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Profitability Analysis of Traditional African Vegetable Seeds Production in Kenya

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ABSTRACT

Traditional African vegetables seed production is constrained by many factors such as poor quality of the seeds used for production; spatial and time gaps in seed distribution systems and lack of structured seed markets. In response to these weaknesses, seed companies opt to contract farmers for the production of quality vegetable seeds to ensure availability and accessibility. The study analyzed economic potential of contracted farmers producing traditional African vegetable seeds in Kenya using data collected from 153 vegetable seed growers in Western Kenya. Gross margin analysis was used to estimate the profit obtained by contracted and non-contracted seed growers. Findings indicated that, contracted traditional African vegetable seed growers had the opportunity to receive institutional services such as extension, credit, and new technology services from contractors. Contracted farmers received high-profit margin ratio (>50%) compared to non-contracted farmers. The study recommends that public and private organizations should sensitize farmers to enter into contracts with seed companies to get agronomic extension service advantages, ensure quality seeds and increase profits from traditional African vegetable seed production

INTRODUCTION

Traditional African Vegetables (TAVs) are excellent sources of dietary fiber, vitamins, and minerals since they constitute an indispensable constituent of diets, but they are not readily available all year round as many are still primarily collected from the wild and also due to seasonal weather variations (Ukegbu and Okereke, 2013; Ochieng et al., 2018; Weller et al., 2015). Besides their nutritional and medicinal importance, Traditional African Vegetables (TAVs) are considered valuable because of their ability to fit into year-round production systems (Weinberger and Msuya, 2004). In Kenya, the demand for TAVs, especially in major urban and peri-urban centers such as Nairobi, Eldoret, Nakuru, Kisumu, and Mombasa, has increased and are now being sold in modern supermarkets in major cities and appearing on the menus of major restaurants and hotels in urban and peri-urban areas (Opiyo et al., 2015;

Gilbert et al., 2011). The increased demand for TAVs has raised the need for high-quality seeds of improved lines and cultivars.

The seed industry in Kenya comprises of the formal and informal seed sector (including community seed production). The formal seed sub-sector is comprised of the private and public seed entities involved in the development of crop varieties, seed multiplication, processing, marketing, and distribution as per rules and regulations of the country. The informal seed sub-sector continues to be the primary source of seed, about 90% of seeds planted by farmers in Kenya, are provided by the informal seed systems (own saved seeds), whereas 72% of them purchase vegetable seeds from the local markets (Abukutsa-Onyango, 2005; Croft et al., 2018). Furthermore, production and marketing of traditional African vegetable seeds in Kenya and other countries in Sub-Saharan Africa are constrained by many factors: low quality of the seeds; spatial and time gaps in seed distribution systems, and lack of structured seed markets (Ellis-Jones et al., 2008) among others. Previous research shows that government, private, and commercial seed companies in developing countries supply not more than 20% of seeds of even major food crops (Rohrbach et al., 2003). In Kenya there are over 78 seed companies, with only a few of them dealing with TAVs (Sikinyi, 2010).

Kenyan seed companies tend to contract smallholder farmers for the production and supply of different varieties of seeds to counteract the shortages in the supply side and ensure increased availability on the demand side. In the country, contract farming system started in the 1960's, where the Kenyan Tea Development Authority (KTDA) tea scheme serves as one of the earliest examples of contract farming schemes (Ochieng, 2010). Like in many other countries however, contracting in the Kenyan has mainly two dimensions, which are production contracts and marketing contracts (MacDonald and Korb, 2011).

Production contracts in most cases, require farmers to provide land, labor, and equipment while contracting companies/individuals provide technical know-how in return of the desired quality and quantity and key inputs on credits. According to Key (2005), these types of contracts typically leaves most of the production and farm management decisions in the hands of the contractor. However, this is in stark contrast to marketing contracts where production decisions are agreed upon with farmers who are obliged to abide by contract terms that specify the deliverance of the approved product.

Among developing countries, Kenya is one of the most cited in the literature relative to contract farming. This may in part be because contract farming arrangements appear to be more advanced in Kenya than in other African countries (Strohm and Hoeffler, 2006). Most of the literature on contract farming focused mainly on the production and marketing of crops and livestock (Lorenzo et al., 2012; Kagwiria and Gichuki, 2017; Mwambi et al., 2014; Ndalilah, 2015; Kairuki and Loy, 2016). However, these studies lack detailed information on the production of seeds under contract farming systems. This study fills that gap by analyzing the economic potential of contracted farmers under TAVs seed production. The study has compared profitability between contracted and non-contracted seed growers and identified service advantages under the contract seed system.

MATERIALS AND METHODS

Study area and sampling procedure: This particular study was conducted in Nandi, Kakamega, Kisumu, Bungoma, and Busia. A systematic random sampling method was applied to select the sample framework for seed growers. The survey sample was drawn from purposively selected villages in the respective counties. The villages are the lowest administrative unit in the country and are therefore suitable as the primary sampling unit. About 153 TAV seed producers were interviewed; seed producers are distributed by regions as follows: 28 in Kisumu, 26 Kakamega, 41 Bungoma, 20 Busia, and 38 in Nandi. The selected farmers were visited in November/December 2016 by ten trained enumerators. The households involved in this survey were informed about the objectives of the study. The respondents were explicitly asked for

their verbal informed consent to voluntarily participate in the study. The respondents were duly informed that the data collected would be kept strictly confidential, analyzed anonymously, and used for research purposes only. Figure 1 shows a map of the study areas in Kenya.

Data analysis: STATA and Microsoft Excel were used for both qualitative and quantitative data analysis for this study. The analyses included descriptive statistics (i.e., mean, standard deviations, cross-tabulation, ranges, and frequency distribution to identified services offered under contract seed system). Gross margin analysis (GMA) was used to obtain profitability obtained by contracted and non-contracted TAV seed producers.

GMA is the difference between total revenue and total variable costs (SAGIT *et al*., 2012). It is used as a measure of enterprise profitability and means of selecting farm plans. According to Fani *et al.*, (2015), the GMA has been in use since 1960s and has been used in several economic studies for analyzing the profitability of farm production practices. Gross margins were compared between contracted TAVs seed producers and non-contracted TAVs seed producers in Western Kenya. GM was calculated using the following formula:

$$GM_i = TR_i - TVC_i \quad (1)$$

Whereby:

GM_i	Gross margin at point i (in US$/acre)
TR_i	Total revenue at point i (in US$)
TVC	Total variable costs at point i (in US$)
i	Represent points along the supply chain

Operational formula:

TR, in this case, was the quantity of vegetable seeds sold in kg (Y) times their corresponding selling price (P), which is the market price.

$$TR = \sum_{1}^{n} Y \times P_y \quad (2)$$

Where;

TR = Total revenue for the farmer

Y = Amount of vegetable seeds in Kg

P_y= Selling price in US$ (market price)

$$GM = \sum P_y Y - \sum P_X X \quad (3)$$

Where;

P_x= Price of inputs used in vegetable seed production

X = Inputs used in vegetable seed production

RESULTS AND DISCUSSION

Distribution of vegetable seed growers: Results shows that Bungoma region is the leading in terms of vegetable seed growers accounting for more than 27% of all vegetable seed growers in the study area (Table 1). Moreover, 66% of vegetable seed growers in Bungoma region are contracted farmers. Busia region had very few vegetable seed growers and not all of them did seed production under contract. Among the surveyed regions, only Kakamega and Bungoma region had contracted seed systems suggesting that most of the TAVs growing farmers still depend on saved seed from their own farm or a neighbor's farm for use in their cultivation.

Households under TAVs production: As it is widely recognized, contract farming is an agreement between a farmer and a buyer to grow produce with set terms and conditions such as price, quantity, quality, and inputs. Our results revealed that among the interviewed seed growers only 20% are contracted (Table 2). In particular, contracting was most common in the production of three vegetable seeds: spider plant (32%), amaranth (30%), and nightshade (25%).

Gross margin analysis: Gross margins for each produced TAV seeds for both contracted and non-contracted farmers are presented in Table 3.

Generally, all of the TAVs seeds produced by the contracted farmers shows positive gross margins contrary to non-contracted farmers whose gross margins are negative for most of the TAV seeds produced except for spider plant which despite having a positive gross margin have relatively low-profit margins compared to that of the contracted farmers. In particular, the contracted farmers had higher profitability percentage (gross margin ratio) where all the contracted TAV seed farmers attained a profit margin of more than 50%. In contrast, the non-contracted farmers experienced high losses especially in the production of African nightshade and amaranths, which had negative gross margin ratios (Table 3).

Further analysis indicates that contracted farmers harvested more than two times higher seed yield per hectare than non-contracted farmers. Cost-benefit ratio (CBR) results indicate that, the contracted seed growers would get an approximate of $7.92 for each dollar invested in the production of African nightshade; $6.27 for each $1 invested in producing spider plant; and $5.33 for each dollar invested in amaranth production. The CBR findings for non-contracted farmers was however below one for the amaranths and nightshade which implies that non-contracted farmers are incurring losses. Implicitly, such findings provide an implication that investing in the production of TAVs seeds is worthwhile when it is done under contracts. Singh (2002), in the article on political economy of contract farming in India, observed that most contract farmers have seen incomes rise and are satisfied with the contract arrangement. Nevertheless, findings from other sub-sectors such as sugarcane show a different pattern where non-contracted producers have higher yields compared to contracted producers but receive lower prices for their produce (Lorenzo et al., 2012).

Service offered by seed contractors: Overall, 67% of the seed growers indicated that general extension advice about the production of TAVs is the main service provided by seed contractors or companies (Table 4). Other contracting services include providing technical advice about vegetable pests and diseases (47 application of fertilizers (21%) and technical advice on weather problems and new seed varieties (12%).

CONCLUSION

Contracted traditional Africa vegetable seeds growers had an advantage in receiving institutional services (extension, credit, and new technology services) compared to non-contracted seed growers. A large quantity of seeds grown from the study area was from contracted seed growers who sold their products to a contractor. The gross margin obtained by contracted farmers was high compared to non-contracted farmers. Therefore, the study recommends that public and private organizations should sensitize farmers to enter into contracts with seed companies to get agronomic extension service advantages, ensure quality seeds and increase profits from traditional African vegetable seed production.

Table 1: Distribution of vegetable seed growers by regions in Kenya.

By regions	Households		Formal seed system (% contract growers)	Informal seed system (% farm-saved/non contract growers)
	Frequency	%		
Kisumu	28	18	-	100
Kakamega	26	17	19.2	80.8
Bungoma	41	27	65.9	34.1
Busia	20	13	-	100
Nandi	38	25	-	100
Total	153	100	20.9	79.1

Table 2: Kenyan farmers engagement in contract seeds farming.

TAV Seeds Grown	Household engagement in contract seeds farming		Total Sample (n=153)	
	Non-contracted	Contracted		
	%	%	n	%
Amaranth	70	30	30	10
Night Shade	75	25	75	24
Cowpea	100	0	52	17
Spider Plant	68	32	44	14
Ethiopian Mustard	100	0	3	1
Jute Mallow	100	0	38	12
Pumpkin Leaves	100	0	6	2
Crotalaria	100	0	61	20
Total sample	80	20	153	

Table 3: Gross margin analysis of the TAVs by Kenyan farmers.

Costs incurred in TAV seeds production (in US$)	Traditional African vegetables produced					
	Amaranth		African nightshade		Spider plant	
	Contracted	Non-contracted	Contracted	Non-contracted	Contracted	Non-contracted
Seeds	9	30	10	33	14	67
Manure	34	30	7	68	2	37
Fertilizer	124	4	115	37	122	74
Pesticides	32	3	37	17	19	20
Irrigation	0	21	2	22	2	7
Hired labour**	152	79	150	143	90	237
Machine hiring	12	5	14	4	17	3
Other input	57	0	25	8	21	0
Average cost (US$/ha)	420	172	361	331	288	445
Revenue (US$/ha)	2,242	157	2,860	211	1,805	1,171
Yields (Kg/ha)	429	39.57	507	54	371	169
Average. Price/Kg	5.23	3.97	5.64	3.89	4.88	6.93
Gross Margin= TR-TVC	1,822.09	(15.30)	2,498.85	(119.84)	1,517.28	725.36
Gross Margin Ratio	0.81	-0.51	0.88	-0.61	0.85	0.32
Cost-Benefit Ratio	5.33	0.91	7.92	0.64	6.27	2.63

Note[1]: **Other inputs include inputs such as herbicides, packages and storage chemicals. Exchange rate used 1US$=101 Ksh (Ksh=Kenyan Shillings)

Table 4: Type of services offered by the seed contractors in Kenya.

Type of services offered	n	%
General extension advice	22	67
Pest and diseases advice	15	47
Fertilizer advice	7	21
New seed varieties	4	12
Weather advice	4	12
Soil advice	3	9
Irrigation advice	1	3

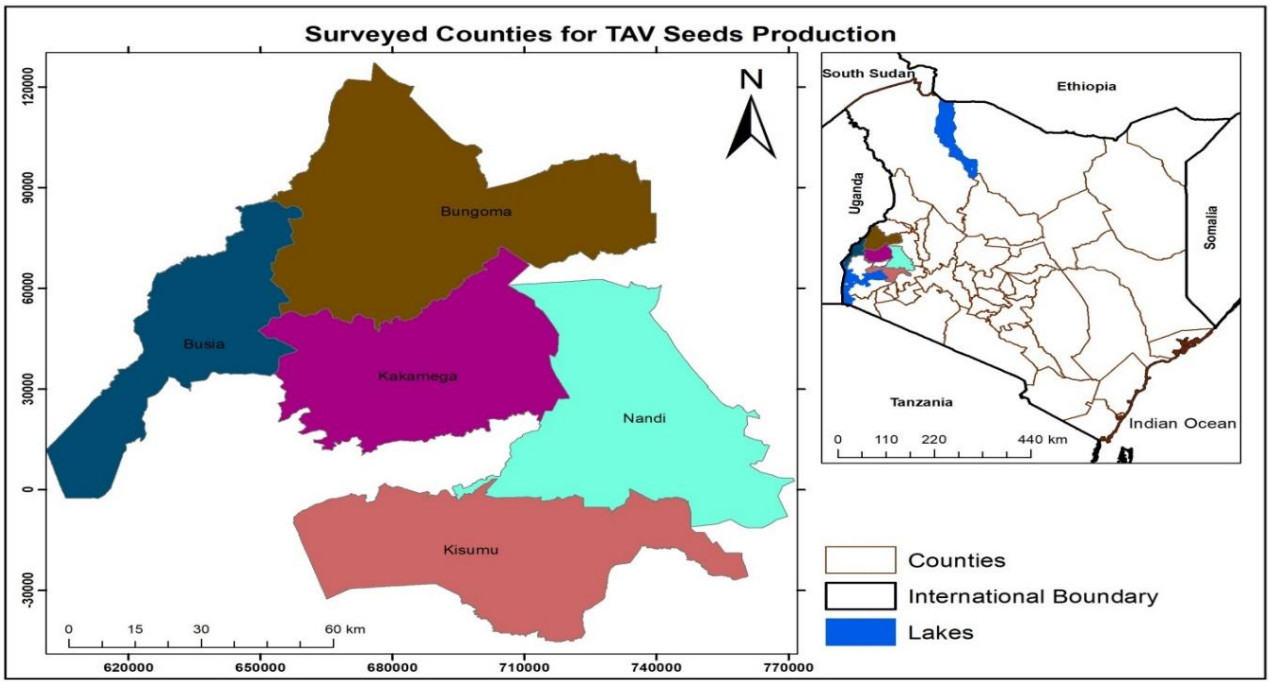

Figure 1: Surveyed Kenyan counties for Traditional African Vegetable seeds production

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