

Effect of Irrigation and Nitrogen levels of Nutrient Contents in Ragi

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A study on the effect of 'N' and irrigation on the nutrient content of Ragi grain revealed that the nitrogen and calcium content of Ragi grain were increased with enhanced nitrogen application as well as with fewer irrigations.

Ragi grain is a palatable nutritive food, with 7.1 per cent protein and 0.33 per cent calcium. Stabursvik and Heide (1974) reported that the crude protein content in ragi may vary from 7 to 13 per cent with rates of nitrogen upto 150 kg/ha. Tripathi (1971) found that irrigation at 40 per cent available soil moisture along with 180 kg N/ha in maize gave higher protein yield. The present investigation was undertaken to study whether irrigation and nitrogen could increase nutrient content in *ragi* grain.

MATERIALS AND METHODS

A field experiment was laid out at the Agricultural College and Research Institute, Madurai during *Kharif* 1974 in a split plot design keeping levels of irrigation as main treatments and levels of nitrogen as sub-treatments. All the plots received a uniform level of 40 kg P_2O_5 /ha and 20 kg K_2O /ha.

Irrigation was scheduled, when irrigation water to cumulative pan evaporation (USWB open pan evaporimeter)

values (IW/CPE) reached 0.6 (I_1), 0.75 (I_2), 0.9 (I_3) and 1.05 (I_4). The depth for each irrigation was kept constant at 6 cm. For example, if the cumulative evaporation reaches 10 cm in USWB evaporimeter, 0.6 ratio irrigation treatment will receive 6 cm of water as irrigation. The irrigation water was measured with the help of 90° V notch.

The soil type was of sandy loam with a pH of 7.7, medium in available N (294 kg/ha) and P_2O_5 (18 kg/ha) and high in potassium (460 kg K_2O /ha) status.

Half of the nitrogen dose was applied as basal and the remaining half was top dressed on 30th day after planting. The entire dose of phosphorus and potassium was applied basally at planting. The grain samples were analysed for nitrogen, phosphorus, potassium, calcium and magnesium as per the standard procedures.

RESULTS AND DISCUSSION

The effect of irrigation regimes and nitrogen levels was studied and the data presented in Table I.

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TABLE I. Effect of irrigation regimes and nitrogen levels on percentage of N, P, K and Ca content in *ragi* grain

Treatment	Nutrient content of ragi grain (%) on dry basis			
	N	P	K	Ca
I ₁ 0.6 IW/CPE ratio	1.54	0.685	0.721	0.364
I ₂ 0.75 IW/CPE ratio	1.24	0.748	0.694	0.318
I ₃ 0.90 IW/CPE ratio	1.31	0.782	0.685	0.307
I ₄ 1.05 IW/CPE ratio	1.11	0.659	0.665	0.265
SE (m)	0.05	0.041	0.021	0.024
CD at 5%	0.11	N.S.	N.S.	0.056
N ₀	0.97	0.722	0.710	0.277
N ₄₀	1.26	0.674	0.690	0.318
N ₈₀	1.45	0.722	0.691	0.349
N ₁₂₀	1.52	0.751	0.680	0.312
SE (m)	0.14	0.064	0.023	0.022
CD at 5%	0.28	N.S.	N.S.	0.045

Effect of irrigation regimes :

Nitrogen : Lower irrigation regimes (I₁) recorded the highest percentage of nitrogen while the highest moisture regime (I₄) recorded the lowest nitrogen content in *ragi* grain. There was no significant difference between I₂ and I₃ levels of irrigation since these two formed intermediate levels of irrigation. At lower irrigation level there was deeper penetration of roots resulting in greater absorption of nitrogen from the deeper soil layers. The root length at I₁ level was 27.50 cm as against

23.89 cm at I₄ level. It is significant to note that the root length in I₂ and I₃ level was 25.76cm and 25.56cm respectively. This also explains the reason for the more or less same level of nitrogen content of the grain in the above two moisture levels. The results are in line with that of Rajagopal (1969) on *ragi*.

Phosphorus and Potassium : Both the phosphorus and potassium content of *ragi* grain was not affected by varied irrigation regimes tried. The effects of irrigation levels on phosphorus content were found to be inconsistent (Jenne *et al.* 1958). As both phosphorus and potassium are subject to considerable fixation by the soil, the moisture regimes did not affect their availability. Kandaswamy *et al.* (1973) found that phosphorus availability was not affected by varying moisture levels under gardenland conditions.

Calcium : The calcium content in *ragi* grain was significantly increased with lower irrigation regime I₁. While it was less in higher moisture regime (I₄). The calcium content progressively decreased with increase in irrigation levels. This may probably be due to dilution effect because of higher moisture content and consequent reduction in uptake of calcium. A similar result was reported by Jenne *et al.* (1958) in corn.

Effect of levels of Nitrogen :

Nitrogen content : Added nitrogen increased significantly the nitrogen content in grain. Upward trend in the nitrogen content of grain (1.26 to 1.52) with increase in the level of applied

nitrogen upto 80 kg/ha was observed which is attributed to increased absorption. Similar results were observed by Boatwright and Hass (1961) in wheat and Sankaran (1967) in *bajra*.

Phosphorus and Potassium :

The phosphorus and potassium contents of grain were not however, influenced by the nitrogen levels tried.

Calcium : Calcium content was significantly influenced by the levels of nitrogen applied. The content at 80 kg N/ha level of nitrogen was higher than that at control.

REFERENCES

- ANONYMOUS. 1975. Brief of Indian Agriculture. Office of the Agricultural Attache, American Embassy, New Delhi.
- BOATWRIGHT, G. O. and H. J. HASS. 1961. Development and composition of spring wheat as influenced by nitrogen and phosphorus fertilization. *Agron. J.* 53 : 33-36.
- JENNE, E. A., H. F. RHOADER, C. H. TIEN and O. W. HOWE. 1958. Change in nutrient element accumulation by corn with depletion of soil moisture.
- KANDASWAMY, P., D. A. SELVASEELAN and K. K. KRISHNAMOORTHY. 1973. Changes in the available P under varying moisture levels in red and black soils.
- RAJAGOPAL, C. K. 1969. Influence of soil moisture on nutrient uptake of *ragi*. *Madras agric. J.* 56 : 642-52.
- SANKARAN, S. 1967. Studies on the response of graded doses of nitrogen and row spacing on the growth, yield and quality characters of HB. 1 Cumbu. Unpub M.Sc. (Ag.) Disser. submitted to Univ. Madras.
- STABURSUIK, A. and O. M. HEIDE. 1974. Protein content and amino acid spectrum of finger millet as influenced by nitrogen and sulphur fertilizers. *Plant and Soil.* 41 : 549-71.
- THIRUPATHI, R. and Y. B. MORACHAN. 1973. Effect of nitrogen levels on the uptake of N, P and K by Co.9 finger millet. *Indian J. Agron.* 18 : 482-85.