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Research Article

Registration of "Hawata" a Newly Released Coriander Variety for Bale Mid Lands, South Eastern Ethiopia

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Abstract

Coriander is a popular spice that's grown for both its fresh leaves and dried seeds. The green plant is used in soups, salads and dressings. Its essential volatile oils play a key role in boosting taste and flavor. Plus, the dried seeds are great for adding a unique touch to various dishes. Hawata (Acc. no. 244652-2) is a Coriander variety released by Oromia Agricultural Research Institute, Sinana Agricultural Research center in 2023. The experiment was conducted by Sinana Agricultural research center from observation nursery to Regional variety trial and promising coriander genotypes were selected based on seed yield score and reaction to diseases especially bacterial wilt. The promising coriander genotypes were evaluated against standard check walta'i and Dinkinesh across three locations for three years (2020 to 2022). Hawata (Acc. no. 244652-2) showed the best yield performance, producing a mean seed yield of 22.5 – 27.5 Qt ha^{-1} on research field and 17.5-21.5 Qt ha^{-1} on farmer's field. The new variety scored yield advantage of 25% and 35.54% over standard check walta'i and Dinkinesh respectively. Relying on its yield performance, disease tolerance and desirable agronomic traits Hawata variety was released for the use by coriander producers at Bale mid altitudes (small holder farmers and large scale producers) and similar agro-ecologies.

Keywords

Coriander, Yield Performance, Variety, Yield Advantage

1. Introduction

Coriander (*Coriandrum sativum* L.), a member of the umbelliferae family (Apiaceae), is recognized as one of the most vital annual spices and medicinal herbs. It is cultivated in Ethiopia and globally for both its seeds and leaves, offering a wide range of applications [8, 9]. The origins of coriander trace back to the Mediterranean and Western Asian regions [3]. In addition to Central Asia and countries in the Near East, Ethiopia is listed among the centers of origin for coriander [1]. [6] Also noted that India, Northern Africa, Central Asia, and Ethiopia serve as significant centers for the development and diversity of various coriander types. Ethiopia has a long-standing tradition of cultivating coriander [14].

Coriander holds considerable significance as a spice across culinary, food, beverage, medicinal, perfumery, pharmaceutical, and sanitary industries [5, 10]. Additionally, its green leaves are utilized in vegetable dishes due to their high vitamin and mineral content [13]. All parts of this herb are in use as flavoring agent and/or as traditional remedies for the treatment of different disorders in the folk medicine systems of different civilizations [10]. In Ethiopia, coriander is exten-

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sively employed in domestic cooking. The seeds are incorporated to enhance the flavor of a spice blend known as "berbere," which is used in various meat and vegetarian dishes, as well as in leavened flatbread called "injera," cakes, and other breads. The leaves are added as a fragrant herb to tea and a stew referred to as "wot" [15].

Coriander is a well-known spice crop cultivated for both its leaves and dried seeds. The green plant is commonly utilized in soups, salads, and dressings, and is particularly prevalent in chutneys [7]. The presence of essential volatile oils enhances its taste and flavor. The dried seeds are also employed in flavoring a variety of food products. They serve as a condiment in the preparation of pickling spices, sausages, and seasonings, as well as for flavoring pastries, cookies, buns, cakes, and tobacco products. The fruits are recognized for their carminative, diuretic, refrigerant, and aphrodisiac properties [2, 12].

Coriander is cultivated as a summer or winter annual crop, depending on the climatic conditions. It is a tropical or subtropical crop that can withstand heat and drought. For leaf production, coriander is grown throughout the year. It can tolerate light frost and high temperatures to a reasonable extent. A temperature range of 15-25 ℃ is ideal for vegetative growth, while 20-30 ℃, along with cool and dry weather, is favorable for seed formation. Heavy rainfall adversely impacts both the yield and quality of the crop. In extremely hot weather, coriander for leaf production can be cultivated under assured irrigation facilities [13]. It demonstrates broad adaptability, thriving well in various soil types and weather conditions [11]. It loves dry climates but can adapt to a variety of soil types, whether it's light and well-drained, moist and loamy, or even heavier black soil [4].

In Ethiopia, the production and exportation of coriander have seen a significant increase over the past few years, attributed to its popularity in both local and national markets. In the Bale region, coriander is one of the primary seed spices cultivated and sold at high and mid-altitudes; however, its production and productivity remain low due to various factors. Among these factors, the lack of high-yielding varieties that are resistant or tolerant to diseases and possess wider adaptability is the most significant. Consequently, the aim of this study was to assess the promising genotypes and to verify and register the most stable, high-yielding, and disease-resistant coriander genotype(s) suitable for the mid-highlands of Bale and similar agro-ecological zones.

2. Varietal Origin and Evaluation

Hawata is the name given by the breeder to a released Coriander (*Coriandrum sativum* L.) variety with a pedigree of 244652-2, which was brought from Ethiopian Biodiversity Institute and it was evaluated in multi locations (Sinana, Goro and and Ginnir in 2013 and 2014 EC) in the south eastern part of the country. The results from multi locations verified that 244652-2 (Hawata) is the best variety for the regional release.

3. Agronomic and Morphological Characteristics

The released variety Hawata (244652-2) has white flower color, round seed shape with brown color, and it has primary and secondary branches.

Table 1. *Agronomic/morphological characteristics of coriander variety, Hawata Variety.*

S. No		
1	Variety name	Hawata (244652-2)
2	Adaptation Area	Mid-high lands and similar areas
2.1	Altitude (m.a.s.l)	1650-2400 in mid altitudes of Bale
2.2	Annual rainfall	750-1000
2.3	Soil type	Well drained Clay loam
3	Seeding rate (kg/ha)	13-15
4	Planting date	Early to mid-August in mid and high lands of Bale
5	Spacing (cm)	30cm between rows
6	Fertilizer rate	NPS (kg/ha): 100
7	Days to flowering	57
8	Plant height (cm)	121.50
9	Days to maturity	112-120
10	Growth habit	Erected and branched at normal condition

S. No		
11	Flower color	White
12	Seed color	Brown
13	Hundred seed weight (gm)	9-12
14	Crop pest reaction	Tolerant to major coriander diseases
15	Yield (qt/ha)	Research field: 22.5 – 27.5
		Farmers field: 17.5 – 21.5
16	Year of Release	2024
17	Breeder seed maintainer	Sinana Agricultural Research Center/OARI

Table 2. *Summary of Mean Yield and other agronomic traits on the two promising Coriander genotypes Selected as candidate for release and checks in regional variety trial over the six environments.*

Genotypes	DF	DM	PH	PB	SB	CPP	BM	SY
90312	57.89	123.0	105.5	3.82	2.18	19.11	43.31	19.85
209704	57.28	120.9	107.2	4.02	2.70	18.83	43.69	19.75
212831	56.72	123.2	107.2	3.88	2.07	20.89	45.44	19.27
214627	55.67	121.4	108.3	3.88	2.34	20.11	44.86	19.40
216854	57.06	122.2	118.7	4.02	2.51	18.39	42.75	18.34
223114	57.72	122.7	108.6	3.78	2.56	20.00	43.79	19.08
245065	57.17	121.6	109.2	3.76	2.14	18.50	43.78	19.49
200497-2	58.83	115.4	109.8	3.89	2.28	20.44	45.47	18.80
207518-2	59.78	121.6	110.9	4.11	2.63	20.28	44.27	18.68
Dinknesh	57.39	121.9	111.0	4.06	2.45	19.61	43.45	19.84
240566-2	56.78	122.3	102.6	3.71	2.27	18.50	42.61	19.33
240574-1	58.61	121.4	110.4	3.87	2.56	20.17	42.31	20.44
242242-2	58.56	122.8	110.2	3.86	2.25	20.22	42.78	19.86
244651-1	55.17	120.3	110.9	5.15	3.44	27.00	50.87	28.27
244652-2	56.44	121.3	111.8	4.78	3.18	25.61	48.08	29.41
Walta'i	56.67	122.7	109.8	3.91	2.37	20.17	43.09	22.04
Local	57.17	122.8	103.1	3.52	2.1	16.89	36.27	15.47
Mean	57.35	121.62	109.13	4.00	2.47	20.28	43.93	20.43
CV	5.5	5.7	15.68	14.8	25.1	15.8	13.9	12.4
Lsd	5.06	11.2	8.9	0.952	1.0	5.15	9.83	4.16

Note: DF=days to flower, DM=days to Maturity, PH=plant height, PB= primary branches/plant SB=secondary branches/plant, CPP=Capsule per plant, BM= biomass mass ton per hectare, and SY= seed yield Quintal per hectare

Table 3. *Means of seed yield (qt/ha) of Seventeen (17) Coriander genotypes across location and years.*

S. no	Genotypes	Sinana		Goro		Gindhir		Grand mean
		2013	2014	2013	2014	2013	2014	
1	90312	22.78	20.62	18.59	19.79	17.70	19.63	19.85
2	209704	22.08	22.60	19.26	16.25	17.74	20.56	19.75
3	212831	19.51	19.94	19.91	18.16	19.80	18.28	19.27
4	214627	22.68	22.67	15.83	16.76	19.37	19.09	19.40
5	216854	20.48	21.44	16.09	17.31	18.84	15.85	18.34
6	223114	21.35	21.64	16.18	18.33	19.02	17.95	19.08
7	245065	20.81	23.59	18.80	17.93	17.43	18.35	19.49
8	200497-2	21.50	18.85	19.92	17.53	18.10	16.91	18.80
9	207518-2	20.44	23.74	14.78	17.16	19.36	16.62	18.68
10	Dinknesh	22.39	21.69	16.58	17.15	22.22	19.01	19.84
11	240566-2	17.49	21.85	19.11	19.67	19.33	18.50	19.33
12	240574-1	23.92	23.67	20.84	15.22	20.22	18.75	20.44
13	242242-2	22.22	21.23	20.15	17.60	19.95	18.01	19.86
14	244651-1	30.63	28.08	26.82	26.41	31.58	26.09	28.27
15	244652-2	32.95	29.53	27.54	26.28	32.94	27.23	29.41
16	Walta'i	21.18	22.25	22.58	20.82	23.40	22.01	22.04
17	Local	14.83	17.88	14.19	13.87	15.32	16.73	15.47
	Mean	22.19	22.43	19.25	18.60	20.73	19.39	20.43
	CV	13.9	11.0	13.8	10.7	11.0	9.4	12.4
	Lsd	5.13	4.096	4.41	3.3	3.77	3.02	4.16

4. Yield Performance

Hawata variety was evaluated along with standard check walta'i. This standard check was previously evaluated and recommended for Bale mid lands depending on its yield performance and adaptability to multi location environments. The new variety Hawata recorded significant higher yield than standard check across locations and years. Hawata and walta'i recorded total seed yield of 27.5 and 22.04 quintal per hectare (qt/ha) respectively. This variety recorded 19.9% yield advantage over standard check.

5. Reaction to Diseases

The yield of coriander is mostly affected by Bacterial blight which is caused by *Pseudomonas syringae Coriandricola* (Psc). Bacterial wilt is the most serious disease that severely reduces the yield of coriander. Both the standard check and Hawata variety showed moderately resistant to bacterial wilt disease.

6. Adaptation

Hawata is released for the mid lands of Bale and similar agro-ecologies. It performs very well in areas having an altitude of 1650-2400 m a. s. l. and annual rainfall of 500-1000mm. It can also possible to extend the production of this variety to other areas having similar agro-ecologies.

7. Variety Maintenance

Breeder and foundation seed of the variety is maintained by Sinana Agricultural Research center.

8. Conclusion

Hawata Corainder variety was released for the use of coriander producers at Bale mid lands (small holder farmers and investors) in Sinana, Goro, Ginnir and similar agro-ecologies based on its high yielding, disease tolerance and desirable agronomic characteristics. Therefore, the release of the variety is expected to improve coriander production in the study area and similar agro-ecologies.

Abbreviations

qt/ha	Quintal Per Hectare
℃	Degree Celsius

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Conflicts of Interest

Authors declare no conflict of interest.

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