

## **Relationship Between Negative Geotropism and Seedling Traits on Rice**

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### **OBJECTIVE**

This study was conducted to select some promising cultivars which adaptable to long period growing or tolerant to aging in the rice seedling nursery bed and to determine the effects of aged rice seedling on growth, yield and grain quality when the transplanting was delayed by spring season drought.

### **MATERIALS AND METHODS**

1. Rice varieties : Three early maturing cultivars (Sangmibyeo, Taebongbyeo, Gimbongbyeo), three medium maturing cultivars (Whayoungbyeo, Whasungbyeo, Guemobyeo), and four late maturing cultivars (Junambyeo, Ilpumbyeo, Nampyungbyeo, Dongjin 1).
2. Seedling age (days) : 30, 40, 50, 60days old seedlings
3. Measured seedling traits : Plant heigh (cm), leaf number (No./plant), dry weight (mg), dry weight/height (mg/cm), newly grown root number (longer than 5 mm), newly grown root length of longest root and negative geotropism (° )
4. What is the negative geotropism? : The rice seedling has a nature to rise up when it has fallen down on the field, and this nature is called negative geotropism.

### **RESULTS AND DISCUSSION**

As the seedling age was increased the seedling height and leaf number were also increased continuously, however, from 50 days seeding the rate of seedling dry weight/height was not increased, and newly grown root length and number were gradually decreased. Especially, the negative geotropism, which were the standard for healthy rice seedling, were significantly deteriorated after 50days seddling. The negative geotropism was negatively correlated with seedling height and leaf number, however it was positively correlated with newly grown root length and number. Therefore, it is more effective to select the cultivars adaptable to long period growing in the rice seedling nursery bed with shorter seedling height, less leaf number, longer newly grown root length, more newly grown root number and bigger negative geotropism. From these results the varieties of Sangmibyeo, Ilpumbyeo and Junambyeo showed the tolerance to aging in the seedling nursery bed.

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Table 1. Composition of seedling quality and negative geotropism as affected by seedling age.

Seedling age (days)	Plant height (mm)	Leaf number (No./plant)	Dry weight (mg)	Dry weight /height (mg/cm)	Root length <sup>1)</sup> (mm)	Root number <sup>2)</sup> (No./plant)	Negative geotropism (°)
30	18.0	4.0	2.4	1.4	51.7	5.7	21.5
40	20.2	4.6	3.4	1.7	59.3	6.2	22.2
50	24.3	5.4	4.8	2.0	53.5	6.1	22.2
60	26.3	5.9	5.4	2.0	52.6	5.8	14.7

1) Newly grown root length

2) Newly grown root number

Table 2. Correlations among the seedling traits and geotropism.

Traits	Leaf number (No./plant)	Dry weight (mg)	dry weight /height (mg/cm)	Root length (mm)	Root number (No./plant)	Negative geotropism (°)
Plant height	0.711**	0.854**	0.330*	0.349**	0.181	-0.666**
Leaf number		0.924**	0.828**	0.095	0.014	-0.203
Dry weight			0.766**	-0.122	-0.089	-0.326*
D.W./height				0.218	0.223	0.221
Root length <sup>1)</sup>					0.310*	0.409**
Root number <sup>2)</sup>						0.343*

1) Newly grown root length

2) Newly grown root number

Table 3. Difference of geotropism and seedling traits among cultivars.

Cultivars	50Days seedling					60Days seedling				
	Plant height (mm)	Dry weight (g/plant)	Root <sup>1)</sup> length (mm)	Root <sup>2)</sup> number (No./plant)	Geotro- pism (°)	Plant height (mm)	Dry weight (g/plant)	Root <sup>1)</sup> length (mm)	Root <sup>2)</sup> number (No./plant)	Geotro- pism (°)
Sangmi	20.9	4.6	48.9	5.9	33.7	22.8	4.8	49.6	5.6	11.8
Taebong	29.7	5.4	48.0	6.0	6.7	32.1	6.0	46.8	5.9	5.9
Ginbong	25.5	4.8	51.5	5.7	8.8	26.5	5.4	51.3	5.5	6.5
Whayoung	25.4	4.2	54.7	6.8	13.1	28.3	5.2	52.3	6.1	16.0
Whasung	28.8	6.4	54.2	5.5	20.8	31.6	6.4	54.2	5.6	13.1
Guemho	26.9	5.4	58.2	5.7	15.5	27.6	5.0	50.3	4.8	9.3
Junam	18.3	4.2	55.2	6.6	36.6	20.9	4.6	57.7	6.4	23.1
Ilpum	19.7	4.0	57.0	6.8	38.9	20.9	4.8	55.4	6.6	28.5
Nampyung	24.4	4.4	55.1	6.3	20.8	26.6	5.2	52.1	5.9	18.4
Dongjin 1	23.2	4.4	51.8	6.3	27.5	25.3	5.6	56.5	6.1	14.8

1) Newly grown root length

2) Newly grown root number