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Effect of Complex Fertilizer on Yield and Yield Components of Rapeseed

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Abstract - To find out the best complex fertilizer for high yielding of rapeseed crop, experiment was conducted on complex fertilizers at the experiment field in upland of rapeseed in Mokpo Experiment Station, Nat'l Institute of Corp Science, RDA, Korea. Experiment was laid out in randomized complete block (RCBD) design. The effects of complex fertilizer (22-22-11) on the number of branches, pod length, percentage of seed set and seed yield were highest but on the plant height, ear length, and number of pods per ear were negligible. On th basis of the results reported above, for getting higher yield of rapeseed crop, among the tested fertilizers complex fertilizer (22-22-11) gave the superior performance and is recommended for application.

Key words - Rapeseed, Complex fertilizer, Yield

Introduction

China, Canada and India produce rapeseed less than 10 percent of world production of vegetable oilseeds. However, the E.E.C., Poland and Sweden are being the major producers. In terms of areas cultivated, it is the most rapidly expanding crop in the world.

Rapeseed (*Brassica napus* L.) is a most important oil seed crop grown as a winter crop in the southern part of Korea supplying good quality oil and meal, substitute energy, raw material of cosmetics, lubricating oil and increasing farmers' income and socio-economic development.

Southern part of Korea including Jeju island is the most important production area of rapeseed. For successful rapeseed production, integrated cultural management techniques had been developed by National Institute of Crop Science and six Provincial Rural Development Administration, through research works conducted at th Mokpo Experiment Station located in the southern area, The seed was ordinarily treated with Benoram fungicide. Some farmers use their own seed without seed treatment, which results, poor crop due to attacked by pests. For transplanted rapeseed cultivation, late September was optimum for sowing on seed bed and early November for transplanting 40 days old seedlings on main field. The optimum time for direct seed sowing culture was early October in southern part of Korea. Good seed 50g was required for 90m^2 seed bed for 10a main field and 500g per 10a for direct sowing culture.

The plant space was 50×15cm for direct sowing for main field. The time at which the application of fertilizer takes place is rather important. Fertilizer should be given before sowing. It was also important before sowing winter rape. An additional fertilizer should be applied when the plants start regrowing in the spring.

Just after sowing, preemergence herbicide "Lasso" must be applied uninformly being 313cc/100ℓ water/10a. Most weeds cannot be controlled by herbicides since the rapeseed crops are more sensitive. Manual weeding was rather efficient, with most weeds(Kim *et al.*, 1977, 1978, 1979a, 1979b, Lee *et al.*, 1977, 1984a, 1984b, 1984c, 1984d, 1986a, 1986b). This experiment was conducted to examine the effects of complex fertilizers on yield components of rapeseed at the southern area of Korea.

Materials and Methods

To find out the best complex fertilizer for high yielding, experi-

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

Field	pH (1:5H_2O)	OM (%)	P_2O_5	EX (me/100g)			L R (10g/10a)
				K	Ca	Mg	
Upland	5.96	1.31	93	0.24	6.07	0.83	129
Dried paddy	6.08	1.31	62	0.34	7.38	2.62	129

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ment was conducted on complex fertilizer at the experiment field of oil rapeseed in Mokpo Experiment Station, National Institute of Crop Science, RDA from October 10 to June 2000.

The randomized block design (RCBD) was used in this experiment and treatment was randomized in each of the three blocks. The size of each experimental unit was 12.5m^2 (2.5m×5m). Soil properties of the experimental plot at the beginning of experiment was given in the Table 1. The complex of fertilizer application was the same as this given in the Table 2. Extract were determined by AOAC methods.

Table 2. Method of fertilizer application (25kg/10a)

No. of test	Basal dressing	Top dressing
1	complex fertilizer (18-18-18)	complex fertilizer (18-18-18)
2	complex fertilizer (22-22-11)	complex fertilizer (22-22-11)
3	complex fertilizer (14-37-12)	complex fertilizer (14-37-12)
4	complex fertilizer (3-8-8)	Single fertilizer (7-0-0)

Results and Discussion

Inherent characteristics

Mean value of inherent characteristics of rapeseed variety Yudal under different complex fertilizer of various Kinds were presented in Table 3. As shown in Table 3, bolting date ranged from Mar. 6 to Mar. 7, flowering date from Apr. 4 to Apr. 8, flowering period from 40 to 43 days, flower ending from May 11 and to May 14, growth duration from 246 to 248 days, maturing date from Jun. 4 to Jun. 5, and fruiting period from 57 to 61 days.

Comparisons of the agronomic characteristics among complex fertilizers.

As Shown in Table 4, the superior complex fertilizer (22-22-11) showed relatively higher values for all characteristics with 127cm in plant height, 48cm in ear length, 53 in number of branches, 54 in number of pods per ear, 5.8cm in pod length, 88 percentage of seed set, 244.6kg/10a in seed yield, 370ℓ in seed capacity, 674g in 1ℓ, and 3.0g in weight of 1,00 grains. All the morphological characteristics showed some variations, in mean value on yield.

Table 3. Variation of inherent characteristics of rapeseed variety Yudal under different types of complex fertilizer

No. of test	Bolting date	Flowering date	Flowering period days	Flower ending	Growth duration days	Maturing date	Fruiting period days
1	Mar.6	Apr.5	42	May 13	248	Jun.5	61
2	Mar.7	Apr.4	43	May 13	246	Jun.4	60
3	Mar.6	Apr.8	42	May 14	247	Jun.4	57
4	Mar.7	Apr.7	40	May 11	247	Jun.4	58

Table 4. Variation of agronomic characteristics of rapeseed variety Yudal under different type of complex fertilizer

No. of test	Plant height (cm)	ear length (cm)	No. of branches	No. of pods per ear	Pod length (cm)	percentage of seed set (%)	Per 10a			1ℓ (g)	Wt. of 1,000 grains (g)
							Seed yield (kg)	Index (%)	Seed capacity (ℓ)		
1	129±0.19	49±0.18	49±0.12	56±0.13	5.6±0.17	88±0.53	219.1±13.41	94	268.1±35.57	675±0.05	3.1±0.01
2	127±0.13	48±0.09	53±0.06	54±0.04	5.8±0.08	88±0.33	244.6± 8.89	107	370.0±21.27	674±0.02	3.0±0.01
3	129±0.18	45±0.14	40±0.11	53±0.09	5.7±0.15	84±0.41	225.9±11.27	97	297.5±31.34	672±0.04	2.9±0.02
4	123±0.17	44±0.10	39±0.08	50±0.06	5.6±0.12	84±0.38	234.0± 9.81	100	354.0±24.49	661±0.03	2.9±0.02

Table 5. Analysis of variance for yield

Factor	DF	MS	LSD		C.V (%)
			0.05	0.01	
Tatal	29	-	-	-	-
Block	2	3824	-	-	-
Treatment	9	30574*	39.33	53.94	9.96
Error	18	503	-	-	-

The results indicate that complex fertilizers show different adaptabilities to a particular environment. Hence, among the tested fertilizers complex fertilizer (22-22-11) seems to be the most suitable complex fertilizer for getting higher yield at the southern area of Korea.

Analysis of yield are presented in Table 5. As shown in Table 5. seed yield showed large variations, and its differences in variance was significant at the 5% level.

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