

## ABSTRACT

To determine a rational method of fertilizer application so that consistently high rice yields may be realized it is desirable to have an understanding of plant growth processes of nutrient uptake by the plant at different stages of growth and of the contribution of various nutrients to grain formation. To this end is a literature review directed. A discussion of rice varieties their growth and response to nitrogen is followed by a consideration of rice soils, nitrogen fertilizer and nutrient uptake.

Of all the factors governing rice yield in tropical conditions the most easily controllable is the interaction between variety and nitrogen fertilizer. An experiment was conducted in the dry season to compare the growth and nutrient uptake of two rice varieties with different nitrogen fertilizer regimes. The varieties used were Joya - a widely used local Indica type, and S.M.L. - a Japonica x Indica hybrid imported from Surinam. Fertilizer was applied at the following rates:- 0, 50, 100, 150 and 200 lbs.N/acre.

Joya tillered more rapidly, reached greater tiller numbers and had a greater rate of dry matter increase than S.M.L. In both varieties dry matter increase was reduced after flowering, but most especially in Joya. Whereas nitrogen increased dry weight in all Joya treatments a maximum response was exhibited by S.M.L. between 150 and 200 lbs.N/acre. All Joya and none of the S.M.L. treatments lodged. S.M.L. exhibited a more extended flowering period than Joya and matured unevenly but out-yielded Joya at all nitrogen levels. Grain yield in Joya attained a  
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maximum at 100 lbs. N/acre increasing nitrogen thereafter decreased yield. The yield of S.M.L. at 200 lbs. N/acre was not significantly higher than that at 50 lbs. N/acre. The 100 and 150 lbs. N/acre treatments were despoiled by birds. S.M.L. had an increasingly greater grain-straw ratio than Joya with increasing nitrogen.

Soil analyses were correlated with nitrogen uptake. Rates of Ammonia release in the soil and percentage fertilizer loss were computed.

The results of stem and leaf, and grain tissue nutrient analyses were presented and discussed. S.M.L. had a higher initial nitrogen percentage, and absorbed more nitrogen over the ripening period than Joya. Increasing nitrogen application increased stem and leaf N, Ca, P and grain Mg; and reduced stem and leaf K and grain Ca. Varietal differences were found in the proportion of grain nutrients derived from those absorbed during ripening and from vegetative stores.