Meals for Nutrition Uganda (MENU)

Final Report

January–December 2018

Prepared for:
HarvestPlus

Submitted by:

Meals for Nutrition Uganda (MENU)

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Prepared by:

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Cover Photo:

Joweria Namakula (left) (NaCRRI) and Peter C. Apunyo (right) (CIP) join excited farmers looking at roots from cleaned variety 'NASPOT 8' during harvesting of on-farm trials in Kamwenge.

(Credit: Gerald Kyalo–CIP)

TABLE OF CONTENTS

ACRONYMS

AYTs	Advanced yield trials
CEC	Cation exchange capacity
CIP	International Potato Center
KEPHIS	Kenya Plant Health Inspection Service
MENU	Meals for Nutrition Uganda
NaCRRI	National Crops Resources Research Institute
NARO	National Agricultural Research Organization
OFTs	On-farm trials
OSP	Orange sweetpotato
OTs	Observation trials
PYTs	Preliminary yield trials
SPVD	Sweet potato virus disease

SUMMARY

During this reporting period (Jan.–Dec. 2018), the Meals for Nutrition Uganda project planted 80 on-farm trials (OFTs) so as to evaluate seven promising orange sweetpotato (OSP) clones—namely KML756(OP)/2013/2, KUM84(OP)/2013/2, MPG1158(OP)/2013/7, Magabali(OP)/2013/3, S47, S97, and D26—in five districts: Kamuli, Lira, Masaka, Isingiro, and Kamwenge. Forty-seven OFTs planted in 2017B and 2018A were harvested. Results from the 2018A OFTs showed that root yield differed significantly between location ($p<0.001$) and genotypes ($p = 0.011$). Generally, genotypes performed well in Kamwenge (average root yield = 12 t/ha) and Lira (average root yield = 8 t/ha). Test clone S97 had the highest yield recorded in Kamwenge (18.4 t/ha), whereas the lowest yield was recorded for MPG1158(OP)/2013/7 in Kamuli (1.9 t/ha). Genotype S97 (average yield = 10.9 t/ha) performed slightly better than the best standard check 'NASPOT 8' (average root yield = 9.8 t/ha).

There was a significant difference in incidence of sweet potato virus disease (SPVD) across locations and genotypes ($p<0.001$). The highest incidence of SPVD was observed in Kamwenge (average score of 3.5). Lira and Kamuli had similar but low incidence of SPVD (average score for each of 1.9). The most susceptible genotype was S47 (average score of 6), whereas the most resistant were 'NASPOT 8' and 'NASPOT 13 O' (average score of 1.5).

The National Crops Resources Research Institute (NaCRRI) established one observation trial and three preliminary yield trials and advanced yield trials each in Serere, Kacwekano, and Rwebitaba using promising OSP clones. NaCRRI has dispatched three OSP candidate clones for official release to the Kenya Plant Health Inspection Service for cleanup.

The last round of curing experiments was set up with Miti farmers' group in Kalisizo Rural Subcounty, Kyotera District. The experiments were set up with sweetpotato varieties 'Kabode' ('NASPOT 10 O'), 'NASPOT 8' (OSP), and 'NASPOT 1' (cream-colored root parenchyma) using six treatments and de-topping for 0, 1, 2, 3, 4, 5, and 7 days before harvesting. After 87 days of storage, results showed a significant difference in weight loss, rotting, and weevil infestation ($p<0.05$) between treatments. Generally, less weight loss was observed in treatments 4 and 5 across varieties. There was no significant difference between treatments for shriveling and sprouting. Weevil damage was significantly different between varieties ($p=0.048$), treatments ($p=0.029$), and locations ($p<0.001$). Results of the curing trial were presented to 24 commercial farmers from Mukono, Lwengo, Rakai, Luwero, and Mpigi districts. Farmers adopting curing were also trained on good harvesting and postharvest handling practices for roots.

1. INTRODUCTION

The Meals for Nutrition Uganda (MENU) is a 5-year project implemented by the International Potato Center (CIP) and the Root Crops Program at the National Crops Resources Research Institute (NaCRRI). Started in 2017 as a continuation of the Delivering and Disseminating Biofortified Crops in Uganda (BIOFORT Uganda) project, MENU aims to continue efforts of developing new clones of orange sweetpotato (OSP) and contributing to development of the sweetpotato seed systems to ensure that quality planting materials are supplied in the required quantities. MENU works in collaboration with HarvestPlus and the Root Crops Program of the National Agricultural Research Organization (NARO), to support the scaling up and commercialization of OSP for sustainability through increasing access of virus-free planting material, scaling up of recommended practices of curing, and continued development of varieties that satisfy consumer demand. This is the final report for the second year of the project with component objectives.

This report is organized around the project's three major objectives and briefly describes the progress made, with illustrations in Tables 1–5, Figures 1–2, and Appendix 1.

1.1 Project Objectives

The main objectives of the MENU project are to:

1. Continue varietal improvement of next-generation seed supply in collaboration with HarvestPlus and NARO
2. Conduct on-station and on-farm testing of new OSP potential and released varieties in five agro-ecological zones
3. Further test curing of sweetpotatoes and other storage options for fresh roots with smallholder farmers

2. MAJOR ACCOMPLISHMENTS

2.1 OSP Varietal Research and On-Farm Trials

To evaluate promising OSP clones, 80 on-farm trials (OFTs) were planted in 2018 in five districts: Kamuli, Kamwenge, Isingiro, Masaka, and Lira. Procedures for the evaluation and analysis of sweetpotato trials by Grüneberg (2010)[1] were followed. Thirty OFTs were planted in the first season and 50 planted in the second season. The first season trials were established in June 2018, whereas the second season trials were established between August and October 2018, depending on weather conditions in the different locations. The OFTs were established with individual farmers and farmer groups in the respective districts. Ten OFTs (the farms were replicates) were planted per district with seven OSP clones (the clones were randomized in each

1. Grüneberg, W.J., R. Eyzaguirre, J. Espinoza, R.O.M. Mwanga, M. Andrade, H. Dapaah, S. Tumwegamire, S. Agili, F.P.Ndingo-Chipungu, S. Attaluri, R. Kapinga, T. Nguyen, X. Kaiyung, K. Tjintokohadi, T. Carey, and J. Low. 2010. Procedures for the evaluation and analysis of sweetpotato trials. International Potato Center, Lima, Peru.

farm): KML756(OP)/2013/2, KUM84(OP)/2013/2, MPG1158(OP)/2013/7, Magabali(OP)/2013/3, S47, S97, and D26, with two standard checks, 'NASPOT 13 O' and 'NASPOT 8'. Each trial consisted of 10 plots of 20 mounds, planted with 60 cuttings (30 cm each). Trials were assessed for establishment, vigor, sweetpotato virus disease (SPVD), and *Alternaria blight* disease (incidence and severity). Data on root and vine yield as well as weevil infestation were collected at harvest.

Seventeen OFTs planted in Kamwenge (Fig. 1), Kamuli, and Dokolo in the second season of 2017 were harvested between February and May 2018 (results were presented in the MENU midterm report, 2018). OFTs planted in the first season of 2018 were also harvested between September and November 2018. The results on root yield differed significantly between location (p<0.001) and genotypes (p=0.011). Generally, genotypes performed well in Kamwenge (average root yield of 12 t/ha) and Lira (average root yield of 8 t/ha) (Table 1). Overall, genotype S97 recorded the highest root yield (10 t/ha), whereas genotype S47 recorded the lowest yield (4 t/ha). Genotype S47 did not only perform poorly but it was also very susceptible to SPVD, which could be one of the reasons for its poor performance. Genotype S97 performed slightly better than the best standard check 'NASPOT 8' (average root yield of 10 t/ha).

Vine yield varied significantly across locations and genotypes (p<0.001). The highest vine yield was observed in Kamwenge (17 t/ha), followed by Lira (9 t/ha). The lowest was observed in Kamuli (5 t/ha).

There was a significant difference in SPVD incidence across locations and genotypes (p<0.001). The highest incidence of SPVD was observed in Kamwenge (average score of 3.5). Lira and Kamuli had similar but low incidence of SPVD (average score for Lira and Kamuli was 1.9). The most susceptible genotype was S47 (average score of 6), whereas the most tolerant were 'NASPOT 8' and 'NASPOT 13 O' (average score of 1.5). Except for Kamwenge, genotypes D26, KML756(OP)/2013/2, KUM84(OP)/2013/2, Magabali(OP)/2013/3, and MPG1158 (OP)/2013/7 had comparably low levels of SPVD in the rest of the districts. This shows that the three potential OSP genotypes KML756(OP)/2013/2, KUM84(OP)/2013/2, and MPG1158(OP)/2013/7 were relatively resistant to SPVD. Although clone S97 performed well, its susceptibility to SPVD in Kamwenge shows that it cannot be grown in high SPVD pressure areas like Mukono, Mpigi, and Rakai. The higher incidences of SPVD in Kamwenge can be attributed to possible favorable factors for multiplication of virus vectors such as whiteflies and aphids; whereas the low SPVD occurrence in Lira can be attributed to less favorable factors for the increase of the virus vectors.

The levels of incidence of *Alternaria blight* were not significantly different between genotypes, but differed significantly between locations (p<0.001). Like SPVD, the incidence of *Alternaria blight* was highest in Kamwenge (average score of 2.1) and lowest in Lira (average score of 1.1). In Kamwenge, MPG1158(OP)/2013/7 recorded the highest incidence of *Alternaria blight* (average score of 4.2).

Weevil infestation did not differ significantly among genotypes (p=0.545), but differed significantly (p<.001) across locations. There was no interaction between genotypes and locations (p=0.332). The highest weevil infestation was recorded in Kamwenge and Kamuli (average scores of 2.3 and 2.1, respectively), whereas the lowest incidence was observed in Lira (average score of 1.6) (Table1). Generally, most of the genotypes had low levels of weevil damage across all locations, due perhaps to the heavy rains that were received across the country during the time of harvesting.

Table 1. Average performance of seven OSP clones evaluated in verification OFTs in four districts in Uganda (trials planted in June 2018, harvested in October–November 2018)

District/Genotype	Root Yield (t/ha)	Marketable Root Yield (t/ha)	Vine Yield (t/ha)	SPVD Scores	Alternaria Scores	Weevil Infestation	Flesh Color
Lira							
D26	8.2	6.8	8.6	1.2	1.0	1.6	8
KML756(OP)/2013/2	6.8	5.7	9.7	1.2	1.0	1.4	8
KUM84(OP)/2013/2	9.2	7.8	7.8	1.8	1.2	1.4	8
MAGABALI(OP)/2013/3	9.1	7.5	9.9	1.2	1.2	1.4	8
MPG1158(OP)/2013/7	14.0	10.7	9.4	1.2	1.2	2.2	8
S47	3.4	2.4	5.1	6.4	1.0	1.4	8
S97	8.9	7.5	12.2	2.0	1.2	1.8	8
NASPOT 8	6.8	5.9	8.6	1.0	1.0	1.6	6
NASPOT 13 O	6.2	4.6	9.8	1.2	1.0	1.4	8
Mean	8.1	6.5	9.0	1.9	1.1	1.6	NA
Kamwenge							
D26	8.9	6.8	7.2	2.8	1.6	2.2	8
KML756(OP)/2013/2	12.2	9.7	17.7	2.8	3.6	2.6	8
KUM84(OP)/2013/2	12.9	10.8	15.5	2.0	1.4	2.4	8
MAGABALI(OP)/2013/3	11.2	9.6	23.3	4.2	1.0	2.2	8
MPG1158(OP)/2013/7	10.7	8.0	6.4	3.0	4.2	2.2	8
S47	7.5	5.4	5.9	7.4	2.8	3.4	8
S97	18.4	15.4	25.4	4.8	1.0	2.0	8
NASPOT 8	18.7	17.3	22.5	2.2	1.0	1.8	6
NASPOT 13 O	10.0	8.9	36.4	2.4	2.2	2.0	8
Mean	12.3	10.2	17.8	3.5	2.1	2.3	NA
Kamuli							
D26	4.1	2.2	3.7	2.20	1.20	2.40	8
KML756(OP)/2013/2	3.5	1.9	3.7	1.40	1.00	2.20	8
KUM84(OP)/2013/2	4.9	3.3	9.9	1.20	1.00	2.60	8
MAGABALI(OP)/2013/3	4.6	2.9	6.7	1.20	1.60	3.20	8
MPG1158(OP)/2013/7	1.9	0.5	4.6	1.80	1.20	2.20	8
S47	2.1	1.1	3.2	5.60	1.40	2.40	8
S97	5.3	4.0	4.3	2.00	1.00	2.20	8
NASPOT 8	3.8	2.9	7.6	1.40	1.20	2.20	6
NASPOT13 O	3.1	1.9	9.3	1.00	1.00	1.80	8
Mean	3.7	2.3	5.9	1.98	1.18	2.36	NA
Overall mean	8.0	6.3	10.9	2.47	1.45	2.08	NA
$LSD_{0.05}$ genotype	3.3	3.2	5.3	0.65	0.78	0.61	NA
$LSD_{0.05}$ location	1.9	1.8	3.1	0.38	0.45	0.35	NA

District/Genotype	Root Yield (t/ha)	Marketable Root Yield (t/ha)	Vine Yield (t/ha)	SPVD Scores	Alternaria Scores	Weevil Infestation	Flesh Color
LSD$_{0.05}$genotypex location	5.8	5.5	9.2	1.13	1.36	1.05	NA
CV (%)	22.3	24.2	19.3	11.40	31.20	11.20	NA

Performance by genotypes

District/Genotype	Root Yield (t/ha)	Marketable Root Yield (t/ha)	Vine Yield (t/ha)	SPVD Scores	Alternaria Scores	Weevil Infestation	Flesh Color
D26	7.1	5.3	6.5	2.1	1.3	2.1	8
KML756(OP)/2013/2	7.5	5.8	10.3	1.8	1.9	2.1	8
KUM84(OP)/2013/2	9.0	7.3	11.0	1.7	1.2	2.1	8
MAGABALI(OP)/2013/3	8.3	6.7	13.3	2.2	1.3	2.3	8
MPG1158(OP)/2013/3	8.9	6.3	6.8	2.0	2.2	2.2	8
S47	4.3	3.0	4.7	6.5	1.7	2.4	8
S97	10.9	9.0	13.9	2.9	1.1	2.0	8
NASPOT 8	9.8	8.7	12.9	1.5	1.1	1.9	6
NASPOT 13 O	6.4	5.2	18.5	1.5	1.4	1.7	8
Mean	8.0	6.4	10.9	2.5	1.5	2.1	NA
LSD$_{0.05}$ genotype	3.3	3.2	5.3	0.65	0.78	0.61	NA

NOTE: Pests and diseases were scored on a scale of 1–9, where 1 = no infestation/damage and 9 = very severe damage; flesh color scored: 6 = pale orange, 7 = intermediate orange, and 8 = dark orange. NA = not applicable.

A

B

C **D**

E **F**

G **H**

Figure 1. **A** ***and*** **B*****, harvesting OFTs in Kamwenge District;*** **C*****, roots from cleaned 'NASPOT 8';*** **D–G*****, roots of some of the clones after harvesting; and*** **H, Alternaria blight** ***symptoms on MPG1158(OP)/2013/7.***

During the palatability tests conducted on boiled roots and fried sweetpotato roots, farmers preferred KML756(OP)/2013/2 (32%) more than the standard check variety 'NASPOT 8' (30%). This was followed by Magabali(OP)/2013/3 (19%) and KUM84(OP)/2013/2 (13%). The least preferred clone was MPG1158(OP)/2013/7 (4%). For fried sweetpotato, farmers most preferred the check variety 'NASPOT 8' (25%), followed by KML756(OP)/2013/2, Magabali(OP)/2013/3, and KUM84(OP)/2013/2 in equal measure (22%) (Table 2).

Table 2. Preference of test clones during palatability tests in Lira District; conducted on 2018A on OFT materials, harvested in October 2018

Boiled Sweetpotato			**Fried Sweetpotato**		
Sweetpotato Genotype	**Freq.**	**%**	**Sweetpotato Genotype**	**Freq.**	**%**
KML756(OP)/2013/2	15	32.2	KML756(OP)/2013/2	8	22.8
KUM84(OP)/2013/2	6	13.0	KUM84(OP)/2013/2	8	22.8
MPG1158(OP)/2013/7	2	4.3	Magabali(OP)/2013/3	8	22.8
Magabali(OP)/2013/3	9	19.5	NASPOT 13	2	5.7
NASPOT 8	14	30.4	NASPOT 8	9	25.7
Total	**46**	**100**	**Total**	**35**	**100**

2.1.1 Soil sampling and analysis

Samples were collected from all the districts where OFTs were conducted and taken to the PAAT soil clinic to be analyzed for different physical, chemical, and biological properties (Table 3). There were no significant differences (p= 0.889) in cation exchange capacity (CEC) across the different locations. Kamwenge had the lowest (92.7cmol/kg) and Lira the highest (101cmol/kg). CEC is a very important chemical property of the soil as it reflects on the ability of the soil to retain nutrients in plant-available forms. It also influences the management of the soil—for example, since soils with low CEC cannot hold nutrients for long in case of fertilizer application, a farmer should apply fertilizers as split doses to reduce nutrient loss through the process of leaching.

Exchangeable potassium (K) did not differ significantly (p=0.498) across the different locations, and ranged from 5.12 (Lira) to 6.25 (Kamuli) with the overall mean of 5.78.

There was no significant difference in nitrogen (N) content (p=0.809), with Kamwenge having the highest (2.13), followed by Lira (1.97) and Kamuli 1.93). N values for Lira and Kamuli were below the critical values (1–2). The differences in the N levels of the soils can be attributed to the differences in the types of soils as well as farmers' management practices. The low levels of N in Kamuli could be an indication of the low yields observed. The amount of organic carbon did not differ significantly (p=0.685) across the different locations. The amount of organic carbon ranged from 22.7 (Kamuli) to 26.9 (Kamwenge), with the overall mean of 24.7. There were no significant differences (p=0.221) in total phosphorus (P) across the different locations: from 0.427 (Lira) to 0.565 (Kamuli), with the overall mean of 0.496.

Soil pH did not differ significantly (p=0.491) across all the locations, with the overall mean of 4.934. The pH ranged from 4.813 (Kamuli) to 5.047 (Lira). The pH values indicated that most of the soils were slightly acidic and were not within the ideal range of 5.5–6.5. The low pH can therefore affect the availability of most of the essential nutrients, especially available P, which gets fixed at low pH levels. The low pH also reduces the availability of other important nutrients such N, K, manganese, magnesium, as well as the activities of soil organisms.

Table 3. Summary of the results of soil analysis from 2018A OFTs

District	pH	O.C	N	P	K	Mg	Mn	Na	Ca	Zn	CEC
Kamuli	4.8	22.7	1.9	0.6	6.3	2.3	15.6	0.2	3.9	6.7	100.0
Kamwenge	4.9	26.9	2.1	0.5	6.0	1.9	29.2	0.1	3.7	9.0	92.7
Lira	5.0	24.3	2.0	0.4	5.1	2.0	18.9	0.2	4.4	8.6	101.0
Mean	4.9	24.7	2.0	0.5	5.8	1.9	22.1	0.1	3.8	7.6	97.9
$LSD_{0.05}$	0.4	10.4	0.7	0.2	2.1	0.5	13.7	0.1	1.2	1.5	39.7
CV (%)	6.7	34.2	28.2	26.4	29.3	22.2	51.9	40.5	26.2	16.5	32.9

2.2 Evaluation of Multilocation On-station Trials of OSP at the Advanced Yield Trials Stage

NaCRRI established sweetpotato trials, one observation trial (OT) at NaCRRI–Namulonge and three preliminary yield trials (PYTs) and advanced yield trials (AYTs) each at Serere, Kachwekano, and Rwebitaba in the first season of 2018. NaCRRI is multiplying three candidate clones for on-station and on-farm evaluation. Three clones will be sent to the Kenya Plant Health Inspection Service (KEPHIS) for cleanup in preparation for anticipated variety release.

2.3 In-ground and Out-of-ground Curing Experiments

The last round of curing experiments were set up in July 2018, with Miti farmers' group in Kalisizo Rural Subcounty, Kyotera District. The experiments were set up with sweetpotato varieties 'Kabode' ('NASPOT 10 O'), 'NASPOT 8' (OSP), and 'NASPOT 1' (cream fleshed) using six treatments—detopping for 0, 1, 2, 3, 4, 5, and 7 days before harvesting. The roots were stored for almost 3 months and were assessed biweekly for rotting, sprouting, weight loss, and weevil infestation using a five-point scale (1 = absence of defects, 5 = severe defects) (Table 4; Fig. 2). After 87 days of storage, results showed a significant difference in weight loss, rotting, and weevil infestation ($p<0.05$) among treatments. Generally, less weight loss was observed in treatments 4 and 5 across varieties. The highest level of weight loss was observed in treatment 2, 'NASPOT 8' (% weight loss = 68%), followed by treatment 7, 'NASPOT 1' (% weight loss = 66%). There were no significant differences between varieties. More rotting was observed in roots that were cured for 2 days compared with the rest of the treatments. There was no significant difference between treatments for shriveling and sprouting.

Weevil damage was significantly different between varieties (p=0.048), treatments (p=0.029), and locations (p<.001). On average, roots stored in Rakai District had the highest level of weevil infestation after 87 days of storage (average score = 5.3; data not shown), whereas roots in Masaka had relatively low level of weevil infestation (average score = 3.6). 'NASPOT 8' had the highest weevil infestation (average score = 4.8), followed by 'NASPOT 10 O' (average score = 4.2).

Table 4. Percentage weight loss, rotting, shriveling, sprouting, and weevil damage of three sweetpotato varieties under different in-ground curing treatments in 2016

Variety	Treatment (days)	% Weight Loss	Rotting	Shriveling	Sprouting	Weevil Damage
NASPOT 1	0	24.41	1.00	2.00	3.00	3.67
	1	46.18	1.00	2.00	2.17	3.00
	2	55.07	1.67	2.33	2.67	3.33
	3	60.57	1.00	2.00	2.50	3.50
	4	27.55	1.33	2.33	3.00	5.00
	5	22.50	1.00	1.67	2.67	4.00
	7	66.41	1.00	2.00	3.00	2.00
NASPOT 10 O	0	20.41	1.00	2.00	2.00	3.67
	1	19.76	1.00	2.00	2.33	3.00
	2	67.89	2.00	3.50	2.00	3.50
	3	63.78	1.00	3.00	1.67	4.00
	4	25.80	1.00	1.67	2.33	4.00
	5	25.06	1.00	2.33	2.00	4.67
	7	58.43	1.00	2.33	1.67	2.67
NASPOT 8	0	22.04	1.33	1.67	2.00	3.67
	1	24.67	1.00	2.00	3.00	5.00
	2	68.48	2.33	2.67	2.33	5.00
	3	65.05	1.00	1.50	2.00	2.00
	4	62.18	1.00	1.67	2.00	4.33
	5	35.10	2.33	2.67	2.00	3.00
	7	64.38	1.33	2.00	2.33	2.33
Mean						
$LSD_{0.05}$ Trt		S	S	NS	NS	S
CV (%)		25.90	41.61	27.65	26.28	36.16

NOTE: Sprouting, shriveling, and rotting—Codes: 1= absence of defects, 5= severe defects; weevil damage: scale of 1–9, where 1 = no infestation and 9 = very severe damage.

2.3.1 Presentation of curing results to commercial farmers

Results from curing experiments were presented to commercial farmers from Mukono, Masaka, Luwero, Lwengo, Rakai, and Mpigi districts at Zebra Hotel, Masaka, on 20 December 2018. Farmers were also introduced and trained on good harvesting and postharvest handling practices that prolong root shelf life. The meeting was attended by 35 people (8 females). Mr. Jude Asiimwe from HarvestPlus presented on practices that increase sweetpotato shelf life. Farmers tested cooked sweetpotato roots that were cured and stored for 21 days and compared them to roots that had been harvested in the morning. Farmers could not tell which one was 21 days old or 1 day old. Curing sweetpotato roots in-ground extends shelf life by more than 3 weeks. This is sufficient for home consumption and for storage in markets (which rarely exceeds 1 week).

A

B

C

D

E

F

G

Figure 2.* A-G, *cured and non-cured roots after 87 days of storage.

2.5 Strengthening Conservation, Multiplication, and Dissemination of Clean Planting Material

CIP has continued to support vine multipliers across all regions of Uganda to increase usage of clean planting materials. Gerald Kyalo participated in the vine multipliers' review meeting, held in Luwero on 21–23 February 2018. Twenty-four people (4 females) attended. The meeting's objectives were to:

- Share experiences in the production, inspection, and marketing of vines and roots in sweetpotato production
- Review last years' work plans for associations and draft work plans for 2018
- Spot check on items such as nets, fields, and markets for the host vine multipliers
- Get an update from stakeholders on the sweetpotato seed systems' inspection and research.

3. SUMMARY OF PERSONNEL COMMITMENTS

Dr. Robert Mwanga and Dr. Gerald Kyalo are serving as principal investigator and agronomist for the project, respectively.

4. MAJOR EQUIPMENT ACQUIRED

None.

5. DESCRIPTION OF SIGNIFICANT TRAVEL

During the reporting period, CIP staff undertook travels to accomplish project objectives (Table 5).

Table 5. Summary of significant travels in 2018

Date	Name	Institution	Location	Travel Objective	Output
22–26 May	Gerald Kyalo	CIP	Masaka	Monitoring materials for curing and plan for set up of curing experiments	Plan for set up of curing experiments finalized
25 May–8 June	Gerald Kyalo, Joweria Namakula	CIP NaCRRI	Kamwenge, Lira	Harvesting 2017B OFTs, planting 2018A OFTs	7 OFTs harvested in Kamwenge, 20 OFTs planted
11–22 June	Gerald Kyalo, Joweria Namakula	CIP NaCRRI	Kamuli, Masaka	Harvesting 2017B on-farm trials, planting 2018A on-farm trials	5 OFTs harvested, 20 OFTs planted
3–5 July	Gerald Kyalo	CIP	Iganga	Participate in the HarvestPlus semiannual review meeting	Notice obtained from panel discussion for 2019 seed systems work plans
24–29	Gerald Kyalo	CIP	Rakai,	Setting up curing trials	Curing set up with farmers in

Date	Name	Institution	Location	Travel Objective	Output
July			Masaka		Masaka and Rakai
15–21 Oct.	Gerald Kyalo Joweria Namakula	CIP NaCRRI	Lira	Harvesting 2018A on-farm trials	10 OFTs harvested, 1 palatability test conducted
30 Oct–4 Nov.	Gerald Kyalo Joweria Namakula	CIP NaCRRI	Kamuli	Harvesting 2018A on-farm trials	8 OFTs harvested, 1 palatability test conducted
12–17 Nov.	Gerald Kyalo Joweria Namakula	CIP NaCRRI	Kamwenge	Harvesting 2018A on-farm trials	10 OFTs harvested, 1 palatability test conducted
5–13 Dec.	Gerald Kyalo Joweria Namakula	CIP NaCRRI	Kamuli, Isingiro	Monitoring and data collection from 2018B on-farm trials	OFTs monitored; pre-harvest data on SPVD, establishment, and vigor collected

6. DELAYS, PROBLEMS, SUGGESTIONS

The planned project activities were implemented smoothly, although there were delays in starting implementation. The delay caused the 2017B OFTs to be late and loss of some plots to animals on the host farmers' fields.

APPENDIX 1. PROGRESS ON OBJECTIVES AND OUTCOMES

Milestone	Targeted Outputs	Baseline	Target Data	Progress/Status	Comments
Objective 1: Continue varietal improvement of next-generation seed supply in collaboration with HarvestPlus and NARO					
Provide at least 2 new clones for cleanup for the seed system in 2018	Promising clones cleaned up before they are provided to vine multipliers and farmers	New clones from NaCRRI not yet cleaned	Continuous activity	NaCRRI keeps *in vitro,* virus-free plantlets of all released OSP varieties at the tissue culture lab. NaCRRI has submitted to KEPHIS 3 promising OSP clones for clean up.	Cleaned OSP varieties are a source of seed to feed into the seed system
Objective 2: Conduct on-station and on-farm testing of new OSP potential and released varieties in five agro-ecological zones					
Conduct participatory evaluation of promising OSP clones	New OSP clones evaluated with farmers and at least 2 clones selected for further evaluation	New OSP clones from NaCRRI have not been tested in new HarvestPlus project areas	Continuous activity	80 OFTs planted in Lira, Kamuli, Isingiro, Masaka, and Kamwenge districts; 85% completed	OFTs were set up with 7 OSP clones: KML 756(OP)/2013/2, KUM84(OP)/2013/2, MPG1158(OP)/2013/7, MAGABALI(OP)/2013/3, S47, S97, and D26, with 3 standard checks: 'NASPOT 13 O' and 'NASPOT 8'. 2018A trials were harvested. 2018B trials to be harvested in early 2019.
	New OSP clones evaluated in OTs, PYTs, and AYTs in different agro-ecologies	New OSP clones from NaCRRI need to be evaluated at different levels areas	Ongoing	NaCRRI has established OTs at NaCRRI, PYTs and AYTs at Serere, Kachwekano, and Rwebitaba. 1 OT, 3 PYTs, and 3 AYTs were planted on-station.	Clones from the on-station trials feed into the OFTs
Objective 3: Improve curing techniques and investigate other ways to improve postharvest quality and extend postharvest shelf life of trade OSP					
Design and conduct trials and curing demos	Conditions for curing established	There is no curing of OSP in E. Africa	December 2018	Experiments on curing were set up in July 2018 with two commercial farmers in Kyotera with sweetpotato varieties 'Kabode' ('NASPOT 10 O'), 'NASPOT 8' (OSP), and 'NASPOT 1' (90% complete)	Data collection completed. Results presented.
Evaluation of improved curing methods vs. current practice	Improved curing and storage techniques tested with farmers	Limited shelf life of sweetpotatoes	December 2018	Curing experiments to evaluate above-ground and in-ground curing methods were set up with 6 treatments—detopping for 0, 1, 2, 3, 4, 5, and 7days before harvesting	Data collection completed; results presented.
Work with implementation team to improve training on handling of roots	Selected lead farmers from project areas trained in postharvest handling	No trained farmers in postharvest handling	Continuous activity	CIP and HarvestPlus trained commercial farmers on postharvest handling and presented results on curing.	A brochure on curing has been drafted and will be finalized in February 2019. Farmers have been trained on postharvest handling. 31 commercial

Milestone	Targeted Outputs	Baseline	Target Data	Progress/Status	Comments
during harvest and postharvest					farmers from Mukono, Luwero, Mpigi, and Masaka
	On-farm production of clean planting material enhanced. Production techniques of registered secondary vine multipliers and tertiary vine multipliers enhanced	Issues among partners vary	Continuous activity	CIP staff have backstopped HarvestPlus team on training vine multipliers, and have participated in partner meetings at different levels	Key messages to strengthen skills for production of clean planting material developed for partner staff. Participated in vine multipliers beginning of year meeting in Luwero.

The International Potato Center (known by its Spanish acronym CIP) is a research-for-development organization with a focus on potato, sweetpotato, and Andean roots and tubers. CIP is dedicated to delivering sustainable science-based solutions to the pressing world issues of hunger, poverty, gender equity, climate change, and the preservation of our Earth's fragile biodiversity and natural resources.

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