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Irish Potato (*Solanum Tuberosum*) Variety Evaluation at Bule Hora District of Borena Zone

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Keywords: Irish potato; variety; adaptation.

I. INTRODUCTION

An Irish potato is an edible tuber from the *Solanum tuberosum* plant, which is actually native to South America, not Ireland. Irish potatoes are named after Ireland because they are closely associated with the Irish potato famine, a historical famine caused by a mold infestation of the Irish potato crop [1, 2] Irish potato is the fourth most important crop in the world after wheat, maize, and rice with annual production of 314.1 million tons cultivated on about 18.1 million hectares of land [3]. In Ethiopia Irish potato has promising prospect in improving the quality of the basic diet in both rural and urban areas [4]. It is a short duration crop that can mature within short period of

time. Potato production has been considered as the first priority compared to other food crops because of its contribution to food security, income generation and double cropping advantages and its utilization in different forms [5, 6]. White potato became an essential staple in the diets of common people throughout Europe. In Ireland, where the crop did extremely well, potato was the only staple food. It is also advantageous in that its' consumable part, the tubers, are below the ground that not subjected to some vertebrate pests like birds and to some insect pest attack.

It is the world's fourth-largest food crop, following rice, wheat, and maize. Long-term storage of potatoes requires specialized care in cold warehouses [3]. It is also widely produced in Ethiopia. From vegetable crops it stands second next to enset (*Ensete ventricosum*) in area coverage in Ethiopia and also gives high yield per unit area [7]. Most of the small holder farmers were used low yielding and susceptible to potato disease because of limited availability of improved variety in the country [8, 9]. Lack of proper storage system is among the limiting factors contributing to the low yield of potato in the region, which is the case at the country level [10].

In the study area, Bule hora district, potato varieties available at hand of farmers are poor yielders which have been under production for many years. Therefore developing and making available adaptable, high yielding and pest and disease tolerant varieties of potato is a priority concern in its productivity increase strategy.

a) Objective

- To identify potato varieties that is better in adaptation, yield and other agronomic characteristics, and pest and disease tolerant.

II. MATERIALS AND METHODS

a) Description of the study area

The experiment was conducted at Gerba research site which was found in Bule hora district of Borena zone and it is located south of Addis Ababa at 453 Km. The site is characterized by bimodal rain fall. The first is from March to June and the second is from September to November. The altitude of the area is 2243. Potato is the most staple food crop and coffee is major cash crop in Bule hora district.

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b) Planting materials and experimental methodology

Six improved and recommended potato varieties namely: Jallane, Guddane, Gorobela, Marechere, Guassa, Gera introduced from Holeta research center and with one local variety was tried for their adaptation at gerba research site. The site was cleared; ploughed, harrowed, and fine seed bed was prepared. Planting of tubers was carried out with spot application of phosphorous in the form of DAP at time of planting while nitrogen top dressing was carried out after full emergence as the recommendation by [8] (Girma, 2001). The experimental design was RCBD with three replications.

c) Data collected and statistical analysis

The data collected were days to flowering 50%, Days to maturity, disease and pest score, harvestable fresh yield at maturity (kg/ha), Above ground biomass, harvest index (dry mater partitioning), stand count at harvest, total tuber number per plant or hill, average tuber weight /plant or hill, Marketable yield, Unmarketable yield, Tuber DM (%). Data was analyzed using SAS software and mean separation was done using LSD.

III. RESULT AND DISCUSSION

a) Phenological parameters

i. Days to flowering

There was a significant variation among the varieties for days to flowering (table 1). The variety Gorobela was the fastest in flowering followed by Gudane (Table 2). Guassa and Marachere were significantly higher in number of days to maturity. It took 60 days for both varieties.

ii. Days to maturity

Days to maturity were significantly different among the varieties (Table 1). Gorobella and local varieties were significantly earlier in maturity than other varieties except Jalane and Gudane (Table 2). It took

significantly longest time (128.7 days) for Guassa, but not significantly different from Marachere (125.6 days).

b) Tuber yield and yield components

i. Number of tubers per hill (NTPH)

In the case of number of tubers per hill there is a significant difference among the varieties (Table 1). Local variety significantly exceeded all other varieties (Table 2). Gera and Marachere are significantly lower in NTPH than local, Guassa and Jalane but not significantly different from Gorobela and Gudane. In Gorobella, Gudane and Jalane the number of tubers are relatively lower but they have got large size so that large weight. In contrary, local has got largest number of tubers but most of the tubers are small below marketable size and were unhealthy.

ii. Unmarketable yield (UNMY)

Unmarketable tubers include unhealthy and less than 25g size category and calculated on the basis of t/ha. UNMY was significantly different among the varieties. Local is significantly higher than all other varieties with total amount of 3.38 t/ha UNMY (Table 2). The improved varieties are not significantly different. This implies that in local cultivar large amount of the yield is below the size required on market and also unhealthy.

iii. Marketable yield (MY)

In the case of MY, there was also significant variation among the varieties (Table 1). Gorobela, Gudane and Jalane are significantly higher in MY when compared to the other varieties except Guassa (Table 2). They have got 66.3, 63.8 and 53.3% marketable yield increments over local respectively. The varieties Marachere and Gera are not significantly different from local in which the lowest MY was recorded. This implies that even though large number of tubers was recorded in local variety, most of them are of below the size important on market. But, varieties Gorobella, Gudane and Jalane have got smaller number of tubers which were large enough for market and were healthy.

Table 1: Mean squares of days to flowering, days to maturity, unmarketable yield, marketable yield, number of tubers per hill, tuber dry matter, tuber yield, Stand count and tuber weight per hill as affected by variety and replication

Mean squares									
Source of variation	DF	DM	UNMY	MY	NTPH	TDM (%)	TYLD (t/ha)	SC	TWPH
Varieties	6	143.15*	19.78***	276.36*	51.25***	57.63ns	256.19*	37174211.2***	0.113064ns
Replication	2	10.71ns	.06ns	66.61ns	5.07ns	26.35ns	66.73ns	4291593.2ns	0.02436ns
Error	12	10.65	0.1496	57.98	3.62	54.16	56.49	3605722.1	0.04630686

DF-degree of freedom, DM-day of maturity UNMY- Unmarketable yield, MY-marketable yield

NTPH-Number of tuber per hill TDM-Tuber dry matter TYLD-Total yield Sc-stand count TWPH-tuber weight per hill

c) *Tuber Dry matter (TDM)*

There was no significant difference among the varieties. That means dry matter content among the varieties is not statistically different.

d) *Tuber weight per hill*

Tuber weight per hill was significantly affected by difference in varieties (Table). The varieties Jalane, Gudane and Gorobella were significantly higher in tuber weight per hill than Marachere and Gera. But they were not significantly different from the local. This might be due to the fact that larger number of tubers per hill recorded in local could contribute to the weight as well. Gorobella, Gudane and Jalane were significantly lower in tuber number per hill but their healthy and larger sized tubers enabled them to have significantly higher tuber weight than other improved varieties.

e) *Stand count*

There was also significant difference in stand count (Table 2). Gudane, Marachere, and Gorobella are

significantly higher in stand count when compared to the other varieties. But, they were at par with the variety Guassa. The lowest number of plants was recorded in the local variety.

f) *Tuber yield (TYLD)*

In the case of tuber yield, there was a significant difference among the varieties (Table 1). So that the varieties Gorobella, Gudane and Jalane were significantly higher in TYLD than the other varieties except Guassa which was not significantly different from Marachere and local as well (Table 2.). The variety Gera is the least of all varieties. In Gorobella, Gudane and Jalane the higher tuber weight per hill was the major yield component contributing to higher yield recorded. Stand count might also be another factor for higher tuber yield in Gorobella and Gudane.

Table 2: Mean values of Days to maturity, Unmarketable yield, Marketable yield, Number of tubers per hill, tuber dry matter, tuber yield, stand count and tuber weight per hill as affected by varieties

Varieties	Days to flowering	Days to maturity	UNMY	MY	NTPH	TDM	YLD (t/ha)	SC /ha	T. weight/hill
Jalane	57.67c	121.7bc	1.07b	50.94a	15.26b	27.78	52.01a	35556bc	1.46a
Gudane	54.00e	124.0abc	0.68bc	54.44a	12.59bc	27.15	55.12a	39630a	1.39a
Guassa	60.00a	128.7a	1.34b	36.49bc	14.84b	31.88	48.83ab	38519ab	1.27ab
Maracher	6.00a	125.6ab	1.09b	36.92bc	11.03c	27.68	38.01bc	39259a	0.97b
Local	55.33d	118.3c	3.38a	33.22c	22.23a	20.19	36.40bc	30741d	1.19ab
Gorobella	51.00f	119.0c	0.95bc	55.25a	12.44bc	34.10	56.20a	40741a	1.39a
Gera	58.67b	125.7ab	0.31c	34.33bc	9.63c	29.36	34.64c	34815c	1.00b
LSD 5%	0.71	5.8	0.69	13.55	3.39	NS	13.37	3378.1	0.38

IV. CONCLUSION

Potato was required to be cultivated in Borana zone for consumption and selling purpose also. Adapting best suited varieties in the environment for increasing production and productivity and resistant to disease was a best strategies to overcome economic and food security. Adaptation and evaluation of varieties for local adaptation continued to part of strategic approach of Yabello research center in developing and promoting appropriate crop technologies in the area. In this experiment the potato varieties Gorobella, Gudane and Jalane were significantly higher in total and Marketable yield respectively than all varieties. Therefore, the varieties Gorobella Gudane and Jalane can be recommended for the farmers in the area to improve their Irish potato productivity under normal rain fall condition in the area.

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