

## Genetics of Shoot Tip Colour in Black Pepper \*

Shoot tips of black pepper (*Piper nigrum* L.) appear in two colours viz., purple and white. Not many studies on the genetics of this character have been attempted in this crop, mainly due to its perennial nature. However, based on a preliminary study of selfed progenies of six cultivars, Ibrahim, Sukumara Pillay and Sasikumaran (1985) reported complimentary type of gene action involving 2 pairs of genes. The present note deals with inheritance of pigmentation in shoot tips of progenies of 12 black pepper crosses.

First generation ( $F_1$ ) progenies of twelve crosses (Table I) were scored for shoot tip colour in the multiplication nursery of black pepper at the research farm of National Research Centre for Spices, Peruvannamuzhi, Kozhikkode. The observed and expected frequency of progenies segregating for shoot tip colour are presented in Table I. In most of the crosses the expected frequency confirmed the observed pattern of segregation eventhough the number of individuals were few in two cases, as revealed by the  $\chi^2$  test of goodness of fit.

Following the gene symbols proposed by Ibrahim et al. (1985) a genotype heterozygous at two loci may be represented as  $A_1a_1A_2a_2$ . Assuming complimentary type of gene action, in the persence of genes  $A_1$  and  $A_2$  purple coloured shoot tip will be produced. In the absence of either of the complimentary genes shoot tips will be white.

Further, with no linkage, a genotype heterozygous at two loci will produce 4 types of gametes in equal proportion and a genotype heterozygous at any one loci will produce 2 types of gametes. By crossing the various selected genotypes, offsprings will be produced at ratios as given in Table I. Thus, an expected segregation ratio of 3 : 5, 3 : 1 or 1 : 1 can be arrived at by crossing the selected genotypes.

Based on the segregation pattern observed and assuming complimentary gene action without linkage the genotypes of the parents used in the study are proposed in Table II. Thus, Panniyur-1, which is a cross between Cheriakaniakadan and Uthiramcotta, both purple coloured varieties may be represented as  $A_1a_1a_2a_2$  or  $A_1A_1a_2a_2$ . This genotype is white as expected. Further, selfing such a genotype will produce

Table II. Proposed genotypes of pepper cultivars utilised in the cross

Cultivar	Genotype	Phenotype
Panniyur-1	$A_1a_1a_2a_2$ $A_1A_1a_2a_2$	White
Karimunda	$A_1a_1A_2a_2$	Purple
Cheriakaniakadan	$A_1A_1A_2a_2$	"
Valiakaniakadan	$A_1A_1A_2A_2$	"
Cholamundi	$A_1A_1A_2A_2$	"
Neelamundi	$A_1A_1A_2A_2$	"
Narayakodi	$A_1A_1A_2A_2$	"
Thommankodi	$A_1A_1A_2A_2$	"
Irumanian	$A_1A_1A_2A_2$	"
Aimpirian	$A_1a_1A_2A_2$ $A_1A_1A_2A_2$	"
Perumkodi	$A_1A_1A_2A_2$	"

\* Contribution No. 131, National Research Centre for Spices, Kozhikkode.

Table I. Segregation for shoot tip colour in progenies of pepper crosses

Cross	No. of proge- nies observed	Observed frequency		Expected frequency		Expected segrega- tion ratio	$\chi^2$ -value ( $P=0.5$ )
		Purple	White	Purple	White		
Panniyur-1 (White) x Karimunda (Purple)	43	15	28	16.12	26.8	3 : 5	0.14
Perunkodi (Purple) x Karimunda (,,)	20	20	0	All purple		—	
Cholamundi (,,) x (,,)	68	68	0	All purple		—	
Narayakodi (,,) x (,,)	11	11	0	All purple		—	
Valiakaniakadan (,,) x (,,)	12	10	2	All purple	3	3 : 1	0.44
Thommankodi (Purple) x (,,)	12	12	0	All purple		—	
Cheriakaniakadan (,,) x Panniyur-1 (White)	9	9	0	All purple	2	1 : 1	—
Narayakodi (,,) x Neelamundi (Purple)	21	21	0	All purple		—	
Valiakaniakadan (,,) x Aimpirian (,,)	5	5	0	All purple		—	
Cholamundi (,,) x Panniyur-1 (White)	86	86	0	All purple		—	
Irumanian (,,) x (,,)	6	6	0	All purple		—	
Panniyur-1 (White) x Cheriakaniakadan (Purple)	4	2	2	All purple	2	1 : 1	

only white tipped shoots. This behaviour of Panniyur-1 is already reported (Ibrahim et al., 1985).

In the present study a case of reciprocal effect is suspected in Cheriakaniakadan x Panniyur-1 cross. While Panniyur-1 and Cheriakaniakadan pro-

duced purple and white progenies in a 1 : 1 ratio as expected, the reciprocal cross produced only purple seedlings.

It may be concluded from the available data that shoot tip colour in black pepper is controlled by 2 pairs of genes having complimentary action.

#### REFERENCE

- IBRAHIM, K. K., SUKUMARA PILLAY, V, and SASIKUMARAN, S. 1985. Inheritance of anthocyanin pigmentation on stipules in black pepper. *Indian Cocoa, Arecanut and Spices J.* 9(1) : 12-14.

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