

ABSTRACT

Increasing yield through selection for yield **per se** in most Agricultural Crops has been difficult to achieve since yield is quantitatively inherited with low heritability. A field experiment was carried out in 2010/11 growing season at Sebele, Gaborone, Botswana on twelve tomato genotypes consisting of two sets; semi determinate and determinate. A randomized complete block design was used with four replicates. The objectives of the experiment were to determine yield and yield components, and the correlation among the components that explain most of the variation in tomato yield. It was also conducted to determine the direct and indirect effects of the morpho – physiological traits on yield in tomato. Data collected was yield, marketable fruit number, single fruit weight, number of truss per plant, number of fruits per truss, fruit weight per truss, plant height, total soluble solids, dry matter, days to 50percent flowering, fruit number per plant, fruit weight per plant and flower number per truss.

The checks yielded higher in both sets. For semi determinate Espresso yielded significantly ($p < 0.05$) higher with 67.04t/ha compare to other four elite lines, however it yield was not significant different from LBR – 11 which yielded 64.10t/ha. The lowest yielder was LBR – 16 with 51.58t/ha. In the determinate Sixpack yielded significantly higher from other three elite line with 62.4t/ha but it was not significantly different from the other two. In both sets the checks performed significantly better in most components.

Semi determinate yield was positively and significantly correlated to number of truss per plant ($r = 0.41$), fruit number per plant ($r = 0.54$), fruit number per truss ($r = 0.44$), fruit weight per plant ($r = 0.50$), marketable fruit number ($r = 0.68$) and flower number per truss ($r = 0.47$). For determinate yield was positive and significantly correlated to marketable fruit number ($r = 0.64$) and plant height ($r = 0.52$).

A cause and effect relationship between yield and the parameters measured was analysed using the stepwise multiple regression analysis in order to select the parameters that have a strongest influence on yield as a bridge to the direct and indirect effect analysis of the selected parameters on yield using the Path coefficient analysis. Path coefficient analysis for semi determinate showed that marketable fruit number and fruit weight per truss were the traits directly related to yield with direct effect of 0.989 and 0.592 respectively. Fruit number per truss was indirect very important for yield via fruit weight per truss 0.394 and marketable fruit number 0.445. Determinate results showed that marketable fruit number and single fruit weight were traits directly related to yield with direct effect of 0.752 and 0.446 respectively.

Results from this study suggest that fruit weight per truss and single fruit weight are relevant components to use as the selection criteria for improving tomato yield. Using correlation coefficients alone would have lead to the erroneous conclusion that single fruit weight is not an important components as its correlation was not significant at ($r = 0.32$) in semi determinate and ($r = 0.30$) in the determinate types. Fruit weight per truss would have also been left out as an important components as its correlation was also not significant at ($r = 0.35$) and ($r = 0.23$) for semi determinate and determinate respectively.

DEDICATION

To my daughters Amogelang and Refilwe with love and with all my heart to my wife Mmapula

.T. Moseki - Monamodi

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LIST OF ABBREVIATIONS

ANOVA – Analysis of variance

LSD – Least significant difference

C.V – Coefficient of variation

PCA – Path coefficient analysis

BCA – Botswana College of Agriculture

SADC – Southern African Development Community

SCARDA – Strengthening Capacity for Agricultural Research and Development in Africa

T/HA – Tonnes per hectare

AVRDC – Asian Vegetable Research and Development Center

ARP – Africa Regional Program

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