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Farmers' Preference Ranking in Pole type of Common Bean (*Phaseolus vulgaris* L.) – Participatory Varietal Selection

F. A. Sheikh*, M. N. Khan, P. A. Sofi, Z. A. Dar, N. R. Sofi and M. A. Bhat

Division of Genetics and Plant Breeding, Sher e Kashmir University of Agricultural Sciences and Technology Kashmir - 190025, India

*Corresponding Author E-mail: fayaz127@gmail.com

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ABSTRACT

Present investigation was undertaken during 2012-2014 to generate information on the farmers' perception and preferences about the variety, evaluation of the set of materials at the farmers' field along with the farmers' variety as a check through participatory varietal selection. Trials were laid at various locations of three districts summing to a total of three mother trials with one grand mother trial at the research station. The yield and yield attributing traits of all genotypes were taken on ten competitive plants of both grand mother and mother trial. The participatory varietal selection was carried out at farmer's field through farm walk at pod development stage in order to assess the genotype through preferential scoring. The genotypes WB-83, WB-258 and WB-222 were selected and preferred by the farmers across locations and were found at higher in term of mean preference when compared by the farmers'. Farmer's variety was the least preferred variety and was at par with the test genotype WB-258. Also genotypes WB-38, WB-222, WB-1011 were statistically found at below in term of mean preference when compared by the farmers'.

Key words: *Common Bean, PVS, Mother Trial, Preferential Scoring, Preferential Ranking.*

INTRODUCTION

Pulses, a variety of plant species belonging to the legume family, include Bambara beans, broad beans, chickpeas, cowpeas, dry beans, dry peas, lentils, lupines and vetches. While varying widely in shape, colour and size, they all share significantly higher protein content-per-gram than most cereal crops and a unique ability to enrich the soil they grow in. In December 2013, the UN General Assembly declared that 2016 will be the **"International Year of Pulses"**. This will likely draw much needed attention to a commodity group which has, despite its many appreciable qualities, proven quite undervalued up until now. Much research has been done into evaluating varieties with farmers[1,4,5,6,7] and this process is now commonly termed participatory varietal, or variety selection (PVS). Less attention has been given to methods of working with farmers' in the segregating generations and there is little evidence in the literature on how this should best be done or, indeed, if it is required at all[8].

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Agriculture in general and *Rajmash* in particular in small holder farming system like in Kashmir suffer from certain inherent bottlenecks such as marginality, fragility, inaccessibility, heterogeneity while enjoying a comparative advantage in niche based cropping system. Therefore any technological intervention including the varietal developmental process has to be fine-tuned in order to enable farmers to harness advantages and overcome the constraints. Plant breeders as outsiders have often failed to appreciate certain important farm and nonfarm characteristics that have a significant bearing on varietal suitability and adoption. It is with this imperative that SKUAST Kashmir initiated participatory varietal selection programmes to add relevance to the process. As a socially responsible process it seeks to empower farmers in decision making and varietal evaluation as well as strengthen the local seed system. The current study is a part of broader research effort in order to identify farmers' production constraints and varietal attributes that will help disseminate appropriate varieties suitable to the farming systems.

MATERIALS AND METHODS

The present study was undertaken during 2012-2014 in three districts of Kashmir valley namely Baramulla(Village Hajibal), Bandipora (Sumlar) and Kupwara (Warnov) which are potential areas for *rajmash* cultivation. The experimental set up is presented below under appropriate headings:

Selection of study area

In the present study three districts namely Baramulla, Bandipora and Kupwara were selected. In each district one location (village) was selected for undertaking the study. The mother trials were laid at Hajibal in District Baramulla, Warnow in District Kupwara and Sumlar in district Bandipora. A grand mother trial was laid at Regional Research Station Wadura Sopore. The selection of sites was done in consultation with KVK's of respective districts and line (agriculture) departments. All the three districts were selected on the basis of their strategic importance.

Farm walk and preference score index

At the time of full pod development, farm walk was organized at all locations and the preference score index was calculated at the time of farm walk by De-Boef and Thijssen[3] and Ceccarelli[2].

Preference Index =	No. of positive votes – No. of negative votes
	Total No. of votes

The mean preference score was calculated separately across four locations to arrive at cumulative preference of varieties on the basis of traits specified by them.

EXPERIMENTAL FINDINGS

Thirty one genotypes of *rajmash* were evaluated to identify genotypes suitable for specific niche areas. The genotypes were evaluated in a Randomized Complete Block Design (RCBD) with three replications across four random environments separately.

Preferential scoring

Participatory varietal selection was carried out in three districts, in the form of farm walks and focus group discussions. Farm walk was done when pods were at edible stage. Farm walk is an exercise done by research scientists and farmers' to know perception of farmers' about different genotypes and to select genotypes of their choice. During farm-walk each farmer was given two cards to vote for their preferential variety (white card for preferred genotype and yellow for non-preferred genotype).

Evaluation of Mother trials through farmer's preferential ranking was carried out at four locations. At the time of pod maturity when *rajmash* pods were at edible stage, Focal Group Discussions (FGD) and the differences in farmer specified traits were discernible, were used to evaluate the varieties. There was very good response from the farmers' who not only cooperated while laying out the trials in their area but actively participated in

preferential ranking of the varieties through voting.

Preferential ranking

Thirty one genotypes were selected from the material and was laid at four locations in three districts. The farmers' responded overwhelmingly through votes against a particular variety, the number of the farmers' that participated in voting was 14, 16, 10 and 15 respectively at the four locations. There were many genotypes which carry the farmers' attention but few were most promising lines. Table-1.5 shows the summation of ranks and pooled preference data for different test entries as collected from four mother trials.

At the village Warnov Kupwara highest preferential scoring was for the genotype WB-83 and the lowest preference was recorded for WB-224 followed by WB-330. It was due to overwhelming response of farmers towards the variety having more number of pods per plant and seed yield per plot. Similarly at village Hajibal Baramulla maximum scoring was recorded for WB-83. At village Sumlar Bandipora district WB-83, WB-258, WB-1011, WB-450, WB-38, received maximum number of votes as preferred by the farmers'. At Research Station Wadura Sopore the genotype WB-83 (1), WB-258 (1), WB-1012 (1), have maximum preferential scoring followed by WB-38(2), WB-143(3). The reasons for the preference were related to many traits including seed size and colour, early maturity, high seed yield, taste and swelling and free from diseases as per the interviews.

Table-1.1: Farmers' preference ranking of different test varieties of common bean in mother trails at four locations Preferential Scoring at Hajibal Tangmarg Baramulla

Genotypes	Total No. of farmers' participated (16)			
	Positive votes	Negative votes	Preference score	Rank
WB-38	14	2	0.75**	3
WB-222	10	6	0.25	7
WB-143	12	4	0.5	6
WB-184	9	7	0.12	8
WB-158	13	3	0.62	4
WB-83**	16	0	01	1
WB-230	7	9	-0.12	9
WB-255	2	14	-0.75	14
WB-257	13	3	0.62	5
WB-258**	15	1	0.87	2
WB-243	6	10	-0.25	10
WB-258-1	7	9	-0.12	9
WB-206	5	11	-0.37	11
WB-261	4	12	-0.5	12
WB-358	7	9	-0.12	9
WB-128	10	6	0.25	7
WB-224	4	12	-0.5	12
WB-240	5	11	-0.37	11
WB-1137	10	6	0.25	7
WB-461	12	4	0.5	6
WB-443	2	14	-0.75	14
WB-409	10	6	0.25	7
WB-411	12	4	0.5	6
WB-08	4	12	-0.5	12
WB-450	14	2	0.75	3
WB-370	6	10	-0.25	10
WB-400	4	12	-0.5	12
WB-1012	5	11	-0.37	11
WB-330	3	13	-0.62	13
WB-1115	2	14	-0.75	14
WB-1011**	14	2	0.75	3

Table-1.2 : Preferential scoring at Warnov, Kupwara

Genotypes	Total No. of farmers' participated (14)			
	Positive votes	Negative votes	Preference score	Rank
WB-38	11	03	0.57	4
WB-143**	12	02	0.71	3
WB-83**	14	0	01	1
WB-184	6	08	-0.14	6
WB-158	6	08	-0.14	6
WB-258**	13	01	0.85	2
WB-230	5	09	-0.28	7
WB-255	1	13	-0.85	11
WB-257	6	8	-0.14	6
WB-222**	12	2	0.71	3
WB-243	3	11	0.57	4
WB-258-1	10	04	0.42	5
WB-206	3	11	-0.57	9
WB-261	1	13	-0.85	11
WB-358	4	10	-0.42	8
WB-128	3	11	-0.57	9
WB-224	2	12	-0.71	10
WB-240	4	10	-0.42	8
WB-1137	3	11	-0.57	9
WB-461**	12	02	0.71	3
WB-443	6	8	-0.14	6
WB-409	3	11	-0.57	9
WB-411	2	12	-0.71	10
WB-1011**	12	02	0.71	3
WB-1012	10	4	0.42	5
WB-370	6	08	-0.14	6
WB-400**	12	02	0.71	3
WB-450**	12	02	0.71	3
WB-330	2	12	-0.71	10
WB-1115	4	10	-0.42	8
WB-8	10	04	0.42	5

Table-1.3 : Preferential scoring at Sumlar, Bandipora

Genotypes	Total No. of farmers' participated (10)			
	Positive votes	Negative votes	Preference score	Rank
WB-38	8	2	0.6	3
WB-83**	10	0	1	1
WB-258**	9	1	0.8	2
WB-184	6	4	0.2	5
WB-158	8	2	0.6	3
WB-143	7	3	0.4	4
WB-230	4	6	-0.2	7
WB-255	5	5	0	6
WB-257	6	4	0.2	5
WB-222	8	2	0.6	3
WB-243	5	5	0	6
WB-258-1	7	3	0.4	4
WB-206	4	6	-0.2	7
WB-261	3	7	-0.4	8
WB-358	4	6	-0.2	7
WB-128	6	4	0.2	5
WB-224	4	6	-0.2	7
WB-8	7	3	0.4	4
WB-1137	6	4	0.2	5
WB-450	8	2	0.6	3
WB-443	5	5	0	6
WB-409	4	6	-0.2	7
WB-411	3	7	-0.4	8
WB-1011**	9	1	0.8	2
WB-1012	7	3	0.4	4
WB-370	6	4	0.2	5
WB-400	4	6	-0.2	7
WB-461	3	7	-0.4	8
WB-330	2	8	-0.6	9
WB-1115	1	9	-0.8	10
WB-240	4	6	-0.2	7

Table-1.4: Preferential ranking at Regional Research Station, Wadura, Sopore

Genotypes	Total No. of farmers' participated (15)			
	Positive votes	Negative votes	Preference score	Rank
WB-38	12	3	0.6	2
WB-222	10	5	0.3	4
WB-143	11	4	0.4	3
WB-184	9	6	0.2	5
WB-158**	13	2	0.7	2
WB-258**	14	1	0.8	1
WB-230	7	8	-0.06	6
WB-255	2	13	-0.7	11
WB-257**	13	2	0.7	2
WB-83**	14	1	0.8	1
WB-243	6	9	-0.2	7
WB-258-1	7	8	-0.06	6
WB-206	5	10	-0.3	8
WB-261	4	11	-0.4	9
WB-358	7	8	-0.06	6
WB-128	10	5	0.3	4
WB-224	4	11	-0.4	9
WB-240	5	10	-0.3	8
WB-1137	10	5	0.3	4
WB-461	12	3	0.6	2
WB-443	2	13	-0.73	11
WB-409	10	5	0.3	4
WB-411	12	3	0.6	2
WB-1011	4	11	-0.4	9
WB-1012**	14	1	0.8	1
WB-370	6	9	-0.2	7
WB-400	4	11	-0.4	9
WB-450	5	10	-0.3	8
WB-330	3	12	-0.6	10
WB-1115	2	13	-0.7	11
WB-8**	14	1	0.8	1

Table-1.5: Cumulative/average ranks of genotypes over four locations

Genotype	Individual ranks				Cumulative rank	Average of ranks	Pooled preference score
	Warnov (Kupwara)	Hajibal (Baramulla)	Sumlar (Bandipora)	Research Station			
WB-38	4	3	3	2	12	3	2.5
WB-83	3	7	1	4	15	3.7	2.3
WB-143	1	6	2	3	12	3	2.6
WB-184	6	8	5	5	24	6	0.8
WB-158	6	4	3	2	15	3.7	1.3
WB-109	2	1	4	1	8	2	2.6
WB-230	7	9	7	6	29	7.2	-0.6
WB-255	11	14	6	11	42	10.5	-2.3
WB-257	6	5	5	2	18	4.5	1.3
WB-222	3	2	3	1	9	2.2	3.6
WB-243	4	10	6	7	27	6.7	0.1
WB-258-1	5	9	4	6	24	6	0.6
WB-206	9	11	7	8	35	8.7	-1.4
WB-261	11	12	8	9	40	10	-2.2
WB-358	8	9	7	6	30	7.5	-0.8
WB-128	9	7	5	4	25	6.2	0.2
WB-224	10	12	7	9	38	9.5	-1.8
WB-240	8	11	4	8	31	7.7	-0.7
WB-1137	9	7	5	4	25	6.2	0.2
WB-461	3	6	3	2	14	3.5	2.4
WB-443	6	14	6	11	37	9.2	-1.6
WB-409	9	7	7	4	27	6.7	-0.1
WB-411	10	6	8	2	26	6.5	-0.01
WB-1011	3	12	2	9	26	6.5	0.3
WB-1012	5	3	4	1	13	3.2	2.7
WB-370	6	10	5	7	28	7	-0.3
WB-400	3	12	7	9	31	7.7	-0.4
WB-450	3	11	8	8	30	7.5	-0.2
WB-330	10	13	9	10	42	10.5	-2.5
WB-1115	8	14	10	11	43	10.7	-2.7
WB-8	5	3	7	1	16	4	1.8

DISCUSSION

The present investigation was undertaken to generate baseline information about the farmers' varietal preferences and perceptions and livelihood opportunities associated with *rajmash* in three districts of Kashmir valley. Under the university's renewed focus on adding relevance to varietal developmental process, *rajmash* was identified as one of the target crops in view of its niche status as well as continuing dismal performance of pulses due to a host of socio-economic, biological farming system as well as production constraints. The present study aimed at identification of farmer and non-farmer attributes of *rajmash* based farming system as well as farmers' varietal preferences that meet their aspirations. Thirty one genotypes of *rajmash* including farmer's variety (as check) were evaluated through mother trial evaluation system in three districts of Kashmir to identify the most appropriate genotypes on the basis of preferences of the farmers' and to find the varietal specification to be bred in future in consultation with farmers'. Out of these 31 genotypes 5 were selected by the farmers' for baby trial evaluation.

Preferential ranking

The farmers' responded overwhelmingly and there were many genotypes which carry the farmers' attention but few were most promising lines. The farmers selected these varieties because of certain desirable characteristics as that may be high number of pods per plant, high grain yield, high seed yield and early maturity.

Lowest cumulative rank of a particular genotype with highest pooled preference indicates that the variety is the most preferred one. The variety WB-83 with mean preference rank of 1.6, WB-222 identified as second best (1.8) followed by WB-1011 (1.9), WB-38 (2.4) and WB-258 (3.2). The genotypes WB-184, WB-258-1 and WB-330, WB-255 were statistically at par in term of rank summation index.

The reasons for the preference were related to many traits including seed shape, size and colour, early maturity, high seed yield, taste and swelling and free from diseases as per the interviews.

From the preferential ranking of *rajmash* varieties at different locations, varieties WB-38, WB-83, WB-258, WB-222 and WB-1011 were selected by the farmers' as these varieties were having desirable preferential score. From among these only five were selected for baby trial evaluation at 20 different locations.

Further significant interaction between varieties and locations for the preferences ranking was recorded. Infact, Witcombe *et al*[7]., has reported that most of the variations in ranking between sites occur for the lower ranked varieties.

SUMMARY AND CONCLUSION

Preferential index

The preferential scoring of test genotypes revealed that most preferred genotype on the basis of lowest cumulative rank and highest preferential score were WB-258 with mean preference rank of (3.2) followed by WB-38 with mean preference rank of (2.4), WB-83 (1.6),WB-222 (1.8) and WB-1011 with mean preference rank of (1.9). The genotype that received maximum number of negative votes was WB-1115 (-2.6). Farmer's variety was the least preferred variety and was at par with the test genotype WB-258. Also genotypes WB-38, WB-222, WB-1011 were statistically found at below in term of mean preference when compared by the farmers'.

Roadmap for future

While institutional efforts on part of SKUAST-Kashmir and development departments have led to considerable diffusion of modern high yielding varieties in case of rice, maize and wheat, the situation is not so encouraging in pulses in general and *rajmash* in particular, with little or no impact of released varieties. The disproportionate impact of modern varieties is largely due to the inherent bottlenecks of low input small holder farming system of which *rajmash* is an important component in Kashmir valley. The attributes of such farming systems are both farm and non-farm and most of the times plant breeders have failed to appreciate the non-farm attributes, such as the socio-economic status, market opportunities and consumer preferences. This disconnection between the existing research priorities and the real world problems need to be bridged in order to overcome the risks associated with such disconnect.

PPB has evolved as a socially responsible effort in plant breeding in order to connect the farmer, his situations as well as the future challenges to research priorities of national and international breeding efforts. Even if the experience of PPB in *rajmash* has been worth the effort, there is a need to strengthen the linking mechanisms to build a knowledge based for addressing current production constraints, harness the niches status of the crops as well as enhance the adaptive capacity of small *rajmash* farmers to future challenges. There are strong ecological, economical and social imperatives of such linkage. However major goal should be to enhance the farmers to be able to harness the livelihood opportunities, promote conservation through use and link gene banks to farmers needs as well as make them future ready. There is a growing demand for local niche crop based food that can provide new opportunities to small farmers'. There is a need to optimize different channels from production to consumption. Plant breeders have a strong role to develop varieties that are able to enable the farmers to harness the benefits.

Therefore while, as plant breeders as

we re-orient our breeding programmes we should understand the farmer a socioeconomic status, his production constraints, his excess to resources as well as opportunities he has. There is a need to put farmer first in our breeding goals and then think beyond our obsession with yield. We need to identify the constraints and preferences of farmers and accordingly prioritize our researchable issues.

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