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Inheritance of Cold Tolerance-related Traits of Recombinant Inbred Lines in Rice

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OBJECTIVE

Inheritance of related to cold tolerance characteristics generation of information for cold tolerance program

MATERIALS AND METHODS

○ Metarials : RILs (F_8) - *Milyang23×Stejaree45*

○ Cultivation : Seeding (4. 25), Transplanting (5. 25), Space (30×5㎝)

○ Treatment : cold-water irrigated (17℃)

ABSTRCT

○ This study was carried out to construct cold-tolerance characteristics. The RILs were developed from progenies of a cross between cold-susceptible Toingil-type rice variety, *Milyang23* and cold-tolerant Japonica rice variety, *Stejaree45* by single seed descent methods. The 175 RILs (F_8) were evaluated for cold tolerance traits by field screening under cold-water irrigation.

○ Frequency distribution of RILs in leaf discoloration, heading delay, culm length reduction and number of spikelets reduction displayed nearly normal distributions with transgressive segregations to either side of parents, while the spikelet fertility reduction and panicle exsertion at low-temperature showed the more or less skewed continuous distribution toward the susceptible parent.

○ Higher heritabilities over 60% were observed in leaf discoloration, spikelet fertility reduction, panicle exsertion, while relatively lower heritabilities less than 40% were observed in culm length reduction, number of spikelets reduction and grain yield reduction. Some cold-tolerance RILs were selected effectively by cold water irrigation, which are expected to be good materials in breeding program for cold tolerance.

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Table 1. Variation of cold tolerance characteristics in RILs population and their parents *Milyang23* and *Stejaree45*.

Characters	Parents		RILs	
	Milyang23 (M±SD)	*Stejaree45* (M±SD)	M±SD	Range
Leaf discoloration(1-9)	8.1±1.2	2.5±0.5	5.2±1.6	1.5 ~ 8.0
Heading delay(days)	23.4±2.1	15.1±3.3	19.0±4.0	6.5 ~ 34.0
Culm length reduction(%)	42.7±9.0	28.7±6.9	31.4±6.7	17.2 ~ 53.1
Panicle exsertion(1-9)	7.9±0.8	2.3±1.0	5.4±1.5	5.4 ~ 1.5
Spikelet fertility reduction(%)	86.3±14.4	36.1±6.7	68.6±18.8	23.4 ~ 99.6
No. of spikelet reduction(%)	59.8±15.1	23.9±11.6	38.4±10.2	8.0 ~ 66.5
Grain yield reduction(%)	90.5±5.1	46.1±15.2	79.7±13.2	31.5 ~ 98.6

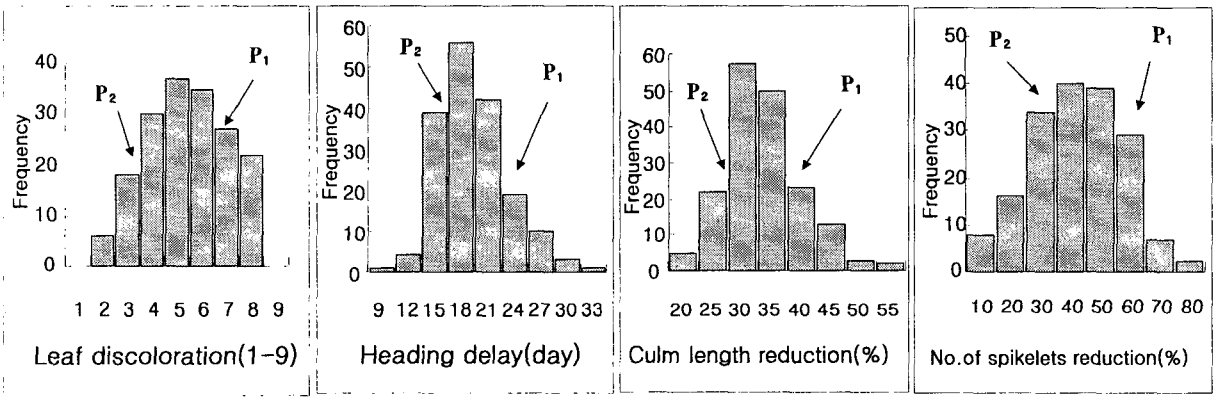

Fig. 1. Frequence distribution of the leaf discoloration, heading delay, culm length reduction, and no. of spikelet reduction of 175 RILs and their parents *Milyang23* (P_1) and *Stejaree45* (P_2).

Table 2. Heritability estimates of cold tolerance characters in the RILs derived form a cross between *Milyang23* and *Stejaree45*.

Characters	Heritability(h^2B)
Leaf discoloration	**69.3**
Heading delay	**52.4**
Culm length reduction	**6.1**
Spikelet fertility reduction	**65.2**
No. of Spikelets reduction	**34.2**
Panicle exsertion	**64.4**
Grain yield reduction	**26.7**