LIMITATIONS OF CUCUMBER (*Cucumis sativus* L*)* PRODUCTION FOR NUTRITION SECURITY IN SOUTHEAST NIGERIA

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ABSTRACT
Vegetables are important components of Nigeria's diet that a traditional meal without it is assumed to be incomplete. Recently in Nigeria, the demand of cucumber (*Cucumis sativus L)* is on the increase due to the continued awareness of the overwhelming importance of cucumber's health benefits along with skin care. But its supply is low because of a number of factors that militate against the production of the crop. Production of cucumber in southeast Nigeria is most seriously constrained by scarcity of planting seeds, lack of capital, climatic factors, plant pests and diseases, high fruit perishability and farmers' inexperience. Addressing these enormous problems encumbering the production of cucumber in this zone will further help strengthen the national vegetable reserve base and alleviate the devastating effects of the global food crisis, particularly in Nigeria.
Keywords: Cucumber, Agronomy, Nutrition Security, Southeastern Nigeria

INTRODUCTION

Cucumber is a widely cultivated plant in the gourd family, Cucurbitaceae (Swaider *et al.,* 2005). It is one of the most important market vegetables in the tropics (Okonmah, 2011), a monoecious annual climber or creeper (Adetula and Dentan, 2003) that has been cultivated for over 3,000 years. It is a soft succulent plant with high water content and has large leaves that form canopy over the fruit. The vines grow on stakes or on trellises. The fruit is roughly cylindrical, elongated with tapered ends, they are used in unripe mature state, usually eaten raw in salads or pickled and are also stewed in tropical regions (Grubben, 1997). The crop is fourth most important vegetable after tomato, cabbage and onion in Asia (Tatilogu,1997) and the second most important vegetable crop after tomato in Western Europe (Phu, 1997). The world's largest cucumber producer is China with 48,000 million kilograms which is 73% of total global production. Russia is second largest producer with 1,742 million kg (2.68%) followed by Turkey, with a production of 1,600 million kg (2.46%). Spain is in the seventh place with a production of 713 million kilograms of cucumber, which is 1.09% of this vegetables' global production. The Food and Agriculture Organization of the United Nations (FAO, 2016), reported that world cucumber production in 2012 surpassed 65,000 million kg for the first time, reaching 65,134.08million kilogrammes .

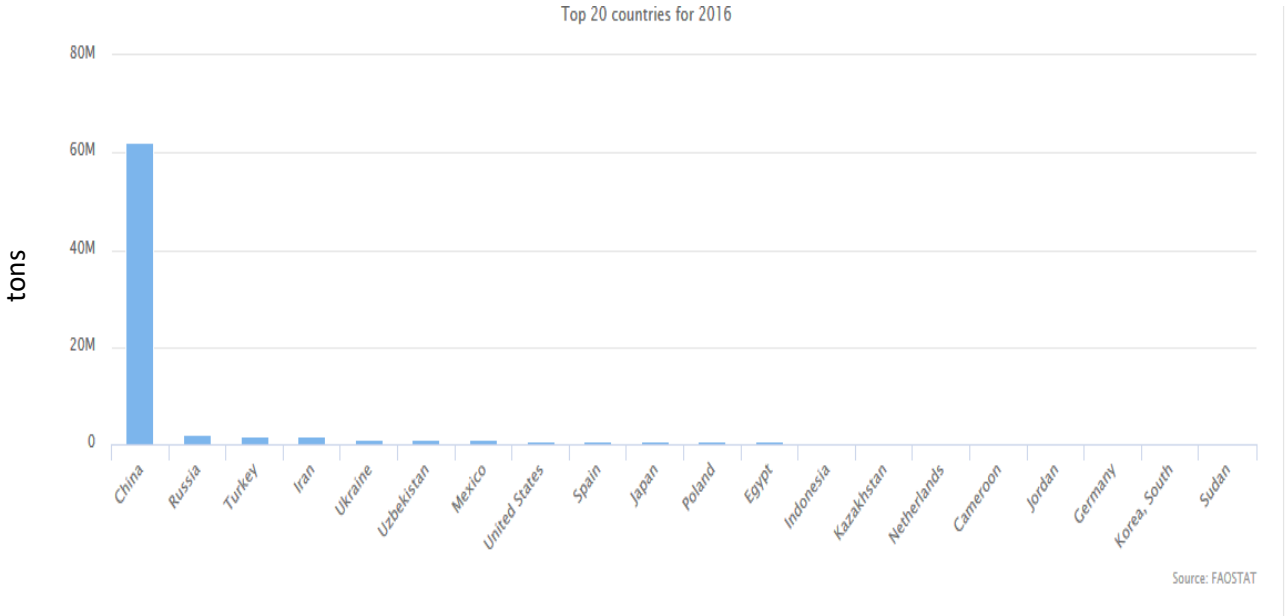


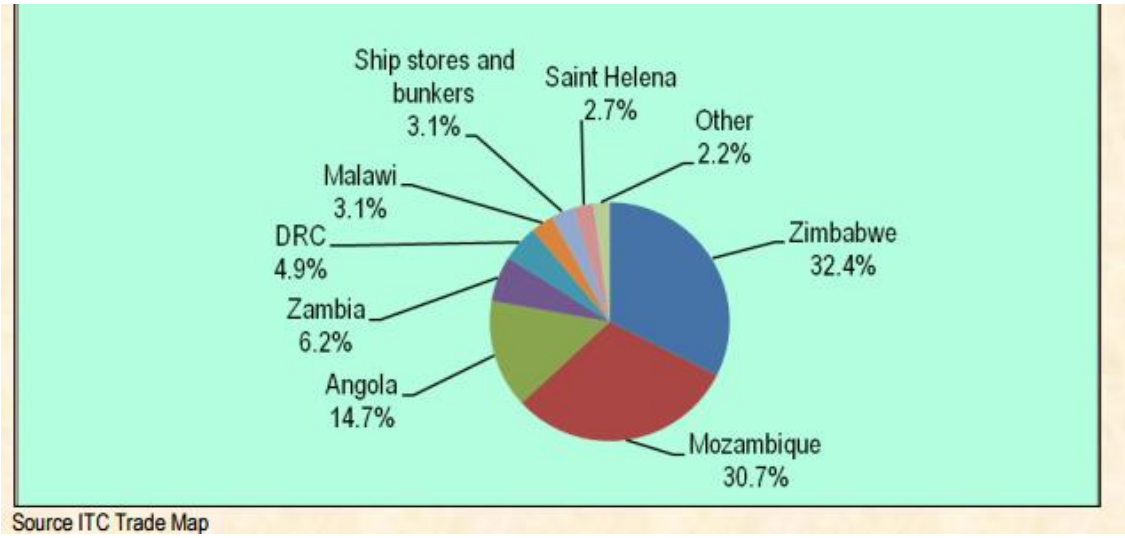
Figure 1: Representing world largest cucumber producer

In 2011, South Africa's cucumber exports represented 0.01% of world exports for this product and its ranking in world cucumber exports was 52. South Africa has lost its competitive in cucumber exports as in 2010, South Africa cucumber exports was ranked 51 in world cucumber exports. During 2011, only 3.1% of South African cucumber exports left in ship stores and bunker. This was significantly improvement as compared to 45.5% of South African cucumber left in ship stores and bunkers in 2010. South African cucumbers were exported mainly to Zimbabwe, Mozambique, Angola, Zambia, Nigeria and other African countries.

Table 1: Showing South Africa cucumber exports in 2011

Importers	Exported value 2011 (USD thousand)	Share in South Africa's exports (%)	Exported quantity 2011 (tons)	Unit value (USD/unit)	Exported growth in value between 2007-2011 (%, p.a.)	Exported growth in quantity between 2007-2011 (%, p.a.)	Exported growth in value between 2010-2011 (%, p.a.)
World	225	100	196	1148	-1	3	-31
Zimbabwe	73	32.4	68	1074	161	236	49
Mozambique	69	30.7	65	1062	28	9	28
Angola	33	14.7	18	1833	11	5	-13
Zambia	14	6.2	27	519	98	81	0
DRC	11	4.9	4	2750	13	3	-21
Malawi	7	3.1	5	1400	16	19	133
Ship stores and bunkers	7	3.1	5	1400	-49	-48	-95
Saint Helena	6	2.7	1	6000	16	-16	
Mauritius	2	0.9	1	2000	-17	-29	
Nigeria	2	0.9	1	2000		-10	
United Arab Emirates	1	0.4	0				

Source ITC Trade Map



Source ITC Trade Map

Figure 2: South Africa cucumber exports destinations in 2011

In Nigeria, cucumber production has not been ranked; it is grown mainly in Jos, Plateau State, little in Ohaji-Egbema in Imo State and in some other states of the federation. Cucumber does well on well-drained fertile soils with pH 6.0 -7.0 and ample richness in organic matter. It is often planted on raised beds and thrives in sandy loam soils. The crop requires a good amount of sunshine, warmth and is mostly grown in green houses (Jeffery, 2001). Cucumber grown for eating are called slicers and those intended for pickling are called picklers. Picklers refer to cucumber that is primarily used for processing (Grubben, 1997). Although it is less nutritious than most fruits, it is still a very good source of phytonutrients such as flavonoid, beta-carotene, triterpene, lycopene, lignin vitamins A, C, K, B6, potassium and also provides dietary fibers, pantothemic acid, magnesium, phosphorus, copper and manganese (Vimala *et al*., 1999). It contains ascorbic acid and caffeic acid both of which helps to smoothen skin irritation and reduces swelling in skin. Its juice is often recommended as a source of silicon to improve the complexion and health of the skin (Duke, 1997).

Table 2: Nutritional Composition of cucumber

Nutritional Value of cucumber

Calories	39	% Calories from Fat	7.8
Total Fat (g)	0.4	% Calories from Carbohydrates	73.8
Saturated Fat (g)	0.1	% Calories from Protein	18.5
Monounsaturated Fat (g)	0.0	% Refuse	3.0
Polyunsaturated Fat (g)	0.2	Vitamin C (mg)	16
Cholesterol (mg)	0	Vitamin A (i.u.)	647
Carbohydrate (g)	8.3	Vitamin B6 (mg)	0.13
Dietary Fiber (g)	2.4	Vitamin B12 (mcg)	0
Protein (g)	2.1	Thiamin B1 (mg)	0.07
Sodium (mg)	6	Riboflavin B2 (mg)	0.07
Potassium (mg)	433	Folacin (mcg)	39.1
Calcium (mg)	42	Niacin (mg)	0.7
Iron (mg)	0.8	Caffeine (mg)	0.0
Zinc (mg)	0.6	Alcohol (g)	0.0

Daily Values:		
	% Daily Value (2000 Cal diet)	% Daily Value (2500 Cal diet)
Total Fat (g): 0.4	1%	0%
Saturated Fat (g): 0.1	0%	0%
Cholesterol (mg): 0	0%	0%
Sodium (mg): 6	0%	0%
Carbohydrate (g): 8.3	3%	2%
Dietary Fiber (g): 2.4	10%	8%
Protein (g): 2.1	4%	3%

Source: FAOSTAT

Inspite of the increasing relevance of cucumber, low yields are obtained in farmers farms and its production in southeastern Nigeria is seriously constrained by scarcity of planting seed, lack of capital, climatic factors, plant pests and diseases, high fruit perishability and lack of production experience. It is necessary, however, to increase the production of cucumber in this zone, so as to supplement the high intake of carbohydrate and other common foods. Some of the factors militating against the production of cucumber in southeast Nigeria and solutions thereto are articulated below:

SCARCITY OF PLANTING SEED

Getting healthy cucumber seeds for planting in southeastern Nigeria is difficult; it is one of the major constraints in cucumber production which results in low production and productivity. Farmers in the agro-ecology depend so much on their local varieties which do not give high yields. Moreover, the improved planting seeds of cucumber are costly when compared to other crops' seeds, due to importation costs. Consequently, an average farmer may not afford the improved seeds for planting due to its cost. Currently, for instance, improved 50g cucumber seeds is sold at N9,500 ($26.51)Source: Premier Seed Nigeria Limited . Availability of the improved planting material will engender better production and productivity of the crop. It is suggested that research institutes in Nigeria,

especially, the National Horticultural Research Institute (NIHORT), with vegetable crop production as core mandate, collaborate with growers, breeders and other stake holders to ensure availability of planting seeds at affordable prices to farmers thereby promoting increased cucumber production (Umeh et al.,2017).

FINANCIAL CONSTRAINT

Commercial cucumber farming need adequate financing to achieve the structure needed to generate profit (Wilcox, et al., 2015). The capital needed goes into many areas such as; construction of standard greenhouses since the crop is mostly grown under greenhouse conditions, irrigation facilities, labour, construction of adequate storage structures in view of the nature of the fruit, and pests and diseases control and management (Umeh and Onovo, 2015). These constraints hinder the production of cucumber and need concerted capital injection through agricultural loans and credit facilities which will go a long way in assisting commercial production of cucumber in the agro- ecological zone.

CLIMATIC FACTOR

Cucumber requires a warm climate with optimum temperature for growth at about 30^{o}C. The optimum night temperature is 18-21^{o}C while the minimum temperature for its development is15^{o}C.At temperature less than 10^{o}C, growth stops while at 0^{o}C all plants perish (Khurana and Singh, 2001). However, high light intensity is needed for optimum yields .Low relative humidity results in high plant evapotranspiration due to the large leaf area. Sufficient irrigation is, therefore, required in such cases. Conversely, high relative humidity facilitates the occurrence of downy mildew. Though cucumber yield is enormous and great, its production in southeastern Nigeria is adversely affected during the rainy season mostly due to excessive precipitation and consequent diseases and pests' proliferation; these pests usually cause large ragged holes in leaves and fruits, thereby eating up germinating fruits. General insect damage may be caused by beetles, leaf miners and leaf hoppers. In a survey of incidence and severity of diseases in cucurbitaceous crops in southeastern Nigeria, Onovo (1992) reported the occurrence of common foliar diseases such as downy mildew, powdery mildew, anthracnose, gummy stem blight, as well as the bacterial disease, angular leaf spot. Good air circulation, for example through trellising, reduces the incidence of these diseases to some extent.

Wilting in cucumber which is caused by soil borne Fusarium wilt, or bacterial wilt is induced by cucumber beetles (*Diabrotica undecimpunctata howardi* Barder and Acalymma vittatum)which were found to be severe in many areas where it occurs with the percentage yield loss ranging between 5 and 30% (Onovo, 1992) .

Spotted cucumber beetle (*Diabrotica undecimpunctata howardi* Barder)with12 black spots on the wing covers and the striped cucumber beetle (*Acalymmavittatum*) with three black stripes down their wing covers causes great damage to cucurbitaceous crops such as cucumber (*Cucumis sativus* L), melon *(Cucumis melo*) and squash (*Cucurbita maxima*) seedlings. The adult of these pests feed heavily on the flowers, fruits and roots of cucumber and as they feed, they transmit viral diseases and bacterial wilt, which causes plants to wilt and die. Floating row covers are the most dependable way to protect plants and also yellow sticky traps can be used to monitor and eliminate the populations of these beetles. Cucumber is susceptible to damping off, resulting in seedling death soon after emergence; this occurs more often when the soil is poorly drained, and can be caused by several fungi, e.g *Pythium spp or Phytophthora spp*., some of which can also cause root rot in older plants (Onovo, 1992). A general recommendation is to grow cucumber only on sites where no other cucurbits have been grown for a number of years, to prevent soil borne diseases. Aphids *(Aphis gossypil)*, whitefly *(Trialeurods vaporariorum)* and thrips (*Thrips palmi* Karny) are insects that can cause major problems mainly because they act as vectors for viruses or diseases (Jeffery, 2001). The symptoms of aphids on the cucumber farm is targeted mainly on the leaves, which may show prominent light green mosaic pattern, deformation, puckering, blisters, narrow leaves, green vein branding, and pale yellow colouration which results to Green mosaic virus disease. While whitefly symptoms on young leave include brightening, yellowing, leaf deformation, development of shorter internodes and plant stunting. Thrips also have symptoms on young leaves such as brightening, yellowing, leaf curling, leaf cupping downward, leaf deformation thereby resulting to yellow mosaic virus disease (Jeffery, 2001).

Cut worms and prickle worms are also pests of cucumbers. The former damage the crops by cutting the plants off near soil level after which they chew the stems, roots and leaves, while the latter, with a dark brown or black head, cause small holes as they borrow into the fruit or vine to feed. Cut worms can be controlled by spraying woodash at the root of plants while pickle worm by destroying the eggs of these worms if discovered and by always opening up closed up leaves to expose hidden larva of pickleworms. Slugs and snails also present their own worries on cucumber farms in southeastern Nigeria, thereby resulting in low production (Jeffery, 2001). The use of natural insect enemies is a more environmental friendly method than spraying chemicals against insect pests.

HIGH FRUITPERISHABILITY

The perishable nature of cucumber is the factor that constrains its production. Usually, cucumber fruit is enjoyed when it is still fresh and dark green, once it turns pale green or yellow, there is normally a slump in the price thereby resulting in market glut. Jeffery (2001) posited that storage of agricultural commodities has a very important role to play in enhancing the shelf life of the produce and thus offer the commodity for sale in a phased manner to avoid unnecessary market glut and concomitant price slump. The problem is more acute in the case of perishable commodities like cucumber which cannot be stored for more than a week after harvesting (Tatilogu, 1997). However, fruits should be placed on leaves or on sawdust beds to avoid injuries to them while transporting to major consumption centers. It is not advisable to pile up too many layers of fruits. The establishment of cold storage rooms by the government for storage of vegetables and fruits would improve its marketability thereby reducing the problem of low prices faced by farmers due to the perishable nature of fruits and vegetables.

FARMERS' INEXPERIENCE AND LITERACY LEVEL

The inexperience and literacy level in cultivation requirements by farmers could affect the effectiveness of cucumber production in southeastern Nigeria. About 21.0% of cucumber farmers in southeastern agroecology had no formal education while 50% completed primary school, less than 25% of cucumber farmers had secondary education, and 4%possessed post secondary school certificate FAO (2009). However, the poor literacy level of the cucumber farmers could affect their choice of inputs and the utilization of existing inputs and their willingness to adopt improved technologies. Moreover, organizing seminars, workshops and extension workers' on-the-farm training on agronomic production packages for cucumber will go a long way in bridging most of the constraints militating against the yield, production efficiency and income of the farmers. Adinya (2001) and Idiong *et al*., (2006) had earlier noted that technical and commercial education broadens the knowledge of farmers and enables them to farm intelligently, accurately and efficiently, leading to increased yield, productivity and farm income.

Literacy level (years of education) of cucumber farmers in Southeast agro ecology

No formal education	21.0
Primary education	50.0
Secondary education	25.0
Tertiary education	4.0

Source: FAO, (2009)

Table 3: Limitations of Cucumber Production in Southeastern Agroecology

Constraint	Very serious		Serious		Mod. serious		Not serious	
	Freq	%	Freq	%	Freq	%	Freq	%
Storage problems	58	88.9	09	12.9	03	4.3		
Scarcity of planting seed	55	81.4	09	12.9	04	5.7		
Lack of capital	49	70.0	12	17.1	09	12.9		
Climatic factor	53	75.7	11	15.7	06	8.6		
Literacy level	50	65.5	11	15.7	06	8.6		

Source: FAO (2009)

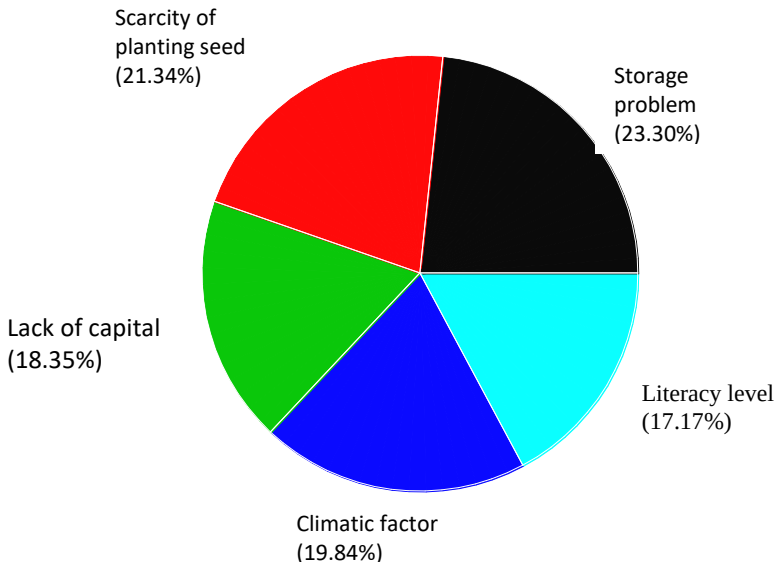


Figure 3: Pie chart representing the very serious constraints in %

CONCLUSION

The production of cucumber especially in Southeast Nigeria has suffered untold setback as a result of some factors militating against it. These factors can be redressed through the provision of sufficient improved seeds, at affordable prices and provision of low-interest loans to genuine cucumber farmers. Government should assist in the construction of standard green houses, controlled-atmosphere storage systems and irrigation programmes to tackle the environmental, postharvest and climatic factors as is practiced in northern Nigeria.

Extension agents should make effort towards educating the farmers on recent developments and methodology of cucumber production through seminars, trainings and inspections of cucumber farms.

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