



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

**CARIBBEAN FOOD CROPS SOCIETY**

**PROCEEDINGS**



**ELEVENTH ANNUAL  
MEETING**

**AN INVESTIGATION ON THE YIELD RESPONSE OF TWO TOMATO  
VARIETIES TO DIFFERENT LEVELS OF NITROGEN AND  
POTASH FERTILIZER AND TO A DRY GRASS  
MULCH COVER**

*by*

**LIONEL H. SMITH**

*Agrometeorologist, Caribbean Meteorological Institute.*

**INTRODUCTION**

In Barbados tomatoes are grown on small areas by many farmers. Unfortunately, there has been no research on the fertilizer requirements of tomatoes on the various soils of the Island. There is a need for information on the response of tomato varieties to fertilizers on all the major soil types of the Island. This experiment attempts to determine the response of tomatoes to nitrogen and potassium fertilizers on the Vertisol (30 series Vernon & Carrol 1961) at the Central Agronomic Research Station, Graeme Hall, Christ Church.

In the drier areas of the Island tomatoes are planted at the end of the wet season. Farmers in these areas may often cover the soil with a dry grass mulch during the growing period of the tomato crop. Many farmers are unable to give an explanation of the value of this traditional practice. This experiment thus also attempts to determine whether a dry grass mulch could appreciably increase the yield of the crop.

The fertilizers and mulch were tested in a trial in which two varieties of tomatoes were used. The varieties were planted at the same time in adjacent areas of the station. The variety 'Indian River' was selected because of its reported heavy vegetative growth characteristic and longer vine (plant) persistence.

The 'Bounty' variety was selected because of its reported hardiness under local growing conditions. This variety also shows less vine growth and is reported to be higher yielding. The 'Bounty' variety is more commonly grown by farmers than the 'Indian River'. During the trial, observations were also made of the growth habit of these two varieties.

### METHOD

The experiment consisted of a 2<sup>3</sup> factorial design with each of the two varieties. The three primary treatments were as follows:—

- (1) Dry grass mulch cover VS No mulch cover.
- (2) Zero Potash fertilizer VS 200lbs Sulphate of Potash per Acre.
- (3) Zero Nitrogen fertilizer VS 200lbs Ammonium Sulphate per Acre.

The area was marked out into 32 plots each 600 sq. ft (30 x 20 ft), with 6 ft guard areas between adjacent plots. Sixteen (16) plots were planted (15.4.71) with the 'Indian River' variety and sixteen (16) with the 'Bounty' variety. Four (4) seeds were planted at sites spaced approximately 18" x 18" apart in each plot. Three weeks after planting the seedlings were sprayed with 'Gustathion' to avoid damage by insects.

It was necessary to thin out and transplant the plots to achieve the desired plant density. This was first done 30 days after planting. The final thinning out and transplanting were done 7 days later. At this stage the final plant population averaged 220 plants per plot.

The crop was periodically sprayed with 'Lannate' to protect it against severe 'leaf-miner insect' attack. The plants were also sprayed with 'Antracol' to protect them against damage due to leaf-fungal disease.

The plots were irrigated at intervals of about once per week during the first 6 weeks of crop growth, the last irrigation being on the 11th May.

The appropriate fertilizer treatments were applied to the plots 40 days after planting. After the plots were fertilized the dry sour grass mulch cover was applied to the appropriate plot areas. The whole area of the plot was covered with the mulching material.

The crop was harvested on 10 occasions between 15th June and the 3rd August, 1971. At the final harvest the vines were removed. All the fruits were removed from the vines and the number of immature fruits still on the plant were counted and weighed.

## RESULTS AND DISCUSSION

The fruits were harvested and separated into marketable and unmarketable groups; each group was weighed separately. The major cause of unmarketable fruits was bird damage. Seventy-one (71) percent of the total number of fruits harvested from the 'Bounty' variety were marketable. This quantity of fruits constituted a similar seventy-one (71) percent of the total fruit-weight. Two percent of the fruits were unmarketable because of immaturity at the time of the final harvest. Twenty six percent were unmarketable due to bird damage and one percent had damage or blemishes which made them unmarketable.

The 'Indian River' variety had fifteen percent of its fruits damaged by birds and six percent immature fruits at the time of the final harvest. It would seem that the fruit of the vigorously vegetative 'Indian River' variety is not as easily accessible to birds. This results in less bird damage to these fruits.

The harvest dates for both varieties started about 75 days after planting, but the 'Bounty' variety showed greater signs of senescence after 130 days of growth. During the 10 harvest days (between the 75th and 130th day after planting) the fruit yield obtained from the 'Bounty' variety was 53% of that obtained from the 'Indian River' variety.

**TABLE 1(a)**

**The effect of a grass mulch cover and varying levels of Ammonium Sulphate on the yield of the Indian River variety of tomatoes (lbs/Acre) harvested**

AMMONIUM SULPHATE LBS/ACRE

		Cover	0	0	2002	200	Average
K <sub>2</sub> O lbs/	0	None	24,825	11,475	33,650	18,925	21,665
	0	Mulch	13,000	31,375	28,500	11,575	
Acre	120	None	42,000	16,575	28,300	36,525	26,684
	120	Mulch	23,325	17,200	17,150	32,400	
		Average	22,471		25,878		

(Average None = 26,534)

(Average Mulch = 21,815)

**TABLE 1(b)**

**The effect of a grass mulch cover and varying levels of Ammonium Sulphate on the yield of the Bounty variety of tomatoes (lbs/Acre) harvested**

AMMONIUM SULPHATE LBS/ACRE

		Cover	0	0	200	200	Average
K <sub>2</sub> O lbs/	0	None	6,475	5,725	2,000	14,675	9,243
	120	Mulch	11,275	22,950	7,925	2,925	
Acre	120	None	9,225	20,025	9,825	21,075	16,575
	120	Mulch	20,325	15,725	20,050	16,350	
		Average	13,965		11,853		

(Average None = 11,128)

(Average Mulch = 14,690)

**TABLE 2(a)**

The effect of a grass mulch cover and varying levels of Nitrogen and Potassium fertilizers on the number of fruits produced by 200 Indian River variety tomato plants

**AMMONIUM SULPHATE LBS/ACRE**

		Cover	0	0	200	200	Average
K <sub>2</sub> O lbs/	0	None	1,538	588	1,746	1,132	1,158
	0	Mulch	664	1,610	1,308	680	
Acre	120	None	2,198	1,148	1,720	2,194	1,606
	120	Mulch	1,242	1,174	1,286	1,888	
		Average	1,270		1,494		

(Average None = 1,533)

(Average Mulch = 1,231)

**TABLE 2(b)**

The effect of a grass mulch cover and varying levels of Nitrogen and Potassium fertilizers on the number of fruits produced by 200 Bounty variety tomato plants

**AMMONIUM SULPHATE LBS/ACRE**

		Cover	0	0	200	200	Average
K <sub>2</sub> O lbs/	0	None	376	464	230	858	556
	0	Mulch	1,028	1,032	288	172	
Acre	120	None	1,890	1,142	580	1,254	1,141
	120	Mulch	1,066	1,162	1,056	980	
		Average	1,020		677		

(Average None = 849)

(Average Mulch = 848)

Note: 1 ounce = 28.35 gms; 1 pound = 0.45 kg; 1 acre = 4046.8 m<sup>2</sup>; 1 hectare = 2.47 acres.

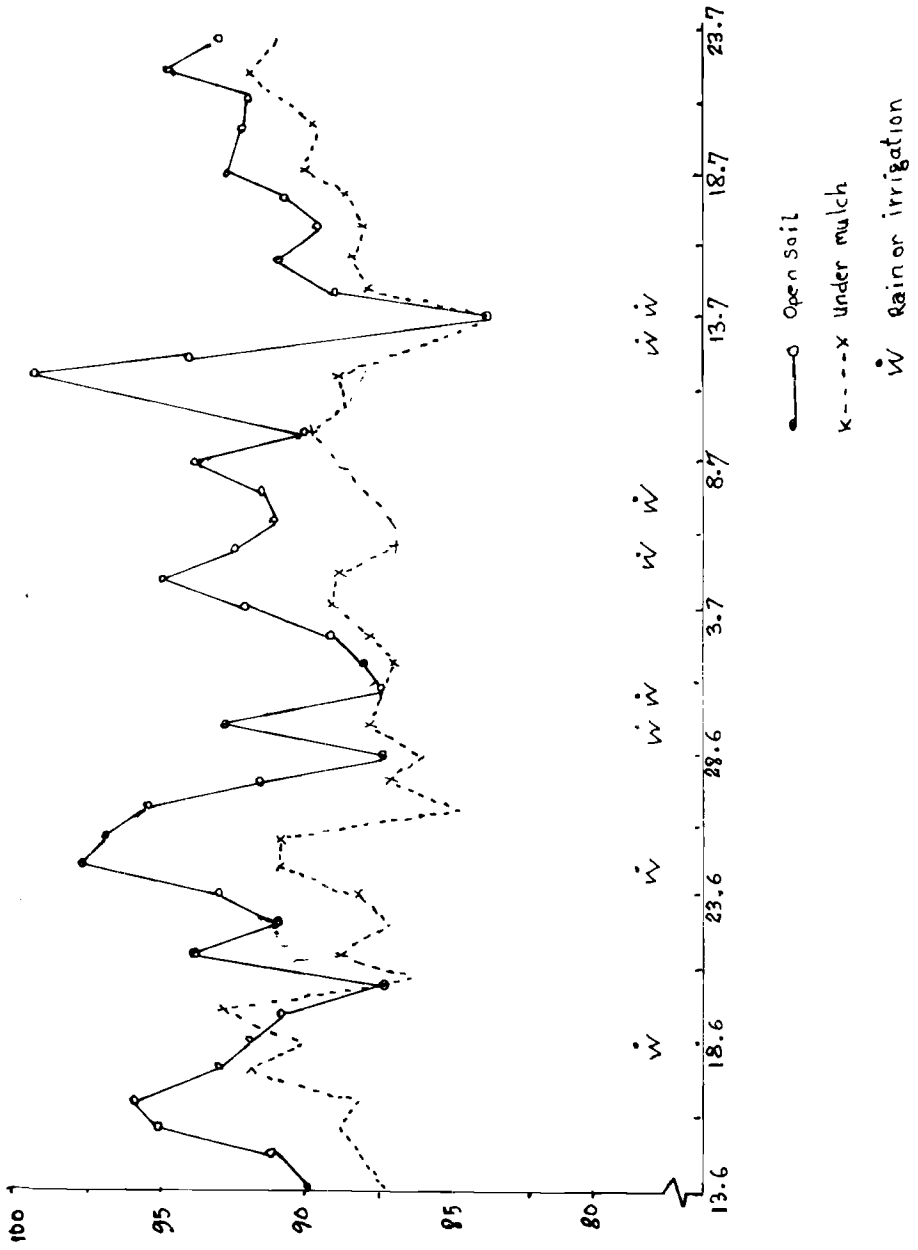
After 130 days the vines were harvested and all the immature green fruits were removed, counted and weighed. There was 320 immature fruits for 200 plants of the 'Bounty' variety and 506 immature fruits for 200 plants of the 'Indian River' variety. It could be inferred that the potential difference in yield between the two varieties was greater than actually measured during the normal harvest period.

Both varieties responded to the application of Potassium Sulphate, a yield increase of about 5,000 lbs per acre was achieved in the 'Indian River' variety (23% increase) while in the 'Bounty' variety the increase was about 7,000 lbs per acre of 79% increase (see Table I). The data in Table 2 shows that this increase was a result of increased fruit production rather than fruit size; since the percentage increase in number of fruits harvested by the Potash application was greater than that of the weight increase.

The mulch increased the yield of the 'Bounty' variety but not of the 'Indian River' variety. Table 2 shows that there was no difference in the number of fruits produced. It could be inferred that the mulch increased the yield of 'Bounty' by increasing the size and weight of the fruits. It should also be noted that the highly vegetative 'Indian River' variety covers the ground surface and is somewhat self mulching so that the difference in mulched and unmulched surfaces under this variety might not be as great as in the 'Bounty' variety. The temperature in the open soil was generally about 4<sup>0</sup>F higher than in the soil under a dry grass mulch (Fig.I). During periods when the soil was wet either through rain or irrigation, the temperature of the soil was reduced; the reduction was greater in the uncovered soil. On some days wetting the soil surface reduced the maximum soil temperature in the open soil below that recorded in the mulched areas. It could be expected that the faster evaporation loss from the exposed soil surface when wet will cause a greater evaporative cooling of the exposed soil and as a result a lower temperature.

The 'Indian River' variety responded to the application of 200 lbs of Ammonium Sulphate per acre, producing an increased fruit weight yield of more than 3,000 lbs/acre. This weight increase was brought about by





an increase in the number of fruits produced (Table 2) rather than an increased fruit size.

The 'Bounty' variety gave no positive response to the nitrogen application but rather both fruit numbers and yield were depressed as a result of the nitrogen application. Under the present farming practice in tomatoes, it is likely that low nitrogen levels prevail in the mulch fields during growth. It is therefore interesting to note that in this experiment the increase in the 'Bounty' fruit size occurred mainly in the Zero Nitrogen fertilizer plots. It could be speculated that vegetative growth could have been enhanced in the high nitrogen plots and that as a result the increased ground cover diminished the mulching effect. However, the vegetative growth change was not ascertained in this experiment.

#### CONCLUSION

The 'Indian River' variety produced a much higher fruit yield than the 'Bounty' variety. Both varieties responded strongly to the application of potash, both in terms of the weight and number of fruits produced.

The 'Indian River' variety which has much more vegetative growth than the 'Bounty' variety responded both in fruit numbers and yield to the application of Sulphate of Ammonia.

The 'Bounty' variety which does not shade the ground surface as readily as the 'Indian River' variety, responded to the use of a soil mulch cover. This response was exhibited in greater fruit yield weight but not fruit numbers. Thus the mulch brought about the formation of bigger and heavier tomatoes.

The farmers in the northern districts who mulch their fields when growing the 'Bounty' variety, are likely to obtain heavier and bigger tomatoes.

LHS/jh

21st November, 1973.