

Genetics of flower colour in Indian mustard (*Brassica juncea* L. Czern & Coss)

K. H. Singh and J. S. Chauhan

Directorate of Rapeseed-Mustard Research, Sewar, Bharatpur 321 303

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Bright yellow petal colour is the characteristic of family Brassicaceae, however the white petal flowers in mustard (*Brassica juncea* L.) are often observed. White/yellow petal colour, being distinct in phenotype, may be a useful morphological marker for many studies in breeding programmes. In the present investigation, white and yellow flowers were observed in F₃ generation of a cross B 33 x Sanjuncta asech. These plants were selfed and in the subsequent generations (F₄–F₇), near isogenic lines (NIL) with white and yellow colour were developed. Crosses between yellow flowered and white flowered plants were attempted during 2005-06 and subsequently (during 2005-06 to 2007-08), F₁, F₂, BC₁ (F₁ x yellow) and BC₂ (P₁ x white flower) generations were developed. These generations (P₁, P₂, F₁, F₂, BC₁, and BC₂) were grown during 2008-09 and observations on flower colour were recorded. Data recorded for number of white/yellow flowered plants were subjected for statistical analyses and the χ^2 values were

calculated.

All F₁ plants had yellow flowers (Table 1). Out of 820 F₂ plants, 486 had yellow petal while, 334 had white petal. This ratio fitted well to the 9 (yellow): 7 (white) ratio, indicating epistatic gene action. A duplicate recessive epistasis was indicated for this flower colour difference. This was further confirmed by the BC₁ (F₁ x yellow flower) and BC₂ (F₁ x white flower) crosses, which gave the expected ratio of (yellow) and (white) in BC₂ and fully yellow in BC₁. The expected ratios have been explained in Table 2 with the gene symbols C₁c₁ and C₂c₂ (standing for colour). Earlier researchers (1) have reported the trait flower to colour to be under the control of two genes designated as Y₁ and Y₂. Rawat and Anand [2] reported two genes inheritance with dominant epistatic action (12:3:1) for flower colour in *B. juncea* and postulated the genotype (yellow), yy Cr (cream yellow) and yycrcr (white). Alam and Aziz [3] investigated

Table 1. Segregation for petal colour in Indian mustard

Generation	Yellow petal	White petal	Expected χ^2 ratio	χ^2 value	P value
Cross: B33 x Sanjuncta Asech					
P ₁	94	0	01:00	0	1
P ₂	0	212	00:01	0	1
F ₁	29	0	01:00	0	1
F ₂	486	334	09:07	3.03	0.08
BC ₁ (F ₁ x yellow petal parent)	56	0	01:00	0	1
BC ₂ (F ₁ x white petal parent)	24	60	01:03	0.19	0.66

*Corresponding author's e-mail: kharendrasingh@gmail.com

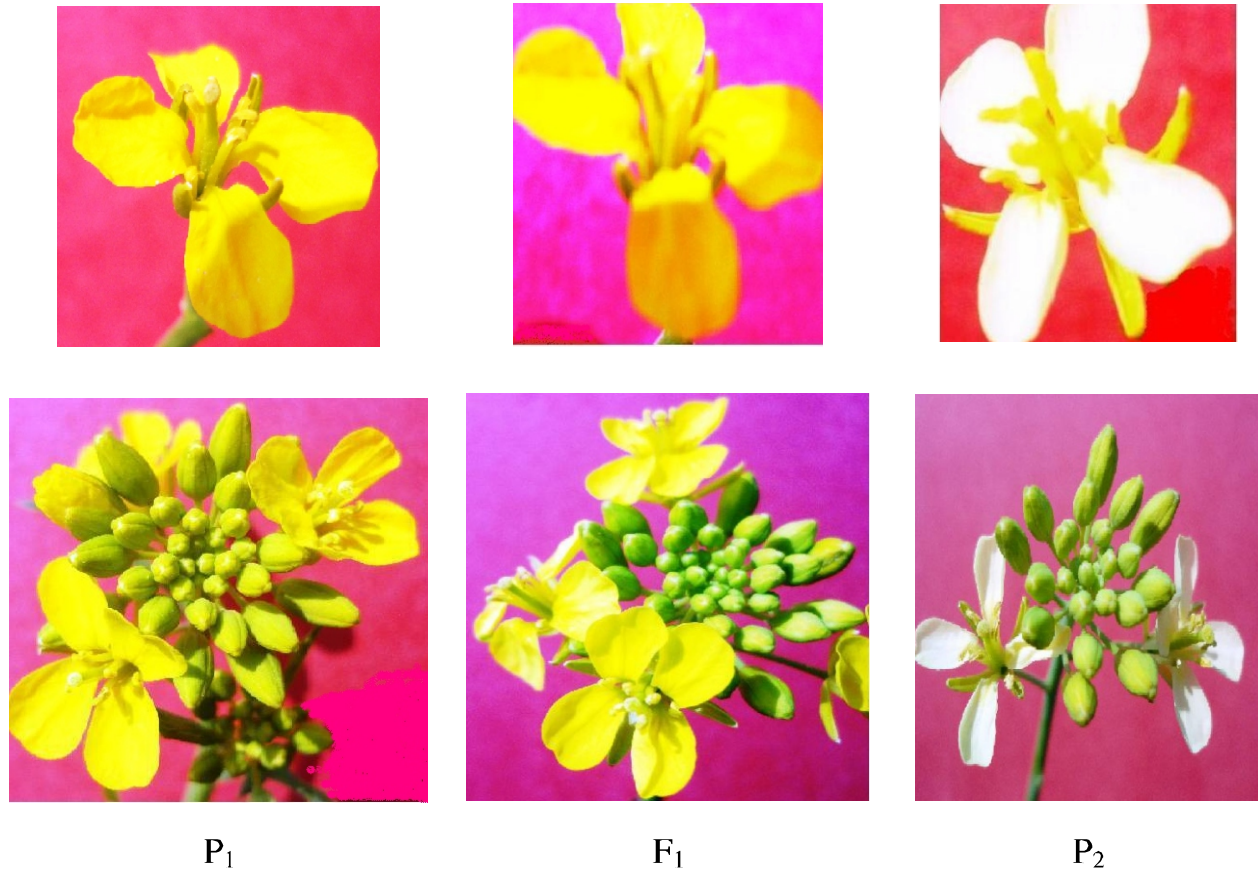


Fig. 1. Flower colour of parents and F_1

the inheritance of petal colour in *B. juncea* and found to be under the control of two genes designated Y_1 and Y_3 with dominance epistasis (F_2 ratio; 12 yellow: 3 light yellow: 1 white).

Table 2. Assigned gene symbols for parents, F_1 , F_2 and back cross generations

Generation	Genotype	Phenotype
P_1	$C_1C_1C_2C_2$	yellow
P_2	$c_1c_1c_2c_2$	white
F_1	$C_1c_1C_2c_2$	yellow
F_2	$C_1-C_2^-$	yellow
	$C_1C_1C_2C_2$	white
	$C_1c_1C_2C_2$	white
	$c_1c_1C_2C_2$	white
BC_1 (F_1 x yellow)	$C_1-C_2^-$	yellow
BC_2 (F_1 x white)	C_1-C_2	yellow
	$C_1^-c_2c_2$	white
	$C_1c_1C_2^-$	white
	$c_1c_1C_2C_2$	white

References

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