GENE SYMBOLS IN PIGEONPEA

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Pigeonpea (*Cajanus cajan* (L) Millsp.), also called as 'red gram' in India, 'Nandolo' in Malawi, 'Gandul ' in Puerto Rico, 'Mu Dou' in China and 'Quinchocho' in Venezuela, is an important pulse crop of the semi-arid tropics regions of the Indian subcontinent, Africa, and the Caribbean. A large genetic variation exists within this species for different quantitative and qualitative traits (Remanandan, 1990; Saxena and Sharma, 1990). A number of genetic studies have been conducted in the past and gene symbols assigned. In this paper an attempt has been made to compile information on gene symbols for a number of traits. The studies conducted by different authors have been grouped together appropriately and we have not made any attempt to equate them or to reinterpret the published data. A compilation of originally assigned gene symbols in pigeonpea and in some interspecific crosses, involving pigeonpea and its wild relatives, is respectively summarized in Table 1 and 2.

This compilation is the first such attempt in pigeonpea and the information will be useful in assigning gene symbols in future. Also, it will avoid duplications of the gene symbols. In most cases the information has been obtained directly from the published articles and attempts have been made to reproduce them in the original form. However, the authors could not acquire two research papers (marked with *) and the information has been cited using other related publications. The authors would appreciate comments from readers regarding any errors of content and/or omission. In this review an attempt has also been made to provide information about genetic variation considered for study, the details about the genetic control of various phenotype(s) is not discussed for the sake of brevity and for such details the readers are advised to refer the original articles.

Table 1. Summary of gene symbols in pigeonpeas

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Flower colour					
Yellow, white	Yellow	49:15	**W_1, W_2, I^y**	Patil and D'Cruz, 1962	W_1 and W_2 duplicate genes produce white flowers, I^y inhibits and produces yellow flowers.
Creamy white with red veins on back of standard, yellow-red veins on back of standard	Yellow with red veins on back of standard	3:1	**Y fl**	Patil et al., 1972	
Yellow, creamy white	Yellow	207:49	**$Yvsd_{a1}$, $Yvsd_{a2}$, $Yvsd_{b1}$, $Yvsd_{b2}$**	Jambhale et al., 1978	
Yellow, yellow with red veins	Yellow with red veins	45:19	**$Rvds_a$, $Rvds_b$, $Rvds_c$**	Chopde et al., 1979	
White, yellow	Yellow	49:15	**Wfl_1, Wfl_2, I-Wfl**	Kolhe and Nayeem, 1977	
Colour of ventral surface of standard petal					
Yellow, pale yellow	Yellow	3:1	**Yvs**	D'Cruz and Deokar, 1970a	
Orange yellow with diffused purple base, yellow	Orange yellow with diffused purple base	9:7	**$Oyvs_a$, $Oyvs_b$**	Deokar and D'Cruz, 1972a	$Oyvs_a$ pleiotropic for colour of dorsal surface of standard and purple spotting on white seed
Yellow, lemon yellow	Yellow	13:3	**Llt, I-Llt**	Deokar and D'Cruz, 1971a	I-Llt common to colour of dorsal surface of standard and to colour of veins on dorsal surface. Also pleiotropic action on pod colour (duplicate action with gene Blp of pod Colour)

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Yellow, pale yellow	Yellow	3:1	**Yvs**	D'Cruz et al., 1971c	
Yellow, lemon yellow	Yellow	162:94	**Yvs_a,Yvs_{b2}, Yvs_{c2}, Yvs_{d2}**	Deokar et al., 1972c	The subscript of 2 has been to three out of 4 genes because these three have duplicate complementary action, any two of the three are effective.
Yellow, orange yellow	Orange yellow	3:1	**Oyrs**	Chaudhari and Thombre, 1983	
Red, yellow	Red	3:1	**Pds**	Narkhede et al., 1980	
Cream, white	Yellow	9:7	**Yvs_a, Yvs_b**	Ghatge and Kolhe, 1985	
Colour of dorsal surface of standard petal					
Orange yellow with purple veins and purple patch at the base, yellow	Orange yellow with purple veins and purple patch at the base	3:1	**$Oyvs_a$**	Deokar and D'Cruz, 1972a	Common with one of the two genes for colour of ventral surface of standard
Yellow, light purple with purple base	Yellow	13:3	**Llt, I-Llt**	Deokar and D'Cruz, 1971a	
Yellow with deep red veins and base diffused red, yellow with light red veins	Yellow with deep red veins, and base diffused red	3:1	**Rvbds**	Shinde et al., 1972	
Orange yellow, yellow	Orange yellow	45:19	**$Oyds_a$, $Oyds_{b1}$, $Oyds_{b2}$**	D'Cruz et al., 1971b	
Yellow with purple veins, yellow, orange yellow	Yellow with purple veins, orange yellow	9:7	**$Rvds_a$ $Rvds_b$ $Oyds_a$, $Oyds_b$**	D'Cruz et al., 1973	
Yellow red vein, yellow	Yellow red vein	183:73	**Rvds, I-Rvds, A-I-$Rvds_1$, A-I-$Rvds_2$**	Marekar and Chopde, 1985	
Yellow, yellow with purple veins	Yellow with purple veins	3:1	**Rvds**	D'Cruz et al., 1974	

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Purple, diffused with deep purple veins	Yellow with faint purple veins	1:2:1	**Pds**	Narkhede et al., 1980	
Colour of vein of dorsal surface of standard petal					
Purple, yellow	Purple	39:25	**Llt, I-Llt, A-I-Llt**	Deokar and D'Cruz, 1971a	
Dark red, Purple red	Dark red	21:43	**Drv, I-Drv**	Chaudhari and Thombre, 1975	
Yellow, red	Red veins	9:7	**$Rvdss_a$, $Rvdss_b$**	Chaudhari and Thombre, 1977	
Yellow with purple vein Yellow with self coloured veins	Yellow purple veins	15:1	**$Pvds_1$, $Pvds_2$**	Deokar et al., 1971b	
Yellow with purple veins, yellow	Yellow with purple veins	3:1	**Rvds**	D'Cruz et al., 1974	
Yellow, red	Red	9:7	**$Rdvds_a$, $Rdvds_b$**	Kolhe et al., 1972	
Yellow, red	Red	9:7	**$Rdvds_a$ $Rdvds_b$**	Patil, 1970	
Red, yellow	Yellow	13:3	**Rvds, I-Rvds**	Ghatge and Kolhe, 1985	
Calyx colour					
Pigmented, yellow	Pigmented	9:7	**A, B**	Singh and Srivastava, 1981	
Partially cleistogamous flower					
Normal, partially cleistogamous	Normal	3:1	**Pct**	Saxena et al., 1992	
Normal, closed	Normal	15:1, 3:1	**Clf 1, Clf 2**	Mehetre et al., 1992	Mutant form governed by duplicate genes
Response to photoperiod					
Sensitive, insensitive	Sensitive	3:1	**PS_3, PS_2, PS_1**	Saxena, 1981	PS_3, >PS_2, >PS_1. Therefore, 3:1 every time

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Flowering habit					
Early, late	Early	45:19	**Efl_a, Efl_{b}, Efl_{b2}**	Marekar, 1982	
Early, late	Early	45:19	**Efl_a, Efl_{b2},Efl_{c2}**	Marekar and Chopde, 1985	
Male sterility					
Fertile, sterile	Fertile	3:1	**ms_2**	Saxena et al., 1983	
Fertile, sterile	Fertile	3:1	**ms_1**	Reddy et al., 1978	
Fertile, sterile	Fertile	15:1	**$Stfl_1$, $Stfl_2$**	Mehetre et al., 1989	Duplicate genes
Pod colour					
Maroon blotched, green	Maroon blotched	15:1	**$Gppd_1$, $Gppd_2$**	D'Cruz and Deokar, 1970a	
Maroon blotched + green with blackish purple streaks, maroon blotched + green with blackish purple shades	Maroon blotched with blackish purple all over pod	15:1	**Blp, I-Llt**	Deokar and D'Cruz, 1971a	Unripe pod colour
Maroon blotched red grained, maroon blotched round leaf	Maroon blotched	195:61	**BIp_1, BIp_2, I-BIp, A-I-BIp**	Deokar et al., 1972b	Unripe pod colour
Purple, green with purple shade	Purple	9:3:4	**Gpstpd Gpshpd**	Deokar et al., 1971b	
Green with purple streaks, green	Green with purple streaks	3:1 3:1	**Gppd**	D'Cruz et al., 1971b D'Cruz et al., 1971c	
Dark purple, purple streaks	Dark purple	39:25	**Ppd, I-Ppd, A-I-Ppd**	D'Cruz et al., 1974	
Purple with green streaks, green with Purple streaks	Purple with green streaks	117:139	**$PGPD_a$, $PGPD_b$, I-$PGPD_{ab}$, A-I-$PGPD_{ab}$**	Deokar et al., 1972c	

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Green with black colour diffused, green with black color in streaks	Green with black color diffused	3:1	**Bldpd**	Shinde et al., 1972	
Green with purple streaks, green with black streaks	Green with black streaks	3:1	**Bl_{pd}**	D'Cruz et al., 1970b	
Greenish black, maroon blotched	Greenish black	3:1	**Blp**	Patil and D'Cruz, 1965	Unripe
Greenish black, maroon blotched	Greenish black	3:1	**Bl_{pd}**	Patil, 1970	Unripe
Green, black streaked	Black streaked	45:19	**$Gbpd_a$, $Gbpd_{b1}$, $Gbpd_{b2}$**	Jambhale et al., 1978	Duplicate complementary
Plain, maroon	Plain	3:1	**Bpd**	Nayeem, 1978	
Plain, maroon	Plain	3:1	**P_{pd}**	Kolhe and Nayeem, 1977	
Pod development					
Normal, open carpel	Normal	3:1	**Cd_1**	Saxena et al., 1988a	
Seed colour					
Reddish brown, white	Reddish brown	9:7	**$Brsd_a$, $Brsd_b$**	D'Cruz and Deokar, 1970a	
Blackish purple, white	Chocolate	3:6:3:1:2:1	**$Oyvs_a$, Brsd**	Deokar and D'Cruz, 1972a	
Reddish brown, white	Reddish brown	9:7	**Llt, Brsd**	Deokar and D'Cruz, 1971a	
Reddish brown, white	Reddish brown	3:1	**Rsd**	Deokar et al., 1972b	
Brown, white	Brown	3:1	**Brsd**	Deokar et al., 1971b	
Brown, white	Brown	3:1	**Brsd**	D'Cruz et al., 1974	
Blackish purple, white	Blackish purple lighter than parent	9:3:3:1	**Brsd Wpsd**	D'Cruz et al., 1971b	

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Brown, white, blackish purple	Brown Blackish purple	9:7 9:3:3:1	**Brsd, Wpsd** **$Brsd_a$, $Brsd_b$**	D'Cruz et al., 1973	
Reddish brown, white	Reddish brown	63:1	**$Brsd_1$, $Brsd_2$, $Brsd_3$**	Patil et al., 1972	
Red, white	Red	9:7	**Rsd_a, Rsd_b**	Marekar and Chopde, 1985	
Black, white, brown	Brown	39:13:9:3	**$Brsd_1$, $Brsd_2$, $Brsd_3$**	Singh and Srivastava, 1981	
Brown, white	Brown	39:25	**Br_{sd}, Br_{sd}I, Br_{sd}IA**	Patil, 1970	
Brown, purple	Purple	3:1	**Plsd**	Chaudhari and Thombre, 1975	
Pinkish white, brown	Brown	9:7	**$Brsd_a$, $Brsd_b$**	Chaudhari and Thombre, 1977	
Brown, fawn	Light brown	9:3:4	**Brsd, Fsd**	Ghatge and Kolhe, 1985	
Seed size					
Bold, small	Bold	27:37	**Bsd_a, Bsd_b, Bsd_c**	Marekar, 1982	
Bold, small	Bold	129:127	**Bsd, I-Bsd, A-I-Bsd_a** **A-I-Bsd_b**	Marekar and Chopde, 1985	
Growth habit					
Determinate, indeterminate	Indeterminate	13:3	**Id, D**	Waldia and Singh, 1987a	Id had an inhibitory effect on the gene for determinate habit, D
Determinate, indeterminate, semi-determinate	Determinate, indeterminate or semi-determinate	3:1 3:1 12:3:1	**Dt_1** **Dt_{2s}**	Gupta and Kapoor, 1991	two epistatic genes
Plant type					
Erect, creeping	Erect	3:1	**Egr**	Deokar and D'Cruz, 1971a	
Creeping, prostrate	Erect with spreading branches	45:9:10	**Cgr_a, Cgr_{b1}, Cgr_{b2}**	Deokar et al., 1971b	

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Erect, prostrate	Erect	54:10	**Egr_{a2}, Egr_{b2}, Egr_{c2}**	D'Cruz et al., 1974	The subscript 2 indicates that any two of the three are necessary for production of erect which is dominant.
Erect, creeping	Erect	13:3	**Cgr I-Cgr**	Shinde et al., 1972	
Erect, creeping	Erect	13:3	**Cgr, I**	Patil and D'Cruz, 1965	
Erect, creeping	Erect	13:3	**C_{gr}, I**	Patil, 1970	
Erect, creeping	Erect	3:1	**Egr**	Chaudhari and Thombre, 1975	
Erect, semi-erect	Erect	54:10	**Egh_{a1}, Egh_{a2}, Egh_{a3}**	Chaudhari and Thombre, 1977	
Plant height					
Tall, dwarf	Tall	3:1	**Tsta**	D'Cruz et al., 1971a	
Tall, dwarf	Tall	49:15	**Tht, I-Tht_2 I-Tht_{2x}**	Marekar, 1982	
Tall, dwarf	Tall	165:91	**Tht, I-Tht_a, I-Tht_b, A-I-Tht**	Marekar and Chopde, 1985	One basic, two inhibitory complementary and one anti-inhibitory gene
Tall, dwarf	Tall	3:1	**d**	Sen et al., 1966	
Tall, dwarf	Tall	3:1	**t_3, t_3^h**	Saxena et al., 1989	
Tall, dwarf	Tall	15:1	**t_1, t_2**	Waldia and Singh, 1987b	
Tall, dwarf	Tall	3:1	**t_4, t_5**	Gupta et al., 1992	
Stem colour					
Purple, green	Purple	3:1	**Pst**	D'Cruz and Deokar, 1970a	
Purple, green	Purple	45:19	**Pst_a, Pst_b, Pst_c**	Deokar and D'Cruz, 1972a	
Purple, green	Purple	3:1	**Pst**	D'Cruz et al., 1971a	

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Purple, green	Purple	3:1	**Pst**	D'Cruz et al., 1971b	
Purple, green	Purple	3:1	**Pst**	D'Cruz et al., 1974	
Purple, green	Purple	3:1	**Pst**	D'Cruz et al., 1971c	
Purple, green	Purple	45:19	**Pst_{a1}, Pst_{b1}**	Nayeem, 1978	
Purple, green	Purple	9:7	**Pst_a, Pst_b**	Kolhe and Nayeem, 1977	
Purple, green	Purple	3:1	**Pst**	Narkhede et al., 1980	
Stem surface					
Corky, smooth	Smooth	13:3	**sm, Ck**	Saxena et al., 1988b	Dominant form of sm masks the expression of Ck allele, resulting in smooth surface
Straight, wavy	Straight	45:19	**$Strst_a$, $Strst_{b1}$, $Strst_{b2}$**	Marekar, 1982	One complementary and two duplicate complementary genes
Branching habit					
Spreading, erect	Spreading	3:1	**Sbr**	D'Cruz and Deokar, 1970a	
Spreading, erect	Spreading	3:1	**Sbr**	Deokar and D'Cruz, 1972a	
Spreading, erect	Erect with spreading branches	54:10	**Sbr_{a2} Sbr_{b2} Sbr_{c2}**	D'Cruz et al., 1971c	
Spreading, erect	Spreading	9:7	**SBR_a, SBR_b**	Deokar et al., 1972c	
Spreading, erect	Spreading	3:1	**Sbr**	D'Cruz et al., 1971b	
Spreading, erect	Spreading	3:1	**Sbr**	Kolhe et al., 1972	
Spreading, erect	Erect	111:145	**Sbt, A-I-sbr_a, A-I-sbr_b, A-I-sbr_c**	Marekar and Chopde, 1985	

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Close, semi-spreading	Close	63:193	**$Clbr_a$, $Clbr_b$, $I\text{-}clbr_c$, $I\text{-}clbr_d$**	Marekar, 1978	
Spreading, erect	Spreading	9:7	**Sbr_a, Sbr_b**	D'Cruz et al., 1970b	
Spreading, erect	Spreading	9:7	**Sbr_a, Sbr_b**	Nayeem, 1978	
Semi-erect, spreading	Spreading	243:13	**Sbr_a, Sbr_b,Sbr_c, Sbr_d**	Chaudhari and Thombre, 1983	
Spreading, erect	Spreading	3:1	**Sbr**	Narkhede et al., 1980 and Ghatge and Kolhe, 1985	
Spreading, semi-spreading	Semi-spreading	27:37	**$Ssbr_a$, $Ssbr_b$, $Ssbr_c$**	Chopde et al., 1979	
Close, erect	Close	21:43	**Clbr, $I\text{-}Clbr_a$, $I\text{-}Clbr_b$**	Marekar, 1982	
Leaflet shape					
Lanceolate, obcordate	Lanceolate	3:1	**Llt**	D'Cruz and Deokar, 1970a	Pleiotropy with wing shape, wing position, keel shape, habit of keel
Lanceolate, obcordate	Lanceolate	3:1	**Llt**	Deokar and D'Cruz, 1972a	Pleiotropic effect with wing shape, wing position, keel shape, habit of keel
Lanceolate, round	Lanceolate	3:1	**Llt**	Deokar and D'Cruz, 1971a	Common to the two genes governing colour characters of standard petal. At the same time it showed complementary action with the gene for seed colour.
Lanceolate, obcordate	Lanceolate	3:1	**Llt**	D'Cruz et al., 1971a	Pleiotropic effect with wing shape, wing position, keel shape, habit of keel
Lanceolate, round	Lanceolate	3:1	**Llt**	Deokar et al., 1972b	Linkage with gene for seed coat colour
Lanceolate, obcordate	Lanceolate	3:1	**Llt**	D'Cruz et al., 1971b	Linkage with genes for stem colour and leaf thickness

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Lanceolate, obcordate, round	Round, lanceolate indifferent crosses	3:1 3:1	**Llt, llt, llt^r**	D'Cruz et al., 1973	
Lanceolate, obovate	Lanceolate	3:1	**Llt**	Patil and D'Cruz, 1965	Linked with genes for growth habit and unripe pod colour. First linkage group reported.
Lanceolate, obovate	Lanceolate	3:1	**Llt**	Patil, 1970	
Lanceolate, obcordate	Lanceolate	3:1	**Llt**	Marekar, 1978	Linked with one of the two complementary genes of branching habit
Lanceolate, round	Lanceolate	39:25	**Llt, I-Llt, A-I-Llt**	Chaudhari and Thombre, 1977	
Lanceolate (pointed apex), obcordate (depressed apex)	Oval (blunt apex)	9:3:4	**Llt, Obclt**	Patil and Deokar, 1980	One of the two genes shows supplementary gene action.
Round, obcordate connate	Obovate (oblong obovate)	27:9:9:9:3 :3:4	**Llt, Rlt, Clt**	Ghatge and Kolhe, 1984	
Obovate, lanceolate	Lanceolate	3:1	**Llt**	Nayeem, 1978	
Lanceolate, obcordate	Lanceolate	3:1	**Llt**	Chopde et al, 1979	
Obcordate, lanceolate	Oblong	27:21:16	**Llt, Oblt$_a$, Oblt$_b$**	Jambhale et al., 1978	One basic and two complementary genes
Leaflet number					
Trifoliate, multifoliate	Trifoliate	183:73	**Tf, I-Tf, A$_1$-I-Tf, A$_2$-I-Tf**	Patil et al, 1972	A_1 and A_2 duplicate genes having anti-inhibitory effects
Trifoliate, multifoliate	Trifoliate	189:67	**Tf, Tf$_{a1}$, Tf$_{b2}$, Tf$_{c3}$**	Marekar, 1982	
Trifoliate, multifoliate	Trifoliate	45:19	**Tf$_a$, Tf$_{b1}$, Tf$_{c2}$**	Marekar and Chopde, 1985	
Leaf thickness					
Thick, thin	Thick	3:1	**Dg lt**	D'Cruz et al., 1971c	Same gene for leaf colour

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Thin, thick	Thin	3:1	**Tn lt**	D'Cruz et al., 1971b	Linked with genes for leaflet shape and stem colour
Leaflet base					
Broad, narrow	broad	9:7	**$Bdlb_a$, $Bdlb_b$**	Kolhe et al., 1972	One of the genes along with the gene for leaf apex (Llt) shows duplicate gene action for the production of petiolule.
Leaflet apex					
Obtuse, acute, retuse	obtuse	117:75:64	**Alta, Olta, I-Olta, A-I-Olta**	D'Cruz et al. 1971c	
Notchless, notched	Notchless	3:1	**Llt**	Kolhe et al., 1972	Pleiotropic effect on keel shape, keel habit and type of inflorescence
Round, pointed	Pointed	3:1	**Llt**	Nayeem, 1978	
Pointed, depressed	Blunt	9:3:4	**Llt, Obclt**	Patil and Deokar, 1980	
Petiolule					
Present, absent	Present	15:1	**Bdlb, Llt**	Kolhe et al., 1972	
Leaf colour					
Light green, dark green	Light green	3:1	**Dg lt**	D'Cruz et al., 1971c	Same gene for leaf thickness
Dark green, light green	Light green	3:1	**Lglt**	Ghatge and Kolhe, 1985	
Petiole length					
Long, short	Long	3:1	**Lpt**	D'Cruz and Deokar, 1970a	
Long, short	Long	3:1	**Lst_a**	Deokar and D'Cruz, 1972a	Represents one of the two genes governing stipel length
Long, short	Long	15:1	**Lpt_1 Lpt_2**	D'Cruz et al., 1971a	
Stipel length					
Long, short	Long	3:1	**Lst**	D'Cruz and Deokar, 1970a	Closely linked with genes for stem colour and petiole length

Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Long, short	Long	9:7	**Lst_a, Lst_b**	Deokar and D'Cruz, 1972a	
Mutant gigas leaf					
Normal, gigas	Normal	3:1	**Nh, nh**	Pokle, 1976	Pleiotropic action
Disease resistance					
Alternaria susceptible, resistant	Susceptible	3:1	**al_1**	Singh et al., 1988	
Alternaria susceptible, resistant	Susceptible	3:1	**abr_1**	Sharma et al., 1987	
Sterility mosaic susceptible, resistant	Susceptible	43:21 13:3	**Sv_1 Sv_2** **sv_3 sv_4**	Singh et al., 1983	Sv_1 and Sv_2 showed duplicate dominant epistasis and sv_3 sv_4 showed duplicate recessive epistasis for resistance.
Phytopthora susceptible, resesistant	Resistant	3:1	**Pd_1**	Sharma et al., 1982	
Wilt resisistant, susceptible	Susceptible	3:1	**pwr_1**	Jain and Reddy, 1995	

Table 2: Summary of gene symbols in interspecific crosses

Character	Variation studied	F_1 phenotype	F_2 ratio	Gene symbol(s)	Reference(s)	Remarks
Strophiole	Present, absent	Present	13:3	**NS, SDI**	Reddy et al., 1981	
Strophiole	Present, absent	Present	15:1	**SS_1, SS_2**	Pundir and Singh, 1985	Duplicate gene action
Seed mottling	Present, absent	Present	9:7	**Msd_a, Msd_b**	Reddy et al., 1981	
Twining nature	Twining, non-twining	Non-twining	13:3	**I, T**	Pundir and Singh, 1985	
Pod surface	Hairy, non-hairy	Hairy	3:1	**Hp**	Pundir and Singh, 1985	
Plant type	Erect, spreading	Intermediate	1: 1: 14	**Eg_1 Eg_2**	Pundir and Singh, 1985	2 genes partial dominance
Seed colour	Black, orange	Grey	1:2:1	**Osc**	Pundir and Singh, 1985	Partially dominant
Leaflet shape	Lanceolate, obovate	Intermediate	1:2:1	**L_1**	Pundir and Singh, 1985	Partially dominant

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