RESEARCH PROGRAM ON Roots, Tubers and Bananas

CGIAR

Training report:
Farmer Training on Sweetpotato Silage Making in Masaka District

RTB ENDURE

October 2015

European Commission

IFAD
Enabling poor rural people to overcome poverty

A broad alliance of research-for-development stakeholders & partners

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CENTRO INTERNACIONAL DE LA PAPA CIP

ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

NARO

NaLIRRI

CHAIN UGANDA

Bioversity International

CIAT Centro Internacional de Agricultura Tropical International Center for Tropical Agriculture

cirad AGRICULTURAL RESEARCH FOR DEVELOPMENT

IITA Research to Nourish Africa

Expanding Utlization of Roots, Tubers and Bananas and Reducing Their Postharvest Losses (RTB-ENDURE) is a 3 year project (2014-2016) implemented by the CGIAR Research Program on Roots, Tubers and Bananas (RTB) with funding by the European Union and technical support of IFAD.
http://www.rtb.cgiar.org/endure

The CGIAR Research Program on Roots, Tubers and Bananas (RTB) is a broad alliance led by the International Potato Center (CIP) jointly with Bioversity International, the International Center for Tropical Agriculture (CIAT), the International Institute for Tropical Agriculture (IITA), and CIRAD in collaboration with research and development partners. Our shared purpose is to tap the underutilized potential of root, tuber and banana crops for improving nutrition and food security, increasing incomes and fostering greater gender equity, especially among the world's poorest and most vulnerable populations.

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LIST OF ACRONYMS

CIP	International Potato Center
IFAD	International Fund for Agricultural Development
ILRI	International Livestock Research Institute
KARLO	Kenya Agricultural and Livestock Research Organization
NALIRRI	National Livestock Resources Research Institute
NARO	National Agricultural Research Organization
OFSP	Orange Fleshed Sweetpotato
RTB	CGIAR Research Program on Roots, Tubers and Bananas
SPV	Sweetpotato vines
UGX	Uganda Shillings

I. Introduction

CHAIN UGANDA was sub-contracted by CIP to implement the project "*Expanding utilization of RTB and reducing their post-harvest losses in Masaka district*". During the process of implementing the above project, CHAIN UGANDA entered into an agreement with CIP where CHAIN agreed to perform some activities. One of the deliverable was to conduct training on sweetpotato silage making in the two pilot sub-counties (Nyendo Senyange & Buwunga). As a way of achieving this, CHAIN UGANDA in collaboration with NaLIRRI, CIP and ILRI conducted two workshops, one in each of the sub-counties. The major objective of the workshop was to equip farmers with the knowledge of sweet potato silage making.

Sweetpotato for food and feed security

Sweetpotato is the third most important food crop after cassava and bananas in Uganda. Currently, sweet potato is number one food crop in the Lake Victoria region. The crop has potential benefits to poor farm households and urban consumers especially when other crops fail or in specific seasons before the main harvest.

Sweetpotato is a means to address one of the most serious health and nutrition problems of Uganda, Vitamin A deficiency which is a major risk factor for pregnant and lactating women. The Orange Fleshed Sweetpotato (OFSP) cultivars contain particularly high levels of carotenoids and are equaled only by carrot as a source of pro-vitamin A. Sweetpotato roots provide a source of carbohydrates, calcium, ascorbic acid (vitamin C). Sweetpotato roots may be eaten boiled, steamed or processed into simple products such as chips, bread, local brew/drink, juice, pancakes and composite flour (mixed with maize, millet and soya flour). In some communities, tender (young) sweetpotato leaves are consumed as a vegetable. Sweetpotato contributes about 20% of total crop residues provided by vines, non-commercial sweetpotato roots, peels which are very good source of livestock feed.

II. Challenges to utilisation of sweetpotato residues as animal feed

Although sweet potatoes are a good source of energy (roots) and protein (vines), they are highly perishable. As a result, a lot of vines are wasted during periods of peak harvests, yet farmers suffer from feed scarcity during the dry season. In order to make good use of sweetpotato residues (vines and roots) there is need to conserve them in form of silage which has the potential to mitigate seasonal feed shortages and help cope with seasonal feed prices fluctuations that many smallholder livestock farmers experience. It also provides opportunity to reduce waste in urban market and at household level as well as it can open up business opportunities for youth and women.

III. Structure of the workshop and participants

The workshops were conducted at St. Paul Primary School, Kitovu, Senyange sub-county, from 6th to 7th October 2015 and at Buwunga Sub-county headquarters, Buwunga sub-county, from 8th to 9th October 2015. The workshop was organized by the International Potato Centre (CIP), International Livestock Research Institute (ILRI), National Livestock Resources Research Institute (NALIRRI), CHAIN UGANDA and Masaka local government.

Some of the participants who attended the workshop at Buwunga sub-county headquarters

The facilitators of the workshop were; Dr. Jolly Kabirizi (NaLIRRI); Peter Lule (ILRI/CIP), Julius Mabuya (CHAIN Uganda) and Mr. John Kigongo (NaLIRRI). A total of 152 participants attended the workshop (Table 1 and Annex 2).

Table 1: Workshop participants by gender

Sub-county	Female	Male	Total
Nyedo Ssenyange	45	28	73
Buwunga	40	39	79
Total	**85**	**67**	**152**

All participants indicated that they had experience with working with sweetpotato crop. However, one participant informed the group that he grows sweetpotato only for sale and livestock feeding because his family members are allergic to sweetpotato as a food

IV. Farmer workshop: Day 1

The opening prayer was conducted by one of the workshop participants. This was followed by participants' self-introductions (name, institution/district and experience on sweetpotato as a food and animal feed).

PARTICIPANTS' EXPECTATIONS

Participants were requested to give at least one expectation from the workshop. Table 2 shows summary of participants' expectations from the two groups.

Table 2: Summary of participants' expectations

Senyange sub-county	Buwunga sub-county
(a) How to mix feeds for livestock from locally available ingredients	(a) To learn new skills and get more knowledge on livestock management
(b) Apart from use of sweet potato vines and tubers, what else can be utilised as a livestock feed	(b) How to make silage
(c) If there are any feeds which can be used to feed pigs in the shortest period	(c) How to feed sweetpotato vines to livestock
(d) Whether there is an alternative to maize bran which is currently expensive in livestock production	(d) To learn how to conserve animal feeds
(e) To learn from fellow farmers and to know each other	(e) Learn new skills and train other farmers
(f) To have more knowledge on livestock farming	(f) Management of disease control in pigs
(g) To meet and know other farmers	(g) Get knowledge on various types sweet potato varieties and how to utilize them in livestock farming
(h) To learn how to make use of my small place for commercial enterprises	

PRESENTATIONS

1. Presentations by Dr. Jolly Kabirizi, NaLIRRI

(a) Sweet potato for food and feed security and income generation

Uganda as being the leading producer of sweetpotato in Africa; and the crop is ranked 3rd in importance as compared to cassava and bananas respectively. Therefore, sweetpotato has a big role to play to improve the livelihood of farmers in Uganda.

*Importance of sweet potato: f*ood security, source of feed to livestock, income generation, among others.

*Constraints to production sweet potato: p*ests and diseases, land scarcity, labour, lack of planting material, marketing, low price etc.

Common sweet potato varieties: Ejumula, Kakamega, VITA, Kabode, Orange Fleshed Sweetpotatoes.

*Crop management: s*oil requirements, land preparation, selection of good planting material, pest and disease management as well as planting.

(b) Sweet potato residues as animal feeds

Competition for cereal grains between livestock and humans due to increasing population growth and change in weather patterns and thus need for alternative source of human food and livestock feeds.

Roles of sweet potato as feed:

- Source of feed for livestock production systems,

- Good source of energy and can be used to formulate feed rations (use of dried vines, maize bran, fish meal, minerals) to reduce on feeding costs while rearing livestock.

Challenge to use sweet potato residues as feed:

- Anti-nutritional factors
- Conservation methods to cope up with feed shortage

Importance sweet potato silage:

- Negative environmental impacts are reduced, feeding value improved, inexpensive livestock feed developed, among others.

Silage making using different methods

Types of silos used to make silage:

- **Stack silo**: estimated cost of UGX 274 per kg of silage (if producing 500kg)
- **Trench silo** (in a pit): estimated cost of UGX 394 per kg of silage (if producing 500kg)
- **Plastic bag or tube silo** (use of plastic sheet as a bag to compact the material): estimated cost of UGX 204 per kg of silage (if producing 500kg)
- **Improved tube method** (use of a drum and drainage pipe and it involving a number of steps for constructing the required equipment, i.e. making internal drainage system, assembling the internal drainage system, sealing at the bottom of silage tube, compaction by use of a drum, etc.): estimated cost of UGX 214 per kg of silage (if producing 250kg).

Comments/questions from participants

1. How can a farmer extract sweetpotato juice from tubers?
   - By use of a blender.
2. What is the average size of the mound or ridges?
   - A mound should be 100cm wide and 60cm high
   - Ridges should be 0.5m from each other. But tubers in ridges can easily be affected by rats. However, these can be controlled by "T*ephrosia vogelli tree*" (natural control).
3. Is there any effect if sweetpotato roots infected by pests or diseases are fed together with vines or tubers?
   - No effect
4. Is there any advantage of cooking sweetpotato residues (peels or tubers) for pigs?
   - The pig gains more weight when fed on cooked food. But cooked foods produce waste with bad smell and it requires a lot of fire, therefore this has a negative impact on the environments,
5. How can soil fertility be improved before planting?
   - By use of compost manure or artificial fertilizers.
6. Why can't I use the same source of planting materials for many seasons?
   - Could be due to gene degeneration
   - Poor soil fertility management.
7. Can too much rainfall affect sweetpotato production?
   - It leads to vegetative production rather than root formation.
8. What should be the right period to wean piglets?
   - The recommended period is two months. But with good feeding and management they can be weaned at 1.5 months of age.
9. How much feed can you feed a pig?
   - Between 2.5-3.5kgs of feed per day. However, this can be supplemented with sweetpotato vines, weeds, etc.

10. Can you de-worm pigs and give vitamins at the same time?
    - Possible.
11. What is the purpose of giving iron to pigs and what are the sources of iron?
    - To prevent/treat piglet/pig anaemia
    - Pigs/piglets can be subjected to iron sulphate injection or provision of red soil in feeds.
12. What else can be used as an additive apart from molasses when making silage?
    - Maize bran.
13. In what ratios can molasses be used when making silage?
    - 1ltre is used to mix 10kgs of the material to be ensilaged

2. Presentation by Julius Mabuya, Chain Uganda

Mr. Mabuya informed participants that the major objective of the project is to improve utilization of sweetpotato residues (roots, vines and peels) to overcome feed constraint in pig production systems to improve the livelihood of farmers. This is done in partnership with a number of institutions which include: CIP, ILRI, NaLIRRI, Makerere and Uganda Martyr's University, Nkozi. CIP and ILRI are focusing on the best way how to make silage from sweet potato vines and roots and to turn it into business as the best way to help farmers.

- This project will also aim at strengthening capacity building on silage utilization by use of sweet potato
- Linking farmers to markets
- To increase pig production and marketing (entrepreneurship)
- Provision of clean planting material.

This project is to be implemented in both in Masaka and Kamuli districts. He informed participants that this project is only operating in Masaka and Kamuli district and therefore the farmers were informed to use this opportunity to maximize the benefits of the project.

3. Presentation by Peter Lule, ILRI

(a) Roles of CIP and ILRI

- ILRI is responsible for livestock research worldwide. In Uganda research is done on pig farming and in Kenya on Dairy farming.
- CIP conducts mainly research on sweetpotato and potato and, inpartnership with other international research centres also on other crops such as cassava, bananas, yams, among others.

(b) He stressed the significant increase in human and pig population where both need an increase in food production. Therefore, to alleviate reduce poverty and hunger there is a need to find a way of better utilization of sweetpotato residues pigs especially in Uganda.

(c) In Uganda the project is to be implemented in Masaka, because farmers have intensively invested in sweetpotato and pig production. There is therefore a need to train farmers on improving utilization of sweetpotato residues (vines and tubers) through silage making for efficient utilization of the crop during the rainy season.

LESSONS LEARNT AND NEW EXPECTATIONS

Participants were requested to list down key lessons learned and new experiences from the workshop:

- Silage is a good feed resource for pigs.
- Silage from sweetpotato reduces the cost of feeding pigs.
- It is possible to make silage for sale.
- It is important for farmers to form cooperatives to be able to access inputs at a reduced cost.
- The workshop has been an eye opener for farmers on improved sweetpotato production and management.

V. Farmer workshop: Day 2

RECAP OF DAY 1

The day was opened with a prayer from a participant. Two volunteer farmers presented a recap for day one.

Participants were asked to mention at least one important thing they learnt the previous day.

Senyange sub-county:

- Use of sweetpotato residues for making silage.
- Different methods of making silage e.g. the improved tube silo, tube silo, stack silo and the trench silo.

Buwunga sub-county

- What are the dimensions of silage pit? At least 3m deep, but the length varies.
- Farmers were advised to feed sweet potato silage to piglets of more than 3 months in addition to concentrates.
- Can silage be made from different types of crops? Yes
- Marketability of pigs and piglets is still a major a problem, what is the best advice?
- Formation of cooperatives to avoid price fluctuations.

PRACTICAL SESSION ON SILAGE MAKING

Demonstrations were made on silage making using different methods (tube silo, stack silo and improved tune silo). The participants observed that the improved tube silo is expensive and very difficult to use.

Pictures taken during the practical session

VI. Workshop evaluation

- The participants were very happy with the new knowledge and skills acquired during the workshop.
- They requested for more training on silage making and utilization and pig management.

Way forward

(a) Farmers in Senyange sub-counties agreed to meet on 6th November 2015 at Mr. Peter Lubyayi's residence to examine the silage made.

(b) The farmers in Buwunga sub-county will meet on 11th November 2015.

(c) CHAIN UGANDA to proceed with the process of silage making with the farmers of Masaka district.

(d) Farmer workshops in Kamuli will be conducted at from 28th to 31st October 2015..

Acknowledgements

The workshops were supported by CIP and ILRI and facilitated by NaLIRRI and CHAIN-UGANDA.

ANNEXES

ANNEX 1. WORKSHOP PROGRAM

Time	Activity	Responsible person
DAY 1:		
8.00-9.00am	Registration	Mr.Kigongo, NaLIRRI
9.00-9.30am	Opening prayer Self-introduction (name, institution/district and experience on sweetpotato as a food and fodder crop).	Participants
9.30-9.45am	Participants expectations (Use blackboard)	
9.45-10.10am	Importance of sweetpotato in a farming system	Dr. Jolly Kabirizi, NaLIRRI
10.10-10.40am	Questions/Discussion	
10.40-11.10am	BREAK TEA	CIP
11.10 am-12.30pm	Sweetpotato production and management	Dr. Jolly Kabirizi, NaLIRRI
12.30-1.00pm	Questions/Discussion	
1.00-2.00pm	LUNCH	CIP
2.00-3.30pm	Sweet potato (SP) as animal feed ✓ Challenges to use of SP residues as animal feed ✓ Advantages of SP silage ✓ Silage making: types of silos ✓ Improved tube method for making SP silage	Dr. Jolly Kabirizi, NaLIRRI
3.30-4.00pm	Discussion and way forward	
DAY 2		
Time	Activity	Responsible person
8.00-9.00am	Registration	Mr. Kigongo
9.00-9.30am	Prayer Recap for Day 1	Rapporteur
9.30am-10.00am	Participants will share experience on use of sweetpotato silage for feeding livestock	Participants
10.00-10.30am	BREAK TEA	CIP
10.30am-11.15pm	Practicals on silage making	Dr. Kabirizi, Mr. Peter Lule and Mr. Kigongo,
11.15-12.15pm	Discussion Advantages/disadvantages of different forage choppers	Participants
12.15-1.00pm	Discussion and workshop evaluation, closing and departure	Dr. Jolly Kabirizi
1.00-2.00pm	LUNCH and departure	CIP

ANNEX 2. LIST OF PARTICIPANTS

Name of participant	Gender	Village
Nyedo Ssenyange sub-county		
1. Mukalazi Mary	F	Bugya
2. Mabuya Julius	M	Chain-UG
3. Walakira Lamech	M	Kasana
4. Ssekyondwa Emmanuel	M	Kasana
5. Lubyayi Peter	M	Kasana
6. Ssemaganda Polly	M	Kayirikiti
7. Nnassimbwa Teo	F	Kayirikiti
8. Nandawula Regina	F	Kinsadde
9. Kayanja Florence	F	Kinsadde
10. Namanda Pross	F	Kirumba-Katwe
11. Nalongo Ddaki Maria	F	Kitenga
12. Ssenyonga Joseph	M	Kitovu
13. Kiwanuka Marcellino	M	Kitovu
14. Nnabbale Bena	F	Kitovu
15. Kabiito Teopista	F	Kitovu
16. Nabatanda Jane	F	Kitovu
17. Mukasa Kizito Vicent	M	Kitovu
18. Kiyimba Antony	M	Kitovu
19. Lubega Grace	F	Kitovu
20. Naluwuge	F	Kitovu
21. Nazziwa Juliet	F	Kitovu
22. Nakabira Oliva	F	Kitovu
23. Asiimwe Midias	F	Kitovu
24. Kato John	M	Kitovu
25. Nsudde Rebecca	F	Kitovu
26. Ndagire Gorret	F	Kitovu
27. Mujungu Francis	M	Kitovu-Block-A
28. Wasswa Bosco	M	Kitovu-Nume
29. Namuyanja Maria	F	Kitovu-Nume
30. Nakiganda Victoria	F	Kitovu-Nume
31. Kato Kenneth	M	Kitovu-Nume
32. Nakigya Kaggwa Jane	F	Kitovu-Nume
33. Namata Eva	F	Kitovu-Nume
34. Nnalukwago Noroh	F	Kitovu-Nume
35. Muwonge Salongo	M	Kitovu-Nume

Name of participant	Gender	Village
36. Nagawa Florence	F	Kitovu-Nume
37. Namatovu Gorret	F	Mukudde
38. Tumusiime Hilary	M	Nakayiba
39. Mubiru Paul	M	Nakayiba
40. Kigongo John	M	NaLIRRI
41. Dr.Kabirizi Jolly	F	NaLIRRI
42. Buyondo Flugensio	M	Nyendo
43. Nsamba John	M	Nyendo
44. Mutyaba Teddy	F	Nyendo
45. Kikaawa Fred	M	Nyendo-Kitaka
46. Nakitende Justine	F	Ssenyange
47. Lubega Vicent	M	Ssenyange
48. Naggujja Jane	F	Ssenyange
49. Nalugya Susan	F	Ssenyange
50. Nanono Diana	F	Ssenyange
51. Bwanika Annet	F	Ssenyange
52. Namutebi Edith	F	Ssenyange
53. Kaketo John	M	Ssenyange
54. Nalubega Jane	F	Ssenyange
55. Lubega Juliet	F	Ssenyange
56. Kiggundu George William	M	Ssenyange
57. Kasozi Joseph Yiga	M	Ssenyange
58. Anthony Kiyimba	M	Kitovu
59. Nalukwago Norah	F	Kitovu
60. Nakito Margaret	F	ssenyange
61. Nandago Gladys	F	Kitovu
62. Sr. Agnes Gessare	F	Kitovu
63. Sserwadda L Joseph	M	Kitovu
64. Sserwadda Charles	M	Kitovu
65. Ssekajja Joseph	M	Kitovu
66. Nalubwama Margaret	F	Kitovu
67. Namutalira Parcy	F	Kitovu
68. Naziwa Juliet	F	Kitovu
69. Nabikoffu Susan	F	Kitovu
70. Nassuna Mary	F	ssenyange
71. Namazzi Ruth	F	ssenyange
72. Nayiga Jane	F	ssenyange
73. Nakato Josephine	F	Kitovu-Numme

Name of participant	Gender	Village
74. Kimera Emmanuel	M	Kaijja
75. Nambuusi Betty	F	Bulando
76. Semanda George	M	Bulando
77. Baale Christopher	M	Bulenge
78. Bukenya Francis	M	Bulenge
79. Namugambe Regina	F	Bulenge
80. Nalwoga Gonzaga	F	Bulenge
81. Bukenya Sarah	F	Bulenge
82. Matovu Francis	M	Bulenge
83. Nakiboneka Gorretti	F	Bulenge
84. Nantuwa Berna	F	Bulenge
85. Namugerwa Topista	F	Bulenge
Buwunga sub-county		
86. Mukasa Gyaviira	M	Buwunga
87. Serwanyiri Henry	M	Buwunga
88. Nalunga Gerturide	F	Buwunga
89. Kimbugwe Dan	M	Buwunga
90. Nakaiza Maria	F	Buwunga
91. Mbonyebyombi Jonath	M	Buwunga
92. Nakibuule Teddy	F	Kabagabo
93. Kato Charles	M	Kabagabo
94. Benga Desire	F	Kabagabo
95. Mukasa David	M	Kabagabo
96. Muwonge Remegio	M	Kabagabo
97. Sserwadda Vincent	M	Kabagabo
98. Nakato Dorothy	F	Kabagabo
99. Nakiweewa Annet	F	Kaija
100. Nambogo Antonio	F	Kaija
101. Nalongo Joyce Kasolo	F	Kaija
102. Walusimbi Antonio	M	Kaija
103. Semakula Denis	M	Kaija
104. Nampijja Agnes	F	Kaija
105. Sekiryowa Julius	M	Kaija
106. Nakasamba Florence	F	Kaija
107. Nantale Jane	F	Kaija
108. Nalubowa Allen	F	Kaija
109. Nalwadda Noel	F	Kaija
110. Serugo Jereva	F	Kaija
111. Settumba Leonard	M	Kaija
112. Namusisi Margaret	F	Kalugondo

Name of participant	Gender	Village
113. Mirembe Achilles	M	Kamyufu
114. Ssebowa Geresamu	M	Kanagabo
115. Evon Mutebi	M	Karugondo
116. Damulira John R	M	Kasaka
117. Nasaka Janefer	F	Kasaka
118. Tomusange Obadia	M	Katwe-Butego
119. Nakitende Molly	F	Kibindi
120. Sebwana Charles	M	Kitengeesa
121. Sebuuwa David	M	Kitengesa
122. Kasamba John	M	Kitengesa
123. Namukwaya Stephania	F	Kiteza
124. Nantume Lucia	F	Lwannunda
125. Nakanwagi Josephine	F	Lwannunda
126. Nambajjwe Josephine	F	Lwannunda
127. Kintu Matilida	F	Lwanunda
128. Kayima Charles	M	Mikoni
129. Nakayiza Marion	F	Mikoni
130. Nabawuna Florence	F	Mikoni Katoolo
131. Wasswa Mathias	M	Mizinga
132. Sempebwa Simon	M	Mizinga
133. Nsamba Deus	M	Nyondo
134. Sembusi Joel	M	Serinya
135. Mbaziira Sam Godfrey	M	Serinya
136. Kiweewa Frank	M	Serinya
137. Naayemba Yacinta	F	Serinya
138. Nabawanda Grace	F	Serinya
139. Semanda Manuel	M	Serinya
140. Matovu Charles	M	Serinya
141. Semakula Regina	F	Serinya
142. Sebbowa	M	Kabagabo
143. Semmanda Maulisia	F	Kayijja
144. Nasaka Jennifer	F	Kajona
145. Nakayima Sylivia	F	Kayijja
146. Sserubiri Jude	F	Kayijja
147. Nakamya Alice	F	Mugamba
148. Kayondo Joseph	M	Mugamba
149. Ssonko Richard	M	Buwunga
150. Tingegesa David	M	Buwunga
151. Mbazira David Kisekka	M	Kaijja
152. Nuwagaba Peace	F	Kibindi

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