

Registration Of 'Walin' (BG-004-1) Sesame (*Sesamum indicum* L.) Variety

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Abstract

The name Walin was given to sesame variety developed and released by Bako agricultural research center of Oromia agricultural research institute in the year 2017. It is selected from landraces collection made in Benishangul Gumuz area after pure and homogenous line is developed from population with accession number BG004-1. This variety gave high grain yield with 22.2% advantage over the standard check, Chalasa and has high oil content (55.1%). The GGE-biplot analysis also indicated that this variety is stable and gave high yield. Furthermore, Walin is tolerant to bacterial blight, relatively larger seed size, white seeded and erect growth habit. It was released for Uke, Chewaka and Angare Gute areas and similar agro ecologies.

Keywords: *Sesamum indicum*, Variety Verification, Variety Release

Introduction

Sesame (*Sesamum indicum* L., $2n = 26$), which belongs to the genus *Sesamum* and the family Pedaliaceae, is one of the oldest oilseed crops and cultivated in tropical and subtropical regions of Asia, Africa and South America (Zhang *et al.*, 2013). Sesame is the first ranking export oilseed crop in Ethiopia. It is cultivated by small and large scale farmers, and private investors. There is huge gap between the average national grain yield which is less than 1 t ha^{-1} and the genetic potential of sesame in Ethiopia. This was mainly due to shortage of improved sesame varieties (Negash,

2015). Western Ethiopia is characterized as high rainfall areas where bacterial blight is the bottle neck for sesame production. Due to high disease pressure, only three varieties were adapted to western part of Ethiopia among a number of sesame varieties released at national level. Given the fact that western Ethiopia is one of the potential areas for sesame production (FAO, 2015), the demand for adaptable improved varieties of this crop is very high. Therefore, developing a new variety with high yield and desirable agronomic traits is the main objectives of sesame improvement program. Therefore, there is a need to identify high

yielding and stable sesame variety with disease resistance for the western part of Oromia.

Varietal Origin and Evaluation

Walin (BG-004-1) was selected out of landraces population collected from Benishangul Gumuz regional state, western Ethiopia. Including Walin and the standard check, fifteen sesame genotypes were evaluated in sesame regional variety trial at Uke and Chewaka for two years (2014 and 2015) and at Gutin and Mender-10 for one year (2015).

Agronomic and morphological characteristics

The released sesame variety ‘Walin’ has acceptable marketable seed size and thousand seed weight (3 g), erect growth habit which is very important trait, white seed color and it is tolerant to major sesame diseases prevailing in the areas. The detail description of the released variety is presented in Table 1.

Table 1. Agronomic and morphological characteristics of new sesame variety ‘Walin’

1	Variety	Walin (BG-004-1)
2	Agronomic & morphological characters	
	2.1. Adaption area:	Chewaka, Uke, Gutin and similar agro ecologies
	Altitude (ma.s.l)	1250-1450
	Rain fall (mm)	<750
	2.2. Seed rate (kg ha ⁻¹)	5-10
	2.3. Spacing (cm)	40x5 (Inter and Intra rows)
	2.4. Planting date	Late May to early June
	2.5. Fertilizer rate (kg ha ⁻¹)	100 NPS and 50 UREA
	2.6. Days to flowering	54-68
	2.7. Days to maturity	80-110
	2.8. Plant height (cm)	120-160
	2.9. 1000 seed weight (g)	3
	2.10. Seed color	Dull white
	2.11. Growth habit	Erect
	2.12. Crop pest reaction	Tolerant to major sesame diseases
	2.14. Yield (t ha ⁻¹)	
	Research field	1.0-1.38
	Farmers field	9.5-11
3	Year of release	2017
4	Breeder seed maintainer	Bako agricultural research center

Yield Performance

Walin was evaluated in multi-location trial with thirteen pipe line varieties against one standard check, Chalasa for two years (2014 and 2015). It gave grain yield varying 1.0-1.38 t ha⁻¹ on station (Table 2). The on farmers' field grain yield performance of Walin was ranged from 9.5-11qt/ha.

Adaptation and agronomic recommendations

Newly released sesame variety, Walin is recommended for Uke, Chewaka and Gutin and areas with similar agro-ecologies of Ethiopia. It is well adapted in altitude ranging from 1250 to 1450 m.a.s.l. with annual rainfall of

750 mm. Recommended seed rate is 5 kg ha⁻¹ while fertilizer rate is 100 kg ha⁻¹ NPS at planting and 50 kg ha⁻¹ Urea 30 days after planting. The recommended planting time ranging from late May to early June depending on the onset of the rain fall.

GGE-Biplot analysis The ranking of genotypes based on yield and stability

Both PC1 and PC2 were separated based on their scored for fifteen sesame tested genotypes in the study area. The designated genotypes code and Environments code were listed in the table below.

Table 2. Genotypes and environments and their codes

No	Genotype	Genotype code	No	Environments	Env. code
1	BG-005	G1	1	Uke 2014	E1
2	EW-009	G2	2	Uke 2015	E2
3	EW-022	G3	3	Chewaka 2014	E3
4	EW-023	G4	4	Chewaka 2015	E4
5	BG-004-1	G5	5	Gutin	E5
6	EW-007	G6	6	Mender 10	E6
7	EW-021	G7			
8	EW-005-1	G8			
9	EW-009-1	G9			
10	EW-008	G10			
11	WW-005-1	G11			
12	IL-003	G12			
13	BG004(1)01BK	G13			
14	EW011(2)-01BK	G14			
15	Chalasa	G15			

GGE-biplot is mainly used to identify the scaling of genotypes for the locations. As (Yan et al., 2000; Yan, 2002) reported, when PC1 in GGE-biplot approximates the genotype (mean performance), PC2 must

approximate the G x E associated with each genotype which is the measure of stability or instability. Genotypes having PC1 > 0 were recognized as high yielding while those genotypes

having PC1 score < 0 were identified as low yielding, (Kaya *et al.* 2006).

Genotypes 2 (EW-009), 5 (BG-004-1), 11 (WW-005-1), 12 (IL-003) and 14 (EW011 (2)-01BK), are more stable

and give higher yield and Environment 2, 5 and 6 also ideal for the production of this particular crop sesame. The stability and GGE- biplot diagrams are sketch below.

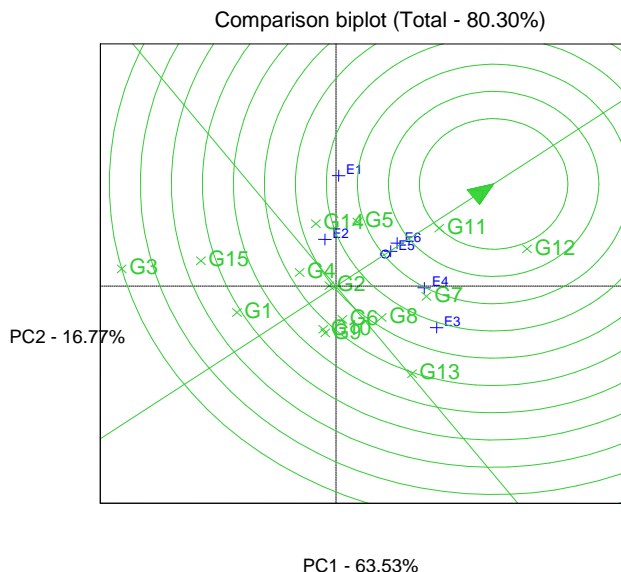


Figure 1. GGE-biplot based on genotype focused scaling for comparison of the genotypes

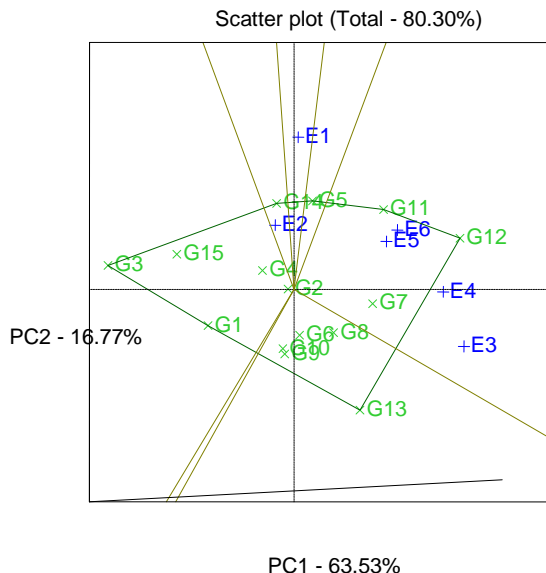


Figure 2. The polygon view of the GGE- biplot based on symmetrical scaling for genotypes and environments. PC, G and E stands for principal component, genotype and environments, respectively.

Table 3. Mean seed yield performance of sesame genotypes across locations and years.

Pipe line variety	Grain (kg ha ⁻¹)						mean	Yield advantage (%)
	2014			2015				
	Chewaka	Uke	Gutin	Chewaka	Uke	Mender 10		
BG-005	892.4	987.2	510.9	1016.1	893.7	1038	889.7	-0.19
EW-009	1093.2	1059.5	551	1229.7	1058.3	1150	1023.6	14.8
EW-022	512.2	1060.2	420.3	911.5	981.7	965.6	808.5	-9.3
EW-023	1054.5	1112.8	575.5	1040.6	867.7	1210.4	976.9	9.6
BG-004-1	1054.8	1294.3	843.2	1258.9	971.8	1114.6	1089.6	22.2
EW-007	1098.5	955.8	611.9	1286.5	954.7	1096.4	1000.6	12.2
EW-021	1244.6	1023.4	665.6	1396.4	918.2	1331.8	1096.6	23
EW-005-1	1138.2	918.7	667.7	1283.3	871.3	1297.4	1029.4	15.4
EW-009-1	1012.2	850	771.3	1055.7	713	1250	942.0	5.6
EW-008	1063.2	933.7	703.1	1133.9	784.9	1107.8	954.4	7
WW-005-1	1206.6	1235.6	842.2	1377.1	951.5	1364.1	1162.8	30.4
IL-003	1366.6	1198.7	904.2	1583.9	841.1	1450	1224.0	37.3
BG-004(1)01BK	1324.3	892.7	683.8	1386.5	714	1046.9	1008.0	13
EW-011(2)-01BK	858.8	1160.4	774.5	1082.3	866.7	1401.6	1024.0	14.8
Chalasa(EW-023)	823.7	1255.8	536.9	976.6	878.1	877.6	891.4	0
Grand mean	1049.5	1062.5	670.8	1201.2	884.4	1180.1	1049.5	13
CV (%)	13.2	15.2	14.2	13.7	10.1	13.6		
LSD (5%)	231.3	271.1	159.2	274.5	149.4	269.2		
F – value	**	**	**	**	**	**		

Quality Attributes and reaction to disease

As compared to the candidates and the check, Walin (BG-004-1) was the best variety with oil content of 55.1% (Table 3). Besides, Walin is moderately resistant to bacterial blight.

Table 4. Oil content and disease reaction of sesame varieties evaluated under verification trial

No	Variety	Oil content (%)	Reaction to bacterial blight (1-9 scale)
1	BG-004-1 (Walini)	55.1	3.75
2	WW-005-1	52.6	3.75
3	IL-003	54.2	5
4	Chalasa (check)	52.7	5

NB: disease score Where: 1 - 3 = resistance; 4 = moderately resistant; 5 - 6 = moderately susceptible; 7 - 8 = susceptible 9 = highly susceptible

Conclusion

Walin variety was officially released in April 2017 for its high and stable grain yield performance, tolerance to major sesame diseases, high oil content, acceptable seed size, and early maturing with an erect growth habit. This variety is recommended for production in Uke, Chewaka, Angar Gute and areas with similar agro ecologies.

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