Registration of *Abdeta, Gebisa* and *Lalisa* Vetch Varieties for Bale Highlands, Ethiopia

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Abstract: Three vetch varieties named as *Gebisa* (common vetch variety with Acc. No. 62632), *Lalisa* (woolly pod vetch variety with Acc. No. 6792DLot-2) and *Abdeta* (narbon vetch variety with Acc. No. 118) were selected and developed in 2010 by the Sinana Agricultural Research Center for the Bale highlands and similar agro-ecologies. These varieties were tested for 12 environments, at four locations (Sinana, Robe, Dinsho and Agarfa) for three years (2006/2007-2008/2009) to see their adaptability to soil and climate, to evaluate for yield and other agronomic parameters. Due to their superior performances, the three vetch varieties were selected and verified at four locations during the *Bona* 2009/2010 cropping season and released for production. *Gebisa* is characterized by growth habit of straggling or semi-climbing. The growth habit of *Lalisa* is crumbling and climbing whereas that of *Abdeta* is erect/upright growth habit striking similar to faba bean. The seed colors of *Gebisa*, *Lalisa* and *Abdeta* are pink, black and reddish brown, respectively. They performed better in yield and important agronomic parameters as compared to their respective checks. They were also better resistant to major diseases and have good nutritional quality. Moreover, the varieties were well adapted to the highland agro-ecologies of Bale. The introduction of these newly released forage varieties could contribute in mitigating the scarce feed resource conditions in the small-scale farmers of the highland agro-ecologies.

Keywords: Bale highlands*; Gebisa; Lalisa; Abdeta*; Vetch variety

1. Introduction

Among a number of annul legumes introduced so far, vetches are one of the leguminous forage adapted to the Ethiopian highlands. Today, vetches are being used as disease break crops in the rotation, grain crops, grain for stock feed, hay production and green and dry grazing. So far, few varieties of vetch were recommended for production in the Bale highlands (Tekleyohannes and Worku, 1999). However, different varieties of vetch have different yield performance and adaptation to specific situation. Moreover, the performances of some of the earlier released vetch varieties have been declining from time to time due to problems including disease and pests attack. Therefore, it is an appropriate time to look for other high yielding and disease resistant varieties of vetch for production in the Bale highlands and similar agro-ecologies. Accordingly, vetch varieties named as *Gebisa* (common vetch variety with Acc. No. 62632), *Lalisa* (woolly pod vetch variety with Acc. No. 6792DLot-2) and *Abdeta* (narbon vetch variety with Acc. No. 118) were developed and released in 2010 by the Sinana Agricultural Research Center.

2. Variety Evaluation

Vetch screening activities were started in 2003/2004 with the objectives to identify adaptable vetch varieties with high forage yield and disease resistance for the highlands of Bale. Accordingly, the nursery screening activity was started with 252 accessions of common vetch (*Vicia sativa),* 20 accessions of woolly pod vetch (*Vicia villosa)* and 54 accessions of narbon vetch (*Vicia narbonensis)* collected from the Holetta Agricultural Research Center and the International Livestock Research Institute (ILRI), Addis Ababa. They evaluated for their growth characteristics, persistence, resistance to pests and diseases and the like at nursery screening stage. Eighty-one promising accessions of common vetch were passed to the preliminary yield trial for further evaluation. From preliminary yield trial, 9 selected accessions of common vetch were tested at 3 locations in the regional variety trials. In the same manner, 11 promising woolly pod vetch accessions were passed to the preliminary yield trial for further evaluation. Then 5 of these accessions were selected and tested at 3 locations in the regional variety trials. Similarly, from 54 accessions of narbon vetch, 19 accessions were promoted to preliminary yield trial, and 7 of them were evaluated at the regional variety trial stage.

At the end of the screening stage, the evaluated vetch varieties were verified at on-station and on farm locations (Robe, Agarfa, and Lower Dinsho Districts) for one year (2010/2011). Accordingly, two candidates from common vetch varieties (Acc. Nos. 62943 and 62632) were verified. One common vetch variety *(Vecia sativa)* was used as adapted check. Likewise, two candidate varieties of narbon vetch (Acc. Nos. 118 and 2464) and two candidate varieties from woolly pod vetch were also verified. The adapted check (*Vicia narbonensis)* was used as the check for the narbon vetch. Whereas the adapted vetch variety (*Vicia villosa)* was used the as check for the woolly pod vetch evaluation. The trial was verified in a single plot observation with plot size of 10 m by 10 m following a row planting method at 35 cm spacing between rows. Seed rate of 30 kg ha^{-1} and fertilizer rate of 100 kg ha^{-1} of di-ammonium phosphate (46% P_2O_5 and 18% N) was used. The trials were well managed and necessary information including farmers' views regarding the varieties were recorded. Chemical analysis of samples of the candidate varieties and the checks were carried out for characterization of nutritional content.

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ISSN 1992-0407

3. Varietal Characters and Adaptation

The released vetch varieties are annual, alternate broad-leaved, herbaceous legumes characterized by their distinctive growth habits. *Gebisa* is characterized by growth habit of straggling or semi-climbing with pink seed coat color. The growth habit of *Lalisa* is crumbling and climbing whereas that of *Abdeta* is erect/upright growth habit striking similar to faba bean with predominantly black and red brown seed coat colors, respectively. On the average, *Gebisa* required 93 days to reach 50% of flowering and 179 days to reach seed maturity stage while the *Lalisa* variety requires 113 days to reach 50% of flowering and 192 days for seed maturity. Likewise, the *Abdeta* variety required 97 and 167 days to reach 50% flowering and seed maturity stages, respectively. *Gebisa*, *Lalisa* and *Abdeta* varieties have a plant height of 81.5, 126.0 and 77.2 cm, respectively, at optimum biomass harvest (Table 1). The varieties were released for the highlands of Bale. They performed well and were stable in yield performance across the locations within an altitude from 2300-3000 meters above sea level and an annual rainfall of 750-1600 mm. It could also be possible to extend the production of these varieties to other areas with similar agro-ecologies.

4. Yield and Quality Performance

The average dry matter yield combined over locations and years were 4.70, 7.00 and 3.25 t ha^{-1}, respectively, for *Gebisa*, *Lalisa* and *Abdeta*. The released varieties had a dry matter yield advantage of 2.1, 15.7 and 16%, respectively, over their respective adapted check. Likewise, better seed yields were recorded for the released varieties. The average seed yield recorded for *Gebisa*, *Lalisa* and *Abdeta* were 1.96, 0.63 and 1.85 t ha^{-1} (Table 1). The data on the nutritional content also indicate that the released varieties have a comparable quality to that of the adapted checks.

5. Reaction to Disease and Pest

Disease and pests are not as such the major concerns for forage legumes such as vetch in the highlands of Bale. Accordingly, low rate of disease reaction was observed for *Gebisa* and its adapted check (*Vicia sativa).* On the other hand, frost damage was observed irregularly on *Lalisa* and its adapted check *(Vicia villosa L.*) at few locations. Diseases including Ascochyta blight, Net bloch and Chekolate spot also appeared on *Abdeta* and *Vicia narbonesis* (adapted check). Generally, as indicated in Table 1, the released varieties are characterized as tolerant types to the occasionally observed diseases at all sites.

6. Variety Maintenance

The breeder and foundation seeds of the varieties are maintained by the Sinana Agricultural Research Center

7. Acknowledgement

We would like to thank the staff of Animal Feeds Resource and Range Improvement Research Team of the Sinana Agricultural Research Center (SARC) for their unreserved efforts in field trial management and data collection during the experimental periods. We also like to thank SARC for the provision of research facilities and the Oromia Agricultural Research Institute (OARI) for funding the study.

8. References

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Table 1. Mean yield, agronomic traits and disease reaction of *Gebisa*, *Lalisa* and *Abdeta* their adapted checks in multi-location testing in 2007/2008-2009/2010.

Variety	Days to 50% flowering	Days to seed maturity	Plant height (cm)	Dry matter (t ha^{-1})	Seed yield (t ha^{-1})	[a]Disease score (1-9) LR, AB, NB, CS, Frost	Nutritional content (%)				
							DM	CP	OM	ADF	NDF
Gebisa	93	176	81.5	4.7	1.96	1.0	88.7	20.8	88.9	32.6	40.8
Adapted check (*Vicia sativa*)	93	180	71.5	4.6	1.88	2.0	89.1	21.0	87.1	25.7	29.9
Mean	93	178	76.5	4.65	1.92	1.5					
Lalisa	113	192	126.0	7.0	0.63	5.0	89.2	24.1	88.2	35.4	41.8
Adapted check (*Vicia villosa*)	114	190	113.1	5.9	0.62	5.0	89.0	23.0	88.0	36.4	43.4
Mean	113.5	191	119.55	6.45	0.63	5.0					
Abdeta	97	167	77.2	3.25	1.85	3.0	89.2	24.8	89.0	21.6	29.3
Adapted check (*Vicia narbonesis*)	99	165	69.5	2.73	1.56	4.0	88.1	24.2	88.1	25.3	30.7
Mean	98.0	166.0	73.35	2.99	1.71	3.50					

[a]*B = Ascochyta blight; ADF = Acid detergent fiber; CP = Crude protein; CS = Chekolate spot; DM = Dry matter; LR = Leaf rust; NB = Net bloch; NDF = Neutral detergent fiber; OM = Organic matter; Disease score based on 1-9 scale where 1 is highly resistant and 9 is highly susceptible; Dry matter and seed yield was an average of 4 locations and 3 years.*