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Short Communication

INHERITANCE OF AROMA IN SAANWAL BASMATI

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Aroma is an important economic trait in breeding rice for high eating quality. The aromatic character of Basmati rices has been attributed to the chemical 2-acetyl-1-pyrroline, which is present in all rice cultivars, but is present in significantly higher concentrations in these aromatic cultivars [1, 2]. Varying aromatic/non-aromatic F_2 segregation ratios have been reported, including 1:3 ratio indicating a single recessive gene [5-8], 3:1 ratio ruggesting a single dominant aroma gene [9], 15:1 or 9:7 ratios indicating two dominant aroma genes interacting in a duplicate or complementary manner [10,,11], 37:27 ratio indicating three complementary recessive aroma genes [12, 13], 175:81 ratio indicating four complementary recessive aroma genes [14] and 3:13 ratios indicating a single recessive aroma gene interacting with an inhibitor gene [3, 15]. Recently, Pinson [16] concluded that aroma is controlled by two recessive genes. The present study reports the identification of an aromatic rice cultivar, Saanwal Basmati, that contains a single dominant aroma gene.

The materials for this study have been derived from a cross involving Saanwal Basmati (aromatic) and Gold (non-aromatic) rice cultivars. The F_2 and backcross 1 (BC_1) seed generations were obtained by allowing natural self-pollination of the F_1 hybrid plants and backcrossing them with the non-aromatic cultivar Gold, respectively. For detecting aroma, green leaves collected from the F_1, F_2 and BC_1 plants were chopped and put in stoppered glass vials containing 1.7% KOH solution [4]. Stoppered glass vials were gently heated for 30 seconds and using controls (Saanwal Basmati and Gold) were scored for the presence/absence of aroma by three panelists.

The aromatic leaves of all F_1 plants (Table 1) indicated that Saanwal Basmati contained a dominant aroma gene. The F_2 population segregated to 176 aromatic : 64 non-aromatic plants, a good fit to 3:1 monohybrid ratio (χ^2 = 0.355; P = 0.7- 0.5). The backcross (Saanwal basmati/Gold^2) progeny segregated to 31 aromatic : 30 non-aromatic plants, a good fit to 1 : 1 ratio (χ^2 = 0.016; P = 0.9-0.8). The observed 3:1 and 1:1 ratios in F_2 and BC populations, respectively, and fitting at a very high level are in agreement with the earlier report [9] thereby indicating that inheritance

of aroma in Saanwal Basmati is governed by a single dominant gene.

Table 1. Segregation pattern of leaf aroma in F_1, F_2 and backcross population derived form a cross between aromatic and non-aromatic rice lines.

Cross	F_1	F_2					BC1 (Saanwal Basmati/Gold^2)				
	aromatic/ non-aromatic	aromatic	nonaromatic	ratio	χ^2	P	aromatic	nonaromatic	ratio	χ^2	P
Saanwal Basmati/ aromatic Gold	All	176	64	3:1	0.355	0.7-0.5	31	30	1:1	0.016	0.9-0.8

Preponderance of reports that aroma in most of the Basmati types is controlled by a recessive gene prompted Lin [8] to question the reliability of earlier results derived from genetic studies [11, 12] and to state further that the earlier conclusions that scented rice is dominant over non-scented are specious. However, results of the present investigation and those of the earlier studies [9-11] indicate that some Basmati genotypes do contain dominant aroma gene(s). Whilst cultural practices can affect the amount of 2-acetyl-1-pyrroline in a sample of aromatic rice [17], the differing observations regarding inheritance of aroma may primarily be due to different genotypes used in various studies and also due to the different efficiency of the techniques used for determining aroma.

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