

PHYSICO - CHEMICAL CHARACTERISTICS OF SOME TOMATO VARIETIES (*Lycopersicon esculentum* Mill) AS INFLUENCED BY SPACING, STAKING AND PRUNING.

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Marglobe and S-12 varieties gave heavier fruits than H. S. 101. Widest spacing also produced significantly heavier fruits than other spacings. Pruned plus staked plants produced fruits of greater weight. In Marglobe and S-12, pruning and staking induced higher weight per fruit. The effect of pruning in increasing the weight per fruit was enhanced due to wider spacing. Maximum and minimum number of I grade fruits were obtained from Marglobe and S-12, respectively. Maximum number of II grade fruits were from S-12. Maximum and minimum II grade fruits were obtained from H. S. 101 and S-12 respectively. As the spacing increased I grade fruits were also increased. Staking and pruning also increased the I grade fruits. Staking and pruning tended to increase the juice percentage in fruits. Staking and pruning appeared to increase the acidity. Tomato pulp of S-12 variety contained relatively higher reducing sugar. Staking and pruning appeared to increase the total sugar. Vitamin C content was significantly lower in Marglobe than H. S. 101 and S-12. Widest spacing (60 x 60 cm²) significantly increased the Vitamin C over the other spacings (45 x 45 cm² and 45 x 30 cm²). Pruned and staked plants produced fruits of significantly higher Vitamin C.

Tomato is one of the most important and popular fruit vegetables in the world grown throughout the year. Its popularity is due to the pleasing taste, high yield, cheapness and high nutritive value. It is a good source of Vitamin A, B and excellent source of Vitamin C. While improving the yield of tomato it is highly essential to see that the quality of the fruit is not deteriorated. Apart from the distinct differences in quality within varieties numerous workers have reported the profound influence of staking, pruning and spacing on the quality of fruits.

MATERIAL AND METHODS

The experiment was conducted in medium black soil during season of

1976-77. Three varieties namely Marglobe, H. S. 101 and S-12, three spacings namely 45 x 30 cm, 45 x 45 cm and 60x60 cm and three cultural practices namely no pruning and no staking, no pruning and staking and pruning and staking were included in the experiment forming total 27 treatment combinations. The design 3₃ was partially confounded. In pruning treatment the main stem just above the first cluster was pinched and all side shoots were retained. These side shoots were also pinched after appearance of the first cluster.

RESULTS AND DISCUSSION

Mean weight of fruit (g) and juice, acidity and T. S. S. Content (%) in

ference. In the mean weight of fruit,

as influenced by various treatments (Table-1) the differences were significant. Marglobe and S-12 produced significantly more weight per fruit than H. S. 101.

In respect 60 x 60 cm² increased the weight of the fruit significantly over the other spacings the pruned plus staked plants increased the fruit weight significantly over the unpruned x unstaked and unpruned staked plants.

In respect of interactions, in H. S. 101 and S-12 the spacing of 60 x 60 cm² increased the fruit weight significantly over rest of the spacing treatments. In variety Marglobe the pruned plus staked plants produced heavier fruits than the fruits from unpruned unstaked and unpruned staked plants, while in S 12 variety the pruned plus staked plants produced heavier fruits as compared to the unpruned staked plants. In the spacing of 45 x 30 cm² unpruned unstaked plants were more in weight than fruits from the unpruned staked and pruned plus staked plants. Similarly in unpruned staked plants, fruit weight was increased significantly over fruits from pruned plus staked plants. In the spacing of 45 x 45 cm², the plus pruned plants produced heavier fruits than unpruned staked plants. In respect of 60x60 cm² spacing, the pruned plus staked plants produced more weight per fruit than rest of the cultural practices while unpruned staked plants increased the weight per fruit significantly over those from unpruned and unstaked plants.

The juice percentage was not much affected by varieties and spac-

ing. But it increased slightly both by staking and pruning (Table 1).

Acidity percentage was not influenced by different spacings. Marglobe stored lowest acidity while S₁₂ and Hs 101 had similar acidity. The fruits from staked and pruned plants registered more acidity. Neither the main treatments nor the interactions influenced the TSS percentage (Table 1).

Vitamin Contents in Juice

There were no conspicuous differences in the reducing and total sugar content of fruits under different treatments (Table 2). However, S-12 fruits appeared to contain more reducing sugar. Similarly both staking and pruning practices appeared to induce more total sugar.

Vitamic C content of fruits was significantly affected by different treatment 3 (Table 2). Fruits of H. S. 101 and S-12 had significantly more Vitamin C than Marglobe.

The spacing of 60x60 cm² produced significantly higher amount of vitamin C than the other spacings. Pruned plus staked plants had fruits of significantly higher Vitamin C than those from the other two cultural practices. The unpruned staked plants produced fruits of more Vitamin C than those from unpruned unstaked plants. In variety Marglobe, the 60 x 60 cm² spacing produced significantly more Vitamin C over the other two spacing treatments. The 45 x 45 cm² spacing induced significantly more Vitamin C over 45 x 30 cm². In H. S. 101 and S-12, the wider spacing of 60 x 60 cm² produced fruits of maximum Vitamin

C and was significant over the other spacing treatments. In S-12 varieties the spacing of 45 x 45 cm² gave significantly more Vitamin C than that of 45 x 30 cm² spacing. In the case of cultural practices, in all the varieties, the pruning plus staking treatments produced significantly more Vitamin C over other cultural treatments. Similarly, staking treatment produced significantly more Vitamin C over un-staking treatment.

Fruit Grades : In Marglobe, more I grade tomatoes (27.6%) were obtained, while more II grade tomatoes (33.8) were obtained by S-12. The III grade tomatoes were more in H. S. 101 (26.7%). The first grade fruits increased with the increase in spacing. Maximum percentage of II grade tomatoes (52%) were observed in closer spacing of 45 x 30 cm², while III grade tomatoes were observed to be lower in spacing of 60 x 60 cm² (23.8%). As regards pruning and staking the I grade tomato was more in the staking and pruning practices (28.3%) over control (24.45%).

In the case of S x C interaction, pruned plus staked plants produced fruits with significantly more vitamin C than those from the other two cultural practices in 45x30 cm² spacing. Unpruned staked plants also produced fruits of higher vitamin C content than those from unpruned unstaked plants. In the spacing of 45 x 45 cm² and pruned plus staked plants produced fruits of significantly more vitamin C over those on unstaked unpruned plants. In respect of 60 x 60 cm² spacing, the fruits

from pruned plus staked plants had significantly more vitamin C than those from other two cultural practices. In S-12 it was observed that staking significantly reduced the vitamin C content.

Wider spacing (60 x 60 cm²) produced fruits of significantly higher weight than those from other treatments. It is quite natural to expect heavier fruits from the plants spaced widely because such plants get more area and the root-system of these plants can take up more nutrients from larger area. The plants also get more sunlight and free air because of non-crowding of the plants. This results in increased production of carbohydrates, the availability of which eventually makes the fruits heavier. Of the three varieties H. S. 101 showed consistent response in increasing the mean weight per fruit with the increase in spacing. Such type of consistent trend was not seen in S-12 and Marglobe, although the wider spacing of 60 x 60 cm² in the case of S-12 gave significantly higher weight per fruit over other spacings.

Percentage of grades of fruit:

Because of the greater area available in the wider spacing, the plants must have been at an advantage, to receive more nutrients, light, aeration, etc., and thereby must have produced superior grade fruits. These results are in conformity with those reported by Tayde and Gupta (1972) under Nagpur conditions. Staking and pruning also proved to be beneficial in giving more number of first grade

fruits. The staked plants were trained on bamboo, their fruits hung all along the stakes, and were exposed directly to good aeration and sunlight, which caused the fruits from staked plants to be heavier. Naphade (1973) reported that higher percentage of I grade fruits due to staking in all varieties under study. Pruning was also found to be beneficial in giving more number of I grade fruits. Pruning prevents the monopolistic mobilisation of carbohydrates for their growth at the cost of fruit development. Similar results have been reported (Patil *et al.* 1973); Gupta Taya-de, 1972).

Juice and acidity percentage:

Juice content was increased in staking and pruning treatments. Staking provides better situation as regards sunlight and aeration. By pruning the metabolites which are utilized for the vegetative growth are diverted towards fruit development. The additional carbohydrates, thus available must have made the fruits more juicy. This has been supported by Patil (1964).

Pruning appeared to have increased the acidity. Increase in acidity due to pruning has also been reported by Devis *et al.* 1959.

Total Soluble Solids

As regards the total soluble solids was concerned, no significant differences were observed. However, unstaked, unpruned plants tended to contain more total soluble solids in fruits. The results are comparable with that of Mac Gillivray (1964). The wider spacing 60x60 cm² appeared

to produce fruits of slightly lower total soluble solids.

Vitamin C

Wider spacing 60 x 60 cm² produced significantly higher vitamin C content in tomato fruits. This may be because of the ample sunlight available to the plants and the increase in nutrient availability. Staked and pruned plants produced highest vitamin C followed by staked unpruned plants, both of them were significantly superior to unpruned unstaked plants.

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