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Full Length Research Paper

The Influence of Community Engagement in Varietal Selection on Seed Quality and Production in Dabat District, Northwestern Ethiopia

Tafere Mulualem

Pawe Agricultural Research Center, Pawe, Ethiopia, Tel: +251-585500271; Fax: +251-585500270; P.O.Box 25, Pawe, Ethiopia.
E-mail: tafere_mulualem@yahoo.com

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Participatory variety selection was initiated to evaluate the performance of improved faba bean varieties and used in the seed production system. The study was conducted in wokin zuria village of Dabat district on four volunteer farmers' field during the 2010 cropping season using ten faba bean genotypes. The analytical tools employed include descriptive statistics and average score value. Selection was carried out at four different growth stages by organizing a field day at each stage i.e. at vegetative, flowering, physiological maturity, and harvesting. The evaluations mean score for each genotype ranged from 5.6 to 9.2. DOSHA (13.2) scored the highest and the lowest was scored by DEGAGA (8.2). Finally, the three best varieties namely DOSHA, WOLKI and WAYU were selected by farmers' evaluation which showed better performance and found to be promising from the analysis of collected data and more likely to enter in the seed production system by Seed Producing Cooperatives (SPC's). The findings showed that farmers have an indigenous knowledge to select varieties that meet their demand.

Keywords: Ethiopia, participatory, seed production, selection, varieties

INTRODUCTION

It is obvious that small-scale farmers are the backbone of agricultural production in Africa. To put some numbers to this, from Nagayets (2005) and FAO data we can derive an estimate of the order of 36 million small scale farmers in Africa with access to 2 hectares or less out of a total population approaching 1 billion. Spencer (2002) estimated that 90% of all agricultural production in Africa is derived from the output of small-scale farmers. The situation is probably not so different in 2010, and the small-scale farmers of Africa continue to represent a huge resource of labor and land. For centuries, farmers in Ethiopia have been using their own seed saved from the previous crop, or informally from their neighbors in the community. About 96% of the estimated annual seed requirement of 420,000 tones comes from farmers' own sources. The main parastatal seed organization, Ethiopian Seed Enterprise (ESE), produces and distributes only 15,000 tones of seed each year, while the participation of the private sector in seed supply is yet at a very low level (Dabi *et al*. 1998). Faba bean is one of the important field crops in the highlands of Ethiopia. Several improved faba bean varieties has been released by agricultural research centers in the country but farmers are still depend on few crop varieties. Participatory Varietal Selection (PVS) has been proposed as a solution to the problem of fitting the crop to a multitude of both

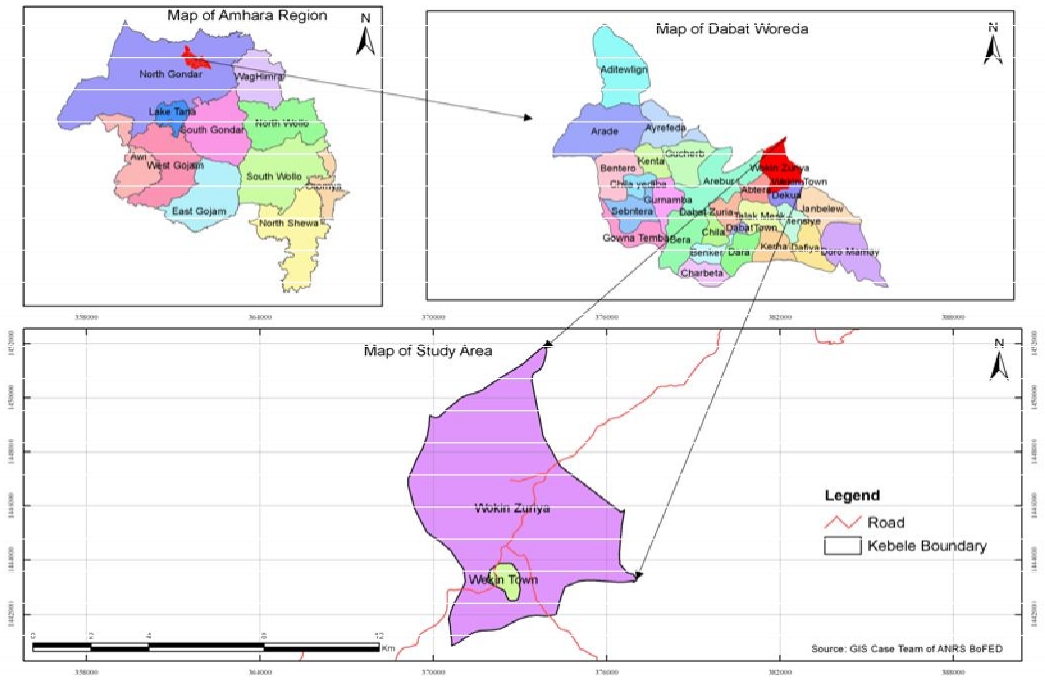

Figure 1. Map of Amhara region (A), Dabat woreda (B) and study area (C)

target environments and users' preferences (Ceccarelli *et al.* 1996). It is worth mentioning that although farmer participation is often advocated on the basis of equity, there are sound scientific and practical reasons for farmer involvement to increase the efficiency and the effectiveness of a breeding program (Ceccarelli and Grando, 2002).

The reason why this research was conducted on faba bean at Dabat is that, following with the opening of the land transportation from Gondar to Sudan there is a new market system of exporting agricultural products especially faba bean. Farmers as well as Seed Producer Cooperatives (SPCs) are highly demanding better yielding varieties to maximize their product and increase their profit, which sequentially improve the livelihood of their families.

METHODOLOGY

The present study was conducted on farmers' field in Wokin zuria village of Dabat district of Amhara region, Ethiopia during 2010 cropping season. Dabat is located at 12° 59' 3" N and 37° 45' 54" E in Amhara National Regional State, North Gondar Zone (Figure,1). It receives an average annual rainfall of about 1100mm with the main rainy season extending from June to October. The average annual maximum and minimum temperatures are 19.9°C and 8.58°C, respectively. The area is known in faba bean production. The major soil type is vertisol having water logging problems. Artificial fertilizer Di Ammonium Phosphate (DAP) was applied at planting at the rate of 100kg/ha.

In the study ten faba bean genotypes were used which were obtained from Holeta Agricultural Research Center (Table 1).

Farmers' preference data were collected. This was done by forming three farmers group. Each group has four to five members and they were invited to visit the whole plot during field day, then discussed with each other and finally give scored value based on the criteria. Farmers' participation for selecting varieties was carried out at four stages of the plant growth i.e. early stage, at flowering, maturity and harvest. Plant establishment (crop stand), disease tolerance, number of branches, stem strength, overall performance (grain yield) and seed size was some of farmers' selection criteria. Farmers considered crop stand at its early stage of development, number of branches and disease situation at flowering, stem strength and overall performance at maturity and seed size at harvest.

Farmers' data were subjected to analysis using simple ranking method and then ranked in accordance with the given value (Walter, 2007). Simple ranking is a tool often used first within a sequence of a set of ranking tools. It is used to identify the criteria used by farmers to distinguish among varieties. It allows the understanding of choices

Table 1. Faba bean genotypes used

No.	Variety name	No.	Variety name
1	DEGAGA	6	WOLKI
2	MOTI	7	HOLETTA - 2
3	GEBELCHO	8	WAYU
4	CS 20 DK	9	SELALE
5	DOSHA	10	EH99051-3

Table 2. Farmer selection criteria and mean of the given value

	Farmer's criteria							
Variety	**PES**	**OAP**	**STS**	**NOB**	**SS**	**Total**	**Mean**	**Rank**
HOLETTA-2	9	8	8	10	13	48	9.6	6
DOSHA	14	12	12	15	15	68	13.6	1
EH99051-3	11	10	8	10	8	47	9.4	7
CS20DK	8	8	7	7	13	43	8.6	8
WOLKI	13	13	15	13	12	66	13.2	2
SELALE	11	12	15	12	7	57	11.4	4
GEBELCHO	8	7	10	8	10	43	8.6	8
DEGAGA	8	8	8	10	7	41	8.2	9
WAYU	12	12	15	12	12	63	12.6	3
MOTI	13	8	8	10	15	54	10.8	5

PES=Plant Establishment, OAP=Over all Performance, STS=Stem Strength, NoB=Number of Branches, SS=Seed Size; Rating of the performance of variety for a criteria: 5= very good, 4= good, 3= average, 2= poor and 1 = very poor

between a set of varieties with the identified characteristics that distinguish them. Like other ranking tools it is often used in participatory varietals selection and participatory plant breeding. The ranking procedure was explained to participants then each criterion was ranked from 1 to 5 (5 = very good, 4 = good, 3 = average, 2 = poor and 1 = very poor) for each variety, ranking was done on consensus where differences are solved by discussion (De Boef and Thijssen, 2006).The simple ranking method has to main steps i.e. first, identifying preferably two (or more) quite distinct varieties and second, comparing the varieties by asking the group/respondent which variety they/he/she prefer(s), and the reason for the preference.

RESULTS AND DISCUSSION

Selection was carried out at four different growth stages by organizing a field day at each stage i.e. at vegetative, flowering, physiological maturity, and harvesting. Farmers' selection criterion were plant establishment (PES), stem strength (STS), number of branches (NOB), overall performance (OAP), and seed size (SS). The evaluations mean score for each genotype ranged from 9.2 to 13.6 (Table 2). *DOSHA* (13.6) scored the highest and the lowest was scored by *DEGAGA* (8.2). *WOLKI* (13.2) and *WAYU* (12.6) ranked second and third best varieties for farmers, respectively. In the selection process both women and men were participated. Every farmer's group comprises both women and men and discussed together during selection. Here the same varieties namely, DOSHA, WOLKI and WAYU were selected 1 to 3, respectively.

Different varieties were selected at different stages of the plant by farmers due to their condition in the field and performance at selection time. Finally, the three best overall ranking varieties namely DOSHA, WOLKI and WAYU were selected by farmers' evaluation which showed better performance and found to be promising from the analysis of collected data.

From the results one can consider that selection of well-adapted and farmer-preferred varieties is the first step in the production of faba bean a range of superior varieties (from farmers' perspective characteristics like seed yield, seed size and others) to make them regularly available. Apart from adaptation, the variety should have high yield

potential, tolerance to biotic and abiotic stresses and have good marketability and consumer preferences.

CONCLUSION AND RECOMMENDATIONS

Farmers used different parameters and methods to evaluate the tested genotypes. Unless the variety meets the requirements of farmers and consumers, it is less likely to be widely adopted and, therefore, the demand for seed can be addressed. In this study farmers' selection were confirmed that DOSHA, WOLKI, WAYU, and SELALE were found good for yield and other agronomic traits among the ten tested varieties based on farmer's selection criteria.

Direct selection from the available genotypes and crossing program can assist the crop improvement program and ensures farmers access to better varieties. Once identified, the seed of farmer-preferred cultivars needs to be rapidly multiplied and cost-effectively supplied to farmers. SELALE, WAYU, DOSHA, and WOLKI gave highest grain yield and outperforming a local check (CS20DK) and found to be well adapted to Dabat conditions.

Therefore, farmers' exposure to evaluate and select new varieties is an advantage to exploit their potential knowledge of identifying adapted varieties that best meets their interest which further helps to include such selection in their varietal portfolio for seed production. The interaction of researchers and farmers will also help to design research objectives to overcome rejection of varieties developed by researchers alone, enhances the acceptance of varieties and reduces costs associated with variety development.

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