Research Paper

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Biochemical Characterisation of Elite Green Gram (Vigna Radiata (L.)Wilczek) Genotypes

Agriculture

KEYWORDS : Mungbean, Germplasm, Biochemical character

*** Anandhi Lavanya. S** — Department of Plant Breeding and Genetics, Agricultural College and Research Institute,Tamil Nadu Agricultural University (TNAU), Madurai – 625 104. * Corresponding Author

Vanniarajan. C — Department of Plant Breeding and Genetics, Agricultural College and Research Institute,Tamil Nadu Agricultural University (TNAU), Madurai – 625 104.

ABSTRACT

Vigna radiata (L.) Wilczek commonly known as green gram or mungbean, is an important food legume that has low flattulence protein, which makes it indispensable in Indian vegetarian diet. There is a global breed disseminate new bio-fortified varieties rich in iron(Fe) and zinc(Zn) content to fight hidden hunger.Fourty green gram genotypes were raised in three different environments viz., Agricultural College and Research Institute, TNAU, Madurai (Kharif 2012), Agricultural Research Station, TNAU, Vaigai Dam (Kharif 2012), Agricultural College and Research Institute, TNAU, Madurai (Rabi 2012).Four biochemical analysis viz., protein , fat, iron and zinc were carried out.The genotypes viz., K.Pudur2, Co(Gg)7, NM65, NM67, K.Pudur3, 76-47/1, 76-43, Co6, M986, Samrat were stable for seed yield per plant in average environmental condition, whereas K.Pudur 2 was found to be good for high Fe and protein content. Hence these genotypes could be used in further breeding programme.

Introduction

Mungbean (*Vigna radiata* L.) is an important short season summer grown grain legume, well suited to smallholder production under adverse climatic conditions and commonly used in Indian cuisine (Vijayalakshmi et al., 2003).Greengram has substantial amounts of low flattulence proteins, which makes the crop indispensable in Indian vegetarian diet. It is principally cultivated for human consumption for its edible seeds which are high in protein. (Popalghat *et al.,* 2001). Iron(Fe) and Zinc (Zn) are two important micronutrients that are required to maintain metabolic regulation and organ function. Greengram contains low levels of Fe and Zn in the cultivated genotpes and therefore it is important to assess genetic variability for these micronutrients in the available germplasm for improving this trait into the commercial cultivars. Besides being a rich source of protein, it maintains soil fertility through biological nitrogen fixation in soil and thus play a vital role in sustainable agriculture.

Materials and Methods

The present investigation was carried out in forty gram genotypes during *Kharif* 2012 and *Rabi 2012*. The trials were laid out in randomized block design with three replications at three different environments *viz.,* Agricultural College and Research Institute, TNAU, Madurai (E1) *Kharif* 2012, Agricultural Research Station, TNAU, Vaigai Dam (E2) *Kharif* 2012 and Agricultural College and Research Institute, TNAU, Madurai (E3) *Rabi 2012*. The trial consisted of forty greengram germplasm accessions In this study, The stable genotypes (Table 1.) were subjected to the following biochemical analyses.

The protein content was estimated using Lowery's method. Micronutrient ((Zn, Fe) content was estimated by Triple acid extract method (Piper 1966). The minerals like iron, zinc, copper were assessed by Atomic Absorption Spectroscopy. The fat content of the sample was estimated by the method described by Cohen (1917). The lipid in the sample was extracted with petroleum ether (60-80°C) in Soxplus apparatus for two hours. Then the solvent was evaporated and the remaining residue was weighed. The fat content was expressed as percentage.

Results

The eight high yielding genotypes based on pooled mean were selected along with the checks Co 6 and Co (Gg) 7 for evaluation of protein, fat, iron and zinc. Nutrient composition of the genotypes are listed in Table 2.

Protein content (g/100g)

The protein content of the genotypes ranged from 12.2 g/100g to 24 g/100g in all environments. The maximum amount of protein was observed in Co (Gg) 7 (22.4 g/100g) in E1, and E2 (24 g/100g) and Vilathikulam in E3 (22.8g/100g). The genotype LM 14 had the lowest value in E1 (14.4g/100g) and in E2 (12.2g/100g) and the genotype M 986 in E3 (14.4g/100g).

Fat content (g/100g)

The fat content of the genotypes ranged from 1.07 g/ 100g to 1.98g/100g. The maximum amount of fat was recorded in 76 - 47/1 and the values are 1.98 g/100g in E1, 1.95 g/ 100g in E2 and 1.93 g/100g in E3. The genotype LM 14 had the lowest value (1.01 g //100g) in E1 and in E2 (1.27g/100g), while in E3, the genotype K.Pudur 3 registered the lowest values of 1.12 g/100g.

Iron content (mg/100g)

The iron content of the genotypes ranged from 3.22 mg/100g to 7.90 mg/100g. The maximum amount of iron was observed in the genotype K.Pudur 2 in all the environments *viz.,* E1 (7.90 mg/100g), E2 (7.25 mg/100g), E3 (7.36 mg/100g). The genotype Co 6 had the lowest value, E1 (3.76 mg/100g) , E2 (3.22 mg/100g) and E3 (3.49 mg/100g).

Zinc content (mg/100g)

The Zinc content of the genotypes ranged from 2.89 mg/100g to 4.76 mg/100g. The maximum amount of zinc was observed in the genotype M 986 in all the environments *viz.,* E1 (4.69 mg/100g), E2 (4.76 mg/100g) and E 3 (4.34 mg/100g). The genotype Co 6 had the lowest value (2.94 mg/100g) in E1 and the genotype Co 6 in E2 (2.89 mg/100g) and the genotype Kovilpatty in E3 (3.23 mg/100g).

Discussion

Green gram is an ideal legume for protein dietary requirement. Since, the nutritional quality of cultivated varieties should essentially be linked to high yielding nature, nutritional analysis was done for the selected ten high yielding genotypes including checks Co 6, Co (Gg) 7 in all the three environments. The potential of seed proteins as a source of amino acids can be assessed by comparison with ideal dietary essential amino acids and other legume seeds (Khan *et al.,* 1979, Rajaram and Janardhanan 1990 and Siddhuraju *et al.,* 1992). The protein content of greengram was reported to range from 20.3 to 29.0 percent (Augustine and Klein, 1989; Calloway *et al.,* 1994) and in the present study, the average seed protein content obtained ranged from 14.07 to 22.87 g/100g. Based on the performance over the environments, the genotype K.Pudur 2 was found to be good with high protein content 19.6g /100g. However there are reports showing higher crude fat content (2.83%) for greengram (Bhatty *et al., 2*000). In addition to protein, green gram varieties are rich in iron, and improved varieties contain as much as 6 milligrams of iron per 100 grams of raw seed, whereas traditional mungbean varieties contain only 3.0 to 3.5 milligrams . In this

study, high amount of iron content was observed in the genotype K. Pudur2 in all environments (7.50 mg/100g). Earlier, Agugo *et al.* (2009) reported iron content ranging between 4.23 mg and 6.45 mg in green gram varieties. Therefore, the high yielding and stable genotype K.Pudur 2 can be promoted for yield testing trails in farmer's holdings.

Table 1. List of stable genotypes based on seed yield

RANK	E1	E2	E3
1	K.Pudur2	Vilathikulam	Co6
2	Co(Gg)7	LM14	K.Pudur2
3	NM65	Vellurior	76-47/1
4	NM67	K.Pudur2	KGG05-008
5	K.Pudur3	K.Pudur3	VBN2
6	76-47/1	Kovilpatty	Co(Gg)7
7	76-43	Co(Gg)7	M986
8	Co6	SML171/1	Vellurior
9	M986	76-47/1	SML1022
10	Samrat	M986	Vilathikulam

Note:
E_1 – AC&RI, Madurai (Kharif season), 2012
E_2 – ARS, Vaigai Dam (Kharif season), 2012
E_3 – AC&RI, Madurai (Rabi season), 2012

Table 2. Nutritional values of high yielding genotypes

Genotype	Protein (g/100g)			Fat (g/100g)			Iron (mg/100g)			Zinc (mg/100g)		
	E1	E2	E3	E1	E2	E3	E1	E2	E3	E1	E2	E3
Co 6	18	16.5	17.4	1.97*	1.83*	1.92*	3.76	3.22	3.49	2.94	2.89	3.28
Co(Gg) 7	22.4*	24*	22.2*	1.35	1.45	1.41	3.91	4.15	4.20	3.94*	4.06*	4.26*
M 986	16.2	13	14.4	1.70*	1.37	1.53*	4.21	5.14	4.87	4.69*	4.76*	4.34*
LM 14	14.4	12.2	15.6	1.07	1.27	1.31	3.99	4.05	4.01	3.70	3.68	3.56
76 -47 / 1	16.7	17.8	20.7*	1.98*	1.95*	1.93*	6.77*	5.30	6.48*	4.16*	4.68*	3.93*
Vilathikulam	18.2	20.8*	22.8*	1.60	1.32	1.48	7.50*	6.31*	6.58*	3.16	3.48	3.23
Kovilpatty	20.4*	19.6*	18.8	1.31	1.60*	1.39	6.03*	5.80*	5.98*	3.28	3.54	3.28
K.Pudur 2	19.4*	18.8*	20.6*	1.30	1.31	1.29	7.90*	7.25*	7.36*	3.94*	3.67	3.33
K.Pudur 3	17.4	21.8*	17.8	1.10	1.43	1.12	7.19*	7.23*	7.05*	3.67	3.77	3.71
Vellurior	18.4	16	18	1.29	1.32	1.30	6.44*	5.46*	6.48*	3.89*	3.89	3.73
Mean	18.35	18.05	18.83	1.46	1.48	1.46	5.77	5.39	5.65	3.74	3.84	3.67
SEd	0.46	0.31	0.32	0.02	0.03	0.03	0.09	0.14	0.10	0.07	0.08	0.07
CD	0.98	0.65	0.69	0.04	0.06	0.07	0.19	0.29	0.22	0.16	0.18	0.15

*** 5 per cent significant**
Note:
E_1 – AC&RI, Madurai, Kharif 2012

E_2 – ARS, Vaigai Dam, Kharif 2012

E_3 – AC&RI, Madurai, Rabi 2012

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