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EFFECT OF TIME OF APPLICATION OF POTASSIUM ON YIELD OF RICE

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ABSTRACT

Experiments were conducted during *Kharif* and *rabi* seasons of 1985-1986 at Tamil Nadu Agricultural University, Coimbatore to study the response of application of yield attributes such as number of panicles hill^{-1}, filled grains panicle^{-1} and thousand grain weight were positively influenced by level and time of K application. During *Kharif*, application of 50 kg.ha^{-1} K_2O applied basally at planting produced greater response while during *rabi*, 50 kg.ha^{-1} K_2O applied in two equal splits at planting and panicle initiation resulted in high response. Application of at least part of K at planting as basal dose was superior to entire K applied as top dressing alone at later growth stages.

KEYWORDS: Rice, Yield, Time of application, Potassium.

Potassium (K) accounts for a greater share of total nutrients removed from soil by rice crop. However K management appears to be far more complex under lowland conditions. For reasons, not yet fully understood, response of rice to K application is often inconsistent (Von Uexkull 1978). While there are many reports of high response to K application (Hati and Mishra 1983; Gurmani *et al.*, 1984), non-response to K in rice has also been reported. (Jagadeesan *et al.* 1978).The inconsistency of response to K is in part due to K is in part due to K equilibrium phenomenon in soil (Gupta *et al.* 1977). Thus, K application to rice is a dynamic aspect requiring constant monitoring and evaluation.

Application of K basally at the time of planting has long been regarded as the best time of application for rice. However, recent evidence indicated that split application of K to rice is often superior to a single basal application (Venkatasubhiah *et al.* 1982, Barthakur *et al.* 1983). Von Uexkull (1985) has identified the conditions which favour single or split application of K. With such diverse views on levels and time of application, there seems to be a continuing need for further research on these aspects.

MATERIALS AND METHODS

Field experiments were conducted at the wetland farm of Tamil Nadu Agricultural University, Coimbatore during *Kharif* and *rabi* seasons of 1985-1986 to study the influence of levels and time of application of K and Zn on the growth and yield of lowland transplanted rice. Variety ADT 36 of 105 days duration during *kharif* and variety Co 43 (135 days) during *rabi*. was raised. The experiment was laid out in split plot design replicated thrice, with levels and time of application of K in main plots and Zn application in sub plots. (Zinc application is not discussed in this paper). Application of K was done at two levels, viz. 25 and 50 kg.ha^{-1} K_2O with four times of application, viz. all at planting, 50 percent each at planting and panicle initiation, (PI) 1/3 each at planting, active tillering (AT) and PI and 50 percent each at AT and PI. A control plot with no K application was also included. Soil of the experimental field was well drained deep clay loam with low available N, medium P and

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high available K. The pH of the soil was 8.2 with an EC of 1.5 ds. m^{-1}. The N at 100 kg.ha^{-1} and P at 50 kg.ha^{-1} were applied uniformly. Observations were recorded on all yield components and yield of grain and straw.

RESULTS AND DISCUSSION

Grain Yield (Table1)

Application of K has significantly increased the grain yield of rice during both *kharif* and *rabi* seasons. During *kharif*, application of 50 kg.ha^{-1} K_2O all at planting recorded higher grain yield (4869 kg.ha^{-1}) over No K as well as 25 or 50 kg.ha^{-1} K_2O^{-1} applied as top dressing at AT and PI. Grain yield with 25 or 50 kg.ha^{-1} K_2O applied in split doses as basal plus top dressing also recorded higher grain yields over No K treatments. These results suggest that during *kharif* season the possibility of applied K being leached due to rains is very less, and basal application or basal plus top dressing would be the best time of K application. But top dressing alone without any basal application would not produce the desired response. The cumulative effect on all the yield attributes had resulted in higher grain yield with treatments receiving 25 or 50 kg.ha^{-1} as basal or in two or three splits as basal and top dressing at AT and/or PI stages.

During *rabi* season, response to K was of a greater order. Though K application treatments were on a par with each other, the order of increase indicated that a higher response was obtained with 50 kg.ha^{-1} K_2O applied in two equal splits at planting and panicle initiation stages (6124 kg.ha^{-1}) and this was followed by 50 kg K_2O applied in three splits at planting, AT and PI (6099 kg.ha^{-1}) and 50 kg.ha^{-1} K_2O applied at planting (6096 kg.ha^{-1}). The results suggest the need for maintaining a higher level of K_2O at 50 kg.ha^{-1} during *rabi* to get assured response.

The trend of response to K application in this study indicate that even in soils of high available K status a positive response to applied K can be obtained. A quantity of 50 kg.ha^{-1} K_2O happlied basally would produce greater response during *kharif* and 50 kg.ha^{-1} K_2O applied in two equal splits at planting and PI stages would give higher response during *rabi*. During both seasons, top dressing alone did not confer any benefit on yield. Similar results were reported by Hati and Misra (1983) and Gurmani *et al.* (1984).

Straw Yield (Table-1) :

The increase in straw yield due to changes in levels and time of application of K did not reach statistical significance in this study. This could be explained by the absence of any significant effect of K application on growth and drymatter production of rice, which are closely correlated to straw yield.

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Table 1. Grain and Straw yield of rice

Treatment		Grain yield (kg.ha-1)		Straw yield (Kg.ha-1)	
		Kharif	Rabi	Khairf	Rabi
1. O kg $K_2O.ha^{-1}$		3422	5153	5942	9398
2. 50 kg $K_2O.ha^{-1}$	- All basal	4869	6096	7055	10248
3. 50 kg $K_2O.ha^{-1}$	- 1/2 basal + 1/2 at PI	4084	6124	6194	10937
4. 25 kg $K_2O.ha^{-1}$	- 1/2 basal + basal + 1/2 at PI	4081	5891	6400	10393
5. 50 kg $K_2O.ha^{-1}$	- 1/3 basal + 1/3 at AT + 1/3 at PI	4399	6099	6190	10309
6. 25 kg $K_2O.ha^{-1}$	- 1/3 basal + 1/3 at AT + 1/3 at PI	4326	5881	6228	9701
7. 50 kg $K_2O.ha^{-1}$	- Top dressing 1/2 at AT + 1/2 at PI	3983	5648	6387	10591
8. 25 kg $K_2O.ha^{-1}$	- Top dressing 1/2 at AT + 1/2 at PI	3815	5606	6180	10737
	SED	300	225	509	514
	CD (5%)	644	484	NS	NS

AT - Active Tillering PI - Panicle Initiation NS - Not Significant

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CLIMATE AND SOIL BASED CROP WATER REQUIREMENT FOR RICE

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ABSTRACT

Estimation of crop water requirement for Coimbatore region revealed that rice requires 591 and 821 mm during *kharif* and summer respectively. Of which 410 and 510 mm were required for crop ET and 181 and 311 mm were required for percolation during *kharif* and summer respectively. The peak water requirement was found to be at panicle initiation stage in *kharif* and reproductive stage in summer.

KEYWORDS : Crop Water Requirement, Rice, Evapotranspiration

In all the major irrigation projects in India, the design was based on duty of water concept which has became obsolete. The water requirement of crops is mainly based on climate, soil and management practices which are not considered in the duty of water concept. On an arbitrary basis the duty was fixed and the canals were designed. The percolation loss accounts for 40 to 70 per cent of water requirement depending upon the type of soil. The remaining share is to be met by the evapotranspiration (ET) of the crop. Hence, a study was taken up to find out a suitable scientific method of estimating crop water requirement for rice crop based on climate and soil.

MATERIALS AND METHOD

Field experiments were conducted dur-

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