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Stability of Faba Bean Genotypes under Terminal Heat

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Abstract

The research deals to evaluate 35 genotypes of faba bean (*Vicia faba* L.) under terminal heat .Genotypes were sown in Randomized block design in three sowing dates during Rabi season 2021-22. Stability of genotypes was calculated on 10 quantitative characters. The pooled analysis of variance revealed highly significant difference between Genotype and Genotype × Environment interaction were also significant for all characters. Based on high mean, unit regression (bi=1.0 i.e., b_i= S Em1) and least deviation from regression coefficient $S^{-2}d_i$ =0 genotypes it was evident that Hanma-2 was most stable genotype under three different environments under terminal heat.

Key word : *Regression coefficient, stability, environment, eberhart and russel.*

Introduction

Faba bean is an legume crop botanically, known as *Vicia faba* L. (1). In India faba bean is popularly known as Bakala and Kala matar (2). Faba bean is originated from south west Asia which grown extensively throughout the world. Faba bean was domesticated 8000 years ago and spread through Europe continent. In India, faba bean was probably introduced during the period 1206-1555 AD. Initially it was grown as a garden crop but slowly it grown extensively due to its high protein (22-28%) and excellent green manure. This crop fixed about 219-63 Kg/N/ ha (Neugschwandtner *et al.*,2015). Faba bean is a diploid crop with 2n = 2x = 12 chromosomes (3), is partially cross pollinated ranging from 4 to 84%, and it possesses one of the largest genomes among legumes. Faba bean is a good source of lysine rich protein (22-28%) (4) and Levodopa (L-dopa), a precursor of dopamine (5) it can be grown as a green manure crop and help in nitrogen fixation. Some anti- nutritional factor Vicin and Covicin is present which cause adverse effect on health of livestock (6). Due to climatic change with increase of global warming terminal heat is a major problem for crops grown in rabi.As faba bean is cool season crop it also affected by the terminal heat which significantly decrease the yield cause a great lost to the farmers.

Materials and Methods

The experimental material consisted of 35 germplasm of fababean. These germplasms were grown in three environments during rabi in 2021-2022 under three different dates at Birsa Agricultural University, Kanke, Ranchi, Jharkhand,India. The Plot size 3 m x 1 m having 3 row and distance between rows and plant were maintained at 30 x 10 cm,respectively in randomized block design with three replication. Five randomly selected plant were utilized to record data for days to flower initiation, days to 50% flowering, day to pod initiation, plant height, number of pod per plant, days to maturity, number of seed per pod, number of seed per plant, seed yield per plant , 100-seed weight (g) and total protein (%) content. (7) method of stability were adapted. The temperature data from November 2021 to April 2022 was given in Table-1 which showed that there was a significant increase in the temperature

Results and Discussion

The pooled analysis of variance showed significant genotype x environment interaction for all the character when tested against pooled error**.** The partitioning of environment + genotype × environment interaction into different component revealed that the environment (linear) was significant for all character (8), Indicating that the response for environment was predicttable.The parameter like mean, regression coefficient and standard deviation may be comparatively more important for interpreting the stability status for all the characters.

The genotype which show high mean, bi>1 and high $ó^2_{di}$ these genotype are adaptive to rich environment, the genotype which show high mean, b_i<1 and low $ó^2_{di}$ these genotype were adaptive to poor environment. The genotypes which were high mean, b_i<1 and low $ó^2_{di}$ these were adaptive to average environment. The genotype which show high mean, b_i=1 and low S^{-2}Di shows stable for the entire environment (7).

The perusal Table-2 showed that genotype which show low or high mean, regression coefficient close to one and non-significant from standard deviation for days to flower initiation are ET226423, ET226425, ET226408,

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Table-1 : Weather data on Temperature (Max and Min.) from November 2021-April 2022.

Sl.No.	Date 2021-2022	Temperature (°C)		Sl. No.	Date 2021-2022	Temperature (°C)	
		Max.	Min.			Max.	Min.
1.	5th Nov-11th Nov	28.8	17.4	14.	5th Feb-11th Feb	23.8	9.6
2.	12th Nov-18th Nov	28.7	17.7	15.	12th Feb-18th Feb	25.2	8.8
3.	19th Nov-25th Nov	29.0	19.2	16.	19th Feb-25th Feb	26.0	11.6
4.	26th Nov-2nd Dec	26.0	9.3	17.	26th Feb-4th Mar	26.7	13.8
5.	3rd Dec-9th Dec	26.8	9.9	18.	5th Mar-11th Mar	29.7	13.5
6.	10th Dec-16th Dec	25.7	7.5	19.	12th Mar-18th Mar	32.3	15.0
7.	17th Dec-23rd Dec	22.0	3.6	20.	19th Mar-25th Mar	34.9	15.4
8.	24th Dec-31st Dec	23.3	8.0	21.	26th Mar-1st Apr	34.4	15.2
9.	1st Jan-7th Jan	21.0	5.6	22.	2nd Apr-8th Apr	36.1	16.3
10.	8th Jan-14th Jan	25.9	13.2	23.	9th Apr-15th Apr	38.1	20.4
11.	15th Jan-21st Jan	23.4	7.4	24.	16th Apr-22nd Apr	38.9	23.8
12.	22nd Jan-28th Jan	24.5	10.9				
13.	29th Jan-4th Feb	23.3	7.1				

Table-2 : Pooled analysis of variance for different components of variation for different character in faba beans.

Characters / Parameters	df	Days to Flower initiation	Days to 50% flower-ing	Days to pod initiation	Plant height (cm)	Number of Pods / plant	Day to Maturity	Number of seed / plant	Seed yield / plant	100-seed weight (g)	Total protein content (%)
Rep within Env.	6	0.291	0.256	1.028	8.228**	0.903	2.01	16.4**	0.490	1.77	0.398
Genotype	34	3.609**	2.250**	4.735**	59.132**	68.49**	26.9**	571.7**	48.82**	31.86**	2.0**
E+(GE)	70	13.6**	8.9**	12.1**	58.2**	38.22**	73.6**	254.5**	48.56**	21.89**	2.392**
Environment (E)	2	377.2**	251.6**	270.43**	1394**	747.4**	1959**	3691**	872.4**	183.74**	22.05**
G E	68	2.893**	1.725**	4.500**	18.932**	17.36**	18.19**	153.46**	24.33**	17.131**	1.814**
Env. (Linear)	1	754.4**	503.3**	540.86**	2786.2**	1495**	3919**	7382**	1745**	367.5**	44.10**
G E (Linear)	34	1.940**	1.457	3.812**	26.124**	27.22**	15.3**	220.8**	22.65**	8.87**	1.95**
Pooled Deviation	35	3.737**	1.937**	5.041**	11.404**	7.28**	20.4**	83.64**	25.27**	24.66**	1.62
Pooled Error	204	0.479	0.687	1.495*	11.926**	1.89**	2.93**	17.63**	1.075	2.41**	0.51
Total	104	10.326	6.703	9.691	58.500	48.12	58.385	358.21	48.649	25.15	2.26

Basabeer, ET226428,Vikrant which are stable for this character. The genotype ET226411, ET226423, ET226415, ET226408, Basabeer, ET226422, ET226427 , ET226432 were stable and adaptable for days to 50% flowering. The genotype ET226420, ET226410, ET226425, ET226418, ET226415, ET226408, Hudalbu, ET226428, ET226421, ET226429, Hanma-2,ET226419 were stable for days to pod initiation. The genotype ET226423, ET226410, ET226413, ET226431, Hudalbu, Hanma-1, PRT- 12, Hanma-2, Sambad-75, RFB-6 are stable for the plant height. The genotype RFB-6, Hanma-2, Sambad-75,Vikrant were stable for the number of pods per plant. The genotypes ET226417, PRT-12 were stable for days to maturity. The genotype ET226420, ET226410, ET226415, Hanma-2, ET226424 Habidulla, ET226419 stable for 100 seed weight. The genotype ET226415, Hanma-1, Hanma-2, ET226424, Vikrant were stable for total protein content.

In the present investigation terminal heat reduced the anthesis and enforced early maturity which results to decrease the yield. The optimum temperature for flowering of faba bean is 22–23 C (9). Temperature above the 27 during pod development stage tends to reduce the seed weight and cause force maturity Reproductive stage of faba bean highly sensitive to heat and pollen viability decreases due to high heat (10, 11). Harmful effect on terminal heat due to high temperature on the growth and development is well known. It is obvious that yield components and many morphologies and physiology character are affects when exposed to terminal heat in late sown environment condition. None the less, the overall effect can be measures by quantify the yield reduction

Protein content and seed yield are complex quantitative character governed by polygene and greatly influenced by environment condition which they were exposed. Environment constitutes all the physical, chemical and physical condition that surrounded and influenced the plant habitat. It is a fact that genotype grown under diverse environment condition respond differentially for their phenotypic expression. Some genotype performs well in some environment but not well in other.

In the Graph-1 the genotypes ET226431, ET226425, ET226415, ET226426, Hanma-2, ET226432, ET226428 which has high yield with high sensitivity to environment. These genotypes were selected under intensive

Table-3 : Estimation of mean and stability of 10 characters in 35 genotypes at three environments.

Character		Days to Flower initiation			Days to 50% flowering			Days to pod initiation		
S No.	Genotypes	Mean	bi	S-²di	Mean	bi	S-²di	Mean	bi	S-²di
1.	ET226411	51.67	1.02	1.66*	62.33	0.76	-0.52	72.5	1.17	4.33 *
2.	ET226420	50.89	0.31*	0.4	63.56	0.47*	-0.18	70.3	1.137	1.42
3.	ET226423	50.67	0.81	-0.44	62.00	0.86	-0.44	70.7	0.784	14.87**
4.	ET226416	50.44	0.65	3.31 **	62.67	0.66	-0.06	70.22	0.555	-1.28
5.	ET226410	51.44	0.84	4.80 **	63.22	0.75	-0.66	68	1.46	1.82
6.	ET226425	49.56	0.88	1.22	61.11	1.61	-0.64	69.7	0.583	1.33
7.	ET226418	50.67	0.39*	0.89	62.67	1.00	1.58	69.1	0.686	2.19
8.	ET226413	52.22	0.99	5.44 **	64.11	1.14	-0.47	70.5	0.340*	2.13
9.	ET226417	53.44	1.3	6.85**	62.78	1.14	7.42**	70.6	0.953	32.71*
10.	RFB-14	50.00	1.27	3.67 **	63.33	0.81	-0.67	71.7	1.715*	26.25 *
11.	ET226431	51.33	0.83	0.76	62.78	1.05	1.10	70.6	-0.105*	-1.42
12.	HFB-1	50.56	0.74	7.79**	62.56	1.12	-0.66	71.4	0.492*	3.96
13.	ET226415	51.56	0.99	-0.04	62.00	0.92	0.60	70	0.622	-1.23
14.	ET226414	51.89	0.91	6.95 **	61.44	1.16	5.61**	71.3	1.04	-1.30
15.	ET226408	51.11	0.88	-0.11	61.67	0.97	-0.19	69.6	0.829	-1.22
16.	Rebaya-40	50.44	1.35	17.45**	63.22	0.05*	1.13	72.2	0.962	4.29 *
17.	Hudalbu	52.22	0.87	1.28	63.56	0.94	1.98*	71.3	1.14	-0.90
18.	Hanma-1	52.44	0.91	1.89 *	62.89	0.69	1.55	70.7	0.705	16.24 **
19.	Basabeer	50.33	1.14	-0.2	61.56	1.29	-0.32	71.3	1.454	-1.47
20.	ET226428	49.33	1.2	1.16	60.78	1.36	-0.43	72.1	0.906	1.91
21.	ET226430	49.67	1.18	22.92**	61.44	1.12	-0.55	72.	1.873*	0.27
22.	ET226422	51.33	1.2	1.34	62.44	0.78	-0.23	72.7	1.218	2.78
23.	RFB-6	51.33	1.15	6.13**	61.56	1.31	2.70 *	70.1	1.837*	-1.09
24.	PRT-12	52.11	1.25	1.24	61.22	0.60	-0.29	72.2	0.454	-0.14
25.	ET226421	50.22	1.68*	0.79	61.67	0.70	0.82	69.7	1.417	-0.88
26.	ET226429	53.11	0.96	-0.37	61.11	0.89	2.70*	70.7	0.999	1.4
27.	Hanma-2	51.67	0.88	9.79 **	63.33	0.83	3.35*	69.2	0.866	-1.44
28.	ET226424	52.22	0.96	2.05 *	62.78	1.22	0.01	70.6	0.411*	0.57
29.	ET226427	51.78	1.33	0.56	62.44	1.08	0.67	71.7	1.115	3.83
30.	ET226432	51.67	1.07	-0.42	62.33	0.98	-0.36	71.1	0.797	-1.44
31.	ET226426	52.56	0.83	-0.47	63.67	1.34	13.65**	73.2	0.561	3.95
32.	Sambad-75	49.56	0.37*	-0.24	62.78	1.21	0.83	71.8	1.604	12.18 **
33.	Habidulla	52.78	1.18	0.58	63.56	1.62	-0.54	72.7	1.726	0.75
34.	ET226419	49.33	1.52*	5.50 **	62.89	1.11	3.89 **	70.2	0.654	-0.01
35.	Vikrant	50.44	1.16	0.81	63.33	1.32	1.78	73.7	2.04	-0.83

agriculture where there was no limitation of resources but will fail under poor environment. The genotype ET226423, ET226416 were high yield but poor sensitivity to environment which will adapt to poor environment and produce high yield even in poor environment. In graph 2 genotypes ET226423, ET226413, ET226417, ET226418, ET226421, ET226427, ET226424, ET226429, Vikrant and Rebaya-40 were high protein content and poor sensitivity towards environments.

Conclusions

Tempratue is a important factor for the crop- growth. Due to increse in the temopprature high heat stress obververd in the later phase of the growth which decrese the yield and induce force maturity.Increase in temperature significantly reduced the days to flowering, days to maturation and height. Like highest post anthesis temperature above the 27 C contributed to decline the

Table-3 :

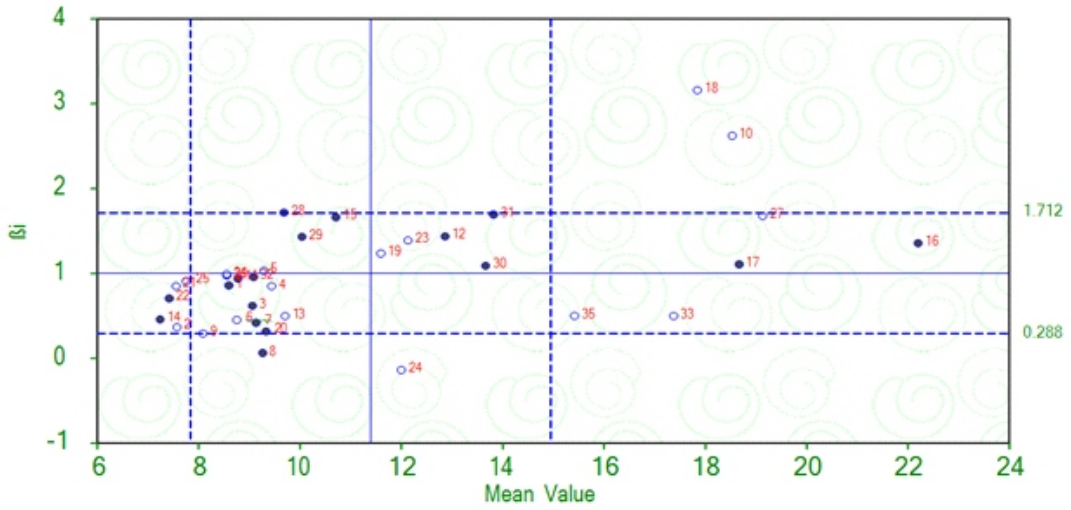
	Character	Plant height (cm)			Number of Pods / plant			Day to Maturity		
S No.	Genotypes	Mean	bi	S-²di	Mean	bi	S-²di	Mean	bi	S-²di
1.	ET226411	68.99	0.085*	-9.10	11.80	0.57	-0.02	135.1	0.7	21.6 **
2.	ET226420	71.03	1.05	5.72	13.58	1.24	-1.85	136.9	0.9	-1.2
3.	ET226423	75.61	0.99	-10.01	17.51	0.89	60.457 **	131.6	1.1	-2.9
4.	ET226416	71.36	0.86	17.05	15.97	1.41	-1.49	131.4	1.604*	17.3 **
5.	ET226410	74.09	1.14	-1.86	13.58	2.038*	1.97	129.9	1.3	42.3 **
6.	ET226425	72.34	1.36	-8.54	13.40	1.574*	-0.21	132.9	0.322*	-1.8
7.	ET226418	69.74	1.13	-11.81	10.13	0.62	-1.66	129.7	1.2	26.4 **
8.	ET226413	75.77	0.83	-2.59	12.33	1.449*	-1.80	130.0	1.1	54.1 **
9.	ET226417	68.93	0.134*	-10.69	13.61	2.19*	-1.31	126.9	0.8	6.9
10.	RFB-14	72.41	0.121*	7.56	25.24	3.350*	-1.72	134.1	1.0	16.3 *
11.	ET226431	73.81	1.28	-11.36	15.74	0.99	-1.00	130.8	1.488*	38.9 **
12.	HFB-1	73.43	-0.039*	-11.82	23.00	0.65	2.03	131.1	1.815*	2.2
13.	ET226415	72.59	0.42*	-9.70	11.71	0.90	-0.97	128.1	1.0	4.7
14.	ET226414	71.33	0.469*	-11.53	17.11	1.03	-1.54	129.6	0.8	15.8 *
15.	ET226408	69.40	1.06	-4.28	11.94	-0.213*	1.96	131.6	1.2	15.8 *
16.	Rebaya-40	81.46	0.619*	17.87	19.03	1.536*	-1.14	131.4	1.2	-2.8
17.	Hudalbu	80.31	1.03	-1.01	18.43	1.795*	-1.83	134.1	1.489*	14.6 *
18.	Hanma-1	73.14	1.24	-11.70	19.36	0.65	0.61	133.7	0.8	56.2 **
19.	Basabeer	70.73	0.282*	-11.22	19.87	0.494*	63.636 **	134.3	1.0	6.0
20.	ET226428	63.73	1.35	37.15*	15.51	0.06*	-0.50	132.3	0.9	39.6 **
21.	ET226430	69.11	1.895*	-9.65	13.49	0.66	0.68	134.0	0.4	3.3
22.	ET226422	62.01	1.36	-2.15	12.28	-0.479*	1.85	126.2	1.2	23.0 **
23.	RFB-6	73.60	0.67	12.67	25.08	1.07	0.31	125.4	0.6	16.3 *
24.	PRT-12	76.40	1.01	-8.10	21.50	0.94	-0.89	128.9	0.6	5.0
25.	ET226421	69.47	1.45*	36.65*	11.14	0.69	-0.13	133.0	1.539*	6.7
26.	ET226429	67.94	1.95*	-1.63	9.83	0.159*	-1.69	132.9	1.3	-2.9
27.	Hanma-2	73.13	0.66	-10.82	23.32	0.54	4.48	128.7	1.1	27.8 **
28.	ET226424	65.78	1.85*	50.23*	16.38	2.084*	50.72**	137.9	0.6	10.3 *
29.	ET226427	75.46	1.54*	-10.60	16.79	1.598*	-1.34	128.9	1.4	24.7 **
30.	ET226432	80.32	2.06*	-2.15	10.22	0.61	-1.36	132.6	1.3	18.5 **
31.	ET226426	77.31	1.39*	-11.48	14.41	1.921*	24.0 **	130.9	0.578*	21.3 **
32.	Sambad-75	76.70	1.28	-4.54	24.24	1.33	-1.62	127.6	0.526*	39.5 **
33.	Habidulla	77.58	0.40	-0.43	23.73	0.562*	2.69	127.9	0.448*	-2.9
34.	ET226419	75.83	1.722*	-8.64	19.00	-0.582*	-0.98	126.8	1.0	9.5 *
35.	Vikrant	76.72	0.35	-2.11	24.23	0.70	-0.68	133.3	0.7	43.8 **

number of pod, yield per plant under environment three than environment one.

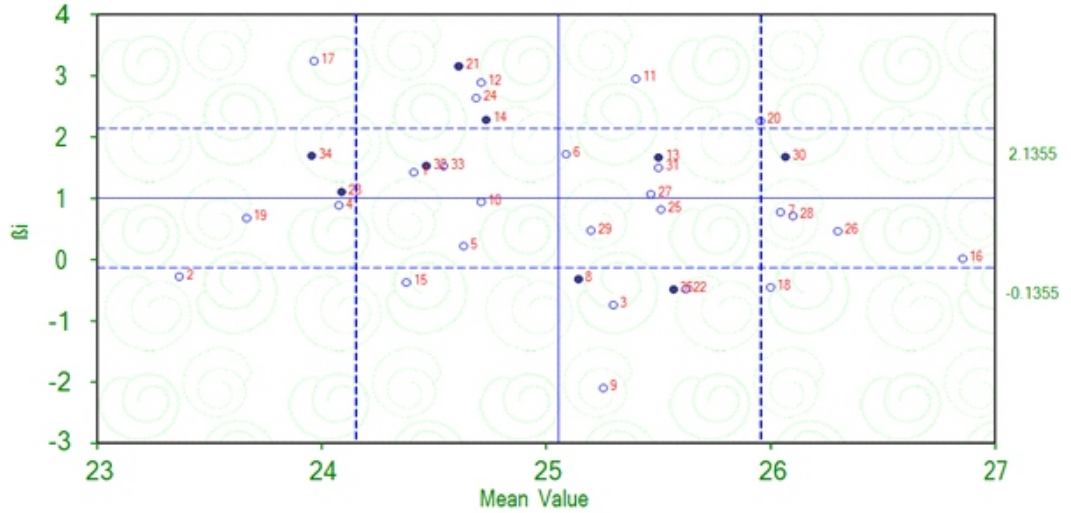
The genotype Hanma-2 was stable for most of the character which was stable for overall environment. The genotypes ET226423 and ET226416 were high yield and poor sensitivity to the overall environment which produce high yield in unfavorable condition.

Character		Number of seed / plant			Seed yield / plant			100-seed weight (g)		
S No.	Genotypes	Mean	bi	S-²di	Mean	bi	S-²di	Mean	bi	S-²di
1.	ET226411	31.7	0.87	0.75	8.6	0.9	13.66 **	26.8	0.5	45.20**
2.	ET226420	40.0	1.41	-13.59	7.6	0.4	-0.9	34.2	1.1	0.3
3.	ET226423	49.2	1.13	413.4 **	9.1	0.6	18.87**	33.2	2.4	18.37 **
4.	ET226416	47.8	1.81*	-11.96	9.4	0.9	-1.0	34.2	1.2	5.8
5.	ET226410	38.6	2.33*	61.76 *	9.3	1.0	1.7	36.1	2.3	1.5
6.	ET226425	36.1	1.31	32.38	8.8	0.5	1.6	30.7	-0.52*	-2.4
7.	ET226418	28.7	0.68	-12.65	9.1	0.4	23.82**	31.1	2.0	7.29 *
8.	ET226413	34.0	1.66	-17.36	9.3	0.06*	46.15**	33.4	1.7	9.33 *
9.	ET226417	37.7	2.67*	-17.16	8.1	0.3	0.3	32.1	1.7	9.330 *
10.	RFB-14	69.4	3.64*	-17.42	18.5	2.62*	0.9	29.2	-0.3	-0.2
11.	ET226431	43.3	0.93	-15.97	8.8	0.9	15.28**	27.8	1.5	11.08 *
12.	HFB-1	69.3	0.26*	-9.72	12.9	1.4	5.03 *	31.2	1.1	44.91**
13.	ET226415	34.3	1.12	-3.88	9.7	0.5	1.1	31.9	0.1	-2.3
14.	ET226414	48.4	1.66*	-11.95	7.2	0.5	3.54 *	36.9	0.7	34.54 **
15.	ET226408	35.3	-0.41*	-15.68	10.7	1.6	10.54**	37.2	0.9	15.50 **
16.	Rebaya-40	51.9	0.97	49.63	22.2	1.4	435.20 **	30.9	1.8	-1.7
17.	Hudalbu	52.7	1.66	-14.24	18.7	1.1	112.08**	36.2	-1.033*	91.37 **
18.	Hanma-1	53.9	0.43	-10.75	17.8	3.16*	0.9	30.2	1.5	4.9
19.	Basabeer	55.9	0.68	429.5 **	11.6	1.2	0.0	38.6	1.0	58.52**
20.	ET226428	44.7	-0.07*	-12.61	9.3	0.3	3.69 *	28.6	0.2	-0.6
21.	ET226430	37.6	0.91	12.45	7.6	0.9	2.2	29.4	0.2	24.04 **
22.	ET226422	33.3	-0.61*	5.41	7.4	0.7	14.05**	31.1	1.0	54.20 **
23.	RFB-6	71.1	0.93	-14.92	12.1	1.4	0.2	26.6	0.1	-0.2
24.	PRT-12	58.9	0.81	-17.42	12.0	-0.14*	-0.2	27.7	0.2	26.80 **
25.	ET226421	31.5	0.55	4.73	7.8	0.9	0.3	28.3	3.222*	14.61 **
26.	ET226429	29.4	-0.16*	-17.08	8.6	1.0	16.05**	32.3	2.0	146.84**
27.	Hanma-2	66.7	0.21*	166.2 **	19.1	1.7	-0.5	33.8	1.5	1.5
28.	ET226424	45.2	2.71*	489.2 **	9.7	1.72*	22.01 **	33.0	1.0	-2.4
29.	ET226427	45.6	1.33	3.57	10.0	1.4	8.60 **	36.1	2.3	41.91 **
30.	ET226432	29.0	0.46	-17.26	13.7	1.1	18.31 **	34.0	0.6	11.38 *
31.	ET226426	43.3	2.22*	409.10**	13.8	1.7	68.021**	31.0	0.0	80.49 **
32.	Sambad-75	73.3	2.05*	-3.877	9.1	1.0	3.51 *	30.0	1.6	28.23 **
33.	Habidulla	65.6	-0.03*	389.6 **	17.4	0.5	-0.2	36.9	0.5	-0.2
34.	ET226419	57.3	-1.17*	58.93 *	8.6	1.0	1.1	33.2	1.2	3.4
35.	Vikrant	69.3	0.02*	40.11	15.4	0.5	1.7	27.3	0.2	-2.0

Character		Total protein content (%)							
S. No.	Genotypes	Mean	bi	S-²di	S. No.	Genotypes	Mean	bi	S-²di
1.	ET226411	24.4	0.5	45.2 **	18.	Hanma-1	26.00	1.48	4.86
2.	ET226420	23.4	1.1	0.3	19.	Basabeer	23.67	1	58.52 **
3.	ET226423	25.3	2.35*	18.38 **	20.	ET226428	25.96	0.22	-0.61
4.	ET226416	24.1	1.2	5.8	21.	ET226430	24.61	0.17	24.04 **
5.	ET226410	24.6	2.25*	1.5	22.	ET226422	25.62	1.03	54.20**
6.	ET226425	25.1	-0.52*	-2.4	23.	RFB-6	24.09	0.08	-0.17
7.	ET226418	26.0	2.0	7.29 *	24.	PRT-12	24.69	0.18	26.80**
8.	ET226413	25.1	1.7	9.33 *	25.	ET226421	25.51	3.22*	14.61 **
9.	ET226417	25.3	1.7	9.34 *	26.	ET226429	26.30	1.99	146.85**
10.	RFB-14	24.7	-0.30*	-0.2	27.	Hanma-2	25.47	1.48	1.50
11.	ET226431	25.4	1.5	11.09 *	28.	ET226424	26.10	1.01	-2.37
12.	HFB-1	24.7	1.1	44.92**	29.	ET226427	25.20	2.26*	41.91 **
13.	ET226415	25.5	0.1	-2.3	30.	ET226432	26.07	0.6	11.38 *
14.	ET226414	24.7	0.7	34.54 **	31.	ET226426	25.50	0.01	80.49 **
15.	ET226408	24.4	0.9	15.50 **	32.	Sambad-75	24.47	1.60	28.23**
16.	Rebaya-40	26.9	1.8	-1.7	33.	Habidulla	24.54	0.46	-0.18
17.	Hudalbu	24.0	-1.03*	91.37**	34.	ET226419	23.96	1.18	3.37
					35.	Vikrant	25.57	0.22	-2.01



Graph-1 : Mean, regression coefficient and deviation from regression for total protein content in faba bean.



Graph-2 : Mean, regression coefficient and deviation from regression for seed yield per plant in faba bean.

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