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Influence of Variable-Rate N Application on Spatial Variation of Rice Yield

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벼 수량의 공간변이에 미치는 질소 변량시비의 영향

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Objectives

To obtain the basic information about the influence of variable-rate application on growth and quality of rice for precision agriculture.

Materials and Methods

Donganbyeo as a medium-late maturing rice variety was transplanted by machine transplanter on May 31th in 2001 to 2003. For the yield responses of different to fertilizer application, the test field square of 3ha was divided into the 144 plots(5.4X6m/plot), which was invested about soil and growth condition during three years old from 2001 to 2003. To examine of rice quality and grain yield by different yearly, the experiment was done testing the standard cultivation in 2001 but also testing the variable-rate nitrogen application at panicle formation stage in 2002 and testing the variable-rate nitrogen application of basal dressing and panicle formation stage in 2003.

Results and Discussion

○ It was concluded that high spatial dependence was shown within a small size paddy field. Also kriged maps enabled the visualization of the spatial variability and comparison of its factors. variable-rate nitrogen application based on the growth characteristics diagnosis of rice at panicle formation stage decreased the spatial variability of grain yield.

Table 1. Descriptive statistices of soil chemical properties and growth habits

Date	Properties	2003				2002	2001
		Min.	Max.	Average	CV(%)	CV(%)	CV(%)
Pre-culture	EC(dS/m)	5.40	13.2	8.71	20.74	17.45	29.3
	O.M(%)	1.00	4.74	3.83	11.84	9.93	11.6
	pH(1:5)	5.13	5.71	5.37	1.96	4.79	2.51
	Total-N(%)	0.10	2.20	1.04	44.1	52.03	45.1
Post-culture	Relief(cm)	0	16.0	8.9	35.8	56.6	43.7
Panicle formation stage	Leaf color(SPAD)	25.9	35.4	29.2	5.38	7.81	4.0
	Plant height(cm)	59	77	69	5.62	7.66	4.49
	Tiller number(ea/m^2)	321	607	445	11.8	14.21	10.6
	Rice yield(kg/10a)	435	583	494	5.81	6.22	8.06
	Protein content(%)	6.9	8.2	7.4	3.40	3.40	4.06

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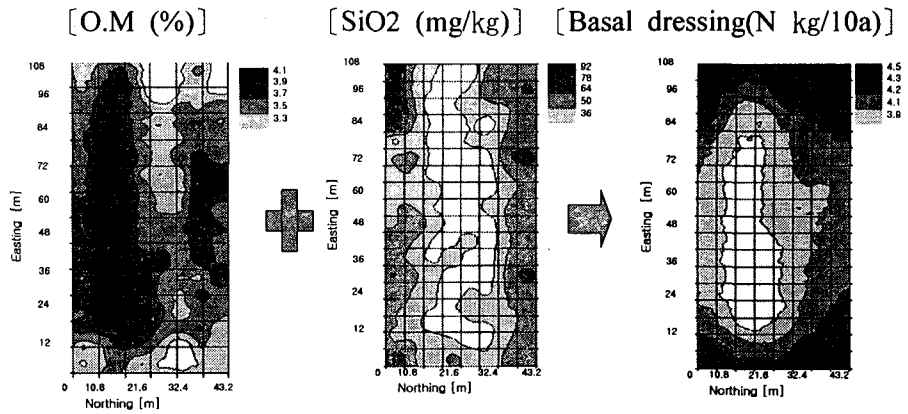

Fig 1. Recommendation rate map of nitrogen fertilization based on soil chemical properties testing.

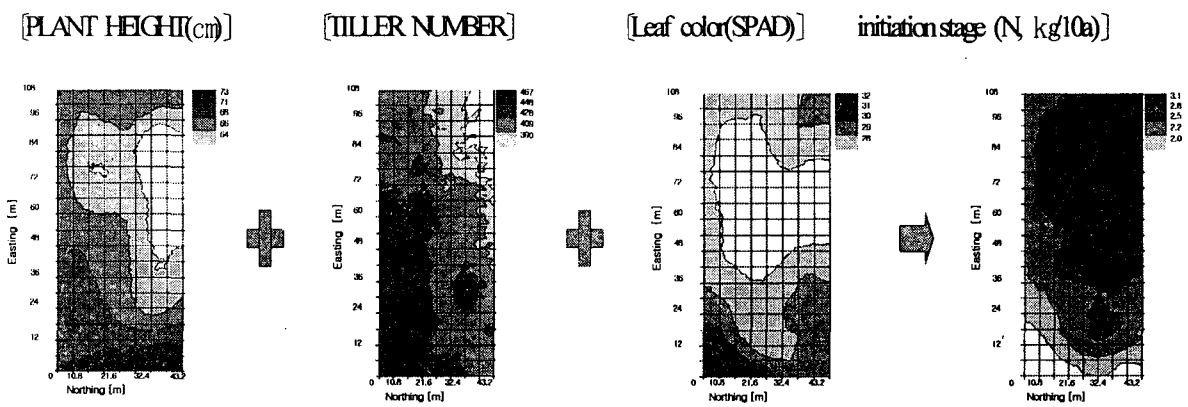

Fig 2. Variable-rate nitrogen application based on the growth characteristics diagnosis of rice at panicle initiation stage.

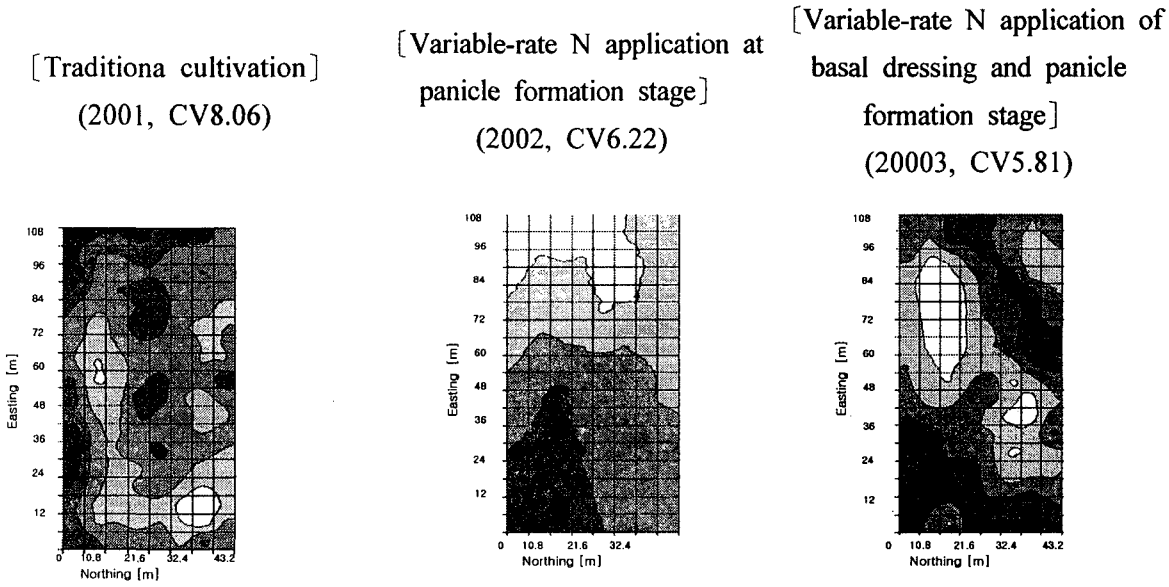

Fig 3. Rice grain yield map on variable-rate nitrogen application of basal dressing and panicle formation stage.