

## **Evaluation of Tomato Varieties on Resistance to Flea Beetle and Fruits Worm in Semi Arid Zone Borno State of Nigeria**

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**Abstract:** The study was conducted to assess the different tomato varieties resistance to flea beetle and fruitworms on growth and yield of tomatoes [solanum lycopersicon]. The objective is to know which variety is tolerance to insect pest, to determine the improvement and adaptation among the varieties. The treatments are local variety, utc, and roma which was laid out in a Randomized Completely Block Design which was replicated four times, the data was collected on plant height, number of insect observed and number of leaves damage and yield weight after harvest. The data was analysed using statistical 8.0 vision. The result of varieties after six weeks on plant height, number of insect observed and number of leaves damage. The plant height at six weeks, the local variety with highest number of plant height with 39.275 and the least number of plant height is recorded under utc with 33.675, the number of leaves damage at five weeks, the result indicate that local variety have the highest number with 2.5000 while utc, 0.8500 and roma, 0.5000, while number of insect pest at five weeks are, local variety 7.6250, roma, 1.4500 and utc, 0.8500

**Keywords:** flea beetle and fruitworms, tomatoes varieties, resistance

### **1.0 INTRODUCTION**

Tomato (*Solanum lycopersicum*) is one of the most widely grown vegetable crops in the world, second to potato (Maerere *et-al*, 2006). Tomatoes are used not only for fresh table food, but also for Ketchup, pure, sauces and in many other ways. Tomatoes have been used for food by the inhabitants of central and South America since prehistoric time. It originally came from tropical area 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 16th century. African tomatoes, on the other hand, were introduced by European merchant 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 (Villard, 1979).

Tomato is a warm season crops and plants cannot stand severe frost. The crop does well under an average monthly temperature of 21° to 23°c but commercially it may be grown at a temperature ranging from 18° to 27°c in most tropical countries, average yield range between 2 to 10 tons of fruit/ha, against yield of 20tons in south Korea 40tons in the USA 50tons in Japan and over 130tons in the Netherlands'. Tomato belong to the family nightshade family, the plant typically grows to 1 to 3 meter (3-10ft) in the height and has a weak stem that often sprawls over the ground and vines over other plants. It is a perennial in its native habitat, although often grown outdoor in temperature climate as annual crop. Tomato is the edible, often red fruit berry of the nightshade solanum, commonly known as tomato plant. Tomato is consumed in diverse ways as an drink while it is botanically a fruit. It is considered a vegetable for culinary purpose, which has caused some confusion. The fruit is rich in hycopence, which may have beneficial health effects. Tomato thrives in between temperature 10° and 30°c and neither tolerant to high acidity can thrive on much kind of soil ranging from sand to heavy clayed. An average common tomato weights approximately 100grams (4oz). Tomato cannot be planted directly on the field but raised on nurseries before transplanting to the permanent site for adequate establishment and productivity. Under some condition, some cultivars can be seeded directly on the field. Tomato is now one of the popular and widely grows vegetables around the world. Tomato are most important vegetable commodity after patota planted to about 6000 hectares which is grow in summer and winter in frost –free areas. Similarly, tomato belongs to one of the most important easy varietals, method of cultivation and processing (purse glove, 1968)

In Egypt tomatoes to as infected with different pest wild caused considerable damage in both quality and the quantity of the species are known to be of great economics importance as bennaci tabaci (germ) my nz pesicae (sulzer) tedranyekus cuticar kock and tetranychs cucurbitacearum (soyed). They cause many indirect damage by transmitting several micro-organisms such as viral, fungus and pathogen. Photoperiods mited are of economic importance as natural enemies of various photophygous miles on many crops. Considered main insect pest infesteting tomato, cause serious damage the plat and yield

Tomato has high level of susceptibility to infestation by insect pests, which are responsible for decline in quantity or quality and germination potentials. The cultural control method by screening the varieties that are resistant to the insect pests attack are more environmentally friendly.

### **3.0 MATERIAL AND METHOD**

#### **3.1 The Study Area**

The study was conducted in Ramat polytechnic teaching farm, Maiduguri is located at latitude 11.15°N and longitude 13.15°N about 354m above the sea level (wikipedia 2013). It is dry sub-humid in native characteristics by a unimodal rainfall pattern and the hottest month being March and April and coolest month being November and December, the minimum range is 37-45°C (wikipedia 2013). The rainy season is usually short normally from the month of May to October with relative humidity and annual rainfall is 440-600mm.

#### **3.2 Sourcing of Material**

Three seed varieties seed of tomatoes (Roma, Utc and Local variety) was sourced from BOSAP office opposite of BRTV area of Maiduguri. Borno state

#### **3.3 Nursery Preparation**

Seeds are sown in a seed bed, preferably of fertilizer soil. Raised beds are prepared, it should be avoided using some place for nursery preparation for every year. The nursery bed of 15cm height and 0.8cm depth and then convenient length beds are prepared and sown sparsely along the line of 0.5cm depth and then covered by a thin layer of straw or dried grasses. Germination occurs within 7-8 days after which the straw cover are removed and beds irrigated directly. When seedling became crowded they are thinned to avoid competition for resources.

#### **3.4 Land Preparation and Field Layout**

Plunging and digging is necessary to prepare the land for a new crop. It improves the structure and water holding capacity. There after hoe, tape, rope, and pegs will be used to demarcate each plots.

#### **3.5 Transplanting of Seedlings**

The nursery seedling was transplanted when it reached the planting period. The seedling of tomatoes will be transplanted to each (12) plots with a spacing size of 0.5m interspaces, 0.5working alley and 0.5 outside the border will be cleared, harrowed and ridged. The tomato seedlings were gently uprooted with their roots covered with soil to prevent transplanted at 2.5cm depth at a spacing 60x60cm in labeled plots. One week after transplanting of the seedling, the

failed stands were filled to maintain existing gaps and plant populations. Weeded as at when due anorganic manure fertilizer was applied at the rate of 15kg per plots.

### **3.6 Irrigation**

The supply of adequate water to the root of a tomato plant is critical. The seedling were watered early morning and late evening by means of irrigation.

### **3.7 Experimental Procedure and Design**

The experiment was conducted in a randomized complete block design with the three treatment replicated four times. The treatment comprised of (ROMA, UTC, and LOCAL VARIETY). The experiment plots consist of 12 plots at a spacing of 2x2m and 0.5 working alley 0.5 borders was cleared harrowed and ridged.

### **3.8 Data Collection**

i. The number of flea beetle species count

Data were collected on insect pest species, number that found attacking the tomatoes varieties were counted counting and recorded.

ii. The damage leaves was counted

This should be done 3 weeks after seedlings establishments on each plot at weekly interval. The number of damage leaves per plant was counted to study the effects of the treatments on fruit worm and flea beetles.

iii. Plant height and of laves size was measured

Data on tomato plants height was obtained by measuring plots from the each randomize selected stand per plot from the ground level to the growing tips using a plastic measuring tape.

iv. The yield per plots

The yield per plot was collected from each plot at an interval of 7 days and weight.

### **3.9 Data Analysis**

All data collection were subject to analysis of variance (ANOVA) use statistical software\ (statistical version 8.0). The different between mean were compared and separated using least significant different (LSD) 5% level of probability.

## 4.0 RESULT AND DISCUSSION

### 4.1 RESULTS

Table 1: Shows plant height (cm) of three cultivars (local variety, Roma and UTC) of tomato at different weeks

Treatments	1 Week	2 Week	3 Weeks	4 Weeks	5 Weeks	6 Weeks
LV	19.625 <sup>a</sup>	23.100 <sup>a</sup>	26.475 <sup>a</sup>	30.875 <sup>a</sup>	34.925 <sup>a</sup>	39.275 <sup>a</sup>
ROMA	14.475 <sup>a</sup>	16.900 <sup>b</sup>	20.950 <sup>ab</sup>	24.475 <sup>ab</sup>	27.975 <sup>a</sup>	33.850 <sup>a</sup>
UTC	14.675 <sup>a</sup>	16.525 <sup>b</sup>	19.900 <sup>b</sup>	23.250 <sup>b</sup>	27.200 <sup>a</sup>	33.675 <sup>a</sup>
CV	19.22	17.82	16.77	15.48	16.21	9.49
SE	2.2097	2.3741	2.6614	2.8686	3.4429	2.3892

Means in the column accompanied by the same letter (a) are not significantly difference at ( $P < 0.05\%$ ) using least significance different (LSD).

#### Week 1

The result shows that at week there are not significant different among the treatments, however, their height number of plant height as recorded under local variety with 19.625, followed by ( Roma with 14.475 and UTC with 14.675.Week2

The result shows that there were significant different among the treatments, however, their highest number of plant was recorded under local variety with 23.100, followed by the (Roma with 16.900 and UTC with 16.525, the find reveal that there are significant different of plant height which was found under local variety with 23.100.Week3

The result shows that there are significant different among the treatments, however their highest number of plant height was recorded under local variety with 26.475, followed by (Roma with 20.950 and UTC with 19.900.At week 3

there are significant different among the treatments, which was found under local variety with 26.475.Week4

The result shows that there are significant different among the treatments, however, their highest number of plant height was recorded under local variety with 30.875, followed by (Roma with 24.475 and UTC with 23.250. At week 4 finding reveals that there are significant different of the plant height which was found under local variety with 30.875.Week5

The result shows that at week 5 there are no significant different among the treatments, however, their highest number of plant height was recorded under local variety with 34.925, followed by (Roma with 27.975 and UTC with 27.200.Week 6

The result shows that at week 6 there were no significant different among the treatments, however, their highest number of plant height was recorded on local variety with 39.275, followed by (Roma with 33.850 and UTC with 33.675

Table 2: Shows the number of leaves damage of three tomato cultivar at different weeks

Treatments	One week	Two weeks	Three weeks	Four weeks	Five weeks
LV	0.2500 <sup>a</sup>	0.7500 <sup>a</sup>	1.5000 <sup>a</sup>	2.0000 <sup>a</sup>	2.5000 <sup>a</sup>
ROMA	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>	0.0000 <sup>b</sup>	0.0000 <sup>b</sup>	0.5000 <sup>b</sup>
UTC	0.2500 <sup>a</sup>	0.6500 <sup>a</sup>	0.0000 <sup>b</sup>	0.5000 <sup>b</sup>	0.8500 <sup>b</sup>
CV	173.21	100.25	66.67	40.00	21.26
SE	0.2041	0.3308	0.2357	0.2357	0.1929

Means in the column accompanied by the same letter (a) are not significantly difference at ( $P < 0.05\%$ ) using least significance different (LSD)

The result shows that the number of leave damage on different tomatoes varieties, there were no significant different among all the treatments, however, the highest number of convert damage was in local variety with 0.2500, followed by (Roma with 0.0000 and UTC with 0.2500.Week2

The result shows that the number of leave damage on three different tomato varieties, there are no significant different among the all treatments, however,

the highest number of converts damage was local variety with 0.7500, followed by (Roma with 0.0000 and UTCwith 0.6500.Week 3

The result shows that the number of leave damage of three different varieties of tomatoes, there are significant different which the highest number of leave damage was recorded on local variety with 1.5000, followed by (Roma with 0.0000 and UTC with 0.000.Week 4

The result shows that the number of leave damage on three different varieties of tomatoes, there are significant different which the highest number of leave damage was recorded under local variety with 2.000, followed by (Roma with 0.0000 and UTC with 0.5000.Week 5

The result shows that the number of leave damage on three different varieties of tomatoes, there are significant different which the highest number of leave damage was recorded under local variety with 2.5000, Roma with 0.5000 and UTC with 0.8500.

Table 3: Shows the number of Insect (fruit worms) on three cultivars of tomato at different weeks

Treatments	One week	Two weeks	Three weeks	Four weeks	Five weeks
LV	2.5000 <sup>a</sup>	3.0000 <sup>a</sup>	3.7500 <sup>a</sup>	5.5000 <sup>a</sup>	7.6250 <sup>a</sup>
ROMA	1.0500 <sup>b</sup>	0.4500 <sup>b</sup>	0.2000 <sup>b</sup>	1.5500 <sup>b</sup>	1.4500 <sup>b</sup>
UTC	0.3500 <sup>b</sup>	0.2500 <sup>b</sup>	0.1500 <sup>b</sup>	0.6500 <sup>c</sup>	0.8500 <sup>b</sup>
CV	62.44	31.86	17.42	16.06	21.86
SE	0.5740	0.2779	0.1683	0.2915	0.5114

Means in the column accompanied by the same letter (a) are not significantly difference at (P< 0.05%) using least significance different (LSD).

Methods adopted by, Dobson *et al.*, [2002]reported African boll worm,is one of most destructive insect pest of tomatoes.

The result shows that the number of insect (fruit worm) on three different tomatoes at weeks, there are significant different among the three varieties of tomatoes. However result reveals that the highest number of insect was found to be in with local variety with 2.5000, Roma with 1.0500 and UTC with 0.3500.

## Week2

The result shows that the number of insect on three different tomatoes, there are significant different among the all varieties of tomatoes, the highest number of insect was found on local variety with 3.0000, Roma with 0.4500 and UTC with 0.2500.

### Week3

The result shows that the number of insect on three different tomatoes, there are significant different among the treatments, however, the highest number of insect was found on local variety with 3.7500, Roma with 0.2000 and UTC with 0.1500.

### Week4

The result shows that the number of insect three different tomatoes, there are significant different among the treatments however, highest number of insect was found on local variety with 5.5000, followed by (Roma with 1.5500 and UTC with 0.6500.

### Week5

The result shows that the number of insect on the three different varieties of tomatoes, there are significant different among the all treatments, however, the highest number of insect was found on local variety with 7.6250, followed by the Roma with 1.4500 and UTC with 0.8500.

Table 4: Shows the yield weight (Kg) of three tomato cultivars after harvest

Treatments	Yield weight (Kg)
LV	1.3000 <sup>a</sup>
ROMA	1.8000 <sup>a</sup>
UTC	1.8250 <sup>a</sup>
CV	25.34
SE	0.2942

Means in the column accompanied by the same letter (a) are not significantly difference at ( $P < 0.05\%$ ) using least significance different (LSD).

The result shows that the yield weight of three different tomatoes after harvest. At reveals that the highest number of yield among the different tomatoes there are no significant among the all the treatment in yield. However, the highest



number of yield was registered under local variety which found to be with 1.3000, followed by the Roma with 1.8000 and UTC with 1.8250. Analysis variable (ANOVA at 05% level].The methods adopted by fayaz,*et al.*,[2001],different in total fruits yield might be due to different fresh fruit yield and nature of fruits.

#### 4.1 Discussion

**Table 1:** Shows plant height (cm) of three cultivars (local variety, Roma and utc,

At week six the result shows that there were no significant different among the treatments, however, the highest number of plant height was recorded on local variety with 39.275, followed by (Roma with 33.850 and UTC with 33.675,the methods adopted by sharma and restogi[1993],who reported on significance variation among cultivars for number of branches and fruit per plant.

**Table 2:** Shows the number of leaves damage of three tomato cultivar at different weeks

At week five the result shows that the number of leave damage on three different varieties of tomatoes, there are significant different which the highest number of leave damage was recorded under local variety with 2.5000, Roma with 0.5000 and UTC with 0.8500.

**Table 3:** Shows the number of Insect (fruit worms) on three cultivars of tomato at different weeks.

Week one result shows that the number of insect (fruit worm) on three different tomatoes at weeks, there are significant different among the three varieties of tomatoes. However result reveals that the highest number of insect was found to be in with local variety with 2.5000, Roma with 1.0500 and UTC with 0.3500,method adopted by Dobson et a.,.[2002]African boll worm, is one of the most destructive insect pest of tomatoes.

Week two the result shows that the number of insect on three different tomatoes, there are significant different among the all varieties of tomatoes, the highest number of insect was found on local variety with 3.0000, Roma with 0.4500 and UTC with 0.2500.

At week three the result shows that the number of insect on three different tomatoes, there are significant different among the treatments, however, the

highest number of insect was found on local variety with 3.7500, Roma with 0.2000 and UTC with 0.1500.

At week four the result shows that the number of insect on three different tomatoes, there are significant different among the treatments however, highest number of insect was found on local variety with 5.5000, followed by (Roma with 1.5500 and UTC with 0.6500.

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