Concept and Experiences on Genetic of Rice Bean

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Introduction

- Ricebean[(Vigna umbellata (thumb) Ohwi and Ohashi]
  syn Phaseolus pubescens
  syn Phaseolus calcaratus
- 2n=2x=22

- It is an important grain legume uses as pulses and vegetable in mid hills.

- It contains22.0,0.6,59.0and 5.2 percent of protien,fat,carbohydrates and fibre,respectively)

- It is also rich in calcium, iron and phosphorus.

- It has comparatively high quantity of amino acids, methionine and tryptophan
- It is grown successfully where Green gram and black gram can not be grown.
- It is highly photosensitive short-day crop so its cultivation is restricted to rainy season in hills
- photo insensitive variety can be successfully grown in spring

- **Photo insensitive lines when planted in spring it took 3 to 18 days more in flower initiation indicated that thermo sensitive nature of the crops. (Gupta,S et.al2005**

- **This is moderately resistant to MYMV and highly tolerant to bruchid infestation.**

- The rice bean has many varieties, varying in seed color and size and time taken for maturity

Crossing behavior and inheritance

- The flowers of rice bean are self fertilized but

  Natural out crossing 27 to 81% in 86 to 100 % lines
- Monogenic inheritance is reported in seedling color.
- Earliness is controlled by dominance gene.

- Stem colour in seed ling (Rs-rs) and pigmentation in flower bud (Psb-psb) were monogenetically inherited (Das and Dana,1980)
- Flower colour standard and wing (Lya-lya) ,Days to flower (E-e) and helium ring color (Ph-ph) are monogenetically inherited (Das and Dana,1981b)
- Stem color,pod color and seed coat base and mosaic are also independent. (Das and Dana,1981b

- They proposed the following gene symbols: T^{st}, straw colour; t^{sg}, sap green colour; t^{sb}, garnet brown colour; M^{d}, dense mosaic spotting; M^{l}, light mosaic spotting; and m, no mosaic spotting.

- Dominance is strawcolor>sap greencolor>garnet brown
- Dense mosaic>light mosaic and no mosaic
- Pod color was controlled by two non allele interacting genes (Ab-ab and Lp-lp) resulting in 13:3 ratio.

- Grain yield has significant negative correlation with DF,DM,Plant hight,and 100 seed wt
- DF,DM,PH and 100 sw were significant positive correlated with each other.
- Path analysis showed that DF has high positive direct effect but DM has direct negative effect on seed yield.

- revealed that100seed wt ,seed yield exhibited high estimates of phenotypic and genotypic coefficients of variance(>50%)along with high heritability> 95%having moderate genetic advance (Kishore,N et al,2005)
- High heritability of DF,DM,PH

Objectives

- To understand the breeding behaviors of the crop.
- To create the variability.

Materials and method

- **Four Rice bean accessions were selected on the basis of previous year performance**
- **Reciprocal crosses of all four lines were made**
- **Crops were planted in raised bed due to rainy season in AGD,Khumaltar on 5th august,2008.**
- **Crops were covered with Net.**
- **Emasculation was done in morning and pollination on afternoon.**

Selected lines for crossing

ccessio s	Collection	Plant habits	Seed colour	DF	DM	Pod length	No of seeds /pod	100 sw
IPGR 882	Bajhang	Determ inate	mottled	82	136	6.1	10	20.6
IPGR 391	Syangja	Determ inate	Mottled	118	153	7.2	6	7
RGR 91	Dang	Indeter minate	Yellow	96	136	6.4	8	15.6
RGR 11	Gulmi	Indeter minate	Red	96	159	8.5	9	14.1

Crossing Results

Crosses	Total	Female	Male	F1 9pods&seeds)			Remarks
				Mottled	Red	Yellow	
NRGR7882x LRGR 91	7	Mottled	Yellow	-	-	7(30)	
NRGR7882x LRGR111	10	Mottled	Red	7(25)	3(12)	-	
NRGR9391x LRGR 91	15	Mottled	Yellow	15(40)	-	-	
NRGR9391x LRGR111	3	Mottled	Red	3(8)	-	-	

Crosses	Total	Female	Male	F1 9pods&seeds)			Remarks
				Mottled	Red	Yellow	
LRGR91 xNRGR7882	1	Yellow	Mottled	-	-	1(2)	
LRGR91 xNRGR9391	11	Yellow	Mottled	1(2)	-	10(35)	
LRGR111 xNRGR7882	6	Red	Mottled	-	2(4)	4(10)	
LRGR111 xNRGR9391	20	Red	Mottled	-	15(40)	5(9)	
LRGR 117 xNPGR9391	6	Dark brown	Mottled				6dark brown(10)

LRGR44 X NPGR00184

Genotype	Cr	Black	Maroon	Brown	Yellow	Total	Rem
LRGR44	**90**	0	4	0	0	94	Pure
NPGR 0184	0	**85**	3	0	9	97	Pure
LRGR44	51	20	0	1	12	84	Mixed
NRGR01 84	38	54	2	0	5	99	Mixed

LRGR44 X NPGR00184

Genotype	Cr	Black	Maroon	Brown	Yellow	Total	Rem
LRGR44	96	0	4	0	0	100	Pure
LRGR0184	0	88	3	0	9	100	Pure
LRGR44	61	24	0	1	14	100	Mixed
NPGR0184	38	55	2	0	5	100	Mixed

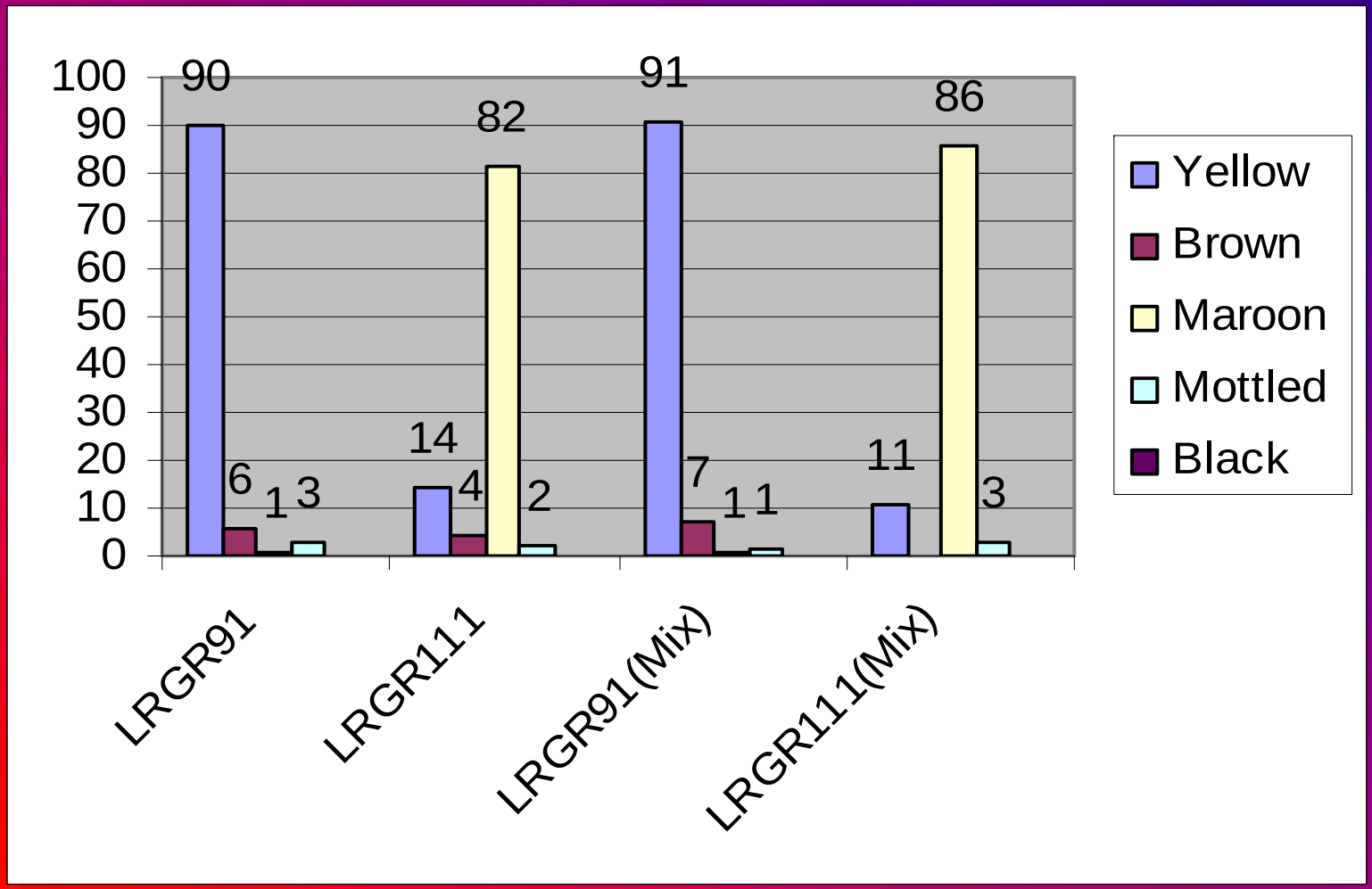
LRGR91 XLRGR111

Genotype	Yellow	Maroon	Mottled	Black	total	Rem
LRGR91	**602**	4	20	0	671	Pure
LRGR111	110	**624**	19	2	765	Pure
LRGR91	261	2	4	0	287	Mixed
LRGR111	27	216	7	0	252	Mixed

LRGR91 X LRGR00111

Genotype	Cr	Black	Maroon	Brown	Total	Rem
LRGR91	**90**	6	1	3	100	Pure
LRGR111	14	2	**82**	2	100	Pure
LRGR91	**91**	7	1	1	100	Mixed
LRGR111	11	0	**86**	3	100	Mixed

LRGR91 XLRGR111



Conclusions

- **Further studies is needed to confirm either parents are homozygous or not?**
- **Three or four markers should be identified and taken to further studies.**
- **Population will be planted at Rampur to conclude.**


NPGR 7882(Mottled)
LRGR 111 (Red)


NPGR 7882(Mottled)
LRGR (Yellow)


NPGR 9391(Mottled)
LRGR 91(Yellow)


NPGR 9391(Mottled)
LRGR 111(Red)


LRGR 91(Yellow)
NPGR 7882(Mottled)


LRGR 91(Yellow)
NPGR 9391(Mottled)


LRGR 111(Red)
NPGR 7882(Mottled)


LRGR 111(Red)
NPGR 9391(Mottled)

LRGR 117(DRK Brown)

NPGR 9391(Mottled)


Thank you