

Characterization of *Phaseolous vulgaris* L.(Common Bean) Accessions Collected from Farmer Fields by Using Morphological Characters

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Introduction

Common bean *Phaseolous vulgaris* L is a major and popular vegetable in Sri Lanka which belongs to the family *Leguminosae*. In Sri Lanka, bean is mainly cultivated in Badulla, Nuwara Eliya, Kandy, Rathnapura and Matale districts (Prabaharan, 2004). Different bean varieties have been recommended by the Department of Agriculture considering their desirable morphological characters. The yield of those recommended Sri Lankan varieties are less than those varieties in the world and they are susceptible to the major diseases and pest attacks (Prabaharan, 2004). The landraces developed by natural process of selection at farmers' fields may bear precious characters. These landraces may be among the accessions collected from the farmer fields. The objective of this research is to characterize different accessions collected from the farmers' fields to be used in bean breeding programs.

Methodology

The experiment was conducted at Horticultural and Crop Research Development Institute (HORDI) at Gannoruwa, Peradeniya during the period of April to August 2011. Twelve accessions with two recommended varieties were selected to evaluate their characters. Both qualitative and quantitative characters of stem, leaves, flowers, pods were considered. Evaluation of these characters of bean accessions was performed with the help of a characterization catalogue on beans developed by the Plant Genetic Resource Centre, Gannoruwa. Karunarathna Tikiribanda (TB), Karunarathna Danapala (DP), Kaha Ata Role (KAR), Capri A.B Hapuhinna (CapriH), Capri Welimada (CapriW), Karunarathna Mandaramnuwara (KMN), Bean from China (CB1), Pole bean Imported (PBI), Sitti Kalu, CB11, BIL, AC#01398 were selected from farmer fields and checked with two recommended varieties, KWG and Lanka Butter (Lanka B). Randomized Complete Block Design (RCBD) with three replicates was selected as experimental model. Quantitative data collected from selected parameters were analyzed with one way ANOVA. The nature of the difference of characters of accessions was identified by Fishers LSD value and mean separation process using SAS 6.5 statistical software (Rumsey, 2007). Qualitative characters (Table 1) were tabulated and scores were given for that characters. A dendrogram was created considering scores of qualitative characters and the mean values of quantitative characters (Table 2) to identify the similarities of the varieties.

Results and discussion

Both qualitative characters (Table 1) and quantitative characters (Table 2) considered here are highly varied amongst the accessions. The longest pod length is from TB and the shortest is from KAR. Sitti Kalu has most weighted pods. CB11, Lanka Butter, TB and

Capri H also have heavier pods. Lightest pods are from KWG. TB gives the highest yield per plant. The lowest yield per plant is given by KWG. TB and Lanka Butter have the highest number of pods per inflorescence. The least is from CBI. Lanka B takes the shortest period to mature but KAR takes the longest period.

Variety	Leaf shape	Flower colour	Seed colour	Pod colour	Anthocyanin stem
TB	Triangular 1	White 1	Buff 1	Green 1	Absent 0
DP	Oval Heart2	White 1	MediumBrown2	Green 1	Absent 0
KAR	Triangular 1	White 1	Light brown 3	Green 1	Absent 0
Capri H	Triangular 1	White 1	Light brown 3	Green 1	Absent 0
Capri W	Triangular 1	white red 2	Light brown 3	Green 1	Absent 0
KMN	Round 3	Pink 3	Dark brown 4	Green 1	Absent 0
CBI	Triangular 1	White 1	Light brown 3	Green 1	Absent 0
PBI	Triangular 1	Purple 4	Dark black 5	Green 1	High 5
Sitti Kalu	Triangular 1	White 1	Dark black 5	Green 1	on nodes 2
CB11	Round 3	White 1	Dark brown 4	Green 1	On nodes 0
BIL	Triangular 1	White 1	Chocolate 3	Green 1	On nodes 0
AC#01398	Triangular 1	White 1	Chocolate 3	Green 1	On nodes 2
KWG	Triangular 1	White 1	Dark brown 4	Green 1	Absent 1
Lanka B	Triangular 1	Purple 4	Dark brown 2	Yellow 2	On nodes 2

Table 1: Qualitative characters and scores

Table 2: Mean values and LSD values of different quantitative characters

Variety	Pod Length (cm)	Weight of 100 pods (g)	Yield per plant (g)	Pods per Inflorescence	Days to physiological maturity
TB	16.9	715	202.08	3.17	46.5
DP	15.4	680	94.69	2.10	51.5
KAR	12.7	675	115.66	2.97	52.0
Capri H	14.2	715	83.44	2.80	46.5
Capri W	13.5	680	88.26	2.64	47.5
KMN	14.2	665	83.58	2.44	51.5
CBI	15.2	665	99.0	1.94	47.5
PBI	14.3	615	91.31	2.50	46.5
Sitti Kalu	13.7	840	55.42	2.50	47.5
CB11	15.4	745	66.25	2.20	46.5
BIL	16.0	650	106.12	2.77	48.0
AC#01398	13.2	575	72.68	2.73	47.0
KWG	13.0	550	55.35	2.17	51.5
Lanka B	13.0	745	73.46	3.17	41.0
LSD	1.45	136.13	56.04	0.66	1.43

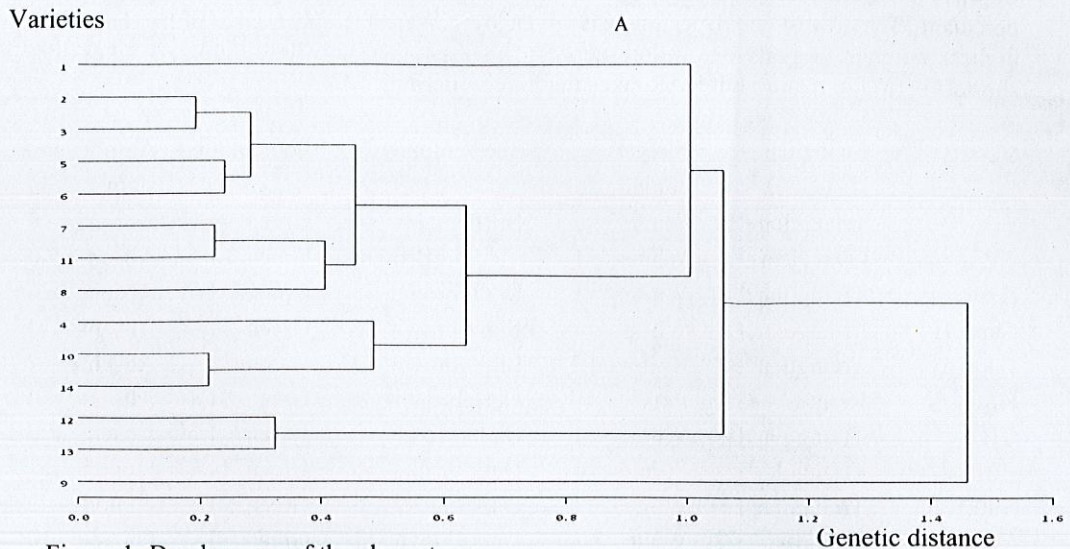


Figure 1: Dendrogram of the characters

1=TB 2=DP 3=KAR 4=CapriH 5=CapriW 6=KMN 7=CB1 8=PBI 9=Sitti Kalu 10=CB11 11=BIL
12=AC#01398 13=KWG14=Lanka B

Amongst the 14 accessions, Sitti kalu has different characters from others (Category D). Seed coat pattern and colour of wings of Sitti Kalu are different from other accessions and Sitti Kalu bears the lowest pod length, the highest pod circumference, the highest mean pod weight and also takes the higher number of days to 50 % flowering. TB too has different characters from others (Category A). Qualitative characters of TB, such as major seed colour, minor seed colour, seed coat pattern, pod curvature are different from other accessions. Among the quantitative characters like pod length, pod circumference and number of days that takes to 50% flowering are highest in accession TB. KWG and AC#01398 have similar characters (Category C). Qualitative characters such as leaf shape, seed coat pattern, pod suture strings, pod cross section, pod markings, roughness of pod surface are similar in this category. The quantitative characters like pod length, pod circumference, mean pod weight of hundred pods, pods per inflorescence, inflorescence length, plant height, seed length, seed height, flower buds per inflorescence are similar in KWG and AC#01398. All other accessions DP, KAR, Capri(H), Capri(W), K(MN), CB1, PB(I), CB11, BIL, AC#01398 belongs to same category (Category B).

Conclusions

The accessions evaluated showed high variation for five qualitative and five quantitative characters. These accessions can be divided into four major categories according to the similarities of the evaluated characters. Characterization proves accessions TB, KAR and AC#01398 have promising characters and high potential to be recommended to farmers.

References

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