

Registration of “Addis-01” Finger Millet Variety

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Abstract: The name *Addis-01* was given to the finger millet (*Eleusine coracana* sub spp. *coracana*) variety with the pedigree of Acc-203544, which was developed by Addis Ababa University in collaboration with Bako Agricultural Research Center between 2011 and 2015. The *Addis-01* and the other pipeline finger millet genotypes were evaluated against two standard checks (*Gute and Taddesse*) across four environments (Arsi Negele, Assosa, Bako, and Gute) in 2012 and 2013 main cropping seasons. Additive main effect and Multiplicative Interaction (AMMI), Genotype and Genotype by Environment interaction (GGE) biplot analysis, and Eberhart and Russell model revealed that Acc. 203544 is stable and high yielding (3.16 ton ha⁻¹) with a yield advantage of 13.7% over the best standard check, Gute (2.78 ton ha⁻¹), and thus was released in 2015.

Keywords: Additive main effect and multiplicative interaction (AMMI), Finger millet (*Eleusine coracana* subsp. *coracana*), Genotype by Environment Interaction (GEI), *Magnaporthe oryzae*

1. Introduction

Finger millet (*Eleusine coracana* subsp. *coracana*) represents one of the critical plant genetic resources for agriculture and food security of farmers inhabiting arid, infertile and marginal lands (Barbeau and Hilu, 1993). Lack of stable and high yielding varieties is one of the major bottlenecks for production and productivity of finger millets in Ethiopia. The consequences of phenotypic variation depend largely on the environment. This variation is further complicated by the fact that not all genotypes react in a similar way to changes in the environment and no two environments are exactly the same. Therefore, identification of adaptable, stable, and high yielding genotypes under varying environmental conditions prior to release is the first and foremost steps for plant breeding and this has direct bearing on the adoption of the variety, its productivity, and total production of the crop.

2. Varietal Origin and Evaluation

Addis-01 (Acc. 203544) was originally introduced from Kenya through the Ethiopian biodiversity Institute. This and the other pipeline finger millet genotypes were evaluated against the standard checks, Taddesse and Gute, across 4 environments (Arsi Negele, Assosa, Bako and Gute) for two years (2012 and 2013).

3. Agronomic and Morphological Characteristics

The released variety, *Addis-01* (Acc. 203544) has light brown seed color, average plant height of 77.14cm and average thousand grain weight of 2.5 grams. The detailed agronomic characters of the newly released variety are indicated in Table 1.

4. Yield Performance

Addis-01 (noted as genotype No.6 or G6) produced the best average yield (3.16 ton ha⁻¹) (Fig 2). As observed from multi-location and multi-year evaluation records, it has a stable and high yield performance under blast disease stressed environment such as Assosa (average yield of 2.75 tons ha⁻¹) and non-stressed or conducive environment such as Arsi Negele (4.4 ton tons ha⁻¹ s/ha). Besides, *Addis-01* gave an average grain yield ranging from 2.5-3.1 tons ha⁻¹ on farmers field and 2.6-4.2 tons ha⁻¹ in verification plots grown in Arsi Negele, Assosa and Gute districts in 2014 (Table 1).

5. Stability and Adaptability Analysis

Eberhart and Russell (1966) model revealed that the best yielding variety, Addis-01 (G6), showed regression coefficient (b_i) closer to unity (1.08) and thus stable and widely adaptable variety than the remaining genotypes (Fig 2). Both environment-focused biplot and genotype-focused comparison of the tested genotypes revealed that Addis-01 (G6) fell in the central circle, indicating its high yield potential and relative stability compared to the other genotypes (Fig 1). Generally, GGE biplot analysis, AMMI and Eberhart and Russell model revealed that Addis-01 (Acc- 203544) was a stable and high yielding (3.16 ton ha⁻¹) variety with 13.7% yield advantage over the best standard check Gute (2.78 ton ha⁻¹) and therefore, officially released and recommended for production under wiser environmental conditions.

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6. Reaction to Major Diseases

Addis-01 is moderately resistant to major diseases particularly blast (*Magnaporthe oryzae*), a devastating disease that affect all above ground parts of the plant.

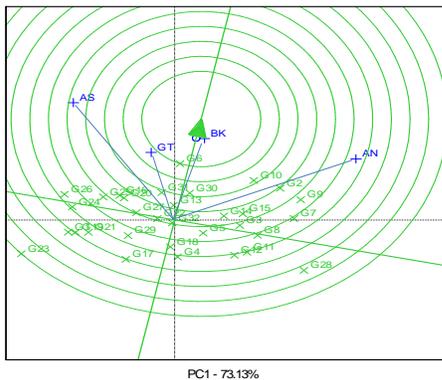
7. Conclusion

The *Addis-01* finger millet variety is hereby released for its high yield, stability, and wider adaptability. Therefore,

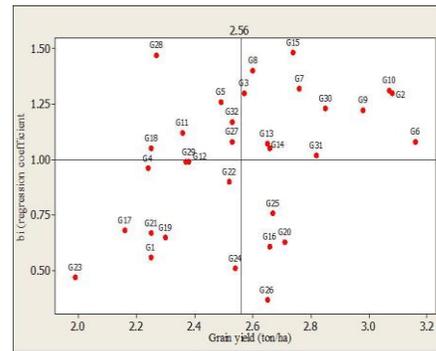
smallholder farmers and other finger millet producers inhabiting Southern Ethiopia (Arsi Negelle, Shashemene and Alaba districts) and western Ethiopia (Bako, Nekemt, Bambasi and Assosa districts) and areas with similar agro-ecologies can double or triple finger millet yield by growing *Addis-01* variety with its full agronomic and other management recommendations.

Table 1. Agronomic/morphological characteristics of finger millet variety, *Addis-01*.

Agronomic characteristics of finger millet variety	
Varietal name	<i>Addis -01</i>
Adaptation area	Adaptation area: Southern Ethiopia (Arsi Negelle, Shashemene and Alaba districts) and western Ethiopia (Bako, Nekemt, Bambasi and Assosa) and areas with similar agro-ecologies
	Altitude (masl):1400-2200m
	Rainfall (mm): 1200 – 1300
Days to heading	95-110
Days to maturity	145-155
1000 seed weight (g)	2-3
Plant height (cm):	77.14
Seed color	Light brown
Growth habit	Erect
Grain yield (ton/ha)	On farmers field: 2.5-3.1 On station: 2.6-4.2
<i>M. oryzae</i> disease reaction	Moderately resistant
Year of release	2015
Breeder/maintainer	Addis Ababa University (AAU) and Bako Agricultural Research Center (OARI/BARC)



Key: AN=Arsi Negelle, AS= Assosa, BK=Bako, GT=Gute, G=genotype number.
Figure 1: GGE biplot analysis showing the stability of genotypes and test environments.



Key: G = genotype
Figure 2. Matrix plot of genotypes mean grain yield (tons ha⁻¹) versus regression coefficient (b) indicating Stability and yield performance of the test genotypes.

8. Acknowledgments

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9. References

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