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Characterization of Field Pea Production and Options for Improved Productivity in Mt. Elgon, Uganda

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Abstract

Field pea is a key source of household income, food and nutrition in Uganda mainly produced in the high land areas of country including south western and Mt. Elgon. The crop fetches a high stable price across markets compared to other grain pulses and yet it has remained outside the mainstream of the research process. The status of this commodity is largely unknown yet such information would support its research agenda to improve productivity and marketing. A study was conducted in the Mt. Elgon sub-zone to determine the status of field pea production, understand its constraints and map out its production cycle. This was done through a survey covering 5 districts namely; Bulambuli, Kapchorwa, Kween, Namisindwa and Mbale. In each district two major field pea growing sub counties were purposively selected, in each sub-county 25 respondents were randomly sampled from a list of field pea producers. A structured questionnaire was then administered; data collated, and analyzed using descriptive statistics and chi-square test. The results revealed that the crop is grown by all gender categories with 60% grown for home consumption and 40% for income. In the districts of Kween and Mbale it is mostly grown for income since the Kween farmers have relatively larger pieces of land whereas Mbale being a commercial hub of the region there is relatively higher price throughout the year which attracts farmers to sell. Field pea is grown alongside other crops which varied by district but was largely grown as sole crop, along boundaries and intercrops depending on availability of land. It is also important to note that it forms a very important part of the rotation system because it plays a significant role in soil fertility restoration as well as serving as a break crop suitable for rotation to minimize the negative impact of cereal based mono-cropping.

Keywords: field pea, production constratint, varietal preferences, cropping systems, nutrition

1. Introduction

Pulses are the second most important crops both in terms of area coverage and in terms of total production after cereals. Peas including field peas (*Pisum sativum*) and beans are the main pulses produced worldwide. Field pea is well known in the mountain regions of central and east Africa and is a well-established and important food crop in Rwanda and south-western Uganda (Fikere et al., 2010). In Uganda, field pea is a staple as well as a major income earner for most small-scale farmers in the southwestern and eastern highlands (Musinguzi et al., 2010), where the agro-ecology is most suited for its production (Kraybill & Kidoido, 2009). The national production is estimated at 16,000 Mt from an area of 44,000 ha and estimated yield of 0.4 Mt/Ha.

Field pea is primarily used for human consumption or as livestock feed. Field pea is a grain legume commonly used throughout the world in human cereal grain diets. Field pea seed, though referred to as a forgotten resource is a rich source of protein, carbohydrate, and some minerals. However, the nutritional content of the seed varies with the environment and genetic factors. By far the highest proportion of the nutrient value of field pea is contained in the cotyledons, with the embryo and seed coat contributing less than 10% to the nutritional value. The protein content is typically ~22% but ranges widely, depending upon the genotype and growing conditions (Khan & Croser, 2004). Although sulfur-containing amino acid is low, it compares favorably with other grain legumes. About 60% of the carbohydrate content of the seed is made up of sucrose and oligosaccharides, starch, and crude fiber. The fat content is low and the seeds are a good source of vitamins such as thiamine, riboflavin,

and niacin, although considerable loss of vitamins may occur in processing. Field peas also contain a variety of bioactive compounds including enzyme inhibitor, lectin, phytic acid, phenolics, and oligosaccharides. Although some of these components have been considered as anti-nutritional factors, recent studies suggest that many may have potential health benefits (Boye et al., 2010; Boye & Ma, 2011).

Dry pea seed is processed via soaking, germination, milling, cooking, roasting, or fermentation. These products can then be used in baked goods, baking mixes, soup mixes, processed meats, health foods, pastas, and purees. There are also several industrial starch uses. Field peas also serve as an excellent stock feed. For poultry, it can be included up to 25% in rations. It may also be fed in high doses to ruminants as a palatable energy and protein-rich feed. Some farmers use the crop residues for fodder. It is considered that the fodder from field pea is very important for their livestock especially in dry periods when there is shortage of animal feed (Twinamasiko, 2014). Sometimes farmers also give to their livestock the seed coat after the residue has been soaked in salty water. The field pea residues are also used for mulching.

Field pea is invariably grown as a component of a cropping system, and its interaction with other crops is an important consideration in a farmer's decision to grow it. Often, field pea will not yield as well or be as profitable as other crops such as wheat, barley, or maize when considered in isolation. However, substantial yield responses are commonly observed in crops following pea, so they can be beneficial when considered in a system context (French, 2016). There are several ways field pea can raise the yield of other crops in the sequence. The most obvious is by fixing atmospheric N, some of which is left in the soil for subsequent crops and by not taking up as much mineral N already present in the soil.

Field pea production is rather on a low scale in Uganda and limited to a few areas in the highlands. It is reported to have been introduced by the colonialists in south western Uganda and Mt. Elgon region. The commercial varieties grown seem to be uniform although on the local market variances are recognized in the seed/grain. Fresh and dry peas go for a premium price compared to other legumes in urban Centre's. This makes the field pea a high value crop that can be used by a wide section of gender to achieve economic freedom. Despite its importance limited studies have been conducted on this crop therefore information on field pea productivity in the Mt. Elgon region is rather unknown. This study therefore seeks to provide current information on the field pea value chainin Mt. Elgon to guide research, development activities and policy on field pea in the country.

2. Methods

A survey was conducted covering 5 districts reported to be growing field peas in eastern Uganda including; Bulambuli, Kapchorwa, Kween, Namisindwa and Mbale in the Mt. Elgon sub zone. In each district two major field pea growing sub counties were purposively selected. From each sub county 25 respondents were randomly sampled from a list of field pea producers identified by the sub county agricultural officer to ensure good representativeness of field pea farmers in the sub zone. A structured questionnaire was then administered, data collated, entered into excel for analysis using descriptive and quantitative statistics. Data from 243 respondents was analyzed using STATA (STATACorp, 2015).

3. Results and Discussions

3.1 Demographic Characteristics of Field Pea Producers

There was a higher percentage of male respondents than females (38%) across all districts as shown Table 1 (χ^2 = 2.44). Further gender assessment showed that 39% of the field pea respondents were youth (18-37 yrs old). A small number of elderly above 57 yrs also grow field peas (10%). This indicates the field pea growing cuts across all age groups and gender. The age group with highest percentage is 38-47 followed by 28-37 age group bracket at 26.9%. This could be an indication that ownership of land and production resources plays a role in growing of field peas.

Table 1. Gender and age description of field pea producers in Mt. Elgon

Districts	Sex (%)		Age (%)				
	1=Male	2=Female	1=18-27	2=28-37	3=38-47	4=48-57	5=>57
Bulambuli	57.63	42.37	10.17	35.59	16.95	20.34	16.95
Kapchorwa	61.22	38.78	16.33	40.82	24.49	16.33	2.04
Kween	58.49	41.51	3.85	19.23	40.38	25	11.54
Mbale	70.83	29.17	14.58	22.92	33.33	25	4.17
Namisindwa	64.52	35.48	9.68	16.13	45.16	16.13	12.9
Total	62.08	37.92	10.88	28.03	30.54	20.92	9.62
χ^2	2.4428		29.8711				

3.2 Land Ownership and Importance of Field Peas

Most of the field pea producers own 1-2 acres (54.4%) followed by 35% owning 2-5 acres (Table 2). It was observed that majority of respondents grow field peas for home consumption 60%, and 40% for income purposes. However, in Mbale, field pea importance is split at 50-50. 50% is sold to generate income for the household. In Bulambuli, Namisindwa and Kapchorwa the crop is mostly grown for home consumption to augment household nutrition whereas in Kween, it is mainly for income probably because the farmers are more commercially oriented and most of them have relatively larger plots of land. This enables growing field pea commercially while still reserving land for other crops since field peas is grown alongside other crops. Mbale being the commercial hub of the region, the crop fetches a stable price throughout the year and price quite often is as high as that of beef. Farmers often considered market class, yield potential, harvest ease, vine length, maturity, seed size and disease tolerance as factors for growing a particular variety.

Table 2. Land ownership and field pea importance

Districts	Proportion of Land Owned (acres)				Importance of field pea	
	1= 1-2	2=2-5	3=5-10	4=10-19	1=Home consumption	2=Income
Bulambuli	71.7	26.42	1.89	0	81.82	18.18
Kapchorwa	53.19	44.68	0	2.13	64.44	35.56
Kween	31.25	35.42	27.08	6.25	34.69	65.31
Mbale	58.14	32.56	4.65	4.65	50	50
Namisindwa	57.69	34.62	7.69	0	69.23	30.77
Total	54.38	34.56	8.29	2.76	59.91	40.09
χ^2	42.8567				27.006	

3.3 Characteristics of Field Pea Types in Mt. Elgon

Field or garden pea is locally known by several names such as; Mbinzinac, Kawoo, and Bukwana. The field pea type with normal leaves is more commonly grown than the semi-leafless type (Figure 1). Of the two main types; the normal leaf type with vine lengths ranging from three to six feet was more grown than the semi-leafless with modified leaflets reduced to tendrils, resulting in shorter vine lengths of two to four feet. Field pea normally has a single stem but can branch from nodes below the first flower. This is more desirable for increased yields. Farmers often considered market class, yield potential, harvest ease, vine length, maturity, and seed size and disease tolerance as factors for growing a particular variety.

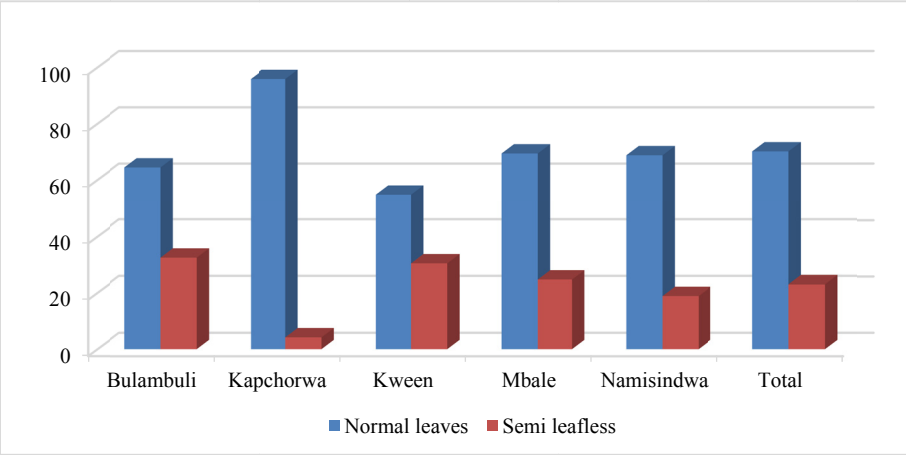

Figure 1. Proportion of field pea types grown in Uganda

3.4 Main Income and Food Crops in Mt. Elgon

The top three income generating crops were identified as potato (24.6%), coffee (23.7%) and field peas (20.7%) as indicated in Table 3. Others are beans and maize at 11.2% and 9.1% respectively. Further assessment showed that 20.69% of the respondents ranked field peas as top for income generation. It is important to note that field pea scored favorably in Mbale but was third overall behind potato and coffee. Mbale is a commercial hub in the region and therefore the availability of ready market and better prices may be responsible for this trend. In Kween, field pea was second after potato whereas in Namisindwa it was second to beans. As already stated this is attributable to the relatively larger plots of land available to Kween farmers to grow the crop commercially and their orientation to commercial agriculture.

Table 3. Main income crops and food crops by district

Districts	Main income crops					Main food crops				
	Potato	Coffee	Field peas	Beans	Maize	Maize	Banana	Potato	Field pea	Beans
Bulambuli	**8.47**	**52.54**	**10.17**	**6.78**	**8.47**	**25.42**	**38.98**	**15.25**	**8.47**	**6.78**
Kapchorwa	35.42	27.08	10.42	6.25	8.33	38.3	19.15	27.66	8.51	4.26
Kween	41.18	1.96	25.49	11.76	15.69	67.35	4.08	18.37	8.16	0
Mbale	30.43	13.04	41.3	8.7	2.17	26.67	35.56	15.56	22.22	0
Namisindwa	0	14.29	17.86	32.14	10.71	30	30	0	20	13.33
Total	**24.57**	**23.71**	**20.69**	**11.21**	**9.05**	**37.83**	**26.65**	**16.52**	**12.61**	**4.35**

The top food crops grown by respondents in Mt. Elgon are maize (37.83%), banana (25.6%), potato (16.5%) and field pea at 12.6% and lastly beans among the top five. In Kween, Mbale and Namisindwa field pea ranked third major food crop and the main legume and source of protein in these districts.

3.5 Field Pea Production Practices

3.5.1 Cropping Systems

The most common cropping system is pure stand at over 60%, followed by band/boundary planting (19.7%) and intercrop (14.2%) (Figure 2). Intercrop is described as growing the field pea within other annual crops which act as stakes. In Kween, field peas are planted within pasture fields used for cut and carry for the animals while band/boundary the field pea is sown on the edges of maize or coffee fields.

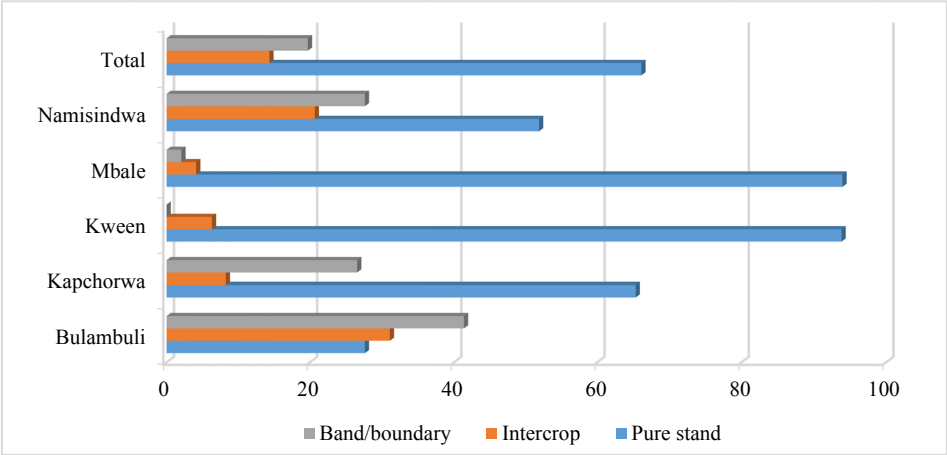

Figure 2. Field pea cropping systems

Field pea is predominantly grown as a sole crop to act as a cover crop and take advantage of restoring soil fertility for the productivity of the next crop. The intercropping combination of field pea with pasture, barley and potato is predominant in Kapchorwa and Kween whereas the combination with Coffee and maize is mainly in Bulambuli, Mbale and Namisindwa districts. Intercropping is important with proven capacity to restrict disease and pest incidence and bring soil fertility benefits as studied by Teshome et al. (2015). In a related study, Kemal (2002) identified mixed cropping as one of the options for the effective control of field pea pests. Boundary/band planting is due to limited land availability in localities such as Bulambuli and Namisindwa, however it also provides for a natural staking mechanism for the crop. Most farmers planted field pea as sole crops whereas intercropping was also practiced in addition to boundary planting.

3.5.2 Crop Rotation

Cereals and legume crops are included in most of the farmers' crop rotation sequences. Barley and wheat are grown after field pea in Kween and Kapchorwa. The period of crop rotation with field pea and other crops varies from district to district and depending on the farm land availability and the household need for other crops. Field pea being a legume plays a key role in the life of farmers and farmland by providing the scarce nutrients to the households and adding nitrogen to their farms/fields. It helps them to increase and restore soil fertility using its efficient symbiotic nitrogen fixation mechanism. It also has the ability of holding water in the soil for the next crops. In addition to increasing crop yield and income, rotating field pea with other crops is used by farmers for better control of weeds by suppressing the growth of weeds and, pest and diseases by breaking their life cycle.

Like other pulses, a grass-free field pea crop will help to reduce the levels of cereal root disease such as crown rot (*Fusariumpseudo graminearum*) which remains a major limitation to cereal production in the highland areas. There is a general recommendation that field peas should be grown in a rotation and should never immediately follow another broadleaf break crop, due to the risk of *sclerotinia* disease carry-over (McKay et al., 2003).

3.5.3 Source of Seed

Seed is mainly accessed from local markets across the districts. It was also observed that stockiest were actually grain traders in the localities but known to avail dry field pea as seed when in season. The neighbor is also a popular source of seed and is the main source in Mbale with 39.13% (Table 4). The reliance on neighbors and home saved seed does not warrant the increased field pea productivity required to meet the high market demand.

Table 4. Source of seed by district

District	Home saved seed	Neighbor	Local market	Stockiest
Bulambuli	23.21	21.43	41.07	14.29
Kapchorwa	17.02	10.64	53.19	19.15
Kween	16.28	9.3	60.47	13.95
Mbale	17.39	39.13	32.61	10.87
Namisindwa	24.14	27.59	24.14	24.14
Total	**19.46**	**21.27**	**43.44**	**15.84**

The result also implies that seeds can profitably be used for income generation of farmers. It is further implied that the varieties grown have been maintained for a long time with limited genetic improvement. This is an opportunity to develop a pluralistic seed system with farmers as central players say through promotion and use of Quality Declared Seed (QDS).

3.5.4 Seed Rates by District

The seed rate on average is 15 kg per acre, however the highest seed rate was observed in Kapchorwa at 25 kg of field pea seed per acre. Average land holding for field peas is 0.67 acres. The largest fields are in Kween and Mbale while the rest have at least 0.5 acres allocated to field peas (Table 5).

This further reveals that farmers grow field pea in addition to other crops. In general there was a significant difference between the farm size of field pea cultivated by farmers in Kween and those in Bulambuli. The farm size of pea was significantly less in Bulambuli, Namisindwa and Kapchorwa due to the dominance of other crops such as coffee, banana and maize in addition to vegetables; and limited landholdings by the farmers in these districts. In Kween, the rotation enables farmers to grow field pea after the cereals majorly barley and wheat and in cattle grazing fields/pasture spaces of adding a positive impact to the plots before cereal crops.

Table 5. Plot sizes and seed rate by district

District	Land (acres)	Seed Amount (kg)	Seed rate
Bulambuli	0.49	7.13	14.66
Kapchorwa	0.51	12.93	25.40
Kween	0.94	13.54	14.38
Mbale	0.78	12.34	15.83
Namisindwa	0.51	4.77	9.27
Total	**0.67**	**10.40**	**15.61**

3.6 Field Pea Planting and Harvesting Period

Field pea is majorly planted in March (51.6%) and April (30.4%) which is the start of the first rains in the region while it is harvested mainly in June (87.6%) as shown in (Table 6). It infers that there are periods of surplus thus low market prices and scarcity when demand is high and supply is low, and therefore farm gate prices are relatively attractive. A farming system that provides for higher farm gate prices will need to be developed to increase income from high value field peas. It is also noted that there is continuous field pea planting in Mbale up to July.

Table 6. Planting and harvesting period of field peas

Districts	**Planting of field peas**					**Harvesting of field peas**			
	March	April	May	June	July	May	June	July	August
Bulambuli	55.93	30.51	1.69	1.69	0	1.69	83.05	13.55	1.69
Kapchorwa	75	20.83	2.08	0	0	0	61.22	34.69	4.08
Kween	33.33	66.67	0	0	0	0	100	0	0
Mbale	20.41	20.41	22.45	6.12	20.41	0	100	0	0
Namisindwa	73.33	13.33	3.33	0	6.67	3.13	93.76	3.13	0
Average	**51.6**	**30.35**	**5.91**	**1.562**	**5.416**	**0.964**	**87.606**	**10.274**	**1.154**

Harvesting activities of field pea is done mainly by women. This can be attributed to the delicate nature of the fresh pods. The harvest is done in phases depending on the market preference. Some are harvested fresh and others dry. Field peas are planted as a cover crop on fields meant to be under fallow in preparation for a late cereal and potato because they mature early.

Planting is timed for flowering to commence during the cool months to avoid the main heavy rains and dry periods. Planting earlier than recommended can result in rainfall damage and later than recommended planting dates can potentially result in yield loss due to heat stress (Kindie et al., 2019). The delayed planting which results in delayed flowering increases the risk of disease problems too, such as powdery mildew, reducing yields

because it would coincide with the second rainy season. The continuous field pea planting in Mbale is because there is ready market and high prices throughout the year which is a motivation for continuous planting. This may also indicate that even if yields may be affected by the weather/environmental conditions the allure of high prices and therefore value drives farmers to continuously plant field pea in Mbale district.

3.7 Land Preparation Method

Figure 3 shows the use of manual labor in land preparation as most common among field pea producers in the region. In Kween, however, use of animal traction was more than any other method. A few respondents reported using tractors for field pea land preparation. A few other farmers do not prepare land at all but rather plant directly into the fields.

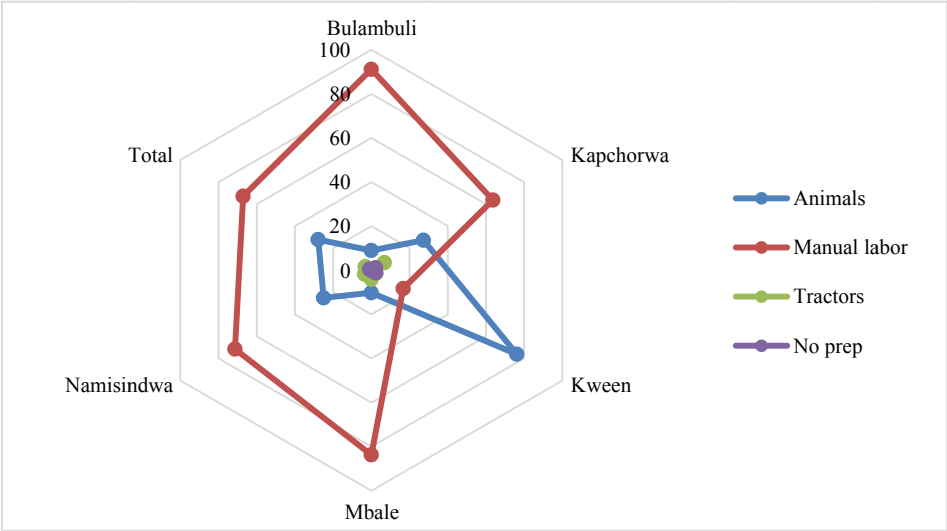

Figure 3. Method of land preparation for field peas

3.8 Method of Planting

Figure 4 indicates field pea is commonly sown by drilling holes and planting in lines (70%), although as earlier indicated the spacing across sub counties was variable. A common planting method in Kween is the spreading (22%) in pastures/grazing fields after harvest of other commercial cereals.

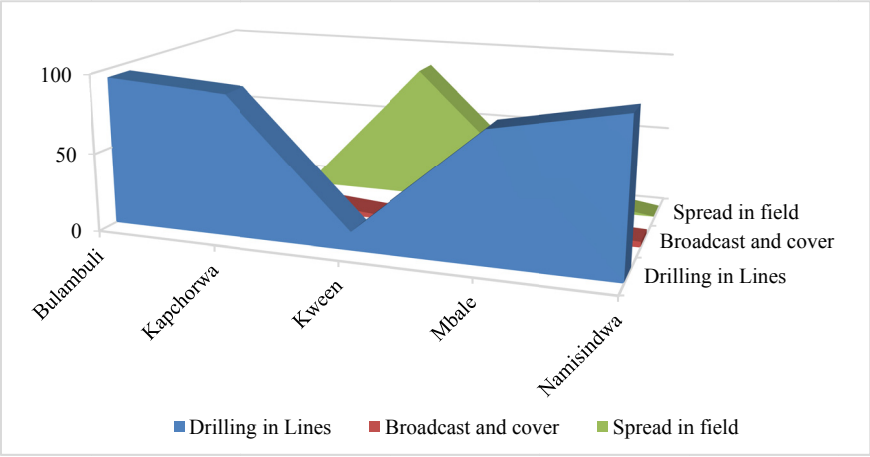

Figure 4. Method of field pea sowing

The spacing used for field pea is quite variable as shown in Table 7 and seems to depend on the purpose for which the crop is grown, amount of land owned, amount of seed and main seasonal crop. It is however, indicated

that the spacing of 60 cm by 60 cm is more frequently used by the respondents. The 15 cm by 15 cm spacing is also popular especially in Bulambuli and Kapchorwa and is linked to broadcasting. This is contrary to a recommendation by McKay et al. (2003) an indication of the need to determine an optmum spacing and therefore plant population.

Table 7. Plant spacing method by cropping system in Mt. Elgon

Spacing	Pure-stand	Intercrop	Boundary	Total
15 cm × 15 cm	4.0	3.4	24.3	7.9
30 cm × 30 cm	5.6	6.9	2.7	5.2
60 cm × 30 cm	4.8	10.3	2.7	5.2
60 cm × 60 cm	44.8	24.1	24.3	37.7
90 cm × 30 cm	40.8	55.2	45.9	44.0
	65.4	15.2	19.4	

Generally planting and staking is encouraged, with row widths ranging from 15 cm to a maximum of 35 cm. Row widths should be reduced to 25 cm or less in bare fallows. Sowing on wide rows, *e.g.*, 50 to 60 cm is not advised as it increases susceptibility to lodging and clumping at harvest. Available literature indicates a plant population of 300,000 plants per acre is recommended (McKay et al., 2003). This though shall need to be validated for our local situation.

Weeding is done by at least 71.2% of the field pea producers. The hand hoeing method is more popular than hand pulling although a few also use herbicides (Table 8). About 80.8% of the field pea farmers apply fertilizer at planting with a few applying top dressing. The is a significantly high usage of pesticides (98%) in field pea production with dimethoate as the most popular pesticide aimed at managing aphids and leaf miners. Fungicides are also applied to manage diseases in 61% of the field pea producers.

Table 8. Field pea crop management practices used in Mt. Elgon

Districts	Weeding (%)		Fertilizer (%)		Pesticide use (%)		Fungicide use (%)	
	Yes	No	Yes	No	1=Yes	2=No	1=Yes	2=No
Bulambuli	30.7	10.6	93.3	6.7	83.1	16.9	3.4	96.6
Kapchorwa	16.0	31.8	82.5	17.5	83.7	16.3	14.3	85.7
Kween	6.7	53.0	54.5	45.5	84.6	15.4	13.5	86.5
Mbale	29.4	1.5	97.9	2.1	98.0	2.0	61.2	38.8
Namisindwa	17.2	3.0	80.8	19.2	71.0	29.0	22.6	77.4
Total	**71.2**	**28.8**	**85.6**	**14.4**	**85.0**	**15.0**	**22.1**	**77.9**

3.9 Field Pea Productivity

Majority of the respondents harvest the field peas as fresh pods at 75 days after planting when the pods are 25% brown and 75% green (Table 9). The pods are picked twice after every 7 days. Any pods left after the 3rd harvest are allowed to dry and ordinarily used as seed. Another marketing approach is selling of gardens to middle men or local traders who then harvest, sort, grade and transport the field peas to urban markets and the city street retailers. On average yield is 650 kg/acre or 1.6 t/ha. The highest fresh pod yield is harvested by farmers in Kapchorwa at 1200 kg/acre or 3t/ha fresh pod weight while Namisindwa and Bulambuli has the lowest yields.

Table 9. Fresh pod and dry field pea yield per acre across the five districts

District	Fresh pod yield (kg)					Dry field pea yield (kg)				
	Sold	Consumed	Given out	Total	Yield kg/acre	Sold	Consumed	Given out	Total	Yield kg/acre
Bulambuli	154.4	20.5	8.4	183.3	377.1	76.0	18.2	3.3	97.6	200.7
Kapchorwa	517.1	47.2	43.8	608.2	1194.3	167.7	10.5	8.5	186.6	366.5
Kween	559.5	32.2	17.1	608.9	646.7	369.2	0.3	0.0	369.5	392.5
Mbale	415.3	13.5	15.9	444.7	570.6	57.9	6.6	6.3	70.8	90.8
Namisindwa	123.5	35.7	10.1	169.4	329.4	47.2	8.9	5.6	61.7	120.0
Total	**383.8**	**28.9**	**20.3**	**433.0**	**650.3**	**154.2**	**11.9**	**5.0**	**171.2**	**257.0**

Dry pea productivity is very low at 270 kg/acre or 0.6 t/ha. This further qualifies the urgency to develop field pea improved cultivars and seed value chain to sustain the field pea value chain. Seed is highly priced because very little is available after most of it is sold as fresh pods. The varieties of field pea are varying by their yields. The farmers in the study area grow field pea mainly for market in addition to food consumption. This is because of high price value of field pea when compared with other crops in equal measure. The respondents indicated that having high number of pods per plant, high number of seeds per pod and high adaptability determine yielding in field peas. The current varieties produce low yield due to degeneration, environmental factors and variations in seasons. It was noted that some of the farmers grow varietal mixtures because the farmers considered that, if one variety is attacked by disease they save the other varieties thereby ensuring yield stability.

4. Conclusion

Field pea is cultivated for fresh green seed, tender green pods, dried seed and forage. Apart from the local demand which is far from satisfaction, the crop presents great potential for export to European countries where it is heavily consumed and forms a significant component of the diets and yet the local supply in Uganda is still fairly low.

The survey revealed that a major determinant of varietal choice is the conscious attempt of farmers to match varieties with the land type. In the sub zone, farmers' criteria for selecting varieties are also associated with duration (short to medium), the adaptation to different user needs; food, livestock fodder, and cash; postharvest operations like ease of threshing, good taste, good storage capacity, and premium market price as was also observed by Mogiso (2017) and Mulugeta (2017) separately in Ethiopia. Clearly, involving farmers and listening to their perceptions in developing and selecting field pea varieties at the early stage of breeding can lead to faster adoption of varieties suited to their specific field pea ecosystems and diverse needs .In areas with higher rainfall and cool temperatures the shortest-vined varieties may be best, while in the drier regions, a grower should choose a semi-leafless type with longer vines.

Plant population is important in determining crop yields, farmers however are using low plant populations resulting in significant yield losses and harvest difficulties due to lodging. The optimum planting rate shall need to be determined for the different varieties to increase production.

In general, the field pea cultivars the farmers are currently growing are low yielding poorly managed and has no seed system. This presents an urgent need for high yielding pest and disease resistant varieties to be availed. These varieties should be versatile and resist the ever changing climatic conditions. An effective field pea seed system and improved management techniques need to be validated and up-scaled with the producers to enable them achieve increased incomes and improved food and nutrition security. Field pea has a high potential for being a youth driven commodity due to its short growth cycle and high returns from sales.

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