former with mostly duplicate type of epistasis was observed for the characters plant height, number of fingers per ear and finger length. Under such situations, intermating of the selected plants in the early segregating generation (biparental mating) may be employed. For number of productive tillers per plant the fixable and non-fixable types of geneaction with complementary type of epistasis was noted suggesting recurrent selection technique for improving this character. With regard to 100 grain weight, both fixable and non- fixable types of gene action with predomiance of the latter and duplicate type of epistasis were recorded. For this case also, recurrent selction procedure may be useful. In respect of ear weight and grain yield, presence of additive, dominance, additive x additive and domiance x dominance gene effects suggested scope of employing reciprocal recurrent selection for the genetic upgradation of these characters. The method also provides opportunities for breaking up of undesirable linkages and possibilities of throwing high yielding lines under selection pressure.

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INHERITANCE OF DURATION, LEAF COLOUR, STERILITY MOSAIC DISEASE RESISTANCE AND GROWTH HABIT IN PIGEONPEA

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ABSTRACT

Direct and reciprocal crosses were attempted between two contrasting pigeonpea varieties viz., Vamban-1 and Gulbarga-1. The study of parents, hybrids and F2 segregating population revealed that the characters such as duration, leaf colour, resistance to sterility mosaic disease and growth habit are monogenetically controlled and are inherited as a linkage block or single unit of recombination. The linkage block has been designated as EDgRDt and its allelic block as **edgrdt.**

KEY WORDS : Pigeonpea, monogenic, linkage block.

Pigeonpea is one of the most important grain legumes widely cultivated in India. Information available on the inheritance of morphological characters is limited. Some of the morphological characters may have linkage with important diseases *viz.*, sterility mosaic, wilt and phytophthora blight. Thus, morphological characters could be used as markers for resistance to diseases. The knowledge of inheritance pattern of these characters is imperative. Therefore, the present study on the inheritance of duration, leaf colour, resistance to sterility mosaic disease and growth habit was conducted.

MATERIALS AND METHODS

Both direct and reciprocal crosses were attempted between two contrasting pigeonpea varieties *viz.*, Vamban-1 and Gulbarga- 1 during March 1994 at the National Pulses Research Centre, Vamban. The well filled crossed seeds were hand picked and sown as F1 hybrids and studied during *rabi* 1994. The performance of the parents and the hybrids are given in Table 1. High yielding true hybrids from both cross combinations were identified, taged and forwarded to F2 as single plant progenies and studied during summer 1995. Observations were made on the following characters at appropriate time of expression. The

Table 1. Performance of the parents and hybrids

Characters	Vamban-1	Gulbarga-1	F1 hybrids
Duration	Early	Late	Early
Leaf colour	Dark green	Light green	Dark green
Resistance to sterility mosaic disease	Resistant	Susceptible	Resistant
Growth habit	Determinate	Indeterminate	Determinate

characters studied are duration, leaf colour, resistance to sterility mosaic disease and growth habit. The segregation and independence of characters or linkage were tested, using chi-square test and goodness of fit as suggested by Panse and Sukhatme (1957) and the results obtained are discussed below.

RESULTS AND DISCUSSION

There was no significant reciprocal difference among the F1 hybrids for the characters studied. A total of 463 F2 plants was studied for segregation of different characters. The F2 population has clearly segregated into 348 early, determinate plants with dark green leaves resistant to sterility mosaic disease and 115 late indeterminate plants with light green leaves susceptible to sterility mosaic disease. The segregation and dominance relationship for individual characters are discussed below.

Duration

The two parents showed distinct differences in days to maturity. Vamban-1 matures in 100 days whereas Gulbarga-1 matures in 150 days. The F1 hybrids matured in 110 days indicating that earliness being dominant over lateness. The F2 population segregated into 348 early and 115 late plants and the expected genetic ratio is 3 early: 1 late. Thus duration was monogenetically controlled and earliness is dominant over lateness.

Leaf colour

The two parents were contrasting in their leaf colour. Vamban-1 is dark green and Gulbarga-1 is light green in leaf colour. The F1 hybrids were dark green in leaf colour indicating that dark green being dominant over light green. The F2 population segregated into 348 and 115 plants with dark green and light green leaf colour respectively and the expected genetic ratio is 3 dark green: 1 light green. Thus leaf colour was controlled by single major gene and dark green was dominant over light green.

Resistance to sterility mosaic disease

The two parents differ in their reaction to sterility mosaic disease. Vamban-1 is resistant to sterility mosaic disease whereas Gulbarga-1 is completely susceptible. The F1 hybrids were resistant indicating that resistance being dominant over susceptiblity. The F2 population segregated into 348 resistant and 115 susceptible plants and the expected genetic ratio is 3 resistant: 1 susceptible indicating that resistance to sterility mosaic disease was controlled by single vertical resistant gene and resistance was dominant over susceptibility.

Growth habit

The two parents were contrasting in their growth habit. Vamban-1 is a determinate type whereas Gulbarga-1 is an indeterminate type. The F1 hybrids were determinate in growth habit indicating determinate being dominant over indeterminate. The F2 population segregated into 348 determinate plants and 115 indeterminate plants and the expected genetic ratio is 3 determinate: 1 indeterminate. Thus growth habit was controlled by single major gene and determinate was dominant over indeterminate.

Table 2. Joint segregation of characters in F2 population

Duration	Leaf colour	Sterility mosaic disease resistance	Growth habit	Observed	Expected	X^2 value	Genetic ratio
Early	Dark green	Resistant	Determinate	348	347.25	0.0016	3:1
Late	Light green	Susceptible	Indeterminate	115	115.75	0.0049	
			Total	463	463	0.0065	

The joint segregation (Table 2) and the test of independence or linkage of characters (X^2 value = 463 **) as suggested by Panse and Sukhatme (1957) clearly brought out the fact that the characters such as duration, leaf colour, resistance to sterility mosaic disease and growth habit were controlled by single major genes (monogenic) and are located on the same chromosome (homologous) in both the parents and are tightly linked together in coupling phase and inherited as a single block of genes or single unit of recombination and segregated jointly in simple mendelion pattern in the ratio of 3:1. No recombinant types were observed for these traits. Hence, this linkage bloc is designated as **EDgRDt** in Vamban-1 and i respective allelic linkage block in Gulbarga-1 a **edgrdt**. That these genes act as basic genes whic determine the genetic system of the plants a dominant and recessive in the segregating F population.

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BREEDING FOR IMPROVED PLANT TYPE IN PIGEONPEA

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ABSTRACT

An attempt was made to breed for improved plant type in pigeonpea by crossing two contrasting parents *viz*., Vamban-1 and Gulbarga-1. The F2 population clearly segregated into four distinct classes of phenotypes (plant types) in the ratio of 50 intermediate erect tall:14 compact dwarf in the early segregants and 15 tall spreading: 1 compact bushy in the late segregants indicating that the plant type in pigeonpea was controlled by interaction of two pairs of non-allelic linkage blocks designated as DTcLS1 and TALs2 and their respective allelic blocks as dtcls1 and tals2.

KEY WORDS : Pigeonpea, plant type, interaction, linkage blocks

A long desired goal in pulse breeding has been to obtain suitable plant types with less vegetative growth, improved harvest index and reduced maturity duration. The plants with these characters not only enable us to raise more plants per unit area but also to fit in different cropping systems. These tall erect, compact and early maturing plants are most desirable. The same goal is achieved in this trial.

MATERIALS AND METHODS

An attempt was made at the National Pulses Research Centre, Vamban to breed for improved plant type in pigeonpea *ie.* early, compact erect tall genotypes with improved harvest index. For this purpose, both direct and reciprocal crosses were effected between two contrasting varieties *viz*., Vamban 1 and Gulbarga-1. Vamban-1 is an early maturing (100 days) compact dwarf genotype with terminal cluster flowering whereas Gulbarga-1 is a late maturing (150 days) tall spreading genotype with axilary flowering pattern. The crosses were effected during March 1994. Out of 263 flowers crossed, 112 crossed pods with 174 well filled seeds were obtained and the hybrids were studied during *rabi* 1994. High yielding true hybrid plants from both cross combinations were identified, taged and forwarded to F2 generation as single plant progenies and the segregating F2 populations were studied during Summer 1995. Observations were made on the following morphological characters at appropriate time of expression. The characters studied were plant type, flowering pattern and leaflet size. The segregation and independence or linkage of characters were studied using the chi-square test and goodness of fit as suggested by Panse and Sukhatme (1957). The experimental results obtained are discussed below:

RESULTS AND DISCUSSION

The interaction of genes during crossing sometimes gives rise to entirely new traits and