

INFLUENCE OF PRUNING ON TOMATO PRODUCTION UNDER CONTROLLED ENVIRONMENTS

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Abstract

A study was conducted to evaluate the influence of pruning on tomato production. Experiments were conducted under controlled environments in plastic tunnels in central Namibia. Hydroponics system with gravel as a growing medium was used. Results revealed that pruning does not increase tomato yield. The only benefits obtained from tomato pruning were increased quality and plant health. Pruned tomatoes were less prone to pest attack than those, which were not pruned. These findings suggest that pruning tomatoes under these environments does not help in increasing the yield.

Key words: hydroponics, Pruning, Tomato.

INTRODUCTION

Namibia is the driest country in southern Africa, with soils that are generally sandy and have poor quality (UPND, 1998). Despite these unfavorable conditions, agriculture is important since it provides a livelihood to more than two thirds of all Namibians (Vigne and Whiteside, 1997). Vegetable production is one of the agricultural activities in the country and has great potential for alleviating poverty, especially among the rural poor. It is actually one of those agriculture components earmarked, by the Namibian government, for increased production (MAWRD, 1996; Dima, et al., 2002).

Tomato (*Lycopersicon esculentum* mill) production is one of the most important vegetables crops grown in Namibia, and has the potential for increased production because of its high demand (Poulet, 1995; MAWRD, 1996; 1997). Both small-scale and large-scale farmers produce this crop. Even urban and peri-urban agriculture practitioners have been reported to be growing a lot of tomatoes (Jones, 1991; Dima and Ogunmokun, 2000). Tomato is highly nutritious, especially as a source of vitamin A and C, and therefore improves the health of consumers. Because the consumption of tomatoes is high in Namibia it could be a good source of income for farmers, especially for the rural poor.

Tomato is grown under various environments and management in Namibia. It is grown in gardens, Urban and Peri-urban Agriculture, and under controlled environments. Harsh environments in most parts of Namibia necessitate the need to grow tomatoes in controlled environments. Whichever way it is grown the tomato yields do not always reach the full production potential. This is probably because of inadequate management. Improved management such as pruning and staking could improve the yield of tomatoes.

Pruning in tomatoes has been reported to increase yields and quality (Hadfield, 1989; Preece et al., 1995;

Srivivasan, et al., 2001). However, other researchers have reported conflicting results that pruning either reduces tomato yields and/or quality or has no effect at all on tomato production (Resh, 1997; Ferrandino, 1999). It is therefore not clear whether tomato pruning is worthwhile or not.

In Namibia, pruning is not a common practice among farmers. Probably because the benefits are not well known. No research has been done to investigate the benefits of tomato pruning despite the importance of this information. The objective of this study was to investigate the influence of pruning on tomato production.

MATERIALS AND METHODS

A study on tomato pruning was conducted from September 2001 to April 2002. Experiments were conducted under controlled environments in greenhouses or plastic tunnels at Desert Green Horticulture Company in central Namibia. Hydroponics growing system, with gravel as a growing medium, was used. Three varieties of tomato, Baldo, Fanny and Rz72-30, were used in the study.

Tomato seedlings were raised in seedling trays, which were kept in a dark room for 24 hours. After that they were transferred to the nursery. One month after germination, seedlings were transplanted. Pruning was done one month after transplanting. It was done by removing the side-shoots.

Treatments applied were: Baldo – no pruning; Baldo – one stem pruning; Baldo – two stem pruning; Fanny – no pruning; Fanny – one stem pruning; Fanny – two stems pruning; Rz72-30 – no pruning; Rz72-30 – one stem pruning; Rz72-30 – two stem pruning.

Harvesting started at 54 days after transplanting and continued at intervals depending on fruit ripening. Fruits harvested from each plot were weighed and the weighed recorded.

The following data were collected:

1. Yield,
2. Number of fruits,
3. Fruit size or fruit diameter,
4. Time spent on pruning,
5. Disease incidence.

The experiments were designed in a randomized complete block with four replicates. Tomato plants were planted at a spacing of 45 cm intra-row and 30 cm inter-row. Each plot was 1.4 m², having two rows. Data was subjected to analysis of variance by means of the SPSS programme on the mainframe computer at the university of Namibia. Treatment means were compared using Turkey's Least Significant Difference (LSD) test at the 5 % level of significance.

RESULTS AND DISCUSSION

Results of the parameters measured in the experiments are presented in Tables 1, 2, 3, and 4.

Results pertaining to tomato yields showed that pruning does not increase the yield. Higher yields were obtained from tomatoes that were not pruned (Tab. 1). Yields from pruned tomatoes, to either one stem or two stems, were significantly lower than those, which were not pruned. There was no significant difference in the yields obtained from the tomatoes pruned to either one stem or two stems for the varieties of Rz72-30 and Fanny. However, one stem pruning resulted in higher yields than two stem pruning for Baldo variety.

Similarly, the number of fruits obtained from tomatoes that were not pruned was significantly higher than those from the pruned tomatoes (Tab. 2). Tomato fruit sizes did not differ significantly among those from pruned or not pruned (Tab. 3)

There was no significant difference in time taken to prune tomatoes to either one stem or two stems (Tab.4). However, there were differences between pruning and no pruning. Tomatoes that were not pruned were attacked by early blight disease while the pruned ones were not affected at all.

Pruning tomatoes was found to have no benefits to tomato yields. In fact there was a reduction in yield due to pruning in some cases. This suggests that pruning is not necessary in tomato production. This finding is similar to the results reported by Resh (1997) and Srinivasan et al (2001). They reported that pruning causes marginal reduction in tomato yields and quality. The yield reduction could be a result of reduced plant capacity to produce more fruits. Pruned plants have fewer branches on which to produce fruits hence the low yields.

Labour costs required for pruning exacerbates the disadvantage of pruning in tomatoes. It costs more to produce pruned tomatoes than those that are not pruned. However, the disease occurrence in tomatoes that are not pruned may cause losses to tomatoes. It may require extra cost to control the disease.

The findings suggest that tomato pruning could cause marginal reduction in tomatoes yields and therefore may not be necessary in tomato production under the environments the study was conducted. However, tomatoes that are not pruned appear to be more prone to pest attack. This indicates that where pests are a problem, it may be advisable to prune tomatoes in order to minimize pest attack.

Tab. 1. : Mean tomato yield

Treatments	Yield (kg/m ²) per variety		
	Rz72-30	Fanny	Baldo
No pruning	23	30	33
One stem pruning	12	21	40
Two stem pruning	16	23	12
LSD (P=0.05)	7	7	7
Std error	3.5		

Tab. 2. : Number of tomato fruits per m²

Treatments	Number of fruits per m ² per variety		
	Rz72-30	Fanny	Baldo
No pruning	953	598	302
One stem pruning	469	319	187
Two stem pruning	573	311	227
LSD (P=0.05)	700	200	70
Std error	4.8		

Tab. 3. : Mean tomato fruit size

Treatments	Fruit size(diameter in mm) per variety		
	Rz72-30	Fanny	Baldo
No pruning	34	50	42
One stem pruning	37	53	42
Two stem pruning	40	52	48
LSD (P=0.05)	ns	ns	ns
Std error	3.2		

ns=no significance

Tab. 4. : Time spent on pruning tomato

Treatments	Time (minutes/m ²) per variety		
	Rz72-30	Fanny	Baldo
No pruning	0	0	0
One stem pruning	5	3	2
Two stem pruning	4	4	3
LSD (P=0.05)	2	2	2
Std error	0.8		

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*Received for publication on February 14 , 2004
Accepted for publication on May 25 , 2005*

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