# Evaluation and Multiplication of Common Bean Germplasms Collected from Uva Region

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## Introduction

Common bean (*Phaseolus vulgaris* L.) is one of the major and very popular vegetable crops in Sri Lanka. It belongs to family *Leguminosae* and genus *Phaseolus*. Uva region plays a major role in common bean cultivation of Sri Lanka as 2/3 of the common bean cultivation is commercially done in this region. There are mainly 23 common bean germplasms available among the farmers in Uva region (Bandara, 2012). There is a good demand for common beans in the international market (Ariyarathne, 2005). Therefore it is very essential to develop varieties comprised with promising characters. Thus this research was conducted to evaluate the common bean germplasm phenotypically and to multiply the collected germplasms which might be in assistance for the future plant breeding programs.

## Methodology

This research was conducted at Uva Wellassa University, Badulla during the period of June to October 2012. Twenty three germplasms collected from Uva Region were phenotipycally characterized according to the characterization catalogue for common beans developed by Plant Genetic Resource Centre, Gannoruwa. There both qualitative and quantitative characters of leaves, stems, flowers, pods and seeds were considered. The collected germplasms are such as Kappetiola Nil (KN), Kentucky Wonder Green (KWG), Lanka Butter (LB), Cabri Kalu Ata (CKalu), Cabri Kaha Ata (CKaha), Maspanna Kaha Ata (MKaha) , Maspanna Kalu Ata (MKalu), Maspanna, Katugasthota Kaha Ata (KKaha), Katugasthota Kalu Ata (KKalu), Kalu Ata (Kalu), Kaha Ata (Kaha), Kalu Ata Roll (KAR), Kot Roll (KR1), Dik Roll Kalu (DRK), Dik Roll Sudu (DRS), Kola Roll (KR2), Kollu, Murunga Brown (MB), Gas Bonchi (GB), Sudu Bonchi (SB), Dumburu Ata (DA), Black Roll Murunga (BRM). Complete Randomized Design (CRD) with four replicates was considered as the experimental design.

Collected data were analyzed using the Minitab 16 and SAS 9.2 Statistical Softwares. Quantitative data were analyzed with one way ANOVA with Fishers LSD value mean separation process. Qualitative data were tabulated and scores were given for those characters. A dendogram was created considering the scores of qualitative characters and the mean values of quantitative characters to identify the similarities of the germplsms.

## Results and Discussion

The qualitative and quantitative characters shown in table 1 and 2 are the highly variable characters among the germplasm. KAR posses the highest inflorescence length and the shortest is from Maspanna, DRK and Kollu. No. of pods per inflorescence is highest in DRS. Maximum number of flower buds can be seen in MB and the minimum days to flowering can be observed in MB, KAR, Kaha, Kalu, KKaha and KR2. Even though the research was carried out for 23 germplasms, the evaluation was only completed for 18 due to the non viability condition of seeds used for planting.

Table 1. Qualitative characters and scores.

| Germplasm | Pod Curvature | Pod Cross Section | Pod Markings | Seed Shape | Plant Type |
|---|---|---|---|---|---|
| KN | Curved | Round elliptic | Brown | Kidney | B |
| KWG | Slightly curved | Pear shaped | Absent | Kidney | B |
| LB | Slightly curved | Round elliptic | Red | Kidney | A |
| CKalu | Straight | Round elliptic | Absent | Ovoid | C |
| CKaha | Curved | Pear shaped | Absent | Kidney | B |
| MKaha | Slightly curved | Round elliptic | Absent | Kidney | A |
| MKalu | Curved | Round elliptic | Brown | Cuboid | B |
| Maspanna | Recurving | Round elliptic | Absent | Cuboid | C |
| KKaha | Slightly curved | Round elliptic | Brown | Kidney | C |
| KKalu | Straight | Round elliptic | Absent | Cuboid | C |
| Kalu | Curved | Round elliptic | Purple | Cuboid | A |
| Kaha | Slightly curved | Round elliptic | Absent | Kidney | C |
| | Curved | Round elliptic | Purple | Truncate fastigate | C |
| DRK | Slightly curved | Round elliptic | Absent | Cuboid | C |
| DRS | Slightly curved | Pear shaped | Absent | Cuboid | B |
| KR2 | Slightly curved | Pear shaped | Brown | Ovoid | C |
| Kollu | Slightly curved | Very flat | Purple | Truncate fastigate | C |
| MB | Curved | Round elliptic | Absent | Cuboid | B |

Plant Type: A- Indeterminate, moderate climbing and pods evenly distributed, B- Indeterminate, aggressive climbing and pods mainly on upper nodes, C- Indeterminate, aggressive climbing and pods evenly distributed

Table 2. Mean LSD values of quantitative characters.

| Germplasm | Inflorescence length | Pods/inflorescence | Days to flowering | Flower buds/inflorescence |
|---|---|---|---|---|
| KN | 4.5 | 1.0 | 65 | 3.75 |
| KWG | 6.425 | 1.5 | 60 | 2.75 |
| LB | 10.7 | 1.0 | 50 | 4.75 |
| CKalu | 9.975 | 2.0 | 50 | 4.5 |
| CKaha | 7.675 | 2.0 | 50 | 5.25 |
| MKaha | 7.125 | 2.0 | 60 | 4.75 |
| MKalu | 7.1 | 1.75 | 65 | 5.0 |
| Maspanna | 4.375 | 1.5 | 65 | 3.75 |
| KKaha | 8.375 | 2.25 | 45 | 5.25 |
| KKalu | 5.3 | 1.0 | 65 | 4.5 |
| Kalu | 9.850 | 2.0 | 45 | 6.0 |
| Kaha | 7.750 | 2.0 | 45 | 4.0 |
| KAR | 10.750 | 2.0 | 45 | 5.0 |
| DRK | 4.375 | 2.75 | 67.5 | 3.75 |
| DRS | 4.875 | 3.0 | 55 | 5.0 |
| KR2 | 9.225 | 2.0 | 48 | 4.5 |
| Kollu | 4.375 | 1.0 | 48 | 4.5 |
| MB | 10.20 | 1.75 | 45 | 7.25 |

1=KN 2=KWG 3=LB 4=CKalu 5=CKaha 6=MKaha 7=MKalu 8=Maspanna 9=KKaha 10=KKalu 11=Kalu 12=Kaha 13=KAR 15=DRK 16=DRS 17=KR2 18=Kollu 19=MB

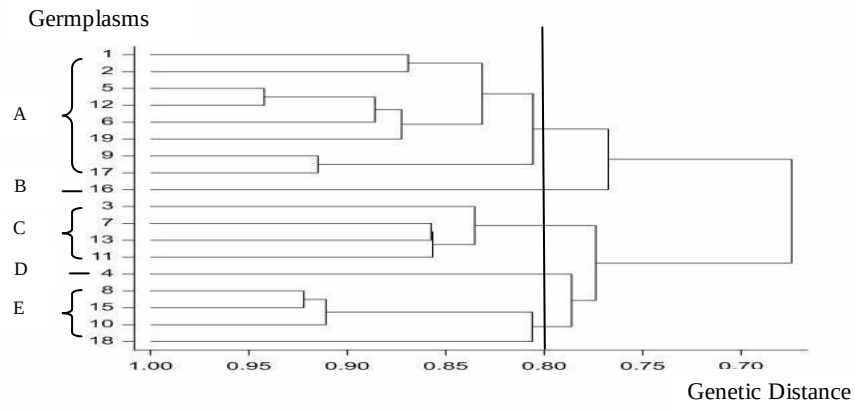


Figure 1. Dendogram of characters

Germplasm DRS (Category A) posses different characteristics compared to other germplasms. DRS has the highest number of pods per inflorescence. Even CKalu (Category D) deviates from the rest. CKalu bears the highest pod width and only CKalu has straight pod curvature. Germplasms KN, KWG, CKaha, MKaha, MB, KKaha, and KR2 in the same category (Category A). Qualitative characters such as petal colours, leaf anthocyanin, hypocotyls colour, pod colour, pod beak position and pod wall fiber are similar for category A. In addition LB, MKalu, KAR, Kalu comes under one cluster (Category C). There characters as hypocotyls colour, stem anthocyanin, flower colour, degree of pod markings, pod beak position, pos wall fiber, major and minor seed colours, brilliance of seed are equal. Maspanna, DRK, KKaha and Kollu comes under one group (Category E). Qualitative characters like leaf shape, seed coat pattern, pod colour, major and minor seed colours, flower colours, hypocotyl colour, brilliance of seed, pod wall fiber and plant type shows same characteristics in this category. In addition it was observed that germplasms such as Kollu, Kalu Ata, Dik Roll Kalu, Murunga Brown, Kola Roll and Kaha Ata posses field resistivity to Spiny Brown Bug.

## Conclusion

The germplasms evaluated show high variation in five qualuitative and four qantitative characters. Some germplasms show field resistivity to Spiny Brown Bug and 14 germplasms were multiplied.

## References

Ariyarathne, H.M., 2005. Bonchi wagava. Wishva Lekha publishers, Rathmalana.

Bandara, L.M.S.S., 2012. A study and collection of bean cultivars grown in Uva region and characterization. Uva Wellassa University, Badulla.