

New Potato (*Solanum tuberosum* L.) Variety Released for the Highlands of Southern Ethiopia

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INTRODUCTION

- Human population estimated: 14.1 million (2004)
- Population density: 4 to 900 persons per km⁻²
- About half of the total population- mid- and high-altitude areas: only 2.82% of the total area
- >70% of farmers- below 2 hectares
- RF pattern: bimodal with “belg”- Feb to April and “Meher”-Jun to August (main rainy season)
- The mean annual rainfall: 500 - 2200 mm
- The annual mean temperature: 15 - 30 °C
 - ➡ Potato is produced in both seasons



Economically important food and cash crop
supply high quality food within a relatively short period
It is becoming an excellent cash crop in the region

It ranks third both in area planted and in production next to Enset [*Ensete ventricosum*(Welw) Cheesm] and sweet potato

In 2008:

- Potato occupied - 7490 ha of land
- Production- 579530.4 tons

Hadiya, Gurage, KAT, Wolayita, Gamo Gofa, Sidama and Gedio zones account for over 95% of the total area and total productio

- Productivity- 7.7 t/ha; national 8 t/ha



Released varieties: 25-45 t/ha

- Potato varieties at the hands of most farmers are poor yielder & susceptible to diseases
- Crop varieties are continuously needed under changing environment
- Accordingly selection work had been undertaken from the advanced clones
- **Objectives:**
Developing high yielding and disease/insect pests tolerant/resistant cultivars adaptable to Mid and highlands of Southern Ethiopia.



Materials and Methods

- Treatments: Eight promising potato clones with one standard and one local check
- Locations: Awassa, Bulle, Kokate & Chench
- Duration: Two consecutive years(2004 & 2005)
- Design: RCB replicated three times
- Plot size: 3X3m Spacing: 75cmX30cm
- Fertilizers: DAP and UREA, 195 and 165 kg ha⁻¹, respectively
- Data: On yield, yield components and disease incidence
- Combined analysis of variance was carried out for tuber yields using MSTAT.

Homogeneity of error variances over years and locations were tested as per Gomez and Gomez (1984)

The square root of yield was analyzed instead of the actual yield then the genotypes mean values were back transformed.

Analysis of stability- Eberhart and Russell (1966)

One best performing & stable variety verified along with standard and local check varieties at 12 locations for release

Plot size 10mx 10m at each location

Data was recorded on marketable & total tuber yields



RESULTS AND DISCUSSION

- There were significant differences among the clones for both marketable and total tuber yields.
- Genotype by location (GXE) interaction was also highly significant



Table 1 Combined Analysis of variance for tuber yields in ten potato clones tested at four locations during 2004 and 2005.

Source	DF	Marketable tuber yield	Total tuber yield
Location(L)	3	155.32**	148.73**
Year(Y)	1	11.53**	18.08**
YxL	3	7.33**	7.75
Genotype (G)	9	5.75**	5.56**
YxG	9	0.76*	0.56**
LxG	27	0.96**	0.90**
LxYxG	27	0.88**	0.77**
Error	158	0.34	0.35

** . * Significant at 1% and 5% probability level, respectively.

Table 2. Mean marketable tuber yields (t ha⁻¹) of ten potato clones tested at four locations during 2004 and 2005

Clones	2004					2005					Mean GXL
	Awasa	Kokate	Bulle	Ch.	Mean	Awasa	Kokate	Bulle	Ch.	Mean	
CIP-389703.3	21.30	46.67	32.96	6.72	26.91	19.31	23.15	42.13	3.15	21.94	24.42 CD
CIP-385021.44	24.07	30.74	37.50	5.19	24.38	13.80	28.89	43.70	4.63	22.76	23.57 D
CIP-387679.17	15.56	48.24	39.54	7.13	27.62	26.20	19.63	43.89	5.84	23.89	25.75 BCD
<u>CIP-385021.26</u>	25.83	49.63	50.65	12.78	34.72	15.83	22.03	46.11	6.94	22.73	<u>28.73 AB</u>
CIP-385383.12	28.98	42.03	37.50	10.83	29.84	23.24	30.93	42.22	2.87	24.82	27.33 BC
CIP-392618.511	30.37	50.46	34.26	13.42	32.13	16.85	38.05	54.81	8.80	29.63	30.88 A
CIP-392640.513	16.11	47.27	31.78	7.69	25.71	19.82	37.87	27.68	3.61	22.25	23.98 CD
KP-90138.1	28.98	40.69	33.80	8.61	28.02	16.34	34.26	39.26	4.44	23.58	25.80 BCD
Wechecha	18.15	24.07	23.61	4.91	17.69	17.50	17.31	40.28	4.35	19.86	18.77 E
Local check	13.89	22.78	21.11	3.61	15.35	21.16	10.92	22.22	3.52	14.46	14.90 F
CV (%)	16.55	17.70	18.84	24.90		26.74	16.30	24.15	18.75		12.84
LSD(0.05)	6.33	12.23	11.07	3.46		8.72	7.37	16.67	1.55		

Means followed by the same letter are not significantly different at 5% probability level

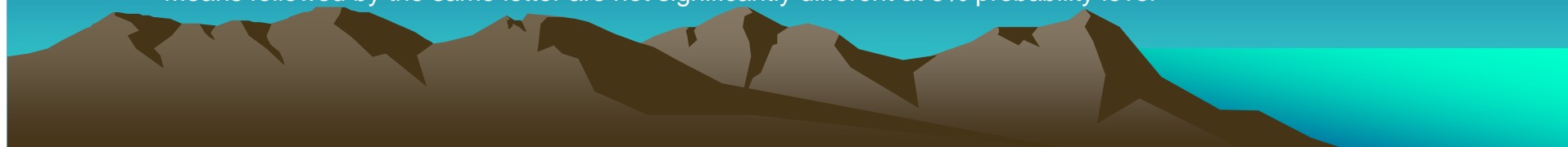


Table 3. Stability analysis of genotypes for tuber yield across four locations

	Clones	Mean	Regression coefficient	MS deviation	Coefficients of determination
1	CIP-389703.3	25.40	1.1 ± 0.04	-4.976	0.9987
2	CIP-385021.44	24.57	1.069 ± 0.25	12.074*	0.9493
3	CIP-387679.17	27.82	1.097 ± 0.1	-1.13	0.9877
4	CIP-385021.26	29.77	1.155 ± 0.32	23.59**	0.9295
5	CIP-385383.12	28.41	1.088 ± 0.11	-1.82	0.9895
6	CIP-392618.511	31.98	1.171 ± 0.19	4.64	0.975
7	CIP-392640.513	25.41	1.020 ± 0.48	61.77**	0.8162
8	KP-90138.1	27.11	1.052 ± 0.15	1.058	0.9799
9	Wechecha	19.12	0.721 ± 0.19	5.09	0.9339
10	Local check	16.11	0.527 ± 0.22	8.16	0.8544
	G. Mean	25.57			
	SD error of mean	±2.33			

*, ** significant at 5% and 1% probability level, respectively.

Table 4 Marketable and total tuber yields of four potato varieties verified at eight farmers' field in the year 2009

variety	Marketable tuber yield (t/ha)								Mean		
	Awassa		Kokate		Chencha		Bulle				
	Farmer 1	Farmer 2	Farmer 1	Farmer 2	Farmer 1	Farmer 2	Farmer 1	Farmer 2			
CIP-392618.511	24.42	27.88	24.71	43.29	32.59	35.06	38.17	49.46	34.45		
Maracharie	14.32	27.76	29.18	32.24	31.29	34.94	27.57	28.41	28.21		
Wechecha	14.81	26.00	23.06	30.12	30.47	32.82	29.10	40.15	28.32		
Local Check	6.32	14.00	7.24	28.12	3.65	7.65	17.30	27.26	13.94		
	Total tuber yield (t/ha)										
	CIP-392618.511	27.35	33.24	25.44	44.24	32.88	35.65	38.17		50.57	35.94
	Maracharie	16.36	30.35	30.15	32.94	32.29	35.76	33.01		44.04	31.86
	Wechecha	16.33	29.53	23.65	31.29	30.58	33.18	29.10		40.76	29.30
	Local Check	6.99	15.65	8.06	29.18	4.74	10.00	18.73		28.14	15.18

Table 5. The reaction of different potato clones to late blight disease incidence at four locations in 2004 and 2005

	Clone	Disease incidence (%)				
		Kokate	Chencha	Awassa	Bulle	Mean
1	CIP-389703.3	17.3	0.0	26.5	0.7	11.1
2	CIP-385021.44	16.9	0.7	35.8	0.0	13.3
3	CIP-387679.17	18.1	0.0	51.5	1.7	17.8
4	CIP-385021.26	13.8	0.0	51.7	0.0	16.4
5	CIP-385383.12	11.6	0.3	17.2	0.0	7.3
6	CIP-392618.511	9.1	0.0	16.3	0.0	6.4
7	CIP-392640.513	15.7	1.0	29.0	1.7	11.9
8	KP-90138.1	9.2	2.0	12.0	0.7	6.0
9	Wechecha	15.8	1.3	30.7	0.0	12.0
10	Local check	34.8	17.7	48.8	15.0	29.1



CONCLUSION

- The clone CIP-392618.511 approved by National Crop Variety Releasing Committee to release for production in the Mid and highlands of Southern Ethiopia as of the year 2009
- Currently, the variety is under multiplication for demonstration and dissemination in major potato growing areas of Southern Ethiopia.



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THANK YOU

