

Sweet Potato Yield as a Function of Certain Climatic Parameters

The genetic potential of a cultivar for its yield is conditioned and modified by the climatic parameters such as rainfall, its distribution, temperature and its relative disparity at different stages of crop growth. The response to nutrients and other inputs depends primarily on the ultimate yield level or the yield possibility. Hence to have an understanding of the effects of different climatic parameters on yield, an attempt was made to correlate the above parameters to the observed yield in sweet potato. Data reported by Shanmugavelu *et al.* (1972) in their time of planting and type of planting material experiment are presented in Table 1. Data on total rainfall and number of rainy days during the cropping period are presented in Table 2. The relative temperature disparity factor (RTD) as proposed by Uexkull (1967) was worked out for the period of tuber development (4th and 5th month of crop age) with the formula :

$$RTD = \frac{M. M. Max. T - M. M. Mini. T}{M. M. Max. T} \times 100$$

M. M. Max. T = Mean monthly maximum temperature (°C)

M. M. Mini. T = Mean monthly minimum temperature (°C)

The observed tuber yield was correlated with the total rainfall and the number of rainy days during the entire cropping period and with the RTD values estimated for the period of tuber development.

The crops planted during the second fortnight of June and during the months of September and October recorded higher tuber yield than the mean, while plantings done in July, August and November showed lesser yield than the mean. The increased tuber yield from September and October plantings were attributed to (1) the natural short day and long night conditions and (2) the maximum number of rainy days prevailed during the entire cropping period (Shanmugavelu *et al.* 1972). But, more rainy days viz. 27.6 and 24.6 for July and August plantings respectively did not result in high tuber yield and the two characters show negative correlation (Table 3). Similarly the total quantum of rainfall received during the same period also showed a negative correlation with the tuber yield. Planting done in October second fortnight and August first fortnight (Table 1) enjoyed similar day time hours. Despite similar day time hours (11.45 hr.), August first fortnight planting recorded 30% less yield than October second fortnight planting though the former had the benefit of more number of rainy days and high quantum of rainfall than for the October second fortnight planting.

Mean RTD values during the months of tuber development showed positive correlation (Table 3). The tuber yield from vines of median cuttings has shown significant positive correlation with the RTD. Uexkull (1967) observed significant positive correlation between rice yields and the

TABLE 1. Effect of time of planting and type of planting material on the yield of tubers of sweet potato cultivar V. 6. (kg/plot), mean of three years 1968-70.

Time of planting	Mean plot yield			Percentage on general mean	Average No. of hours of daily day length for the entire crop duration (hr. mts.)
	Terminal cuttings	Median cuttings	Mean plot yield of terminal and median cuttings		
June IIInd fortnight	24.95	17.93	21.44	106.00	12.16
July IInd fortnight	19.68	15.51	17.59	86.90	12.09
July IIInd fortnight	22.28	16.09	19.19	94.90	12.09
August IInd fortnight	19.63	11.87	15.75	77.90	11.55
September IIInd fortnight	26.27	21.71	23.99	118.60	11.42
October IInd fortnight	27.34	20.48	23.91	118.20	11.36
October IIInd fortnight	21.98	21.71	21.84	108.00	11.55
November IInd fortnight	19.89	16.19	18.04	89.20	11.44
Mean	22.75	17.68	20.22	100.00	12.10

TABLE 2. Total rainfall (mm) and number of rainy days during the cropping period

Time of planting	Total rainfall from planting to harvest (5 months)			Mean total rainfall	Number of rainy days during crop period (5 months)			Mean number of rainy days
	1968	1969	1970		1968	1969	1970	
June IIInd fortnight	202.8	397.1	195.4	265.1	21	27	22	23.3
July IInd fortnight	220.8	452.4	226.7	299.9	22	21	27	23.3
July IIInd fortnight	205.5	539.0	222.9	322.4	21	35	27	27.6
August IInd fortnight	199.9	508.1	220.0	309.3	18	30	26	24.6
September IIInd fortnight	194.0	457.9	207.1	286.3	16	26	22	21.3
October IInd fortnight	175.4	452.9	203.1	277.1	14	25	22	20.3
October IIInd fortnight	167.7	357.2	118.6	214.5	13	19	14	15.3
November IInd fortnight	130.9	245.2	85.9	154.0	8	12	10	10.0

RTD values during the period of grain set and development. The high RTD values at fruiting period favour increased sugar or carbohydrate

accumulation in the respective sinks of crops. The same conclusion is also applicable to tuber yield in sweet potato.

The low yield in November planted crop despite favourable RTD value could be due to the early vegetative phase coinciding with less hours of

bright sunshine and the mean day and night temperatures falling to 29°C and 17-19°C respectively at the second and third month of crop age. The

TABLE 3. Tuber yield in relation to climatic parameters

Time of planting	Mean plot yield (kgs)			Mean RTD for the last two months of cropping period	Total rainfall during cropping period (mm)	Number of rainy days during cropping period
	Terminal cuttings	Median cuttings	Mean of terminal and median cuttings			
June IIInd fortnight	24.95	17.93	21.44	29.17	265.1	23.3
July 1st fortnight	19.68	15.51	17.59	28.95	299.9	23.3
July IIInd fortnight	22.28	16.09	19.19	28.19	322.4	27.6
August 1st fortnight	19.63	11.87	15.75	27.43	309.3	24.6
September IIInd fortnight	26.27	21.71	23.99	39.22	286.3	21.3
October 1st fortnight	27.34	20.48	23.91	38.11	277.1	20.3
October IIInd fortnight	21.98	21.71	21.84	38.99	214.5	15.3
November 1st fortnight	19.89	16.19	18.04	37.80	154.0	10.0

CORRELATION :

S. No.	Factors Correlated	Correlation coefficient
1.	Tuber yield (terminal cuttings) × RTD	$r = 0.435$
2.	Tuber yield (median cuttings) × RTD	$r = 0.791^*$
3.	Mean tuber yield × RTD	$r = 0.668$
4.	Mean tuber yield × Total rainfall	$r = -0.053$
5.	Mean tuber yield × Number of rainy days	$r = -0.107$

(* Significant at $P=0.05$ level)

drymatter production would be the lowest for this crop compared to other months and the favourable effect of RTD value being ineffective at this period.

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REFERENCES

- SHANMUGAVELU, K. G., S. THAMBURAJ, A. SHANMUGAM and N. GOPALSWAMY, 1972. Studies on the effect of time of planting and type of planting materials on the yield of Sweet Potato (*Ipomoea batatas*, LAM) *South Indian Horticulture*, 20 (1&4) 55-8.
- UEXKULL, H. R. V. 1965. Problems in development of modern tropical agriculture. *Proceedings, Japanese Potassium symposium* 1965.