

Effect of K on Competition Between Weedy Rice and Cultivated Rice

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Introduction

Weedy rice is one of the troublesome weedy types associated with the yield reduction of rice. It is found all over the rice growing areas in the world. Fertilizer management is the key factor towards achieving high productivity in rice cultivation. Nitrogen (N), phosphorus (P), and potassium (K) are the most important plant nutrient in rice cultivation. Growth parameters, yield components and yield of cultivated rice and recovery efficiency of N, P, and K fertilizers are shown to be affected due to competition of weedy rice. Kodituwakku and Abeysekera (2011) showed that weedy rice completes for soil K than soil N and P. Not much information is available about the competition by weedy rice in Asian region. Therefore, the objective of this study was to find the most effective potassium (K) level that has the least competition upon cultivated rice by weedy rice for K.

Methodology

This experiment was carried out in a shade house at the Rice Research and Development Institute, Batalagoda which is in the Low country Intermediate Zone of Sri Lanka from May to August 2012. Cultivated rice variety (Bg 352) and weedy rice Kurunegala (KWR) bio type were assessed for growth and yield components with four different levels of K fertilizers. The treatments were T1 (Bg 352 + zero K), T2 (Bg 352 + recommended K), T3 (Bg 352 + double the recommended K level), T4 (Bg 352 + thrice the recommended K level), T5 (Bg 352 + KWR zero K level), T6 (Bg 352 + KWR + recommended K level), T7 (Bg 352+ KWR + double the recommended K level), T8 (Bg 352 + KWR + thrice the recommended K level). These treatments were arranged in two factor factorial Complete Randomized design (CRD) with three replicates. Plant growth parameters and yield components were recorded in two weeks interval. Before crop establishment and after panicle initiation, soil samples were analyzed by using Kjeldahl method. Soil K use efficiency was calculated by using the result of K analysis.

Results and Discussion

In 6 WAP the plant height of rice plants (Bg 352) were significantly reduced due to the competition of weedy rice. All the other growth parameters of cultivated rice (number of leaves per plant and tillers per plant, leaf chlorophyll content, leaf area, plant dry weight) were also significantly affected by weedy rice competition. The compaction by weedy rice was not affected by the soil K levels (Table 1).

Table 1: Means of Plant growth parameters for different treatments

Treatment	Plant height(cm)	No. of Leaves	No. of Tillers	Chlorophyll content	Leaf area
T1	61.5a	25 a	5a	26.7 a	1023 a
T2	58.8a	23 a	5a	26.3 a	707 a
T3	64.3a	27 a	6a	28.2 a	1067 a
T4	62.2a	31 a	6a	29.7 a	942 a
T5	60.3a	26 a	4a	26.2 a	960 a
T6	54.6a	21 a	5a	26.4 a	753 a
T7	58.4a	22 a	5a	26.4 a	659 a
T8	58.4a	22 a	5a	27.9 a	688 a

The yield components, number of panicles per plant, number of grains per panicle, filled grain percentage and 1000 grain weight significantly reduced by the growth of weedy rice. The different K level affected to number of panicles per plant and to the 1000 grain weight (Table 2).

Table 2: Means of yield components

Treatment	NO. of panicles/per plant	No. of seeds/ panicle	Filled grain%	1000 grain weight
T1	6	110	94.77	24.9
T2	7	118	91.99	25
T3	8	119	92.35	25.2
T4	8	128	90.78	24.8
T5	5	108	91.36	23.08
T6	5	104	90.18	22.04
T7	6	115	91.52	23.6
T8	6	102	88.9	22.2

In mono-culture condition, K use efficiency of Bg 352 was higher and with the competition of weedy rice the K use efficiency reduced as shown in Table 3. At K2 level reduction of K use efficiency was low.

Table 3: Soil K use efficiency

K levels	Mono culture	With WRK	reduction
K1	75%	64%	11
K2	77%	68%	9
K3	80%	70%	10

In previous studies it has been reported that soil K levels affected weedy rice competition compared to soil N and P levels (Kodithuwakkue*et.al*, 2011) for Matara weedy rice. Weedy rice was first reported in Matara district in 2000 and it had passed several seasons by now and the weed characters are well improved. Generally, the competitive ability of weedy rice increases from season to season (Ferrero, 2010) Kurunegala weedy rice bio-type was used

for this study and the weed characters of Kurunegala type is not well improved as Matara weedy rice.

Conclusions

The results showed that the growth parameters, yield components and yield of cultivated rice were significantly affected by weedy rice competition. Soil K levels did not affect on the competition of Kurunegala weedy rice with Bg 352.

References

Kodituwakku, P.W.D., Abeysekara, A.S.K. and Devasinghe, D.A.U. 2011 Weedy rice competition on cultivated rice (*Oryza sativa* L.) for N,P,K fertilizers; Undergraduate Research Symposium 2011, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura, Sri Lanka.

Ferrero A, 2010, Weedy rice biological features and control, Weed management for developing countries (Addendum 1).

Table 2. Means of yield components

Treatment	No. of panicles per plant	No. of seeds per panicle	Filled grains/1000 grains	1000 grain weight
T1	6	110	64.73	34.8
T2	7	112	61.99	33
T3	8	113	62.12	32.9
T4	9	128	60.78	32.8
T5	1	108	61.76	33.08
T6	2	104	60.18	32.04
T7	3	113	61.52	33.0
T8	4	103	58.9	32.2

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In previous studies it has been reported that soil K levels affected weedy rice competition. Kodituwakku et al. (2011) for Matara weedy rice (WKK) compared to soil K and P levels (Kodituwakku et al. 2011) for Matara weedy rice. WKK rice was first reported in Matara pattern in 2009 and it had passed several seasons of now and the weed characters are well improved. Generally, the competitive ability of weedy rice increases from season to season (Ferrero 2010). In this study, the competitive ability of weedy rice