

## Registration of *Bonsa* and *Bona-bas* Fodder Oats Varieties for the Bale highlands, Ethiopia

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**Abstract:** The fodder oat varieties named as *Bonsa* (Acc. No. 79AB384) and *Bona-bas* (Acc. No. 1660) 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 observe their adaptability to the prevailing soil and climatic conditions, to evaluate for yield and other agronomic parameters. Due to their superior performances, the *Bonsa* and *Bona-bas* oat varieties were selected and verified at four locations during the *Bona* of the 2009/2010 season and released for production. These varieties were characterized by growth habit of erect and bunch at basal. The seed color of *Bonsa* was pale brown whereas that of the *Bona-bas* variety was dark brown. Both of these varieties performed better in yield and important agronomic parameters than their respective checks. They were also better resistant to major oat 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 relaxing the scarcity of feed resource which is common among the small-scale farmers of the highland agro-ecologies in Bale and elsewhere in the country.

**Keywords:** Bale highlands; *Bonsa*; *Bona-bas*; Variety registration

### 1. Introduction

Fodder oat (*Avena sativa*) is one of the most important annual fodder crops for the cool highlands of Ethiopia. Compared to other cereal such as barely and wheat, oats are adapted to wide range of soils, are resistant to moisture stress and relatively tolerant to water-logging and frost. So far, few varieties of oat were recommended for fodder production in the Bale highlands (Tekleyohannes and Worku, 1999). However, different varieties of oat have different yield performance and adaptation to specific situation. Moreover, the performances of some of the earlier released varieties have been declining with time due to problems including leaf and stem rust attack. Therefore, it is an appropriate time to look for other high yielding and disease resistant varieties of oat for fodder production in the Bale highlands. Accordingly, fodder oats varieties *Bonsa* (Acc. No. 79AB384) and *Bona-bas* (Acc. No. 1660) were developed and released in 2010 by the Sinana Agricultural Research Center.

### 2. Variety Evaluation

Fodder oats screening activities were started in 2003/2004 with the objectives to identify adaptable oats varieties with high forage yield and disease resistance for the highlands of Bale. Accordingly, 734 accessions of oats were collected from the Holetta Agricultural Research Center and the International Livestock Research Institute (ILRI), Addis Ababa and evaluated for their growth characteristics, persistence, resistance to pests and diseases and the like at nursery screening stage. Then 31 accessions from early maturing and 20 accessions from late maturing oats were promoted to the preliminary variety yield trial. At this stage, the accessions were evaluated for their biomass and seed yield as well as for

some agronomic performances. Then 11 early and 8 late maturing best performed accessions were promoted to the regional variety trial. From the early maturing varieties *Bonsa*, and from the late maturing ones *Bona-bas* were selected and evaluated in the regional variety trial for their adaptability and yield performance along with their checks for 3 years (2007/2008-2009/2010) at 4 locations. The adapted oat variety, *Jasery*, was used as check for the early maturing varieties whereas oat 'CI-8235' was used as check for the late maturing varieties. Finally, *Bonsa* and *Bona-bas* varieties were selected as candidates, respectively, from early and late maturing varieties at the regional variety trial and verified in 2010/2011 with their respective checks for releasing in a plot size of 10 m by 10 m at on-station and on nine sites of farmers field of Bale highlands.

### 3. Varietal Characters and Adaptation

The released varieties, *Bonsa* and *Bona-bas*, are characterized by growth habit of erect and bunch at basal. Seed color of *Bonsa* is pale brown whereas that of *Bona-bas* is dark brown. On the average, *Bonsa* needs 106 days to reach 50% of heading and 149 days to reach seed maturity stage while it took 124 and 164 days for the *Bona-bas* variety to reach 50% heading and seed maturity stages, respectively. *Bonsa* and *Bona-bas* varieties had plant heights of 128.4 and 156.2 cm, respectively, at optimum biomass harvest (Table 1). The varieties were released for the highlands of Bale and performed well within an altitude from 2300-3000 meters above mean sea level and an annual rainfall of 750-1600 mm. It may also be possible to extend the production of these varieties to other areas with similar agro-ecologies.

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#### 4. Yield and Quality Performance

The average dry matter yield combined over locations and over years (Table 1) were 10.3 and 10.1 t ha<sup>-1</sup>, respectively, for *Bonsa* and *Bona-bas*. The recorded dry matter yield were higher than that of the adapted checks, *Jasery* and 'CI-8235', by 1.70 and 0.80 t ha<sup>-1</sup> for *Bonsa* and *Bona-bas*, respectively. They had dry matter yield advantages of 16.5 and 7.9%, respectively, over the adapted check. Likewise the average seed yield recorded for the *Bonsa* variety was 2.87 t ha<sup>-1</sup> whereas for that of *Bona-bas* was 1.36 t ha<sup>-1</sup> (Table 1). The leaf to stem ratio data also showed that the released varieties were better in the feeding quality than their respective checks. Data on the nutritional content of the varieties also indicated that the released varieties had crude protein contents of 11.5 and 12.4%, respectively, for *Bonsa* and *Bona-bas* varieties. The varieties also contained comparatively lower fiber content.

#### 5. Reaction to Disease and Pest

The major fodder oats diseases in the study areas of Bale highlands include leaf and crown rust. On 1-9 rating scale, *Bonsa* scored a mean of 3.5 for the above mentioned diseases whereas the *Bona-bas* variety scored 1.0. Hence, the released varieties are characterized by less resistant types of reaction to the major diseases at all sites. The disease score results for the varieties and the checks are summarized in Table 1.

#### 6. Variety Maintenance

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

#### 7. Acknowledgement

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#### 8. References

Tekleyohannes B. and Worku J. 1999. The effect of under sowing barley with forage legumes on barley grain, straw and dry matter yield of forage legumes in the highlands of Bale. pp. 442, *In: Proceedings of 7<sup>th</sup> Annual Conference of the Ethiopian Society of Animal Production (ESAP)*. 26-27 May 1999, Addis Ababa. ESAP, Addis Ababa, Ethiopia.

Table 1. Mean yield, agronomic traits and disease reaction of *Bonsa* and *Bona-bas* and their adapted checks in multi-location testing from 2007/2008-2009/2010.

| Variety                         | Days to 50% heading | Days to seed maturity | Plant height (cm) | Leaf to :stem ratio | Dry matter (t ha <sup>-1</sup> ) | Seed yield (t ha <sup>-1</sup> ) | <sup>a</sup> Disease score (1-9) LR, CR | Nutritional content (%) |      |      |      |      |
|---------------------------------|---------------------|-----------------------|-------------------|---------------------|----------------------------------|----------------------------------|---|-------------------------|------|------|------|------|
|                                 |                     |                       |                   |                     |                                  |                                  |   | DM                      | CP   | OM   | ADF  | NDF  |
| <i>Bonsa</i> (Acc. No. 79AB384) | 106                 | 149                   | 128.4             | 0.74                | 10.3                             | 2.87                             | 3.5                                     | 90.1                    | 11.5 | 88.5 | 32.7 | 53.9 |
| Adapted check ( <i>Jasery</i> ) | 108                 | 150                   | 122.9             | 0.70                | 8.6                              | 2.19                             | 6.0                                     | 88.1                    | 11.2 | 88.8 | 31.3 | 51.7 |
| Mean                            | 107                 | 149.5                 | 125.6             | 0.72                | 9.5                              | 2.53                             | 4.75                                    |                         |      |      |      |      |
| <i>Bona-bas</i> (Acc. No. 1660) | 124                 | 164                   | 156.2             | 0.78                | 10.1                             | 1.36                             | 1.0                                     | 90.6                    | 12.4 | 89.7 | 38.3 | 62.6 |
| Adapted check (CI-8235)         | 121                 | 166                   | 140.4             | 0.66                | 9.3                              | 1.34                             | 4.5                                     | 85.2                    | 10.1 | 87.2 | 33.2 | 52.2 |
| Mean                            | 122.5               | 165.0                 | 148.30            | 0.72                | 9.70                             | 1.35                             | 2.75                                    |                         |      |      |      |      |

<sup>a</sup>ADF = Acid detergent fiber; CP = Crude protein; CR = Crown rust; DM = Dry matter; LR = Leaf rust; 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 are mean of 4 locations and 3 years.

