PERFORMANCE OF NEW SWEETPOTATO ENTRIES UNDER LA TRINIDAD, BENGUET CONDITIONS

Ines C. Gonzales, Esther T. Botangen and Donita K. Simongo
NPRCRTC, Benguet State University

ABSTRACT

Twelve sweet potato entries namely; J06-11-10, JK 18-4, JK 7-4, JK 23-1, J06-30-3, JK 06-11-12, SG 02-07-05, SG 02-05-01, SG 02-05-01, SG 98-16-02, SG 03-09-01, SG 02-06-02, SG 02-13-02 and two (2) check varieties NSIC 30 and NSIC 31 were evaluated for its yield performance and acceptability under La Trinidad conditions for dry and wet season trials from 2009-2011.

Results showed that SG 02-07-05, SG 98-16-02, J06-11-10 had the highest yield with 24.18 t ha^{-1}, 22.39 t ha^{-1} and 20.04t ha^{-1} respectively. SG 02-07-05 significantly outyielded the check variety NSIC 31. Based on the sensory evaluation J06-11-10 was the third top highest yielder. SG 02-05-01, JK 18-4, JK 7-4, SG 02-06-02, JK 23-1, J06-30-3, SG 02-13-02, (NSIC 20 as check variety) were found highly acceptable with rating of 7-like very much. The highest dry matter content of 35% was recorded by JK 18-4 and JK 23-1. Most entries are ridgedly deformed.

Keywords: camote, natural saver, famine crop, acceptability

INTRODUCTION

Sweetpotato (*Ipomoea batatas* L.) is an important crop but Filipinos perceive it to be a “poor man’s food”. The International Potato Center in Peru calls it “a natural life saver,” because of its being a famine crop. It is consumed by many of the world’s poorest and most economically insecure households.

It is the staple food in some regions of the Philippines, Indonesia and Vietnam. Sweetpotato is basically an Asian crop. Asian countries have 82.6% of the world production area and 92.6% of the world production volume. China ranks first with 65% of the world area and 83% world production.

It used to be a staple food in the highland regions of Northern Philippines (Yen, 1974; as cited by Fang-asan *et al*., 1991). It is considered a snack food as well as vegetable in the Filipino diet. Its leaves, vines and roots are used as food and animal feed.

Sweetpotato with 2.1 KJ has higher dry matter production than rice with 1.9 KJ of rice although both produce almost the same amount of energy per hectare per day; 151 KJ for rice and 152 KJ for sweetpotato.

Sweetpotato is a lot cheaper than rice. Milled rice is 14.58 PhP/kg, and sweetpotato is only 3.08 Php/kg with a corresponding price increase of 30%. Hence, sweetpotato is a lot cheaper, only 21% of the world price of rice.

Gonzales and Masangcay (2006) reported that 99.99% of the parts of sweet potato are consumed as food, the .01% is used as feeds or seeds. Traditionally, the crop has been the staple food for many mountain tribes especially in areas where rice is not readily available.

The roots are chopped and dried into “buku” and mixed with wine.

Sweetpotato is made into flour and partly used to substitute wheat flour for baking cakes and pastries. The flour/starch is imported to Korea for noodle making. Fresh sweetpotato has been used as an ingredient of various products such as snack chips, catsup, pickles and candies that are fruit based, jam, beverage and wine (Gonzales and Masangcay, 2006).

Gonzales (2004) showed that PSBSP 17 (check variety) yielded the highest followed by SG 91-25-01, SG 94-13-03 with yields of 11.5 t ha^{-1}, SG 11.12 t ha^{-1} and 10.85 t ha^{-1}, respectively. Most entries were observed to be resistant to weevil. Dakol and Tres Flores were highly acceptable by the test panelist. Dry matter content ranged from 28.5 to 39.5%. OPS 106 gave the highest dry matter content of 28.5%.

The root skin color varied from pink, yellow to purple. Flesh color varied from white, cream yellow to purplish white.

OBJECTIVES:

Evaluate the yield performance and sensory acceptability of new sweetpotato entries under La Trinidad conditions during the wet and dry season trials

MATERIALS AND METHODS

Fourteen sweetpotato entries were sourced from the breeding stations with six from IPB-UPLB and six from PRCRTC, Leyte State University. These entries were planted from November 2009 to May 2011, wet and dry season trials. Selections were based on yield, eating quality and dry matter content.

Two double row plots measuring 1m x 6m were used with 20 cuttings per plot of 40 hills per entry. Stem cuttings each measuring about 30 cm long were planted at one cutting per hill and spaced 30 cm between hills. Each treatment were laid out following the Randomized Complete Block Design with four replications.

All necessary cultural management practices were maintained in all the treatments. Yield component includes number and weight of marketable and non-marketable roots.

Dry matter content and sensory rating were also evaluated.

Sensory evaluation was based from thirty panel members using the hedonic rating scale of 8- like extremely, 7 - like very much, 6 - like moderately, 5 - like slightly, 4 - neither like nor dislike; 3 - dislike slightly, 2 - dislike moderately, 1 - dislike very much.

RESULTS AND DISCUSSION

Computed yield per hectare

Based on the results of the dry season trials of the twelve sweetpotato entries J06 11-10, SG 02-07-05, and SG 02-05-01 had significantly outyielded the other entries with yields of 38.22 t ha^{-1}, 36.66 t ha^{-1}and 35.57 t ha^{-1}, respectively.

The high yield performance could be attributed to the genetic make up of the new entry.

Weight of marketable roots

High significant results showed on the weight of marketable roots per plot. Entry J06-11-10 (LSU entry) had the highest yield with 45.90 kgs per plot/40 hills, producing also the highest weight of non-marketable roots (7.00 kg/plot).

The three entries (UPLB) SG 02-07-05, SG-02-05-01, and SG-98-16-02 followed with 44.00 kg, 42.70 kg and 40.80 kg/plot, respectively.

Number of marketable roots per plot

Significant differences incurred for entry SG 98-16-02 with the most number of 224 roots per plot ; SG 02-05-01 with 196 roots per plot, while the lowest was produced by JK 106-11-22 with 105 roots per plot as shown in table 1.

Weight of non-marketable roots per plot

Significant differences incurred on the weight of non-marketable roots per plot as shown in table 1. Entry SG 03-09-01 had the least weight of non-marketable roots of 2.5 kg/plot while JK 06-11-12 and J06 11-10 had the heaviest weight of 7.00 kg/plot.

Number of non-marketable roots per plot

The number of non-marketable roots per plot had significant differences among the different entries evaluated. Entry JK 06-11-22 had the least number of non-marketable roots of 54 while JK 18-4 had the most number of 122 roots per plot.

Table 1. Yield performance of twelve sweetpotato entries evaluated under BSU Balili experimental station from November 2010 to May 2011, dry season trial

ENTRY	Yield (t ha $^{-1}$)	Weight of marketable roots (kg/plt)	Number of marketable roots/plot	Weight of non-marketable roots (kg/plt)	Number of non-marketable roots
J06-11-10	38.22^{a}	45.90^{a}	191^{ab}	7.00^{a}	118^{abc}
SG 02-07-05	36.66^{a}	44.00^{ab}	122^{c}	3.90^{bcdef}	66^{bcd}
SG 02-05-01	35.57^{a}	42.70^{ab}	196^{ab}	5.90^{ab}	152^{a}
SG 98-16-02	27.70^{abc}	40.80^{ab}	224^{a}	5.40^{abc}	112^{abcd}
JK 18-4	27.30^{abc}	32.80^{bcd}	190^{ab}	5.10^{abcd}	122^{ab}
JK 7-4	23.74^{bc}	28.50^{cd}	141^{bc}	2.70^{ef}	59^{cd}
SG 03-09-01	22.41^{bc}	26.90^{cd}	139^{bc}	2.50^{f}	65^{bcd}
SG 02-06-02	21.47^{bc}	25.80^{cd}	130^{c}	2.90^{def}	65^{bcd}
JK 23-1	20.84^{bc}	25.00^{cd}	127^{c}	4.30^{bcdef}	97^{abcd}
J06-30-3	20.37^{bc}	24.50^{cd}	126^{c}	3.40^{cdef}	91^{bcd}
SG 02-13-02	16.68^{c}	20.10^{d}	142^{bc}	3.20^{cdef}	100^{abcd}
JK 06-11-22	16.76^{c}	20.10^{d}	105^{c}	7.00^{a}	54^{d}
NSIC 31(ck)	29.40^{ab}	35.30^{abc}	164^{bc}	4.90abcde	103^{abcd}
NSIC 30 (ck)	22.65^{bc}	27.20^{cd}	110^{c}	4.40bcdef	105^{abcd}
CV%	25.99	24.27	24.9	32.96	38.89

Means with the same letter are not significantly different at 5% level DMRT

Computed yield per hectare

Based on the results of the wet season trials of the twelve sweetpotato entries, SG 02-07-05, and SG 98-16-02 significantly outyielded the other entries with yields of 33.03 t ha^{-1}, 30.51 t ha^{-1} but was comparable with check variety NSIC 31 with 28.66 t ha^{-1}, respectively. This results could be due to its genetic make up.

Weight of marketable roots

Significant results showed that SG 02-07-05 and SG 98-16-02 had the highest yield with 37.25 kgs per plot/40 hills and 36.63 kg per plot as shown in table 2.

Number of marketable roots per plot

The check variety NSIC 31 and SG 98-16-02 produced the most number of marketable roots per plot with 206 and 203, roots per plot respectively.

Weight of non-marketable roots per plot

Entry JK 06-11-12 had the least weight of non-marketable roots of 1.30 kg/plot while SG 98-16-02 and SG 02-05-01 had the heaviest weight of 11.22 kg/ plot and 11.20 kg/plot, respectively.

Number of non-marketable roots per plot

Entry JK 06-11-22 had the least number of non-marketable roots of 25 roots per plot. SG 98-16-02 had the most with 278 roots per plot.

Table 2. Yield performance of twelve sweetpotato entries evaluated under BSU NPRCRTC experimental station from June-October 2010, wet season trials

ENTRY	Yield (t ha^{-1})	Weight of marketable roots	Number of marketable roots/plot	Weight of non-marketable roots	Number of non-marketable roots
J06-11-10	16.85^{cd}	20.23	136^{abc}	9.40^{abc}	187^{ab}
SG02-07-05	31.03^{a}	37.25	145^{ab}	6.50^{abcd}	103^{bc}
SG02-05-01	8.89^{d}	10.68	77^{bcd}	11.20^{a}	201^{ab}
SG98-16-02	30.51^{ab}	36.63	203^{a}	11.22^{a}	278^{a}
JK 18-4	12.39^{d}	14.88	137^{abc}	9.60^{abc}	184^{ab}
JK 7-4	12.70^{d}	15.25	94^{bcd}	4.5^{cd}	84^{bc}
SG 03-09-01	17.28^{bcd}	20.75	133^{abc}	10.70^{ab}	180^{ab}
SG 02-06-02	19.14^{abcd}	22.98	149^{ab}	10.40^{ab}	196^{ab}
JK 23-1	14.27^{d}	17.13	84^{bcd}	6.10^{abcd}	114^{bc}
J 06-30-3	10.62^{d}	12.75	83^{bcd}	5.30^{bcd}	113^{bc}
SG 02-13-02	9.81^{d}	11.78	73^{bcd}	6.80^{abcd}	95^{bc}
JK 06-11-22	7.23^{a}	8.68	36^{d}	1.30^{d}	25^{c}
NSIC 31(ck)	28.66^{abc}	34.40	206^{a}	6.80^{abcd}	130^{bc}
NSIC 30 (ck)	5.64^{d}	6.78	61^{cd}	6.40^{abcd}	149^{bc}
CV%	31.41	31.58	30.43	24.27	27.67

Means with the same letter are not significantly different at 5% level DMRT

Yield performance of the new sweetpotato entries for three year trials from 2009-2011

Overall results showed that SG 02-07-05 had the highest mean yield of 24.18 t ha^{-1} followed by the check variety NSIC 31 with yield of 23.84 t ha^{-1}. Other top entries were SG 98-16-02, J06 11-10 with 22.39 t ha^{-1} and 20.04 t ha^{-1}, respectively. High yield performance could be attributed to the genetic make up of the newly breed entry.

Sensory evaluation of boiled sweetpotato entries

Appearance. No significant differences incurred on the appearance of boiled sweetpotato entries, however SG-02-05-01, SG 02-06-02 had the highest rating of 7-like very much while NSIC 31 (check variety) check and SG 02-07-05, SG-03-09-01 had the lowest rating of 6.

Color. Based on color NSIC SP 30, check variety had the highest rating of 8-like very much. Most entries were rated 7.

Texture. Significant results showed on the texture of boiled sweetpotato entries SG 02-07-05, 98-16-02, JK 7-4, SG 02-06-02, JK 23-1, Jo6 30-3, SG 02-13-02 and NSIC with a rating of 7.

Flavor. Most entries were rated 7 namely entries, J06 11-10, SG 02-05-01, JK 8-4,J K7-4, SG 02-06-02, JK 23-2, JO6 30-3, SG 02-13-02 and NSIC 31(ck).

General Acceptability. Most sweetpotato entries were highly acceptable. Entries J06 11-10, SG 02-05-01, JK 8-4, JK 7-4, SG-02-06-02, JK 23-2, JO6 30-3, SG 02-13-02 and NSIC 30(ck) were rated 7. General acceptability of the entries was highly affected by its flavor.

Dry Matter Content (%). Entry JK 18-4 had the highest acceptability rating of 35% followed by SG 02-05-01, SG 02-06-02, J06 30-3, SG 02-13-02 with 32%. SG 02-07-05 had the lowest with 27%.

Table 3. Summary yield performance of the new swetpotato entries t ha-1 for three year trials from 2009 to 2011.

Entries	2009	2010	2011	Mean(t thaha-1)
J06-11-10	5.04cd	38.22 a	16.85cd	20.04
SG02-07-05	4.84cde	36.66 a	31.03a	**24.18**
SG02-05-01	3.21def	35.57 a	8.89d	15.89
SG98-16-02	8.96b	27.70abc	30.51ab	22.39
JK 18-4	2.15efg	27.30abc	12.39d	13.93
JK 7-4	3.52def	23.74bc	12.70d	13.32
SG 03-09-01	5.63cd	22.41bc	17.28bcd	15.11
SG 02-06-02	9.06b	21.47bc	19.14abcd	16.56
JK 23-1	0.95fg	20.84bc	14.27d	12.02
J 06-30-3	6.86bc	20.37bc	10.62d	12.62
SG 02-13-02	1.58fg	16.68c	9.81d	9.36
JK 06-11-22	5.27f	16.76c	7.23a	9.75
NSIC 31(ck)	13.45a	29.40ab	28.66abc	23.84
NSIC 30 (ck)	6.48bc	22.65bc	5.64d	11.59
CV%	18.00	25.99	31.41	

Means with the same letter are not significantly different at 5% level DMRT

Table 4. Sensory evaluation of boiled sweetpotato roots and dry matter content of twelve new sweetpotato entries

ENTRY	Appearance	Color	Texture	Flavor	General Acceptability	Dry Matter Content
J06-11-10	7	7	6ab	7a	7a	30c
SG02-07-05	6	6	6ab	5b	5c	27d
SG02-05-01	8	7	7a	7a	7a	32b
SG98-16-02	7	7	7a	6ab	6b	26e
JK 18-4	7	7	6ab	7a	7a	35a
JK 7-4	7	7	7a	7a	7a	30c
SG 03-09-01	6	6	5b	5b	5c	30c
SG 02-06-02	8	7	7a	7a	7a	32b
JK 23-1	7	7	7a	7a	7a	35a
J 06-30-3	7	6	7a	7a	7a	32b
SG 02-13-02	7	7	7a	7a	7a	32b
JK 06-11-22	-	-	-	-	-	-
NSIC 31(ck)	6	6	7a	7a	6b	30c
NSIC 30 (ck)	7	8	6ab	7a	7a	30c

Means with the same letter are not significantly different at 5% level DMRT

Scale: 1 - dislike very much, 8 – like very much

Table 5. Root characters of sweetpotato entries

Entries	Skin color	Flesh color	Root shape	% Malformed shape
J06-11-10	pink	yellow	ridged	46
SG02-07-05	red	cream	ridged	43
SG02-05-01	white	cream	ridged	75
SG98-16-02	pink	white	ridged	51
JK 18-4	purple	white	ridged	28
JK 7-4	pink	purple	ridged	42
SG 03-09-01	purple	orange	ridged	88
SG 02-06-02	white	white	ridged	32
JK 23-1	pink	yellow	ridged	99
J 06-30-3	pink	white	ridged	13
SG 02-13-02	orange	light orange	ridged	55
JK 06-11-22	white	white	ridged	21
NSIC 31(ck)	purple	white	elongated	49
NSIC 30 (ck)	pink	orange	elongated	21

Root characters of sweetpotato entries

Entries varied on the colors. Skin colors were pink, white, purple, orange and red. Flesh color were yellow, cream, white, purple, orange and light orange. Most root shape were ridged, while the check varieties were elongated. Entries SG 02-13-02, SG 03-09-01 and JK 23-1 had the lowest percentage malformed shape ranging from 5-9%. SG 02-05-01 had the highest malformed shape of 75%. Malformation of roots could be due to its sensitivity to cold weather.

Summary and Conclusion

Three year trial from 2009 to 2011 was conducted at BSU experimental area, La Trinidad, Benguet to evaluate the performance of new sweetpotato entries namely; PRCRTC, LSU entries includes; J06-11-10, JK 18-4, JK 7-4, JK 23-1, J06-30-3, JK 06-11-12, IPB-UPLB entries includes; SG 02-07-05, SG 02-05-01, SG 02-05-01, SG 98-16-02, SG 03-09-01, SG 02-06-02, SG 02-13-02. With a total of twelve (12) entries and two (2) check varieties NSIC 30 and NSIC 31.

Among the new sweetpotato entries sourced from IPB-UPLB, root performance showed that two entries namely; SG 02-07-05, and SG 98-16-02, were the top highest yielders.

Among the eight entries sourced from PRCRTC-LSU entry J06-11-10 was the highest top three based on root yield.

Based on the sensory evaluation J06-11-10 was the third top highest yielder. SG 02-05-01, JK 18-4, JK 7-4, SG 02-06-02, JK 23-1, J06-30-3, SG 02-13-02, (NSIC 20 ck) were found highly acceptable with rating of 7-like very much.

Dry Matter Content (DMC) showed that JK 18-4 and JK 23-1 had the highest with 35% DMC. Most entries are ridgedly deformed.

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Plate 1. Sweetpotato entries harvested at BSU Balili Experimental station

Literature cited

Gonzales I. C. and T. D. Masangcay. 2010. Sweetpotato Industry profile. Northern Philippines Root crops research and Training Center, Benguet State University, La Trinidad, Benguet 2601.

Gonzales, I. C 2004. Results of sweetpotato trials under La Trinidad, Benguet. NPRCRTC, Benguet State University, La Trinidad, Benguet-2601.

Gonzales, I. C. and T. D. Masangcay. 2006. Results of sweetpotato trials under La Trinidad, Benguet. NPRCRTC, Benguet State University, La Trinidad, Benguet-2601.

NPRCRTC. 2010. Root Crop Industry profile, NPRCRTC, Benguet state University, La Trinidad, Benguet-2601.

Fang-asan M. L. D. and R. P. Mula. 1991. cited in the Sweetpotato Industry profile, NPRCRTC, Benguet State University, La Trinidad, Benguet-2601.