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Effect of drip fertigation on growth of guava (*Psidium guajava* L.)

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ABSTRACT : The study was conducted in the experimental farm, Department of Horticulture, Assam Agricultural University, Jorhat, during 2009-2010 to analyze the effect of drip fertigation on growth of guava (*Psidium guajava* L.). Experiment was laid out in Split – Split – Plot Design with three replications comprised of twenty four treatments thus total 24X3=72 plots each having 1 plant with the spacing of 6 m x 6 m. Study concluded that the growth parameters were significantly influenced by varieties, drip level and fertigation level. The increments in plant height (28.00cm), plant girth (3.34 cm) were observed in T_{17} ($V_2D_2F_1$). The highest plant canopy (38.86 cm) was recorded in T_5 ($V_1D_2F_1$). Considering the positive effect on growth, T_{17} ($V_2D_2F_1$) is considered to be the best, but from economic point of view T_{19} ($V_2D_2F_3$) is preferable.

KEY WORDS : Drip fertigation, Growth parameters, Guava

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Guava (*Psidium guajava* L.) is one of the most important fruit crops of India. It is also known as "apple of tropics". The fruit is rich in vitamin C and pectin besides being a good source of thiamine and riboflavin. It is also rich in minerals like phosphorus, calcium and iron. In Assam, Guava occupies 4,522 thousand hectare of area and it produces 87,195 MT of guava with 19282 Kg per hectare of productivity (Anonymous, 2009).This fruit crop has immense potential in increasing productivity and yield sustainability in Assam. But under North East condition, the crop faces water shortage during winter and the rainfall in this region is also not well distributed. A distinct dry spell starts from November and extends to March and sometimes up to April- May. The limited water resource is a constraint in increasing area under guava (Sharma, 2009). Drip irrigation is an advanced irrigation method that permits application of precise and measured quantity of water directly to the plant root zone slowly and frequently through emitters. Application of fertilizer along with irrigation water in a technology of distributing fertilizers to the root zone of the fruit crops. It increases nutrient use efficiency and provides ecological safety by avoiding ground water pollution, saving of fertilizers to an extent of 20 to 40 per cent. There is lack of information about the schedule of drip and fertigation on growth, productivity and quality of guava in this region. Therefore, the present investigation was undertaken to study the 'effect of drip fertigation on growth of guava (*Psidium guajava* L.)'.

RESEARCH METHODS

The present investigation was conducted to study the effect of drip fertigation on growth of guava (*Psidium guajava* L.). The study was conducted in the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat during 2009-2010. The experiment was laid out in Split – Split – Plot Design with 3 replications comprised of 24 (twenty four) treatments. There were 72 plots each having 1 plant with the spacing of 6 m x 6 m. The varieties (main plot treatments) were L-49 (V_1) and Allahabad Safeda (V_2). Drip (sub-plot treatments) and fertigation levels (sub-plot treatments) were D_1= 1.00EpR, D_2=0.75 EpR, D_3=0.50 EpR and F_1= 120 per cent of RDF, F_2=100 per cent of RDF, F_3= 75 per cent of RDF and F_4=50 per cent of RDF. The treatments were T_1= $V_1D_1F_1$, T_2= $V_1D_1F_2$, T_3= $V_1D_1F_3$, T_4= $V_1D_1F_4$, T_5= $V_1D_2F_1$, T_6= $V_1D_2F_2$, T_7= $V_1D_2F_3$, T_8= $V_1D_2F_4$, T_9=

$V_1D_3F_1$, T_{10}= $V_1D_3F_2$, T_{11}= $V_1D_3F_3$, T_{12}= $V_1D_3F_4$, T_{13}= $V_2D_1F_1$, T_{14}= $V_2D_1F_2$, T_{15}= $V_2D_1F_3$, T_{16}= $V_2D_1F_4$, T_{17}= $V_2D_2F_1$, T_{18}= $V_2D_2F_2$, T_{19}= $V_2D_2F_3$, T_{20}= $V_2D_2F_4$, T_{21}= $V_2D_3F_1$, T_{22}= $V_2D_3F_2$, T_{23}= $V_2D_3F_3$, T_{24}= $V_2D_3F_4$. Irrespective of treatments on uniform dose of nitrogenous, phosphatic and potasic fertilizer @ 260 g N, 360 g P_2O_5 and 260 g K_2O per plant in the form of urea, SSP and MOP were applied, respectively. Urea and MOP were splited into 12 equal doses and were applied through drip from October to March at an interval of 15 days. The whole of SSP were applied in soil after installation of drip system in the month of October. In case of fertigation the amount of fertilizer was applied for individual treatment was calculated out on the basis of the per cent recommended dose of the fertilizer along with the required irrigation levels and was applied in the root zone through the drippers. The intercultural operation like weeding, earthing up, pruning, removal of water sprouts were undertaken uniformly in all the treatments. Growth parameters *viz.*, plant height increment, plant girth increment, plant canopy increments were recorded and economics of cultivation was calculated.

RESEARCH FINDINGS AND DISCUSSION

The interaction effect of varieties, drip level and fertigation level in plant height increment was non-significant. Among the treatment $V_2D_2F_1$ recorded highest increment in plant height (28.00 cm) followed by $V_2D_2F_2$ (27.03 cm) and lowest in $V_1D_3F_4$ (16.00 cm) (Tablde 1). The increment in plant girth was significantly influenced by varieties, drip level and fertigation level. The highest increment in plant girth was recorded in $V_2D_2F_1$ (3.34 cm) followed by $V_1D_2F_1$ (3.16 cm) and lowest was recorded in $V_1D_3F_4$ (0.90 cm). Plant canopy was significantly influenced by varieties, drip level and fertigation level. The highest increment in plant canopy was recorded in $V_1D_2F_1$ (38.86 cm) followed by $V_2D_2F_1$ (37.73 cm) and lowest was recorded in $V_2D_3F_4$ (17.33 cm). Plant height, girth and canopy were significantly influenced by varieties. Variety Allahabad Safeda (V_2) recorded higher increment of plant height and girth than L-49 (V_1). This might be due to the good genetical character

Table 1 : Effect of drip fertigation on growth parameters of guava

Treatments	Increment of growth parameters (cm)		
	Height	Girth	Canopy
T_1= $V_1D_1F_1$	23.64	2.33	34.70
T_2= $V_1D_1F_2$	22.00	2.11	32.67
T_3= $V_1D_1F_3$	20.90	1.90	31.00
T_4= $V_1D_1F_4$	19.67	1.69	27.13
T_5= $V_1D_2F_1$	27.00	3.16	38.86
T_6= $V_1D_2F_2$	25.13	2.90	36.34
T_7= $V_1D_2F_3$	24.00	2.72	35.96
T_8= $V_1D_2F_4$	20.01	2.52	29.04
T_9= $V_1D_3F_1$	18.31	1.50	24.33
T_{10}= $V_1D_3F_2$	17.01	1.29	21.89
T_{11}= $V_1D_3F_3$	17.78	1.09	20.11
T_{12}= $V_1D_3F_4$	16.00	0.90	19.24
T_{13}= $V_2D_1F_1$	25.04	2.43	32.01
T_{14}= $V_2D_1F_2$	23.08	2.25	29.77
T_{15}= $V_2D_1F_3$	23.50	2.03	26.02
T_{16}= $V_2D_1F_4$	21.43	1.82	22.12
T_{17}= $V_2D_2F_1$	28.00	3.34	37.73
T_{18}= $V_2D_2F_2$	27.03	3.03	36.01
T_{19}= $V_2D_2F_3$	26.04	2.80	33.31
T_{20}= $V_2D_2F_4$	22.11	2.61	24.21
T_{21}= $V_2D_3F_1$	20.21	1.60	21.09
T_{22}= $V_2D_3F_2$	20.89	1.41	19.11
T_{23}= $V_2D_3F_3$	19.33	1.19	18.07
T_{24}= $V_2D_3F_4$	18.79	1.00	17.33
S. E.±	0.76	0.04	0.79
C.D. (P=0.05)	NS	0.08	1.59

NS=Non-significant

of the Allahabad Safeda (V_2). But in respect to plant canopy L-49 (V_1) recorded higher than Allahabad Safeda (V_2). Singh and Kashyap (1993) also reported the higher yield and good growth of Allahabad Safeda. Increase in growth parameters might be attributed to the fact that constant and continuous supply of nutrients form to the active root zone might have caused minimum time lag between application and uptake of nutrients resulting in better cell turgidity which had led to cell enlargement and better cell wall development thus resulting in better plant vigour (Viers, 1972). The availability of N and K in the root zone through fertigation might have induced more plant vigour (Raskar, 2000).

The highest benefit cost ratio (4.26) was obtained in the treatment $V_2D_2F_3$, which was closely followed by the treatment $V_2D_2F_2$ (4.13), while the lowest benefit cost ratio (1.47) was recorded under $V_1D_3F_4$.

On the basis of growth parameters, Allahabad Safeda at 0.75 EpR and 75 per cent recommended dose of N and K through drip can be adopted for increase yield and low cost of cultivation.

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