



## AN INVENTORY OF TOMATO VARIETIES CULTIVATED IN KADAWA AREA, KANO STATE

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### ABSTRACT

The study is on the inventory of the tomato varieties cultivated in Kadawa area of Kano State from (1997-2017) as well as to identify the current most preferred variety by farmers and the reason for that. A survey design method was employed using questionnaire as the research instrument. About two hundred and eighty (280) respondents were selected from nine hundred and twenty-five (925) farmers using purposive sampling. The data collected were analyzed using frequency and percentage table. The result revealed that about 24 different tomato varieties were identified. Griffaton happened to be the most preferred variety by farmers of Kadawa. In Kadawa one out of every three farmers is cultivating Griffaton. This is because of its qualities that include high yield, durability, attractive sizes among others. All the tomato varieties the research identified to be cultivated in Kadawa are imported from abroad except technisem. This can be seen as a challenge to the home industries producing tomato seeds to be producing the product that can compete with those imported to be well accepted by farmers within and outside the nation. The paper advised the stakeholders to put more effort into providing qualitative and acceptable indigenous tomato varieties to avoid further extinction.

**Keywords:** Inventory, Tomato, Variety, Cultivation.

### INTRODUCTION

Tomato is one of the most consumed vegetables in the world, after potatoes and before onions and probably the most preferred garden crop (FAO, 2010). With worldwide production reaching almost 160 million tons in 2011, tomato is the seventh most significant crop species after maize, rice, wheat, potatoes, soybeans and cassava. During the last 20 years, tomato production, as well as the area dedicated to its culture, has doubled. In 2008, China, the world's leading producer recorded the highest production level of over 33.9 million tonnes followed by the United States, also recorded about 13.7 million tonnes. In Bangladesh, the cultivated area and production quantity of tomato was 23887 ha and 150720 tons in 2009 and 26300 ha and 251000 tons in 2013 which have been increased by 10.10 and 66.53%, respectively from 2009 to 2013 (Bangladesh Bureau of Statistics, 2013). The present world's fresh tomato fruit production is more than 100 million metric tons (FAO, 2010).

The cultivation of tomatoes is a major farming activity in the current world. Tomato (*Lycopersicon esculentum*) is commonly grown in the Northern part of Nigeria, but largely consumed in the southwestern states (CBN, 1999). Tomato can be grown in many places in Nigeria; provided there is a regular supply of water, however the crop does well in the savanna zone than the forest zone because diseases and pests are less prevalent. Tomato would also do well in the forest zone only with the late rains probably because of the incidence of whiteflies

(*Bemisia tabaci*), this is the vector of the common yellow patch disease.

In tomato production, the variety to choose depends on local conditions and the purpose of growing. Local varieties (landraces) and improved (or commercial) varieties can be distinguished. They are the result of a continuous process of selection of plants. Selection criteria are based on characteristics such as type of fruit, shape of plant, vitality and resistance to pests and diseases, but also on factors related to climate and management. Farmers select varieties that perform best under the local conditions. Traditionally only fruits from the best plants must be selected and kept for seeds for the subsequent season. Farmers may breed their own cultivars, but it is a costly and risky process. When using hybrids, new seeds should be purchased each season. This may cost more money, but the resistance against diseases of hybrids means the tomato plants need less spraying with pesticides. The yields are also higher, creating more opportunity to produce tomatoes (Shankaraet al., 2005).

### Aim and Objectives

The study aims to have a list of the types of different tomato varieties cultivated in Kadawa from (1997-2017) and identify the current most preferred variety by farmers as well as the reasons for that. The aim is intended to be achieved through the following objectives, to have an inventory of the variety of tomato cultivars cultivated in Kadawa from (1997-2017), to identify farmer's most suitable tomato variety among the

existing ones in Kadawa and determine the reason for choosing the preferred variety.

#### Location and Size of the Study Area

The study area is in Kadawa village covering about 370 hectares of irrigated land. The area which is part of the Kano River Project, Phase I, Kano state, is centered on the Kadawa

Irrigation Project located between latitudes 11°32'N to 11°51'N and longitudes 8°20'E to 8°40'E in the Sudan Savanna of Nigeria. The area which is in Garun Malam local government area is enclaved by Bebeji, Bunkure and Kura local government areas (Figure 1).

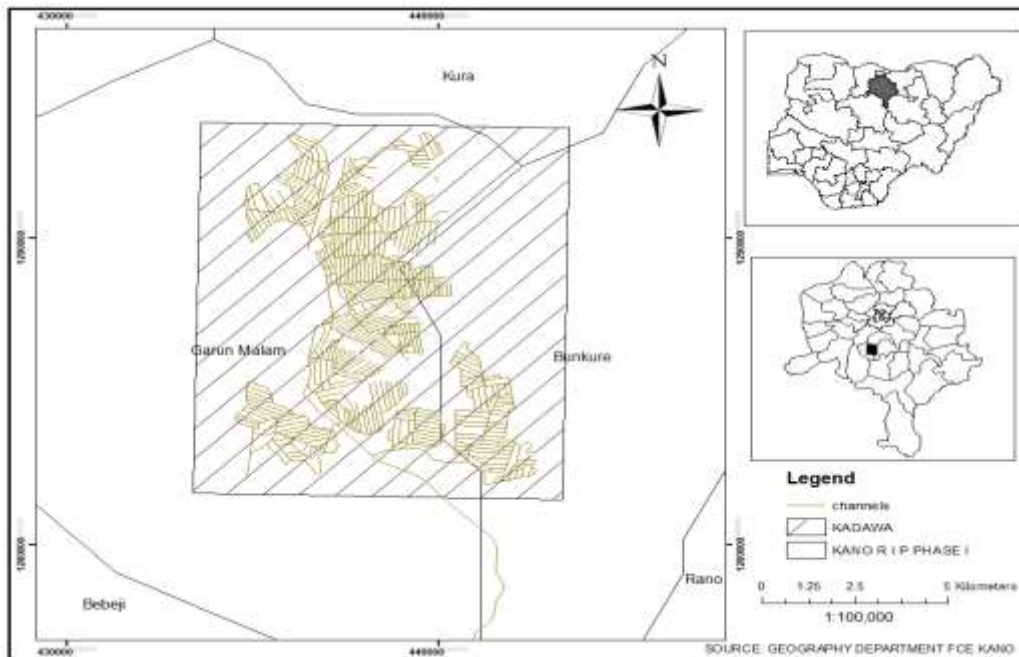


Figure 1: Kadawa in Kano River Irrigation Project, Kano, Nigeria

#### Importance of Tomato

##### (a) Food and Human Nutrition

Tomato has valuable vitamins for instance vitamin A and C and also it contains fibers, and is known as free in having cholesterol. Generally, the average size of a tomato equal to (148g) boasts only 35 calories. Approximately 20–50 mg of lycopene/100g of fruit weight can be found in tomatoes. Lycopene is a member of the family of pigments, are called carotenoids. This family can form colors in fruits and vegetables, naturally. Lycopene is the best powerful antioxidant in the carotenoid family and it prevents humans from free radicals that degrade many parts of the body, lycopene is also known to protect humans from cancer. At present, tomatoes are utilized at a higher rate in the developed countries than in the developing countries and hence it may be referred to as a luxury crop (Bhatia, 2004). Linda Naeve (2015) revealed that Tomatoes have significant nutritional value; they are a good source of vitamin C, vitamin A and antioxidants. Tomatoes have also been promoted as a possible preventative against specific cancers.

##### (b) Economic Importance

Today, tomato is not only sold fresh but also processed as paste, soup, juice, sauce, powder, concentrate or whole. Tomato is one of the most consumed vegetables in the world, after potatoes and probably the most preferred garden crop. With worldwide

production reaching almost 160 million tons in 2011, tomato is the seventh most important crop species after maize, rice, wheat, potatoes, soybeans and cassava. During the last 20 years, tomato production, as well as the area dedicated to its culture, has doubled. Tomato serves as a raw material for the processing industries where investors make huge profit and government generate revenue as well. From its production to the final consumer, tomato provides jobs to millions of people worldwide (FAO, 2008).

##### Origin of Tomato

Tomato comes from the kingdom Plantae, the family Solanaceae and the genus, Solanum. Its botanical name is *Lycopersicon esculentum*. Tomatoes have been used as food by the inhabitants of Central and South Americas since prehistoric times. It originally came from tropical areas from Mexico to Peru. All tomato varieties in Europe and Asia are said to be descendants of the seeds taken from Latin America to Europe and Asia by the Spanish and the Portuguese merchants during the 16<sup>th</sup> century. African tomatoes, on the other hand, were introduced by European merchants or colonizers. Thus, today, modern tomato cultivars and hybrid can be grown and can produce fruit in climates far different from the site of its origin. It has become one of the most popular vegetables in the tropics and other countries in Asia and the rest of the world (Villareal, 1979).

### The Right Variety of Tomato

Hundreds of tomato varieties exist to suit every climate, garden site and taste. Some tomatoes ripen in 55 days and varieties that require three months of hot weather to produce their crop. Some produce vines that will sprawl 25 feet if not maintained by pruning, while others are only 8 inches high at maturity. Some are having thick fruit skin and long durability just like UC 82B. Fruit range in size from as small as marbles to as large as grapefruits and with different colors that attract consumers. Resistance to diseases, stresses, and disorders is another important consideration, especially for growers who have experienced these problems in the past. Many variety names are followed by one or more letters indicating resistance to Verticillium wilt (V) or Fusarium wilt (F) diseases, Petomech

VF or Roma VF, for example, and some varieties are less likely to experience problems such as cracking and yellow shoulders (Sideman, 2016).

### World Tomato Cultivars

Tomato varieties are classified as determinate or indeterminate. Determinate or bush types bear a full crop all at once and top off at a specific height. They are preferred by commercial growers who wish to harvest a whole field at one time. Indeterminate varieties develop into vines that, under favorable growing conditions, never top off and continue to produce fruit until cold weather sets in. They are preferred by commercial fresh market growers and home growers who want ripe fruit throughout a growing season. Different cultivars exist in the world as shown in table 2.1 below.

**Table 1.1: Varieties of Tomato Cultivars in the World**

Common name	Color	Maturity (days)	Genetic type	Size	Shape	Growth
<a href="#">Adoration</a>	Red	70–80	Hybrid	Small	Cocktail	Indeterminate
<a href="#">Beefsteak</a>	Red	96	Heirloom	Large	Beefsteak	
<a href="#">Better Boy</a>	Red	70–80	Hybrid	Medium/ Large	Standard	Indeterminate
Big Beef	Red	70–80	Hybrid	Medium	Beefsteak	Indeterminate
<a href="#">Big Rainbow</a>	Yellow/ Red	80 – 85	Heirloom	Large	Beefsteak	
<a href="#">Cherokee Purple</a>	Brown/ Purple	70–80	Heirloom	Medium/ Large	Beefsteak	Indeterminate
<a href="#">Early Girl</a>	Red	63	Hybrid	Medium	Standard	Indeterminate
<a href="#">Garden Peach</a>	Yellow	75	Heirloom	Large		
Gardener's Delight	Red	65	Heirloom	Small	Standard	Indeterminate
<a href="#">Hillbilly</a>	Red/ Orange	85	Heirloom	Large	Standard	Indeterminate
<a href="#">Jubilee</a>	Yellow	72	Heirloom	Medium	Standard	Indeterminate
Juliet	Red	55–68	Hybrid	Small	Grape	Indeterminate
<a href="#">Kumato</a>	Brown/ Red	70–80	Hybrid	Small/ Medium	Standard	Indeterminate
<a href="#">Lillian's Yellow</a>	Yellow	90	Heirloom	Medium	Standard	
PantanoRomanesco	Red	70–80	Heirloom	Medium/ Large	Standard	Indeterminate
<a href="#">Red Currant</a>	Red	65–70	Heirloom	Small	Round	
<a href="#">Roma</a>	Red	70–80	Hybrid	Medium	Plum	Determinate
<a href="#">Yellow Pear</a>	Yellow	70–80	Heirloom	Small	Pear	Indeterminate

*Source: (University of Nebraska Lincoln Institute of Agriculture and Natural Resources, 2016).*

### Some Tomato Cultivars in Africa

The fresh market cultivars include Florodade, Heinz 1370, Karino, Rodade, Fortress, Hytec, Star 9001, Star 9003, Sundance and Zeal. Baldo, Blockbuster, Disco, P 747 and

Shirley are also fresh market cultivars that have a long shelf life. Tomato cultivars suitable for jam or preserving include HTX 14, Legato, Roma VF, Rossol, Star 9056F, Sun 6216 and UC

82B (Directorate of Agricultural Information Services, Pretoria, 2001).

### MATERIAL AND METHODS

The instrument for the research happened to be a questionnaire where out of the 925 farmers, 280 were identified to be the sample size through the use of the table for determination of sample size (Krejcie & Morgan, 1970). Purposive sampling was

adopted to select the 280 full-time tomato farmers across the whole Kadawa farming area for the administration of the questionnaire. After the retrieval of the questionnaire 18 were found damaged leaving 262 for further treatment. The technique used in this research is a descriptive statistical technique using frequency count and percentage for the analysis.

### RESULTS AND DISCUSSIONS

**Table 1: List of Tomato Varieties Commonly Cultivated in Kadawa (2007-2017)**

Tomato Variety	Origin	Characteristics
Apulia	Italy	It is a variety with good taste, attractive red color, big fruit size, long and dense plants.
Bakker brother	Netherlands	A variety with high yield, thick flesh and long egg shape.
Box-car willie	USA	It is a smooth red tomato with delicious flavor, medium size and high yield
Cherry roma	USA	A long-shaped tomato with good flavor and short maturity period.
Chivilly	China	It is a variety that has the most needed qualities in tomato. It has a very high yield, many plant branches, thick flesh and last long.
Dan Denmark	Denmark	It is a good variety with high yield and long-lasting.
Dandino	USA	It is a moderate size tomato with red and yellow color.
Gianfranco	USA	It is a smooth red color tomato with small fruits and a high yield.
Griffaton	France	It is a good variety with appreciable characteristics that include: qualitative strong skin, average sizes, early maturity period, and high output.
Kalos	Italy	It is a high-yield variety well grown by farmers.
Martino's roma	USA	A meaty and high-yield fruit with an early maturity period. It has a moderate size fruit
Monarch	Netherlands	A tomato variety with tall plants, moderate size and thick foliage.
Pop Vriend	Netherlands	It is a big size variety with a high yield.
PPZ Holland	Netherlands	It is a tomato of moderate size, high yield and long-lasting.
Premier	England	It is a variety with high yield and long-lasting.
Roma VF	Italy	It has a multiple branches, meaty fruit and a short maturity period.
Royal	Kenya	It is a variety with oval shape, long shelf life and long harvesting period
Semetes	China	It is a good tomato variety that yields plenty and big size fruits but takes a long time before been matured.
Starke Ayres	South Africa	It is a variety with high yield, big fruits and takes a long time before becoming due for harvesting.
Technisem	Nigeria	A highly flexible variety that can be grown successfully in both wet and dry season
Top harvest	England	It is a variety with low yield and small fruits size.
Tropica	Australia	It is a sweet medium-sized, fleshy red fruit. Tropica has a rich flavor and is grown successfully in a hot humid climate.
UTC	USA	It is a reddish fleshy tomato with stripes of yellow, low water content and a short maturity period.
Vikima	China	It is a variety with red and yellow color, early maturity period and plum shape.

**Source:** Field Survey, 2018

The majority of the tomato varieties cultivated in Kadawa are from foreign countries as can be seen in table 1. Only one variety (Technisem) is produced in Nigeria, but most of them are the origin of the western countries and China. This shows that the tomato seeds produced by the local industries in Nigeria are up to now yet to be well accepted by farmers in Kadawa. The farmers are usually after having qualitative seeds regardless of their origin. As such, if the local seeds producers can produce improved seeds with the needed quality, they can compete with the foreign products, and they can easily be accepted by farmers both in Kadawa and beyond. Seeds from Netherlands and the USA are the most dominant tomato varieties cultivated in Kadawa. Most of the tomato

varieties experienced in Kadawa are having the good qualities needed in tomatoes. However, the best yield can be gotten from the best farm management.

**Table 2 Farmer's most preferred tomato variety**

Varieties	Frequency	Percentage (%)
Apulia	6	2.3
Chivilly	12	4.6
Dandino	2	0.8
Gianfranco	12	4.6
Griffaton	83	31
Petomech	7	3
Premier	5	2
Roma VF	11	4.2
Royal	20	7.6
Semetes	3	1.1
Starke	28	11
Technisem	17	6.5
Top harvest	3	1.1
Tropica (UC)	22	8.4
UTC	31	11.8
<b>Total</b>	<b>262</b>	<b>100</b>

**Source:** Field Survey, 2018

Table2 shows the tomato varieties available in Kadawa with their rate of been preferred by farmers. Griffaton is the variety with the highest frequency representing 31%. This indicates that Griffaton is the currently most cultivated tomato variety in Kadawa. This is in line with the situation in 'Danja of Katsina state, where Griffaton was also reported on 23<sup>rd</sup> of December's Daily Trust newspaper (Daily Trust, 2015). UTC is the next highly cultivated variety representing 11.8% while starke is the third with 11%. Although, Griffaton is one of the most new variety, but it is now more acceptable by farmers more than all the available ones. The least cultivated varieties are Dandino, Semetes and Top harvest representing 0.8%, 1.1% and 1.1% respectively.

**Table 3 Tomato Varieties against Farmers Reasons for the choice**

Varieties		Reason for choosing						Total
		Quick Yield	High Yield	Big Size	Durability	Multiple branches	Smooth and attractiveness	
Apulia	Frequency	4	4	0	1	0	0	9
	% within Reason for choosing	6.2%	2.7%	0.0%	1.3%	0.0%	0.0%	2.0%
Chivilly	Frequency	0	1	0	13	0	0	14
	% within Reason for choosing	0.0%	0.7%	0.0%	16.9%	0.0%	0.0%	3.1%
Dandino	Frequency	3	7	0	1	0	0	11
	% within Reason for choosing	4.6%	4.8%	0.0%	1.3	0.0%	0.0%	2.4%
Gianfranco	Frequency	0	3	9	2	1	3	18
	% within Reason for choosing	0.0%	2.1%	10.5%	2.6%	4.3%	5.7%	4.0%
Griffaton	Frequency	29	52	20	19	10	23	153
	% within Reason for choosing	44.6%	35.6%	23.3%	24.7%	43.5%	43.4%	34.0%
Petomech	Frequency	1	3	1	2	0	3	10
	% within Reason for choosing	1.5%	2.1%	1.2%	2.6%	0.0%	5.7%	2.2%
Premier	Frequency	0	0	7	0	0	0	7
	% within Reason for choosing	0.0%	0.0%	8.1%	0.0%	0.0%	0.0%	1.6%
Roma	Frequency	0	4	1	0	0	4	9
	% within Reason for choosing	0.0%	2.7%	1.2%	0.0%	0.0%	7.5%	2.0%
Royal	Frequency	12	23	2	0	7	4	48
	% within Reason for choosing	18.5%	15.8%	2.3%	0.0%	30.4%	7.5%	10.7%
Starke	Frequency	10	6	15	15	1	2	49
	% within Reason for choosing	15.4%	4.1%	17.4%	19.5%	4.3%	3.8%	10.9%
Technisem	Frequency	1	8	16	8	2	5	40
	% within Reason for choosing	1.5%	5.5%	18.6%	10.4%	8.7%	9.4%	8.9%
Top Harvest	Frequency	0	0	3	1	0	0	4
	% within Reason for choosing	0.0%	0.0%	3.5%	1.3%	0.0%	0.0%	.9%
Tropica (UC)	Frequency	3	9	2	12	0	1	27
	% within Reason for choosing	4.6%	6.2%	2.3%	15.6%	0.0%	1.9%	6.0%
UTC	Frequency	2	26	10	3	2	8	51
	% within Reason for choosing	3.1%	17.8%	11.6%	3.9%	8.7%	15.1%	11.3%
Total	Frequency	65	146	86	77	23	53	450
	% within Reason for choosing	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

**Source:** Field Survey, 2018

The reason for choosing different tomato varieties by farmers in Kadawa can be seen in Table 3. The percentages of each variety for the whole reason are shown vertically. The frequency for the sum of each reason is given, were the total for “quick yield, high yield, big size, durability, multiple branches, smooth and attractiveness” where shown as 65, 145, 86, 81, 23, and 50 respectively.

The first column which is “quick yield” shows that Griffaton is having the highest percentage of 44.6%. This is followed by royal with 18.5% and stark with 15.4%. This shows that these

three varieties are not taking a long time before becoming due for harvesting compared to the others. This is a good advantage to the farmers because the early period harvest is one of the most valuable produce to farmers. At this period the price of tomatoes is still high. It is after this harvest, the price of tomatoes will be gradually declining day by day up to the least on-season price.

”High yield” is another quality in tomato production that is expected by every farmer for the sake of having a maximum output. Griffaton, UTC and Royal are the most excel varieties

among the current tomatoes with percentages 35.6%, 17.8% and 15.8% respectively.

Big sizes in tomato production have an advantage especially by having limited pieces to fill up a basket and in the market to attract the attention of buyers. Griffaton, Technisem and Starke are the varieties of tomatoes that their sizes are more appreciable by the farmers.

Durability or long-lasting in tomato is much needed by tomato farmers or marketers. Tomato with such quality can be transported to distant places without much problem. The difference in durability between landraces and improved varieties makes the farmers stopped cultivating the landraces and focused on the improved varieties. Griffaton, Starke and Chivilly are the varieties that last longer than the others representing 24.7%, 19.5% and 16.9% respectively.

The fifth column displayed the behavior of tomato varieties on "plant multiple branches". This is a good quality that gives a high yield in tomato cultivation. Some varieties are characterized by plenty of plant branches while some are having limited branches. According to the responses of the farmers in Table 3, Griffaton, Royal, Technisem and Tropica are the varieties with higher plant branches representing 43.5%, 30.4%, 8.7% and 8.7% respectively. This is also one of the good characteristics of the tomato plants that usually call the attention of farmers to stick to cultivating the variety with such quality.

The sixth column which is the last shows the differences of tomato varieties in terms of "smoothness and attractiveness". Some of the good tomatoes that have a smooth skin attract buyers and expect to last long. Based on the responses of farmers in Table 3, Griffaton, Technisem and UTC are the most smooth and attractive varieties.

Considering the responses on the reasons of farmers for choosing tomato varieties that appeared in Table 3, Griffaton excels in all the qualities been considered. This shows the reason why Griffaton is more cultivated by farmers in Kadawa as can be clearly seen in Table 2 above. UTC is the next tomato variety well accepted by farmers in Kadawa. It is among the varieties that spent many years in use by farmers because of its good qualities. High yield associated with UTC is what makes Kadawa tomato farmers to stick to cultivating this variety. Starke is another good variety that emerged as the third most cultivated by farmers for its big size and long last.

## CONCLUSION

This study looked at the inventory of the tomato varieties cultivated in Kadawa for about 20 years (1997-2017). In addition to the inventory of the most tomato varieties, identification of the most suitable variety and the reason for the farmers' choice constitute the objectives of the study. The study succeeded in achieving the aim of the study. About 24 varieties were identified from (1997-2017) out of which 9 are now no longer present in Kadawa. Griffaton is the most highly cultivated among the present 15 varieties. It shows that 31% of

the farmers are cultivating Griffaton due to its advantage over the rest.

Based on the research findings it has been identified that out of the twenty-four (24) tomato varieties been cultivated in Kadawa, Griffaton, an improved tomato variety from France is the most cultivated variety. Almost one out of every three farmers is cultivating Griffaton in Kadawa. Out of the 24 tomato varieties, nine (9) are now in extinct. All the tomato varieties, except Technisem, are from the foreign countries. Most of them are supplied from the western countries and China. This shows that if the certain condition prevents the importation of foreign products into Nigeria including tomato seeds, many farmers will miss the seeds variety they are familiar and rely on. This is also a challenge to the home seed industries because the farmers are ready to accept any crop variety with good quality regardless of its origin. This implies that the survival of the home seed industries in Nigeria is at stake if they cannot produce the quality product that can compete with the foreign ones that dominated the important tomato production sites in Nigeria for quite a long time.

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