NUTRIENT UPTAKE BY PADDY DURING THE MAIN THREE STAGES OF GROWTH

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SUMMARY

Uptake of mineral nutrients and production of carbohydrates by paddy during the vegetative, the reproductive, and the ripening stage of growth were determined in a pot experiment.

From 59 to 84 per cent of the nutrients present in the ripe plants were absorbed between tillering and flowering. More than 90 per cent of the N and K, 80 per cent of the P and Ca, and 65 per cent of the Mg were absorbed prior to flowering, and the remainder after heading.

More than 60 per cent of the carbohydrates present in the ripe stage was produced after flowering.

INTRODUCTION

To obtain the highest yield returns at the lowest fertilizer rate the method of top dressing can be highly efficient. Split doses of fertilizer may keep the field in a constant state of fertility by replacing as much as the crop has removed. But a knowledge of nutrient uptake during the successive stages of growth is relevant to this question.

In the present study the uptake of some major nutrients by paddy in the vegetative, the reproductive and the ripening stage is considered.

A brief review of published data showed that rice absorbs almost all its N and K within 110 days after germination, while uptake of P, Ca and Mg continues into the ripening stage. Other workers report a continuous uptake of N and P until earing, while uptake of K and Ca continues into the ripe stage, and Mg uptake is considerable between panicle initiation and heading. About
90 per cent of the N may enter the crop within 52 days after planting with a similar time course of K, Ca and Mg uptake and slow absorption of P during early growth. Uptake of N increases until tillering while uptake of P continues into the ripe stage. While the major proportion of the N is absorbed between planting and flowering, and that of the K until the dough-ripe stage, uptake of Mg and Ca is greatest during the reproductive stage.

The purpose of the present work was to investigate some new high-yielding rice varieties as to their actual nutrient requirements during three successive characteristic stages of development, and to aid planning of a more efficient use of fertilizer in rice growing.

MATERIAL AND METHODS

Three new high-yielding varieties of paddy: IR 8; IR 20; and IR 22 were used as test crops in a complex pot experiment with:

a. 3 major soil groups of Tamil Nadu: black, red, and alluvial
b. 4 levels of NPK fertilizers: 100-50-50; 150-75-75; 200-100-100; 250-125-125 kg/ha of N, P₂O₅ and K₂O, respectively, N alone split into one half basic at day 0 at planting, one fourth top at day 30 during the vegetative stage, and one-fourth top on day 55 at flower initiation, while P₂O₅ and K₂O applied basally and 3 replicates for sufficient plant material at mid-tillering (day 30), at flowering (day 72) and in the ripe stage (day 110 after planting).

The time-intervals between harvests roughly corresponded to the vegetative stage, the reproductive stage, and the ripening stage, respectively.

The dried material was weighed and analysed for N, P, K, Ca and Mg according to standard methods, and for carbohydrates. From element concentration and weight of dry matter the absolute amounts the plants contained were calculated.

RESULTS AND DISCUSSION

For convenience of presentation the data for soil type, plant variety and fertilizer level were totalled for each stage of growth. The totalled gain in dry matter, nutrients and carbohydrates during the vegetative stage (I), the reproductive stage (II), and the ripening stage (III) were obtained by difference, and these values are listed in Table 1.

During the vegetative stage the plants had absorbed 5 to 11 per cent of what they contained in the ripe stage. For N this agrees with the findings of Kanapathy. At flowering (II) the plants