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Relationship between quantity intensity characteristics of potassium in rice soils of Tungabhadra Command Area and response to split application of potassium

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ABSTRACT

The study indicates the quantity – intensity characteristics of potassium in some rice soils of Tungabhadra Command Area. The results show that PBC^K is significantly correlated with the clay content of soil, has positive correlation with soil exchangeable K and is significantly correlated with the relative percentage of rice yield. ARe^a-K is negatively correlated with clay content of soil and closely related to the frequency of potassium application. Rice crop responded to split application of of potassium in different textural soils.

Key words : Quantity-intensity, Tungabhadra Command Area, Exchangeable K, ARe^a-K.

Since the quantity-intensity (Q/I) concept was put forward by Schofield (1947), Beckett used the Q/I curves and its relevant parameters to evaluate the status of soil potassium. ARe^K could be used to measure the potassium availability. $-\Delta K$ could be used as an index for evaluating the amount of soil available potassium, while the buffering capacity of soil potassium could be estimated by PBC^K. Some researchers have shown that PBC^K was significantly correlated with CEC and $-\Delta K$ was significantly correlated with soil exchangeable K (Zhu *et al.*,1993). Lin (1987) reported that PBC^K was significantly correlated with the total amount of potassium absorbed by rice under pot culture without potassium fertilizer for continuous four crops. The aim of this study was to find out the relationship between Q/I characteristics of potassium in some rice soils with different texture and method of potassium application.

MATERIALS AND METHODS

The rice soils used were sampled from 15 locations comprising of Tungabhadra Command Area and their properties are presented in Table 1.

Field experiment:

Experiment 1: The experiment with two treatments, one received potassium through muricate of potash (75 kg ha^{-1}) and the other had no potassium application, was conducted on farmers fields representing different textural classes. Each experiment was carried out in four replications and each treatment received enough nitrogen and phosphate(150:75 kg ha^{-1} of N and P). Rice was planted in early July.

Experiment 2: The experiment with 5 treatments of split application of potassium and was replicated thrice in RCBD and was conducted in sandy loam soil and clay loam soil of Manavi and Herur village, respectively. The treatments were as follows.

- No potassium fertilizer.
- 100% RD of potassium fertilizer (75 kg ha^{-1}) was applied as basal dressing.
- 50% RD of total potassium as basal dressing and 50% as top dressing on 30 th days after transplanting.
- 50% as basal and 50% at panicle initiation stage.
- 50% as basal, 30% on the 30th day after transplanting and 20% at panicle initiation, respectively.

Equilibration studies:

Five grams of soil were equilibrated with 50 ml mixed solutions containing 0.01 mol/l $CaCl_2$ and 0, 10, 20, 30, 50, 70, 90, 100 mg/l KCl separately. The suspensions were shaken on a reciprocating shaker for 30 minutes. Potassium was determined in the filtrate using flame photometer, while calcium and magnesium were determined in the filtrate by Versenate titration. DK can be calculated according to the difference between initial and final equilibrium potassium concentration. The potassium activity ratio AR^K is equal to

$$AR^K = \frac{aK}{a\ (Ca+Mg)^{1/2}}$$

The Q/I curve was plotted.