**Participatory Varity selection of released common bean varieties Dilla Zuria, Gedo Zone**

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**Abstract**

*Large Red speckled seed common beans are more demanded over the white beans at Dilla Zuria district. However the farmers mainly depend on the local varieties and other species like lima bean. Therefore, farmer’s participatory varieties evaluation and selection methods were applied to identify preferred common bean variety in Dilla Zuria district. Seven released common bean varieties were planted in Randomized Complete Block Design as mother trial replicated with three at Dilla on station to identify farmer’s selection criteria; to popularize the variety and to enhance seed produces capacity in managing varieties portfolios. Twenty surrounding farmers were selected for the baby trials for qualitative evaluation. Farmer’s preference related data was collected for seven common bean traits. Common bean pre harvest traits such as earliness, seed per pod (>5 seed per pod), pod load, up right growth habit and height of basal pod from the soil are identified as the best descriptors to accept and reject the varieties. Uniformity of red seed colour was identified as major decisive criteria for accepting and rejecting common bean variety after harvest. Gegeba and Remeda were variety scored the best ranks for all criteria. Farmers selected and discarded the varieties at various stage of common bean growth with fairly high degree of precision*

**Keywords:** Common bean; Pre-harvest traits; Uniformity

**Introduction**

The major varieties of pulses grown in Ethiopia include Faba beans, common beans, chickpeas, haricot beans, lentils, dry peas, mung bean and vetches. According to CSA (2016), common bean (*Phasoulies vulgaris* L.) is the most important pulse crop in both area coverage and volume of annual production in Ethiopia. The crop is also of the major grain legumes widely cultivated by the smallholder farmers in the Southern Nation, Nationalities and People’s Region (SNNPR). Legumes are the major sources of protein in Ethiopia where common bean (*Phaseolus vulgaris* L.) takes large proportion next to faba bean and field pea (CSA, 2016).

The crop plays an important role in the livelihoods of the rural people of Sidama zone, in which ‘Enset’ [*Enseteventricosum* (Welw.) Cheesman] and maize are dominant. Enset is a perennial root crop that is used as a food crop only in Ethiopia and mostly grown in the courtyard with other crops such as coffee, common bean and maize. A food prepared from Enset (i.e ‘Kocho’) is consumed alone or by mixing with different crops such as boiled beans and maize. It is an important income source; its straw serves as feed for livestock, and also improves soil fertility by its advantage of nitrogen fixation in the cropping system. Although the potential yield of beans is as high as 5 tons ha-1 (Graham and Ranalli, 1997), the average yield of local bean varieties in the study area is about 1.7 tons ha-1, which is very low(CSA,2018). This is attributed to combined effects of edaphic, climatic, disease, and pest problems. Of course, lack of improved varieties in different market class & agro-ecologies and lack of awareness about newly released varieties are some of the top problems for low productivity and production in Ethiopia (Gurmu, 2013).

Moreover, not all the released and high yielding varieties were equally accepted by farmers due to differences in farmers’ preference for the varieties in different localities. This was because the varieties were developed through conventional breeding that didn’t consider farmers criteria. According to Gemechu *et al.* (2004), the rate of adoption of most of the varieties developed by the conventional breeding approach is believed to be far below expectations. They claim that farmers should participate in the research process right from the beginning, because farmers have their own selection criteria regardless of the yield potential of varieties. The other reason is the selected varieties are likely to perform well in environments similar to the research stations, but not in environments that are very different. This is because of genotype x environment interactions (Ceccarelli and Grando, 2006).

Gemechu *et al*. (2002) reported that farmers and researchers have their own unique and common know-how, which should be effectively exploited in the research process. It is based on the idea that farmers as well as professional plant breeders have important knowledge and skills that could complement one another. Participatory variety selection (PVS) is broadly defined as a range of approaches that involve a mix of actors (including scientists, breeders, farmers and other stakeholders) in plant breeding stages. Because the objective is to produce varieties, which are adapted not only to the physical but also to the socio-economic environment in which they are utilized. According to Ashby (2009), the outcome of PVS is that more farmers adopt PVS varieties over wider areas, leading to increased food and income benefits. Another impact is increased research efficiency due to more relevant and desirable research products. Ashby (2009) highlighted the impact of PPB and PVS on various crops in different countries by citing different authors. These are cassava in Brazil and Colombia; pearl millet in Namibia and India; beans in Colombia, Tanzania, Ethiopia and Rwanda; tree species in Burundi; potatoes in Rwanda, Bolivia, Peru and Ecuador; rain fed rice in India; paddy rice in Bangladesh, India and Nepal; maize in Mali, India, Ethiopia, Honduras and Brazil; and barley in Syria, Morocco and Tunisia.

In Ethiopia, efforts have been made to develop and popularize common bean varieties through both PPB and PVS (Asfaw*et al.,* 2004; Gurmu, 2007). However, the farmers’ selection criteria for common bean varieties were not adequately assessed and well documented especially in the southern region of Ethiopia.

**Objectives**

* To evaluate and select the best performing released common bean varieties
* To Assess farmers’ selection criteria for common bean varieties

**Materials and Methods**

The experiment were carried out at Dilla Zuria district, Gedion Zone in SNNPR Region. The area have an altitude of 1600 m.a.s.l., with 1000 mm annual rain fall .It has also Clay loam soil texture. The area known by Agroforestry cropping system dominantly growing perineal crops like Enste and Coffee. The scattered coffee shade trees are also the part of the system .It has also Bimodal rain fall which use to grow different crops under the system in both mehere and Belg seasons.

The mother trial of the experiment was conducted at Gedio zone, Dilla zuria Wereda With seven released common bean varieties (Ibado, Gegeba, Tatu, Remeda, Wajo, Awash-2 and Batu) with Randomized Complete Block Design (RCBD). The total plot size were 12.8 m2 used four rows of two meter length with a spacing of 40cm between rows and 10cm within a row. 100kg NPS/ha fertilizer were applied. All the necessary agronomic practice (weeding, cultivation and others) were applied as per recommendation. All phonological, agronomic and yield traits were taken. Twenty surrounding farmers were selected for the baby trials. Farmers were taken one kilogram of two varieties based on their own preference and managed by themselves. This experiment were planted at 2012 mehere and were harvested 2012 July.

**Result and Discussion**

**Researcher’s evaluation**

The varieties differed for yield and farmers’ overall preference scores, both at farmers’ fields and on-station (Table 1). The highest mean yield kilogram per hectare in was obtained by Gregeba (1900 kg/ha) followed by Remeda (1800 kg/ha). The yield of both these genotypes was statistically similar. The 3rd highest yield was produced by Ibado (1800 kg /ha) followed by wajo (1600 kg/ha) and Awash-2 (1500 kg/ha). The lowest yield was produced by Tatu. At on-station, yield was higher than farmers’ fields.

From the mother trial Gegeba and Remeda were selected by seed size, earliness, pod length, disease resistance and yield, by both men's and women's farmers. In addition the selected varieties are early maturing it uses for double cropping especially in Belg season.

**Table 1. Mean yield (Qt /ha) with farmers preference rank at Dilla Zuria 2012/13**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Varity** | **Market class** | **Yield kg/ha** | Farmers Preference | |
| **Male (7)** | **Female (4)** |
| 1 | Ibado | Large Red mottled | 1600 | 2 | 2 |
| 2 | Tatu | Large Red mottled | 1400 | 3 | 4 |
| 3 | Batu | Large White | 1300 | 6 | 6 |
| 4 | Gegeba | Large Red mottled | 1900 | 1 | 3 |
| 5 | Awash-2 | Large White | 1500 | 7 | 5 |
| 6 | Wajo | Large White | 1600 | 5 | 7 |
| 7 | Remeda | Red Kidney | 1800 | 4 | 1 |
| CV % | | | 19 |  |  |

**Farmers Evaluation**

Representative farmers from the study area were participated in the baby trials and evaluated the PVS trial. The evaluated farmers were most interested in some of the parameters like Pods load, Earliness, yield, seed size, red color, market value, seed shape, maturity period, diseases resistance, Insect resistance, pod appearance and green leaf (Table 2).. At flowering, maturity stage and at harvest, the farmer evaluated PVS trials at Dilla on station , generally farmers responded positively to the common bean varieties they have assessed. In the study common bean varieties farmers' evaluation showed that there was a matching with researchers need. Moreover, farmers ‘evaluations and testing farmers field both show variance. Table 2 Farmers’ entire evaluation indicate that variety Gegeba, Remeda and Ibado were the top from the test common bean varieties. The Batu variety have showed poor performance and least preferences by farmers in most cases.

**Table 2. Rank of The best preferred criteria used by men and women farmers at Dilla Zuria, 2012/13**

|  |  |  |
| --- | --- | --- |
| **Selection criteria** | **Men** | **Women** |
| **Pod loading** | **4** | **2** |
| **Number of seed /pod** | **5** | **5** |
| **Shattering** | **7** | **6** |
| **Diseases resistance** | **5** | **4** |
| **Seed color** | **3** | **3** |
| **Maturity** | **6** | **4** |
| **Growth habit** | **8** | **8** |
| **Seed color** | **2** | **7** |
| **Yield** | **1** | **1** |

**CONCLUSION**

Results of PVS research in DIlla on station indicated that Gegeba, Remeda, and Ibado consistently produced higher yields both in mother and baby trials. These varieties’ also got high farmers’ overall preference) scores. They had better earliness and farmers expressed their opinion to cultivate those in double cropping. Baby trial was found equally effective to mother trial but that was much easy to conduct and less expensive to execute. Farmers’ emphasized more on simultaneous selection rather than empirical selection on yield only. Farmers ‘selected varieties were extending very rapidly and increasing varietal diversity. Farmers to farmers seed transfer was found very effective in scaling-up seed transfer and increase varietal diversity.

**RECOMMENDATIONS**

From the findings, we need to carry out:

* Promotion of selected varieties with their agricultural practices in trials implemented sites
* Designing seed multiplication and distribution technique to make seeds of these varieties sustainability available to farmers

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