



Research report on proven sweet lupin varieties demonstration under North-West Ethiopia

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Abstract

The status of sweet lupin production in Ethiopia is limited by multiple challenges; among these were biotic, abiotic and socioeconomic factors (such as limitation of demonstration and pre-scale up of improved technologies, etc.). Thus, on December 06, 2019 an organized improved sweet lupin varieties demonstration was implemented with the aim to demonstrate the field performance of sweet lupin varieties (Tabor, Sinabor and Local check) and to incorporate variety selection trends or means of farmers under guagusa shikudad district (wasinchi integrated watershed area). A total of 74 participants were involved during the event (among were farmers, agricultural experts, higher government officials and researchers). Based on the observations made under the field condition each group of the participant has its own variety selection criteria but some of them share more or less similar criteria. Small scale farmers (both male and female) variety preference criteria were more numbers of pods per plant, more numbers of seeds per pod, high yield, uniformity, pest and disease tolerant, short duration, even high biomass and overall field performance. Agricultural experts and researchers variety selection criteria were also similar with other groups. Generally the two improved sweet lupin varieties (Tabor, Sinabor), those tested with the local check, were selected by the groups. Therefore, I recommend and suggest that the selected varieties has to be demonstrated in large area (Large Scale Demonstration) for future use so as to enhance seed access for farmers and thereby promote the production of sweet lupin in the study area.

Keywords: Challenges, Demonstration, LSD, Sweet lupin, Varieties

Introduction

Our motherland, Ethiopia, has the capability to produce varieties of pulses (both lowland and highland) because currently there is availability of improved varieties and promising genotypes of these commodities. A recent study conducted by (Likawent Yeheyis, 2022) reported some promising sweet blue lupin varieties identified by field research work.

Currently the status of sweet lupin in Ethiopia covers about 19,248.83 ha of land and produces 360,456.53 quintals in main cropping season per annum with average productivity of 18.73 quintal per hectare (CSA, 2019/2020). According to (Akale Assamere Habtemariam, 2019) report about 95.85% of land coverage and 99.29% of total productions accounted from

Amhara region in 2017/18 cropping season and Benishangul Gumz region is the second producer. Following this, West Gojam and Awi zone are the first and the second, which accounted major productions in the country (Akale Assamere Habtemariam, 2019).

Legume seeds are an abundant source of proteins and, among them, lupin is one of the richest (Marcello Duranti, 2008).

Whereas the contribution of lupins in Ethiopia, particularly white lupin is paramount. A review made by (Nigussie, 2012) indicated that the crop has several uses, such as source of protein for production of protein concentrates, pharmaceutical purposes, nitrogen fixation and crop rotation and others. So far several efforts made to improve the bitter taste of lupins. However, the presences of high alkaloid content in lupins act as a natural component of plant pesticides and ectoparasite control (Nigussie, 2012). In addition, according to (Eleni M. Abraham, 2019) study report lupin is an alternative source of protein for animal feeding because lupin grains are characterized by high protein content, while their oil content is relatively low but of high quality.

A study conducted by (Fikadu T. Riga, 2021) reported, sweet lupine has relatively high crude protein content, higher grain yield and green forage yield under varying environments and plant spacing. A recent study implemented by (Likawent Yeheyis, 2022) reported blue sweet lupin cultivars have multipurpose uses such as high seed yield, resistance to anthracnose and fusarium diseases, palatable by livestock and can be used for human food (due to low alkaloid content).

According to (Chernet Assefa, 2021) improved sweet lupin varieties have better yield potential and appear better suited to small holder farmers in areas that are affected by soil acidity and production of faba bean and field pea. Similar study result reported by (Umata, 2018) suggested that improved mung bean varieties had better yield advantage over the local check and hence

further demonstration has to be conducted. As per (Molla Haile, 2017) report improved sweet lupin varieties have positive impact on feeding of washera sheep breeds. However, further demonstration work is required to exploit more the merit of these technologies.

Still now to modify the agricultural sector, Ethiopia has devoted, enormous amount of capital, skilled manpower, and implementation of working policy, subsidizing the agri-input materials, availability of financial sources, and others. Although several efforts made, by the concerned government and other stakeholders, previously but still our agricultural production is not improved as it expected (regardless of its potential). For this, multiple factors may contribute directly or vice-versa. According to (Nair *et al.*, 2019) and (Yehuala Kassa, 2018) pests and diseases were major threats for the production of grain mung bean. Furthermore, abiotic factors like drought, salinity, climate change were also obstacles for the production of grain mung bean (Nair *et al.*, 2019).

However, according to (Yehuala Kassa, 2018) report absence of improved mung bean seeds, pests and diseases, limited work on pre-scale up of improved mung bean varieties or technologies leads to low grain.

Participatory approach on the promotion and demonstration of proven agricultural technologies has played significant role in agricultural sector. To support this situation a research study implemented by (Chernet Assefa, 2021) suggested that demonstration of new varieties of sweet lupin with low alkaloid and high protein content has resulted in a renewed interest in utilization of lupin as source of protein for human and livestock nutrition. Furthermore; a review paper generated by (Yasin Goa, 2017) suggested that conducting of participatory approach in research and development programs is necessary.

Thus, this particular field work on proven sweet lupin technology demonstration and promotion is initiated with the objective to demonstrate field performance of lowland and midland pulses and to identify small scale farmers' variety preference criteria.

Discussion

On December 06, 2019 cluster of field crops field demonstration was carried out with the objective to demonstrate field performance of different field and horticultural crops (Sweet lupin, Highland Maize, Potato, Bread Wheat, Apple) and to identify small scale farmers’ variety preference criteria and thereby to collect relevant information about the production challenges of these commodities from the participants.

This report is targeting only improved sweet lupin demonstration which was implemented at pawe agricultural research center during 2019/2020 cropping season because other crops were to be reported by other researchers when needed.

The event took one day; the first program was visiting the whole field covered by field and horticultural crops following that each improved varieties of these commodities were evaluated by two groups; the first group incorporated small scale farmers and the second group or team contained both agricultural researchers, who actively involved in the improvement program of these crops, higher government officials and district agricultural experts.

The demonstrated varieties were evaluated based on their traits like phenology (Days to maturity), and agronomic traits such as number of pods per plant, number of seeds per pod, yield potential, good tasting, disease and pest reaction, biomass yield and overall field performance.

Majority of the participants selection criteria is almost similar, that is, they focused on time of maturity (because earliness is required by small scale farmers because they do not have enough time to carry out other farming practices), a greater number of pods per plant and a greater number of seeds per pod, disease reaction and general field performance. This selection scheme is common for the two groups.

The candidate improved sweet lupin technologies were Tabor, Sinabor and Local check. Each of these varieties has their own merits (traits) that make differ from each other. Based on this trend

the first two varieties, that is, Tabor, Sinabor were selected by farmers and even by experts due to earliness, good test (low alkaloid content) and overall field performance. The unique feature of the Local check cultivar was high biomass which is good for livestock feed and important for cropping system (soil improvement activity) and good reaction for pests and diseases, because it adapted the area for long time.

The design implemented for this particular task was single plot having each candidate improved sweet lupin technology with 40-meter length and 40-meter width spacing. Following this each variety has 1600 square meter area.

Regarding on field day demonstration totally 74 participants were taking part, from this figure 43 were small scale farmers among them 12 were female growers and 31 experts, including researchers, involved during the event among which 11 were female experts (See [Table 1] and [Table 2] below).

Table 3: Proven sweet lupin varieties demonstration event participants (Farmers)

No.	Small scale farmers	Sub-total
1	Male	31
2	Female	12
	Total	43

Furthermore, female farmers’ selection criteria are quite different from male farmers’ selection trend such as targeting on marketing access; storage pest tolerance; good testing and cooking ability of the cultivars and early maturity were some of the traits.

Table 4: Proven sweet lupin varieties demonstration event participants (Researchers and Experts)

No.	Researchers and Experts	Sub-total
1	Male	20
2	Female	11
	Total	31

After field visit, we made general discussion focusing on what we observed on the field and what we have set about future plan; with this participant farmers, higher government officials and agricultural experts provided their reflections on different issues among these what inspired them was the performance of sweet lupin varieties mainly those matured early and good tasting (sweetness) (Tabor, Sinabor), plus to that they raised important questions like: what makes significant difference among the cultivated sweet lupin varieties? Agricultural inputs type and rate mainly seed amount and synthetic fertilizer did we applied on the farm? Ways of controlling currently happened pests and diseases? Weeding frequency? When and where can they get seed?

Responsible researchers and other management agents gave appropriate answers to raised issues and questions during the occasion.

Concluding remark: currently the tendency of farmers on cultivating various pulses is increased from time to time due to many factors such as suitable agroecology, the reasonable price of their produce, direct use for home consumption (in different ways), access to improved seeds (for some varieties), nearby support from technical experts, government investment, job creation, establishment of agro-industries, and others. Due to this, their livelihood and way of life getting improved from time to time.

When I come to this, occasion, sweet lupin technology field day demonstration it achieved its object properly and we, the research team, gathered information how to modify the production and productivity of sweet lupin of the current ecology as well as the country for the coming season. We strongly struggle to supply improved sweet lupin seed to growers as per their request.

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