Effect of Fertilizer Levels on Yield for Wanggol(*Cyperus iwasakii Makino*) Cropping before Rice Transplanting

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ABSTRACT

To determine the optimal fertilizer level of wanggol in southeren areas of Korea, Gwangsan ealy local, the highest yielding variety was grown under nine different fertilezer levels.

Yield components such as stem length, number of tillers, stem diameter were the highest at the treatments of fertilizer levels, N- P_2O_5-K_2O -7-2-3 and 9-2-3 kg/10a plots. Dry cortex and medulla yield were the highest at the treatments of N-P_2O_5-K_2O = 7-2-3 and 9-2-3 kg/10a fertilizer levels.

Judging from the results, an optimum fertilizer level of wanggol seemed to be N-P_2O_5-K_2O = 7-2-3 and 9-2-3 kg/10a.

Key words : wanggol, fertilizer level, dry cortex yield.

INTRODUCTION

Fertile soils supply 16 chemical elements essential to plant growth. These are nitrogen, phosphorus, potassium, calcium, sulfur, magnesium, boron, manganese, zine, iron, molybdenum, sodium, copper, chlorine, aluminum, and silicon (Chapman, 1966). At least 6 others - cobalt, arsenic, selenium, lead, lithium, and vanadium stimulate certain plants under some conditions. Carbon and additional oxygen are drawn from the air, and oxygen and hydrogen are supplied in water. Most of these elements, in addition to iodine, fluorine, chromium, and tin, are essential to human or animal nutrition (Adams, *et al.*, 1961 ; Beeson, 1957).

The use of major elements, nitrogen, phosphorus, potassium, and calcium are absolutely essential to plant growth. Plant grown on soils with sufficient amounts of available nitrogen in the soil make a thrifty, rapid growth with a healthy deep green color. Adequate amounts of phosphorus in soils favor rapid plant growth and early fruiting or maturity, and often improve the quality of vegetation. An adequate supply of potassium in the soil improves the quality of the plant, insures-greater efficiency in photosynthesis, increases resistance to certain disease, helps to balance an oversupply of nitrogen and aids plants to utilize soil moisture more advantageously.

It also insures the development of well-filled kernels and stiff straw in the cereals, encourages growth in leguminous crops, assists in chlophyll formation, and is particularly helpful in the production of starch-or sugar-forming crops (Cooper, *et al.*, 1938 ; Dean, 1957). In

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this experiments was conducted to examine the effects of fertilizer levles on yield of dry cortex of wanggol(*Cyperus iwasakii Makino*) cropping before rice transplanting.

MATERIALS AND METHODS

To find out the optimum fertilizer level for high yielding variety, Gwangsan early,

experiment was conducted with 9 compositions of fertilizer levels at the experiment field of wanggol in Gwangju national experimental field. Seed were sown in nursery bed on Mar.20 and seedling were transplanted in the paddy field with 15×15cm distance with 1 plant hill on May 10. The complete randomized block design was used and treatment was randomized in each of the three blocks. The size of each experimental unit was 20 ㎡ (4 m×5 m).

Soil properties of the experimental plot at the beginning of experiment was the same as this given in the table 1. The level of fertilizer application was the same as this given in the table 2. Twenty plants were randomly sampled from each plot at heading stage, stem length, number of tillers and heading stem, stern

Table 1. Soil properties of the experimental plot at the beginning of experiment

PH H_2O (1:5)	OM (%)	P_2O_5 (ppm)	K (mg)	Ca (mg)	Mg (mg)	CEC (mg)
5.7	2.4	110	0.27	4.0	1.6	9.6

Table 2. The levels of fertilizer application (kg/10a)

No	N- P_2O_5-K_2O	No	N- P_2O_5-K_2O	No	N- P_2O_5-K_2O
1	0 - 0 - 0	1	5 - 2 - 3	1	7 - 4 - 3
2	3 - 2 - 3	2	5 - 4 - 3	2	9 - 2 - 3
3	3 - 4 - 3	3	7 - 2 - 3	3	9 - 4 - 3

Table 3. Variations of agronomic characters of wanggol

Fertilizer levels (N-P_2O_5-K_2O)	Stem length (cm)	No. of tillers	No. of heading stem	Stem diameter(mm)		
				Long (Over 100cm)	Medium (Over 80cm)	Short (Over 60cm)
0 - 0 - 0	101	4.4	2.2	5.9	5.0	4.2
3 - 2 - 3	103	5.7	2.7	5.9	5.0	4.2
3 - 4 - 3	106	5.4	2.2	6.4	5.3	4.2
5 - 2 - 3	103	6.2	2.5	6.3	5.3	4.2
5 - 4 - 3	109	6.1	2.5	6.4	5.4	4.2
7 - 2 - 3	117	7.6	4.0	6.8	5.6	4.6
7 - 4 - 3	112	7.5	4.0	6.8	5.6	4.6
9 - 2 - 3	118	7.7	4.0	6.9	5.6	4.6
9 - 4 - 3	116	7.6	4.0	6.8	5.6	4.6
LSD(0.05)	11.70	2.49	1.50	0.69	0.44	0.37

diameter and lodging resistance were investgated. To determine yield, all the plants in 1 ㎡ from each plot were harvested by cutting at about 5 cm above soil level. After skinning the stem, the cortex and medulla wre measured.

RESULTS AND DISCUSSION

Agronomic characteristics

Heading dates were June 22 in all plots. Mean values of agronomic characteristics under different fertilizer levels are presented in Table 3. Stem length, number of tillers and heading stems, and stem diameter increased as fertilizer level by the N-P_2O_5-K_2O = 9-2-3 kg/10a. Mean values of stem length, number of tiller and heading stem, and stem diameter for fertilizer level, N-P_2O_5-K_2O = 9-2-3 kg/10a were 116, 7.6, 4.0, 6.8, 5.6, and 4.6 cm respectively (Table 3). There were significant differences among fertilizer levels. The results were fairly agreement with those of Kwon (1968a, 1968b, 1968c, 1969a, 1969b, 1992) reported that agronmic characters differences as cultural practice by the fertilizer level.

Mean values of stem length, number of tillers and heading stem and stem diameter for fertilizer level, N-P_2O_5-K_2O = 9-2-3 kg/10a were 118, 7.7, 4.0, 6.9, 5.6, and 4.6 mm respectively (Table 3). There were significant differences among fertilizer levels.

Yield and variance

The means of yield of cortex and medulla are presented in Table 4. As shown in Table 4 mean values

Table 4. Variations of yield of wanggol

Fertilizer levels (N-P_2O_5-K_2O)	Dry cortex yield (kg/10a)					Dry medulla yield(kg/10a)
	Long (Over 100cm)	Medium (Over 80cm)	Short (Over 60cm)	Total	Index	
0 - 0 - 0	83.8	27.4	36.0	147.2	77.8	44.3
3 - 2 - 3	84.6	40.3	49.0	173.9	91.9	56.3
3 - 4 - 3	56.7	49.9	52.5	159.1	84.0	47.0
5 - 2 - 3	92.9	54.7	41.7	189.3	100.0	74.7
5 - 4 - 3	83.2	54.3	43.3	180.8	95.5	65.3
7 - 2 - 3	111.7	67.3	76.1	255.1	134.8	82.5
7 - 4 - 3	106.3	57.4	73.8	237.5	125.5	80.6
9 - 2 - 3	107.6	83.8	69.6	261.0	137.9	87.4
9 - 4 - 3	121.6	75.0	50.6	247.2	130.6	91.1
LSD(0.05)	35.01	30.54	27.52	93.07	41.59	30.98

Table 5. Analysis of variance for dry cortex yield of wanggol

Source of variance	DF	M.S	F	C.V(%)
Replication	2	526.05	0.72	13.2
Fertilizer level	8	5,905.97	8.95**	
Error	2	733.91		

** Significant at the 0.01 level.

of dry cortex yield of cortex and medulla for fertilizer level, N-P_2O_5-K_2O = 9-2-3 kg/10a were 107.6, 83.8, 69.6, 261.0, 137.9, and 87.4 kg/10a respectively (Table 4). There were significant deferences among fertilizer levels. The results were fairly in agreement with those of kwon (1968a, 1968b, 1968c, 1969a, 1969b, 1992) reported that yield characters differences as cultural practice by the fertilizer level. The analysis of variance of yield were significant differences among fertilizer levels(Table 5). Fertilizer level, N-P_2O_5-K_2O = 9-2-3 kg/10a is considered to be a suitable fertilizer level of wanggol culture at the southern area of Korea.

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