

## Studies on the Time of Application of Fertilizers for Rice (*Oryza sativa* L.)

By

V. SUBRAMANIAN<sup>1</sup> and Y. B. MORACHAN<sup>2</sup>

### ABSTRACT

The study revealed that the optimum dose of N, P and K for "Padma" rice was 100, 50 and 50 kg/ha respectively. The basal dressing of full dose of P and K combined with one third of N application, followed by two doses of N applications one at tillering and other at floral initiation stage resulted in maximum yield of "Padma" rice.

### INTRODUCTION

In India, average yield of rice per hectare is 1300 Kg, one of the lowest in the world. Important causes for this low productivity are low yielding varieties and inadequate use of fertilizers. Lately, dwarf, high yielding varieties have been introduced and use of fertilizers is also increasing. However, fertilizers should be applied at the time when crop needs them most to increase their efficiency. Therefore, a study on the time of application of fertilizers to rice variety Padma was undertaken in 1969.

### MATERIALS AND METHODS

The experiment was laid out in the Kharif season of 1969, in the wet lands of the Agricultural College, Coimbatore. Nitrogen, phosphorus and potassium were applied as follows:

1. N1 P1 K1 - Nitrogen, phosphorus and potassium were applied as complete basal.

2. N2 P2 K2 - Nitrogen, phosphorus and potassium were applied in two splits half basal and half at tillering.

3. N3 P3 K3 - Nitrogen, phosphorus and potassium were applied in three splits - one third basal, one third at tillering and remaining one third at floral initiation stage of the crop.

A 3<sup>3</sup> confounded design with three blocks, nine plots each, partially confounding the higher order interaction NPK was adopted with two replications. A single level of fertilizer was adopted and ammonium sulphate, super phosphate and muriate of potash were used to supply respectively 100 kg. of N, 50 kg of P<sub>2</sub>O<sub>5</sub> and 50 kg of K<sub>2</sub>O/ha. The crop was harvested and yields were recorded separately. Both grain and straw yields were subjected to statistical analysis and inferences were made.

1. Assistant Scientist (Agronomy), Regional Research Station, Kaveripattinam, Dharmapuri District.

2. Professor and Head, Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore - 641 003.



TABLE 1. Yield of grain as influenced by main effects of the treatment.

|                | Yield Kg/plot |
|----------------|---------------|
| N <sub>1</sub> | 8.09          |
| N <sub>2</sub> | 7.80          |
| N <sub>3</sub> | 8.70          |

S. E. 0.1865

C. D. 0.5469

It is clear that nitrogen application in split doses has significant influence on grain yield (Table 1). The time of application of P and K has no effect on grain yield. In N application, three splits are found to be significantly superior to complete basal and two split applications. Application in three splits has increased grain yield by 7.54 per cent and 11.53 per cent respectively over complete basal and two splits.

The interaction between N and K has significantly influenced the yield of rice (Table 2.) The interaction between N and P and P and K did not have any effect on grain yield.

TABLE 2. Yield of grain as influenced by two factor interactions nitrogen and potassium.

|     | K <sub>1</sub> | K <sub>2</sub> | K <sub>3</sub> |
|-----|----------------|----------------|----------------|
| N 1 | 8.48           | 7.10           | 9.70           |
| N 2 | 7.66           | 8.35           | 7.48           |
| N 3 | 9.23           | 8.52           | 8.63           |

S. E. 0.323

C. D. 0.947

Only the interaction between N and K has significantly influenced the

yield in rice. It is also observed that the three split of N in combination with K gives the highest yield irrespective of the time of application of potassium.

TABLE 3. Straw yield as influenced by main effects of the treatments.

|     | Yield |     | Yield |     | Yield |
|-----|-------|-----|-------|-----|-------|
| N 1 | 13.43 | P 1 | 13.59 | K 1 | 14.64 |
| N 2 | 13.49 | P 2 | 14.01 | K 2 | 13.91 |
| N 3 | 14.16 | P 3 | 13.78 | K 3 | 12.85 |

S. E. 0.2517

0.2517

0.2517

C. D. N. S.

N. S.

0.7381

From the Table 3 it is clear that N and P do not exert any influence on the straw yield by their time of application. In the case of K which significantly influences straw yield, complete basal application gives the maximum straw yield. The interaction effects of treatments on straw yield were also studied. Interaction of N and P and of N and K are significant (Tables 4 and 5).

TABLE 4. Effect of interaction of nitrogen and phosphorus on straw yield.

|      | P 1   | P 2   | P 3   | Mean  |
|------|-------|-------|-------|-------|
| N 1  | 14.35 | 13.88 | 13.07 | 13.43 |
| N 2  | 12.40 | 14.55 | 13.52 | 13.49 |
| N 3  | 14.13 | 13.60 | 14.77 | 14.16 |
| Mean | 13.59 | 14.01 | 13.78 |       |

S. E. 0.4359

C. D.

1.278

The table reveals that the split application of N and P results in highest straw yield though there is no



significant difference between the timings and various combination of nutrients.

TABLE 5. Effects of interaction of nitrogen and potassium on straw yield.

|      | Yield in kg per plot |       |       |       |
|------|----------------------|-------|-------|-------|
|      | K 1                  | K 2   | K 3   | Mean  |
| N 1  | 14.43                | 14.08 | 12.78 | 13.76 |
| N 2  | 13.20                | 14.38 | 12.88 | 13.49 |
| N 3  | 16.30                | 13.25 | 12.95 | 14.16 |
| Mean | 14.64                | 13.90 | 12.87 |       |

S. E. 0.4359

C. D. 1.278

With three splits of N the interaction between N and K has resulted in higher yield but the split application of potassium is less important because complete basal application of it along with three splits of nitrogen has resulted in the maximum yield of straw.

#### ACKNOWLEDGEMENT

The Senior author is thankful to the University of Madras for permission to publish the M. Sc. (Ag.) dissertation submitted by the senior author.