

Screening for Allelopathic Potential and Identification of Allelopathic Compounds
on Rice (*Oryza sativa* L.) Varieties

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벼 품종에 대한 알레로파시 잠재성 평가 및 알레로파시 물질 동정
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Objectives

This study was to screen the allelopathic potential on eight one domestic and forty five foreign rice varieties and identify allelopathic compounds on selected allelopathic varieties.

Materials and Methods

- Germination test: Extracts from one hundred twenty six rice varieties
- Field test: Weed number were counted from the area of $0.60 \times 0.45\text{m}$
- pH and Ec measurement
- HPLC analysis
 - Solvent A - 98% Water and 2% glacial acetic acid in 0.018 M ammonium acetate.
 - Solvent B - 70% solvent A and 30% organic solvent(82% methanol, 16% n-BuOH, and 2% glacial acetic acid in 0.018 M)
 - Column - YMC AM-303 (ODS, 4.6×250 mm), UV detector - 280 nm.
- Germination test with identified chemicals
- Statistical analysis: Statistical analysis system (SAS) program

Results and Discussion

1. In Oegukbyo, IRI 293, IR 1044- 56 and Kasarwala mundara, as the extract concentration progressively was increased from 0 % to 5 %, degree of reduction on total germination percentage increased on radish and prompt index on radish reduced.
2. Gin shun among forty five foreign rice varieties exhibited the greatest reduction on weed numbers and dry weight in field test.
3. HPLC analysis identified caffeic acid, *p*-coumaric acid, syringic acid, ferulic acid, benzoic acid, *p*-hydroxybenzoic acid, *m*-coumaric acid, *o*-coumaric acid in Kasarawala mundara and *p*-coumaric acid, benzoic acid, *p*-hydroxybenzoic acid *o*-coumaric acid in Sancheongdo.

Table 1. Germination percentage and prompt index on radish seed by concentrations treated in Oegukbyeo, IRI 293, IR 1044-56 and Kasarwala mundara.

Varieties		Concentration (%)				CV	LSD(0.05)
		0	1	2.5	5		
OEGUKBYO	Germ(%) ^a	100	100	96	86	20.4	14.4
	PI ^b	185.0	185.0	154.7	144.0	11.8	46.17
IRI 293	Germ(%)	94	94	96	91	5.6	10.4
	PI	153.7	153.7	146.7	135.7	4.3	42.19
IR 1044-56							
	Germ(%)	100	97	93	87	5.2	9.2
KASARWALA	PI	194.0	139.7	134.3	118.0	9.3	28.23
MUNDARA	Germ(%)	100	97	95	77	6.1	11.30
	PI	194.0	170.7	154.0	108.3	8.8	26.14

a: Germination percentage, b: Prompt index

Table 2. The comparison of germination percentage and prompt index on IR 1044-56 and Kasarwala mundara by '97 and '98 extrcats.

Varieties	Years	Fresh ^p	Dry ^p	Germ(%) ^a	PI ^b
		Weight(g)	weight(g)		
IR 1044-56	97	2.60	0.343	75.3	113.3
	98	2.81	0.390	87.3	118.0
CV(%)		21.4	24.7	3.9	5.1
LSD(0.05)		1.94	0.29	7.63	16.08
KASARWALA	97	2.37	0.384	70.7	102.3
MUNDARA	98	2.76	0.400	77.03	108.3
CV(%)		29.9	23.2	2.7	5.1
LSD(0.05)		2.38	0.29	5.24	16.08

a: Germination percentage, b: Prompt index, p: fresh weight and dry weight of germinated seed

Table 3. The result of HPLC analysis of Kasarwala mundara and Sancheongdo.

Test chemicals	Retention		Relative peak		Concentrations	
	time (min)		area (%)		(mg/g)	
	A ^a	B ^b	A	B	A	B
caffeic acid	25.177	0.000	1.342	0.000	0.07	0.00
<i>p</i> -coumaric acid	26.240	27.535	0.068	0.083	0.03	0.004
syringic acid	31.183	0.000	8.970	0.000	4.79	0.00
ferulic acid	40.530	0.000	12.546	0.000	6.11	0.00
benzoic acid	44.587	43.187	3.946	1.983	1.93	0.10
<i>p</i> -hydroxybenzoic acid	45.090	45.652	15.983	7.936	7.87	0.40
<i>m</i> -coumaric acid	49.155	0.000	13.550	0.000	7.49	0.00
<i>o</i> -coumaric acid	0.000	58.535	0.000	3.359	0.00	0.18

a: Kasarwala mundara b: Sancheongdo