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EFFECT OF IRRIGATION AND FERTILITY LEVELS ON NUTRIENT CONTENT, UPTAKE AND RECOVERY IN *RABI* MAIZE.

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ABSTRACT

Experiments at Banaras Hindu University, Varanasi (U.P.) on *rabi* maize during 1985-1986 and 1986-1987 revealed that N and K₂O content of plants (shoot + leaves) increased with increasing irrigation levels but decreased with advancement in age of crop. The P₂O₅ content was lower at higher irrigation levels as compared to lower irrigation levels and the P₂O₅ content increased with advancement in age of crop. Uptake and recovery of N, P₂O₅ and K₂O increased with increasing levels of irrigation.

KEYWORDS: Maize, Irrigation levels, Fertility level, Uptake, Recovery.

Poor water supply or excessive irrigation will result in unavailability or leaching of a major part of nutrients resulting in the deficiency of these nutrients and low yields. Proper water control will hold these losses to a minimum. Similarly the availability of nutrients to plant

roots was also influenced by the amount and movement of water in soil. Keeping these facts in view, the present study was undertaken to find out the effect of different irrigation (IW/CPE ratios) and fertility levels on the content, uptake and recovery of N, P₂O₅ and K₂O by *rabi* maize.

MATERIALS AND METHODS

The experiments were conducted during rabi seasons of 1985-1986 and 1986-1987 at the Institute of Agricultural Sciences, Banaras Hindu University, Varanasi to find out the effect of different fertility and irrigation levels (based on IW/CPE ratios) on maize. The design used was split plot with four irrigation levels (based on IW/CPE ratios of 0.6, 0.8, 1.0 and 1.2) allotted to main plots and four fertility levels (0:0:0 control 60:30:20, 120:60:40 and 180:90:60 kg.ha⁻¹ N P₂O₅ and K₂O in subplots. All the sixteen treatment combinations were replicated four times. A quantity of 60 mm irrigation water (Iw) was applied whenever the cumulative pan evaporation (CPE) values reached 100 mm, 75mm, 60mm, and 50mm to maintain the IW/CPE ratios of 0.6, 0.8, 1.0 and 1.2 respectively. The rainfall, if any, between irrigations was also taken into consideration for scheduling irrigation. Plant samples collected at 30, 60, 90, and 120 days after sowing (DAS) as well as at harvest and grain samples at harvest were used for chemical estimation. The plants were partitioned into shoot (i.e., stem + sheath) and leaves and analysis was done by following the standard procedures. However, the N, P₂O₅ and K₂O contents at harvest in stover (i.e., shoot + leaves) and grain were converted and expressed as uptake in Kg.ha⁻¹ (Table 1).

RESULTS AND DISCUSSION

Nitrogen

The lowest N uptake was obtained with the lowest IW/CPE ratio of 0.6 which resulted in the lowest recovery percentage. The uptake increased with increase in irrigation level and was in conformity with the findings of Hergert (1982). The highest uptake and recovery percentage were obtained with 1.0 ratio (Table 1). Due to decreased N content and uptake, 1.2 ratio resulted in relatively lower N recovery as compared to 1.0 ratio and this was in agreement with the findings of Timmons and Dylla (1983).

Phosphorus

The lowest irrigation ratio of 0.6 resulted in the lowest uptake and recovery of P₂O₅. The uptake increased upto 1.0 and decreased with 1.2

but it was higher than 0.6 and 0.8 ratios. As a result of this, both the higher irrigation levels (1.0 and 1.2 ratios) resulted in higher P₂O₅ recovery (Table 1). Mederski and Wilson (1960) reported increased total amounts of P in plants with increasing soil moisture. Olsen *et al.* (1961) opined that the relative uptake of P₂O₅ by maize decreased as the soil moisture tension increased. The results of the present investigation are in agreement with these findings.

Potassium

The total K content of plants increased with increase in irrigation levels. As in P, it was less with 1.2 as compared to 1.0 ratio but the uptake was not affected. The lowest and the highest K uptake were recorded with IW/CPE ratios of 0.6 and 1.2 respectively (Table 1). Mederski and Wilson (1960) also reported increased uptake of K due to increase in irrigation levels. The higher uptake of K was due to increase in irrigation levels. The higher uptake resulted in highest K recovery with 1.2 ratio.

Maize is a heavy feeder of K and major portion of this nutrient is absorbed by maize plants at early stages itself (Ustimenko-Bakumovsky, 1983). As a consequence, the K content, both in shoot and leaves, was relatively higher than either N or P from the initial stages upto harvest. The N, P and K contents in plants decreased with IW/CPE ratio of 1.2. This might be due to translocation of these nutrients to cobs which was evident from a lower nutrient content of shoot portion as compared to grain.

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Table 1. Effect of irrigation levels on uptake and recovery of nutrients and yield of *rabi* maize. (Mean of two years)

Irrigation levels (IW / CPE ratios)	Nitrogen (N)		Phosphorus (P)		Potassium (K)		Mean Yield (q.ha ⁻¹)				
	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover			
	<u>Uptake (kg / ha)</u>										
0.6	38.8	28.8	67.6	14.2	14.4	28.6	13.3	51.4	64.7	21.4	55.2
0.8	44.5	39.2	83.7	16.0	13.6	29.6	16.5	71.3	87.8	24.0	66.9
1.0	54.8	38.1	92.9	22.2	13.5	35.7	24.7	85.3	110.0	31.2	75.1
1.2	52.2	34.9	87.1	22.2	11.6	33.8	24.0	100.0	124.0	30.0	72.4
S.E	—	—	—	—	—	—	—	—	—	0.8	2.0
C.D. (5%)	—	—	—	—	—	—	—	—	—	2.5	6.5
	<u>Recovery (%)</u>										
0.6	26.8	27.6	54.4	14.4	18.0	32.4	19.0	90.5	109.5	—	—
0.8	29.1	31.9	61.0	20.9	12.4	33.3	19.7	123.9	143.6	—	—
1.0	36.1	25.9	62.0	22.8	10.8	33.6	36.9	150.8	187.7	—	—
1.2	39.1	22.5	61.6	27.3	14.1	41.4	47.3	232.8	280.1	—	—

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EVALUATION OF PROMISING NEW WHEAT CULTURES UNDER TAMIL NADU CONDITIONS

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ABSTRACT

Field experiments were conducted at Tamil Nadu Agricultural University, Coimbatore for five years from 1982-1983 to 1986-1987 to identify the best new wheat cultures suitable for Tamil Nadu conditions. The cultures PBN142, AKW 13-3, AKW 42-3, IWP 5049, MACS 2067, NI 8858, NI 8924 and WSM 22-1 produced significantly higher grain yield over the check variety HD 2189.

KEYWORDS : Wheat, Varieties, Grainyield.

In India, wheat is grown over an area of nearly 24 m.ha and involves almost all the states except Kerala. Its cultivation extends from about 9°N (Palani hills in Tamil Nadu) to above 35°N (Srinagar valley in Jammu and Kashmir). This exposes the crop to wide range of agroclimatic conditions such as temperature, humidity and photoperiods prevalent at different altitudes, soil types and physiographic features of the region during the crop season and cropping systems (Tandon and Rao 1986). Hence specific varieties have to be developed for each agroclimatic zone,

due to the regional peculiarities in wheat growth (Agarwal 1986). Therefore, experiments were conducted to identify the suitable cultures for Tamil Nadu conditions. The cultures evolved in different wheat breeding centres all over India were tested.

MATERIALS AND METHODS

Field experiments were conducted under All India Coordinated Wheat Improvement Project at Tamil Nadu Agricultural University,