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# Registration of Jajo (Acc#28) Small Pod Hot Pepper (*Capsicum frutescens* L.) Variety for Kelem Wollega and West Wollega Zones, Western Oromia

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**Abstract:** Jajo is a common name given for small pod hot pepper (*Capsicum frutescens* L.) variety with accession name of Acc#28. It is selected out of a local collection done during 2013 from West Wollega and Kellem Wollega zones and released by Haro Sabu Agricultural Research Center for production in West Wollega and Kellem Wollega Zones of West Oromia, Ethiopia and similar agro- ecologies in 2021. In multi-location trial, Jajo gave a mean dry pod yield of 1225.78kg<sup>-1</sup>. Jajo performed better than the standard check, Dinsire, which gave 1010.65kg<sup>-1</sup> mean dry pod yield. On farmers' fields a mean dry pod yield of 1048.83 kg<sup>-1</sup> was recorded for Jajo. Jajo is small pod hot pepper variety with sparse growth habit and up right pod orientation. It is a variety with light green at maturity and light red at dry pod color r used for market use and domestic consumption. Yield stability study showed that Jajo was stable variety in test locations and requires favorable environments for good pod yield. It is also moderately to major hot pepper disease (anthracnose and cercospora leaf spot) and insect pest. The breeder seed of Jajo is maintained by Haro Sabu Agricultural Research Center for different research purposes.

**Keywords:** Calyx, Dry Pod, Jajo

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## 1. Introduction

Chilli pepper (*Capsicum frutescens*) is a high value crop that is grown for cash by farmers all over the world [2]. Small pod hot pepper (Chili) (*Capsicum frutescens* L.) is an important vegetable and spice crop cultivated throughout Ethiopia especially in South, Central and South West part of the country [1]. The small fruited chili locally called 'Mitmita' are either prepared as crushed fresh or 18 powder of dry fruits used for special local sauce preparation, to eat raw meat or eaten with local bread/injera for its unique pungency which adds value in local food preparations [13, 10]. It is an important cash crop for smallholder farmers in developing countries such as Ethiopia, Nigeria, Ghana, China, India, Pakistan, Bhutan, Indonesia, Cambodia, and Thailand [7]. In some parts of the country where pepper and chilies are dominantly grown, sales from these crops contribute 50-60% of the household income, as the green

fresh fruits fetches good price and sold at Ethiopian Birr \$80-100 per kg in the retail market [5]. However, the productivity of chili pepper is below the average yield estimation at national level [4]. This yield loss might be due lack of improve variety, sowing methods, use of appropriate plant spacing and environmental conditions [15].

In Ethiopia, chili (small pod hot pepper) has become almost an essential ingredient of the daily diet of the rich and the poor societies [3, 9]. It is an important commercial product supplied to the local market and exported to different countries. In its major area of production, with hot pepper has a huge potential for improving the income and livelihood of thousands of smallholder farmers and can plays a vital role for food security in Ethiopia [10]. On the other hand, among the various spices crops, chilli/small pod hot pepper is the most commonly produced spices with the highest share of the total spices produced in the country [14].

*Jajo* (Acc#28) is small pod hot pepper released in 2021 by

Haro Sabu Agricultural Research Center (HSARC). It is small pod with light green at green maturity stage and light red at dry pod stage. It is obtained from local collection of small pod pepper done during 2013/14 G C of West Wollega and Kellem Wollega zones. Acc#28 was collected and had been evaluated from preliminary to variety development stage at HSARC main station and similar agro ecology of its substation. It was officially approved in 2021G C by Ethiopian National Variety Release Committee in accordance with the national variety release and registration policy of the country to hot pepper producing areas of West and Kellem Wollega, west Oromia and areas with similar agro-ecology. Hot pepper description used [12, 8] was adopted for describing Jajo (Acc#28).

## 2. Materials and Methods

The experiment was carried out at three locations. One of the experiments was conducted at the research farm of Haro Sabu Agricultural Research Center, on station and the others at the farmers' field, Sadi Canqa and Sayo Woreda. The experiment was conducted from the screening nursery till verification trial (2013 to 2018) under rain fed conditions. In 2013, 64 accessions were evaluated at observation nursery on main research center, Haro Sabu. In 2014, 34 accessions were selected from the previous generation and evaluated in the yield trial again at main research center, Haro Sabu for one season. At this time agronomic data such as days to flower, days to maturity, plant height, number of branch per plant, number of pods per plant, pod length, pod diameter, pod weight and yield was collected on plant and plot basis. Finally the collected data was subjected to statistical analysis (SAS) to select the genotypes as compared to the checks.

In the multi-location trial, eight accessions retained from the preliminary yield trial were further evaluated at two locations for three years to see its stability across location. The accessions in multi-location trial were evaluated using randomized complete block design with three replications. Agronomic and yield data were collected and subjected to statistical analysis (SAS and Genstat) in order to identify the best accessions of the evaluated accessions. After the multi- location trial had been conducted for

the above three consecutive years, Jajo (Acc#28) was selected out of eight accessions to be verified for one more season at seven locations and then evaluated by national variety releasing committee as per the guide line of the variety releasing and registration of the country.

## 3. Results and Discussion

### 3.1. Varietal Characters and Its Evaluation

Jajo was tested under regional variety trial at six environments (location x year) in western Oromia, Ethiopia between 2017 and 2019. Jajo was evaluated along with the standard check, Dinsire. On-farm evaluation was conducted during 2020 at seven sites, with Dinsire at altitude ranging from 1400-1650 meters above sea level.

The newly released variety; Jajo has light green leaves with sparse growth habit. The pod of Jajo is light green at maturity and light red at dry pod stage with upright pod orientation. Jajo produces 98.29 pods per plant, with 0.44gm average pod weight, 5.26 cm pod length and 63.89 cm plant height (Table 1). The new variety is a food type/market group preferred by producers mainly because of its high yielding, disease resistant and hard persistent calyx on fruit which reduces perishability during harvest.

### 3.2. Yield Performance

Jajo was evaluated for dry pod yield from early breeding stage i.e. 2013 to 2018 and had better mean value than the standard check, Dinsire. Multi-location yield trial carried out at Haro Sabu research station, Mexi, Ano Michael, Igu and Chole between 2013 and 2018. Jajo was found to be high yielder, stable, well adapted, disease resistant. The mean dry pod yield value of 1225.78Kgha<sup>-1</sup> was obtained from Jajo compared to the standard check; Dinsire which had a mean value of 1010.65Kgha<sup>-1</sup> for dry pod yield. On farmers' fields, the dry pod yield of Jajo was 1048.83/ha (Table 1), which revealed the increment of yield through new variety development. The variety has 31.73% yield advantage over the best performed Dinsire variety. (Table 1)

**Table 1.** Combined mean total yield and other agronomic traits of small pod hot pepper over years and location.

Accessions	DF	DM	PH	CL	PL	PD	NPB	NPPP	PW	TY	YAd (%) against Dinsire
Acc#1	70.94a	164.67ab	62.76a	40.90a	4.29bcd	2.57cd	3.94abc	67.38bc	0.47b-e	988.5bc	-0.28
Acc#14	66.39b-c	166.72a	64.54a	41.26a	4.33bc	2.80bc	4.02abc	71.11abc	0.50bcd	1143.5bc	13.31
Acc#19	66.83abc	163.67bc	59.69a-c	38.09ab	3.88ed	2.31e	3.716bc	78.21ab	0.41e	1088.2bc	8.9
Acc#24	68.83ab	164.44abc	62.27ab	38.64ab	4.04cd	2.44ed	4.13ab	84.36a	0.45ed	1262.5ab	21.48
Acc#28	68bcd	164.28abc	64.07a	40.89a	4.58ab	2.46ed	4.42a	87.10a	0.49bcd	1452a	31.73
Acc#3	68.44abc	161.67cd	63.21a	36.34bc	4.93ab	2.72bc	3.76bc	60.48dc	0.53bc	904.1c	-9.64
Acc#48	66.22cd	162.06bcd	56.37b-d	39.39ab	4.98a	2.71bc	3.72bc	60.21dc	0.53b	922.4c	-7.47
Acc#53	67.56bcd	164.56ab	65.36a	41.95a	4.33bc	2.77bc	3.54c	57.31dc	0.53b	947.3c	-4.64
Dinsire	65.89d	160.00d	54.85dc	32.87cd	4.55ab	3.25a	3.58c	39.58e	0.65a	991.3bc	0
Kume	66.33bcd	162.72bcd	50.70d	31.95a	3.57e	2.87b	4.16ab	47.77de	0.46de	851.5c	-16.42
Mean	67.543	163.479	60.382	38.228	4.348	2.69	3.8986	65.351	0.502	1055.13	
LSD (0.05)	2.52	2.88	5.97	4.3	0.45	0.24	0.5	16.28	0.07	298.88	
CV (%)	5.64	2.67	15	17.1	15.76	13.77	19.53	37.75	22.6	42.91	
F test	*	*	*	*	*	*	*	*	*	*	

Where DF, DM, PH, CL, PL, PD, NPB, NPPP, PW and TY are days to 50% flowering, days to 90% maturity, plant height (cm), plant canopy length (cm), pod length (cm), pod diameter (cm), number of primary branches per plant, pod weight (gm) and total yield (Kg/ha), respectively.

**Table 2.** Mean of some agronomic yield characters of Jajo Vs. standard checks (Dinsire and Kume).

Varieties	DF	DM	PH	CL	PL	PD	NPB	NPPP	PW	TY
Dinsire	65.89d	160.00d	54.85dc	32.87cd	4.55ab	3.25a	3.58c	39.58e	0.65a	991.3bc
Kume	66.33bcd	162.72bcd	50.70d	31.95a	3.57e	2.87b	4.16ab	47.77de	0.46de	851.5c
Acc#28	68bcd	164.28abc	64.07a	40.89a	4.58ab	2.46cd	4.42a	87.10a	0.49bcd	1452a

### 3.3. Adaptation

Jajo is released for production in West Wollega and Kellem Wollega Zones of West Oromia, Ethiopia, preferably for areas receiving a well distributed total annual rainfall greater than 1000mm and altitude of 1400-1650 masl. Never the less, Jajo production can be extended to other regions having similar agro-ecology after adaptation and performance evaluation.

### 3.4. Yield Stability Test

Jajo was tested for its dry pod yield performance in areas ranging from 1400-1650 meters above sea level. The altitude of testing locations in line with [11] which reports hot pepper (*Capsicum*) requires a hot and dry climate free of frost and suitable agro ecological areas and suitable altitude ranges for optimum production of pepper is between 1000 and 1800 m.a.s.l. Its yield stability across test locations was analyzed following the AMMI model with nine small pod hot pepper genotypes [6]. The result of the study showed that Jajo had the highest interaction principal components, indicating that

it is specifically adapted to favorable environments in general.

### 3.5. Disease Reaction

Jajowas tested for its disease reaction starting from preliminary observation nursery and found to be tolerant to major hot pepper diseases in the test locations. Disease reaction was scored on the base of the standard rating scale of 1-5 for pod anthracnose (*Colletotrichum* spp) and 1-9 for cercospora leaf spot (*Cercospora capsici*), where 1 being highly resistant and 5 & 9 are highly susceptible. Jajo scored a mean value of 1.29 for pod anthracnose (*Colletotrichum* spp) and 1.57 for cercospora leaf spot (*Cercospora capsici*) (Table 2).

**Table 3.** Major hot pepper disease reaction.

Major disease	Jajo (Acc#28)	Dinsire
Cercospora leaf spot	1.57	3.14
Pod anthracnose	1.29	1.57

**Table 4.** Agronomic and morphological characteristics of Small pod hot pepper variety.

Candidate variety = Acc#28 (Jajo)

Variety	Jajo (Acc#28)
Agronomic and morphological characteristics	
1. Adaptation area	Dale Sadi, Sadi Chanqa, Hawagalan, Sayo and similar agro-ecologies
a. Altitude (meter above sea level)	1400-1650
b. Rain fall (mm)	1000-2100
c. Soil type	Sandy loam
2. Planting time	Late June – Mid July
3. Seed rate (Kgha <sup>-1</sup> )	0.7-0.8
4. Fertilizer rate (Kgha <sup>-1</sup> )	
a. NPS	200 at transplanting
b. Urea	100 (% 50 at transplanting and 50% after 1.5 months)
5. Days to 50% flowering	70.14
6. Fruit maturity (days)	142.14
7. Plant height (cm)	63.89
8. Growth habit	Erect
9. Color at maturity	Light green
10. Color of dried pod	Light red
11. No of fruits/plant	98.29
12. Plant canopy (cm)	56.71
13. pungency	Very high
14. Crop pest reaction	Moderately resistant for major hot pepper diseases (anthracnose and cercospora leaf spot)
15. Number of pedicle /axis	1
16. Acceptability/use	Dry pod
17. Yield (dry)(Qt/ha)	
a. Research field	10.30-14.33
b. Farmers field	8.48-12.34
18. Year of Release:	2021
19. Breeder/Maintainer:	HSARC/OARI

Keys: HSARC=Haro Sabu Agricultural Research Center, OARI= Oromia Agricultural Research Institute.

### 3.6. Quality Analysis

Besides its yielding ability, other desirable agronomic traits and disease tolerance, producers and consumers preferred Jajo due to hard calyx, attractive pod color for market and local consumption, pod length and high pungency.

### 3.7. Variety Maintenance

Breeder and foundation seed of the variety is maintained by Haro Sabu Agricultural Research Center.

## 4. Conclusion

Jajo (Acc#28) is a responsive variety to inputs which was officially verified and released in 2021 in West and Kellem Wollega, West Oromia, Ethiopia. It is high yielding, highly adaptable, stable and tolerance to major hot pepper diseases prevailing in areas over the standard check. It was also preference by producers for its better dry pod yield performance, high pungency and marketability. Therefore, Jajo was recommended for further demonstration and large scale production in the test locations, and other similar agro-ecology on the base of adaptability study.

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