic, regional and international demand for haricot bean. Results from the same study also show that the rapidly growing population and urbanization of major towns like Douala and Yaounde as well as the expansion of institutions such as boarding schools, military camps, prison yards, orphanage homes

and hospitals within the national territory are also accountable for this domestic increase.

The increased negative impact of biotic and abiotic stresses on food crop production has resulted in crop losses and subsequent shortage of food, impacting the nutrition of millions of people in the country. Thus, in order to improve the productivity of haricot bean and meet the need of the growing population, the Pan African Bean Research Alliance (PABRA) in collaboration with the Institute of Agricultural Research and Development (IRAD) introduced fourteen bush, semi-climber and climbers improved bean varieties; red mottled (Ecapan 021, NUV-99, Mac 55, Feb 192), cream (TY3396-12, Mac 33, Nitu), small white (Mex 142), and large white (BGG and 22-GL), yellow (KJ4/3), small red (NUV-109-2, DOR-701), small black (PNN) according to Siri et al. (2016). The introduction of improved haricot bean was a strategy to enhance food and nutrition security in the country.

A lot of research programs are diffusing bean varieties through multilocational, farmer's field day and on-farm trials in Cameroon, with little or no idea of men and women perception of the different varieties they have been disseminating over the years. Perceptions of new agricultural technology are important factors that are associated with farmers' adoption decisions (Kaup, 2008). Since farmers' perceptions influence crop variety choice, use, and subsequent adoption there is need to understand men and women farmer's views and not household views of these improved varieties (Abdullah and Samah 2013). As recognising the perception of men and women in

Table 1. Distribution of farmers by study areas

Region	Division	Sub-division	No of farmers		Total
			Male	Female	
West	Noun	Foumbot	20	20	40
		Kouoptamo	20	20	40
	Koung-Khi	Bandjoun	20	20	40
		Djebem	20	20	40
	Menoua	Nkong-Ni	20	20	40
		Penka-Michel	20	20	40
	3	6	120	120	240

technology development results in increased agricultural returns (World Bank, 2009).

Based on these premises, the study sought to assess men and women farmers' perception of improved haricot bean varieties in the West region of Cameroon. Farmers may subjectively evaluate the technical and cultural aspects of these technologies differently. Thus, understanding men and women farmers' perceptions are important in designing and promoting agricultural technologies (Uaiene et al., 2009). Farmers' perceptions of improved varieties of haricot bean have significantly influenced their decision in relation to varieties adopted, produced and marketed. Their perception was evaluated based on desirable and undesirable attributes of improved varieties of haricot bean in the study area.

MATERIALS AND METHODS

Study area

The study was carried out in the West region of Cameroon, precisely in Foumbot, Kouoptamo, Bandjoun, Djebem, Nkong-Ni and Penka- Michel sub-divisions, where the rural population comprises 80% of the total population (Figure 1). The climate of this region is characterized by two seasons; the rainy season from about March to October, and the dry season from November to about mid-March (Yengoh, 2012). Most of the agricultural activities take place during the rainy season since the region is poorly equipped with irrigation infrastructure. The region was selected for this study because it is one of the leading production hubs for haricot bean and provides income for most of the men and women farmers. Also, dissemination efforts of improved varieties were concentrated in this region.

Sampling technique

The methodology used in this study is a multi-stage sampling procedure. In stage one, the West region was purposively selected, as one of the leading haricot bean production hubs. In stage two, three administrative divisions were purposively selected - Noun, Koung-Khi and Menoua because of high production of haricot bean

production in the region. In stage three, two sub-divisions were purposively selected from each administrative division - Foumbot, Kouoptamo, Bandjoun, Djebem, Nkong-Ni and Penka-Michel. These sub-divisions were selected because their farmers benefited the most from improved seed distribution through government intervention from the Ministry of Agriculture and Rural Development (MINADER) and Ministry of Scientific Research and Innovation (MINRESI) through the delegations of Agriculture and IRAD, respectively. Also, to reduce bias information of the perception of men and women farmers towards improved varieties, two hundred and forty farmers were selected using a simple random technique from a list of farmers groups in the different sub-divisions. The list was made up of farmers who had cultivated at least three of the different introduced improved haricot bean varieties in these sub-divisions. Thus, forty men and women farmers were selected in each division, making a total of 240 farmers in the entire study. The geographical location of respondents is presented in Table 1.

Data collection

Prior to data collection, three research assistants were recruited and trained to collect data and run a pre-test before going to the field. Three visits were made to the study sites. The purpose of the first visit was to make formal arrangements for entry into the study area and established contact with key institutions and resource persons. The second visit focused on questionnaire administration to men and women haricot bean farmers. Questions were asked on their socio-demographic characteristics, their perception on improved haricot bean varieties. In the third visit, key informant interviews were carried out with selected farmers and key resource persons from MINADER, IRAD and non-governmental organizations. As far as possible, both male and female officers were interviewed to understand which improved varieties have been disseminated to farmers. While key informants farmers were asked which improved varieties, they grew and why, and this was triangulated with information from focus group discussion. Four focus group discussions (FGD) were also conducted during this phase in Foumbot and Penka-Michel sub-divisions. In the FGD, farmers were requested to indicate their views on the desirable and

Table 2. Socio-demographic characteristics of men and women farmers

Variables	Men (%)	Women(%)	P value
Age range			
20 - 29	0.0	0.8	0.097
30 - 39	20.8	29.2	
40 - 49	22.4	11.2	
50 - 59	28.4	32.1	
>60	28.4	26.7	
Education			
Primary school	24.1	73.5	0.000
Secondary school	22.5	16.6	
High school	33.0	9.1	
University	20.4	0.8	
Main occupation			
Food crop production	21.5	64.5	0.000
Livestock farming	51.6	33.5	
Business	12.1	1.5	
Salary employment	14.8	0.5	
Experience in haricot bean cultivation			
<10 years	37.4	0.0	0.003
11-20 years	49.3	0.0	
21-30 years	13.3	47.0	
> 30 years	0.0	53.0	
Experience in improved haricot bean cultivation			
< 2 years	0.8	0.0	0.005
3-5 years	48.4	70.5	
6-8 years	43.3	24.4	
> 8 years	7.5	5.1	

undesirable attributes of improved varieties of haricot bean and reasons why. Also, questions were asked whether the production of haricot bean has increased and why key informant and FGD complemented triangulated quantitative data on farmers' perception of improved varieties of haricot bean and validated the results. Farms and markets were also visited in the different studied areas to get the ground-truth on why farmers preferred certain improved varieties and appreciate those that drive major markets.

Data analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 21.0. Descriptive statistics were used to summarise the data that was collected. This included percentages and frequencies. Qualitative data obtained were transcribed, and themes identified through content analysis and used to interpret the data.

RESULTS AND DISCUSSION

Farmers' socio-demographic characteristics

The ages of farmers ranged from 20 to above 60 years, with a mean age of 42 years in Table 2. The findings also mirrored the information from 767, 000 individuals in 13 countries across three regions (Sub Saharan Africa, Latin

America and the Caribbean and Asia-Pacific) and 38 countries from the Rural Livelihoods Information System by Aslihan Arslan (2019), where the average age of farmers in Africa varies from 41 and 50 years. In addition, we see from the table that women between (20 to 29 years) farming haricot bean are marginally significant compared to men of the same age.

Findings on Table 2 also revealed that almost all (99.2 percent) of the farmers had been cultivating improved haricot bean for more than three years, indicating some experience which can permit farmers to articulate their perception on improved varieties. Fifty-three percent of women farmers have more than 30 years of experience, compared to men farmers. This is because haricot bean for the longest time has been considered a woman's crop (Nakazi et al., 2017). The data on Table 2 further shows 73 percent of women farmers with primary education, have a 1 percent significant difference compared to the men farmers. About thirty-three percent of the men farmers had been to high school and even had higher levels of secondary and university education than their female counterparts. The higher illiteracy rate among females as compared to their male counterparts has been observed in many developing countries (Mugonolaa et al., 2013).

Men were more involved in livestock farming while women were into crop farming. Women involvement in crop production was significantly different by 1 percent compared to their male counterparts. The reason could be as a result of the gender division of labour in the farm and

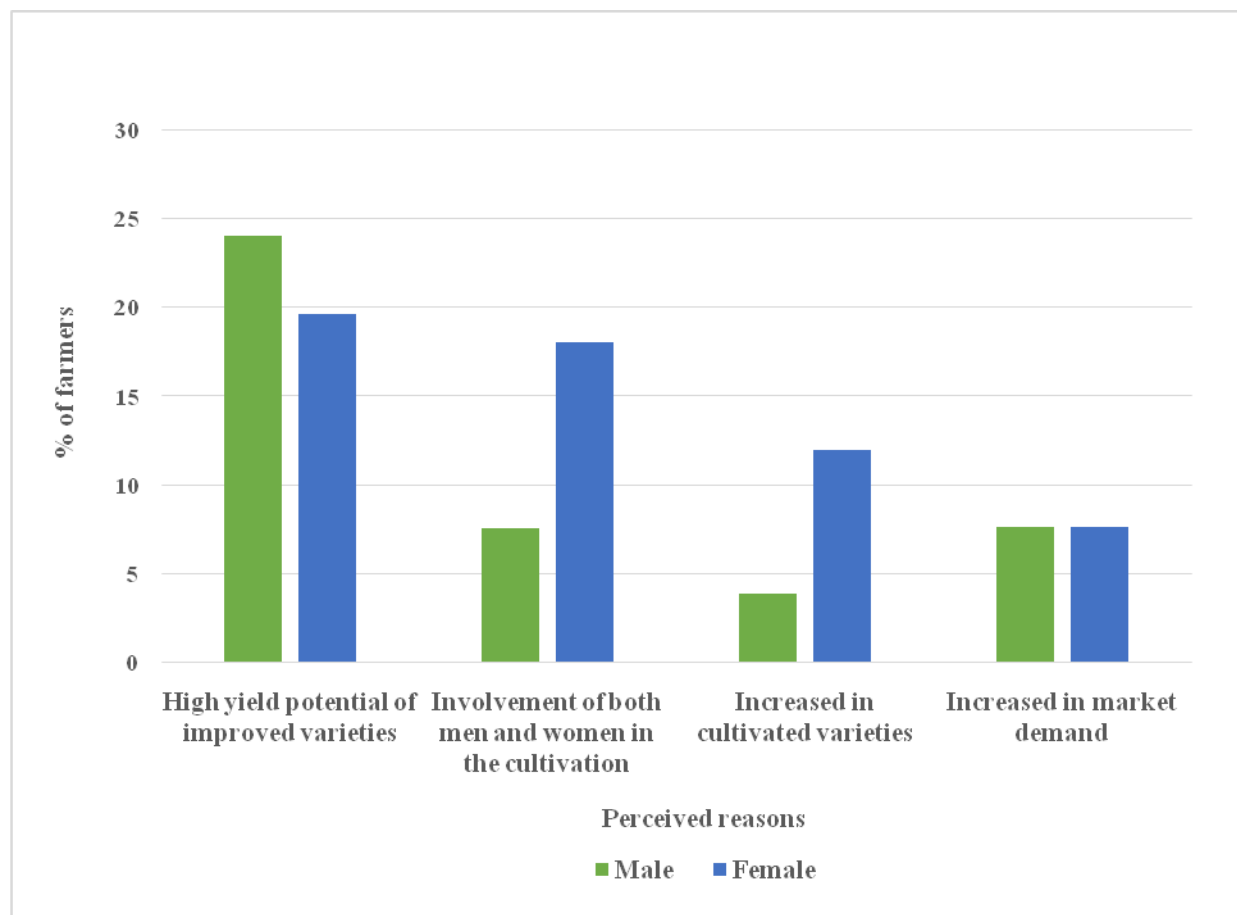


Figure 2: Men and women farmers' perceived reasons for increased production of haricot bean in the region

household. This is an indication that even though both men and women are involved in haricot bean production, it is still a woman's crop. With the introduction of improved varieties, more men have experience than women, and this is probably due to the risk involved in investing in any new technology. During FGD, most farmers in Foubot said they had cultivated these varieties for more than eight years due to their proximity to the mother station charged with the multiplication of these varieties. Thus, proximity and availability also increase years of experience in cultivating these improved varieties.

Farmers' perceived reasons for increased production of haricot bean in the West region

Our interest in this section was focused on perceived reasons given by men and women farmers to support the fact that haricot bean production has increased in the West region. In Figure 2, the high yielding potential of improved haricot bean was the main reason for increased haricot bean production as reported by male farmers. This is confirmed in the male focus group discussions where men said: "We grow more climber's varieties – Mex 142, NUV-109-2 and Mac 33 which are high yielding compared to

women who usually grow bush varieties".

Furthermore, more women than men attributed the increase in haricot bean production to increase haricot bean varieties cultivated as well as increased participation of men in haricot bean cultivation (Figure 2). Men and women acknowledged the importance of market demand for these varieties as a factor that attributed to its increased production and participation of both sexes. Thus, promoting the adoption of improved haricot bean varieties has the potential to increase production, household food security and farmer's revenue, which is one of CIAT-PABRA objectives for all targeted countries across Africa.

The observation on increased in haricot bean production from farmer focus group discussions confirms FAO statistics (2020), which shows an increase in haricot bean production in the country from 342,270 and to 402,054 and yields from 12,687 to 13,456 in 2014 to 2018 respectively. The observation is also in line with findings of Katungi et al. (2015), who reported that adoption of improved haricot bean has caused an increased in haricot bean cultivation and yields. Therefore, policies aimed at enhancing haricot bean productivity and promoting the adoption of new, improved technologies should consider the perception of men and women farmers.

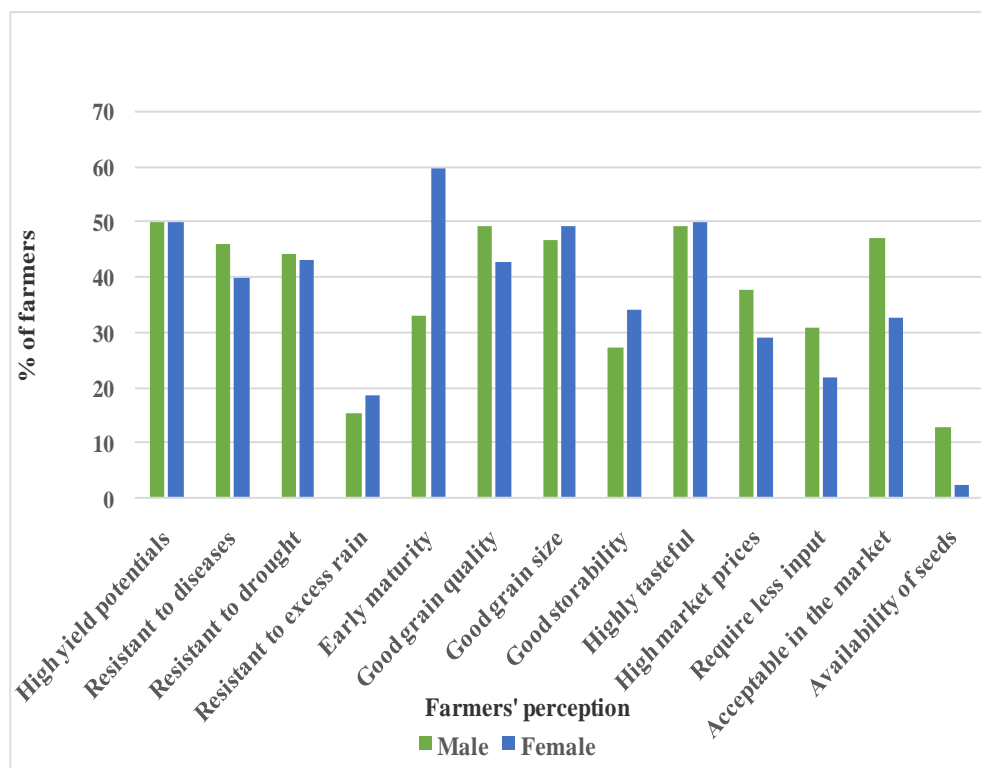


Figure 3: Farmers' perception of desirable attributes of improved haricot bean varieties

Farmers' perception of desirable attributes of improved haricot bean varieties

The results on farmers' perception on desirable qualities of improved haricot bean varieties showed that men and women farmers attached high importance to high yielding potentials, early maturing varieties and varieties that are resistant to diseases as compared to the local ones (Figure 3). The above choices can be attributed to changing climate and adverse effects on the crop. Several empirical studies have shown that an improved variety will be appreciated highly if the new variety is technically and economically superior to the local varieties (Krishna and Qaim, 2007; Kruger et al., 2011). Further analysis by sex indicates that traits such as high yielding, resistant to drought, rainfall and diseases, taste, right grain size and quality, market price were rated almost equally by male and female farmers.

More specifically, women preferred the following traits: early maturing and storability, while men on their part preferred varieties with more seed accessibility and less input (Figure 3). This implies that varieties having varietal traits with high yielding potentials and early maturing will be highly adopted by men and women farmers. For example, Kruger et al. (2011) report that farmers in Burkina Faso appreciated a modern sorghum variety because it gave high yield, compared to the traditional sorghum variety that farmers planted in previous

agricultural years.

Chong (2005) argues that farmers' adoption of new agricultural technologies is also affected by farmers' perception of the amount of labour requirement they will have to allocate if they adopt the underlying technology. Thus, this might have been a key motivational factor why the majority (59.7 percent) of the women appreciated varieties that are early maturing the most. Additionally, women explained during focus group discussions that early maturing varieties such as TY3396-12, Nitu, Eapan 021 and Feb 192 allow them to have many cropping seasons in a year, hence helping them to meet their economic obligations such as paying school fees and loans. This study concurred with Martel et al. (2000), who argue that farmers adopt new agricultural technologies because they perceive that the new technology could reduce labour requirements and other associated costs, and reduce losses due to risk (drought and heavy rains) during production.

Farmers' perception of undesirable attributes of improved haricot bean varieties

Farmers' evaluation on undesirable attributes of improved haricot bean varieties established that they were not contented with varieties that are difficult to harvest (62 percent), susceptible to excess rains (43.4 percent) and those with late maturity (36.2 percent) as well as varieties

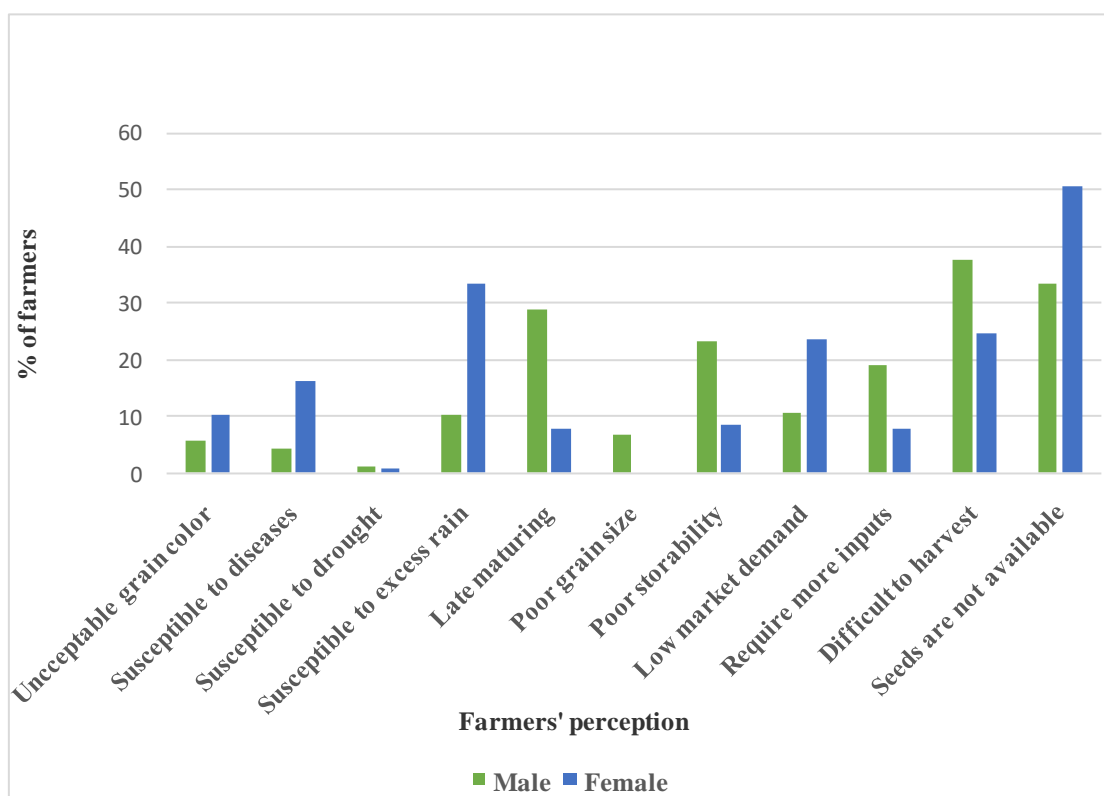


Figure 4: Farmers' perception of undesirable attributes of improved haricot bean varieties in the region

with low market demand (34.1 percent) as shown on Figure 4. As gathered during focus group discussions, the men reported that climbing varieties (Mex 142, NUV-109-2, Mac 33 and Mac 55) during the March season are challenging to harvest because these varieties get ready at the peak of the rains, resulting to poor grain quality and post-harvest losses.

Men further complained that in some circumstances, these losses not only increase the risk of food insecurity at the household level but also at the level of benefits that accrue from its sale. This implies that farmers' perception of undesirable attributes, especially under changing environmental conditions are also important. Adebola and Gardebroek (2007), report that in addition to considering yields and profit associated with improved technology, farmers also consider improved varieties that reduce risks because damages from insects and/or disease during grain production and storage can result in substantial yield losses and poor grain quality.

Men and women farmers both agreed that an undesirable trait was when the crop is susceptible to drought. Women complained of the following attributes: susceptible to excess rain and diseases, low market demand, unacceptable grain colour and unavailability of seeds. On the other hand, men undesired traits were dull haricot bean colour, late maturing, poor storability and more input. They also did not like when the crop was difficult to harvest, an attribute often associated with drudgery. These variations in

undesirable attribute may be due to differential access to information, differences in cultivated varieties and the seasons in which these varieties are being cultivated. Men and women may have different agricultural production functions, possibly because crop choice differs by gender, which may be influenced by cultural norms (Doss, 2002) or by other factors such as lack of access to resources and the culturally accepted division of labour. However, both men and women emphasized the fact that climbing varieties were challenging to harvest, especially during heavy rains. Finger et al. (2009) show that easy crop management was part of the reasons that would encourage farmers to accept a particular technology.

Conclusion and implications for policy

Men and women had varied perceived reasons for why improved haricot bean production increased in the region. They both agreed that high market demand was responsible for this increase. Women farmers also added that the increasing involvement of men in haricot bean farming is a contributing factor while men highlighted the high yielding attributes of the improved varieties. It was noted during focus group discussions that men mostly cultivated climbers which were high yielding compared to women who mostly grew bush varieties. Women also attributed increase haricot bean production to available

different varieties which they could cultivate. This can be attributed to women's search for multiple varieties that meet food and market needs.

Both men and women farmers desired attribute in an improved haricot bean variety was high yielding and drought-tolerant. Women wanted a variety that could store well, was early maturing, had a good grain size and not susceptible to too much rains while men desired attributes were disease-tolerant, less input, grain quality, good market price and availability. Men and women farmers desired attributes that could help them adapt to the changing climate, reduce the cost of production, that can stay for long to meet consumption patterns and better prices. In addition, the availability of improved haricot bean seeds is also crucial for continues production and wider dissemination.

Perceived undesirable attributes for both men and women farmers was susceptible to drought. Women farmers did not want a variety that had a dull grain colour, was susceptible to heavy rains, not available and susceptible to diseases. In contrast, men farmers perceived undesirable attributes was late maturing, poor storability, poor grain size and difficulty in harvesting. Looking at desired and undesirable perceived attributes of improved haricot varieties for both men and women farmers, it is clear that they have similar attributes they desire and do not in varying degrees. Thus, perceptions of new agricultural technology should be studied, and information used for breeding varieties that meet men and women attributes of different haricot bean varieties to increase adoption and wider production impact.

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Conflict of interests

The authors declare that they have no conflicting interests

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