

# **Sustaining Frafra Potato (*Solenostemon rotundifolius* Poir.) in the Food Chain; Current Opportunities in Ghana**

**By**

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# Biology and Botany

***Solenostemon rotundifolius* Poir. Family:  
Labiatae (Tindall, 1983)**

***Plectranthus esculentus* (Kyesmu and  
Akueshi, 1989)**

***Coleus dysentericus* (Tindall, 1983)**

***Coleus rotundifolius* (Vasudevan and Jos 1989;  
Bejoy et al. 1990; Mohankumar et al. 1990)**

***Coleus parviflorus* (Yayock et al. 1988; Abbiw, 1990).**

# INTRODUCTION

- **Under-exploited food crop in the Upper East and Upper West Regions of Ghana (Dittoh *et al.* 1998; Benett-Lartey, 2008).**
- **Major Production Districts: Jirapa, Lambussie, Nadowli, Lawra, Nandom and Wa of UWR; and Bongo, Kassena-Nankana, Bolga, Bawku-West and Bawku-East of UER (Tetteh and Gou, 1997; Dittoh *et al.* 1998; Bayorbor and Gumah, 2007).**
- **Production is primarily planned for household consumption; contributing up to 20% of household food between October to December.**

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- **Earlier studies by Tetteh and Guo (1997) and Dittoh (1998), noted that FP is becoming endangered in many communities.**

**They Identified critical problems and intervention programmes for FP**

**Threat of genetic erosion by close substitutes (gradually replaced by high yielding sweet potato varieties (Benett-Lartey, 2008)**

- **This lead to some research and other technology deployment under the RTIM Project from 1999 to date.**

# Some Research highlights so far

- **Response of genotypes to fertilizer (NPK) and time of planting (Quainoo and Bayorbor, 2002);**
- **Effect of seed weight and spacing on yield (Bayorbor and Gumah, 2007)**
- **Integrated pests management strategies (Tanzubil et al., 2005)**
- **Germplasm collection and characterization of different accessions (Opoku-Agyeman *et al.* 2007).**
- **Potential of vegetative propagation methods Aculey et al., (2011)**



**Initial plant establishment is usually slow which requires several weeding**



**By 10 week after planting, plant canopy usually spread to cover entire ridges, only rouge out weeds by hand. Spray with appropriate chemical to control soil arthropods**







# Utilization

**Tubers are mostly boiled and consumed as main meal or snack**

**Tubers turn fibrous (dormancy) By 3MAS**

- **Boiled before peeling and eaten alone or with a sauce**
- **Peeled before boiling: Some oil and spices are usually added and the food served to the family.**
- **Over-boiled and stirred into a thick mass called 'piese sam', which is consumed with stew or sauce.**
- **Larger tuber are selected, parboiled or blanched for storage. The tubers are sun-dried for future use.**

**Figure 2a . Frafra potato setts are mixed with ash, millet/sorghum husk and stored in clay pot sealed with cow-dung , pot is opened prior to planting.**





**Fig.2b Setts are wrapped in thatch and stored under shade of tree or summer hut**

# Objectives

- **To review the current FP production systems and identify strategies to increase production and utilization.**
- **Identify how research-policy-extension linkages can accelerate production, technology dissemination and utilization of FP.**
- **Identify strategies to improve upon postharvest handling and processing, as well as training and research needs in the FP value chain.**

# Methodology

**Study was carried out from May to June 2013, using field survey, key informant interviews and focused group discussions**

**Five main Producing districts and 10 main communities were selected**

**80% of respondents ever cultivated FP in previous 1-4 years.**

- **The questionnaire captured information of type of variety, source of sett, reasons for selecting a variety, current challenges, possible training and research needs**

**Table 1: Details of communities participating in the survey**

<b>Districts</b>	<b>Communities</b>	<b>Numbers of focus group discussions</b>	<b>Number of respondents</b>	<b>Name of Extension Agent</b>
<b>Bawku-East</b>	<b>Nikongo</b>	<b>1</b>	<b>25</b>	<b>A. Dominic</b>
	<b>Tes-Natinga</b>	<b>1</b>	<b>25</b>	
<b>Bawku-West</b>	<b>Tilli-Azupupuugu,</b>	<b>1</b>	<b>25</b>	<b>Paul Musah</b>
	<b>Teshie, Kperigu-</b>	<b>1</b>	<b>25</b>	
	<b>Soogo</b>	<b>1</b>	<b>30</b>	
<b>Bongo</b>	<b>Eyelibile</b>			<b>K. Anane</b>
	<b>Bongo-Soe</b>	<b>1</b>	<b>25</b>	
		<b>1</b>	<b>30</b>	
<b>Garu-Tempene</b>	<b>Kpatia</b>			<b>M. Jamal-Deen</b>
	<b>Tankpasi-Avusum</b>	<b>1</b>	<b>25</b>	
<b>Talensi-Nabdam</b>	<b>Sakote-Kotitab</b>	<b>1</b>	<b>30</b>	<b>Musah Adam</b>
	<b>Dasabligo</b>	<b>1</b>	<b>30</b>	
<b>Total = 5</b>	<b>10</b>	<b>10</b>	<b>270</b>	

**Table 2: Overall ranking of crops according to their contribution to household livelihoods**

<b>Crop</b>	<b>Average farm size (ha)</b>	<b>%HH cultivating</b>	<b>Relative involvement of Women</b>	<b>Overall contribution to food</b>	<b>Overall contribution to income</b>	<b>Access to improved varieties</b>
<b>Maize</b>	<b>2.5</b>	<b>95</b>	<b>45</b>	<b>80</b>	<b>55</b>	<b>90</b>
<b>Sorghum</b>	<b>1.5</b>	<b>90</b>	<b>20</b>	<b>70</b>	<b>40</b>	<b>40</b>
<b>Millet</b>	<b>1.5</b>	<b>90</b>	<b>20</b>	<b>65</b>	<b>35</b>	<b>20</b>
<b>Rice</b>	<b>0.8</b>	<b>60</b>	<b>80</b>	<b>40</b>	<b>60</b>	<b>60</b>
<b>Cowpea</b>	<b>1</b>	<b>70</b>	<b>40</b>	<b>40</b>	<b>50</b>	<b>70</b>
<b>Soybean</b>	<b>1</b>	<b>65</b>	<b>75</b>	<b>30</b>	<b>70</b>	<b>60</b>
<b>Groundnut</b>	<b>1</b>	<b>60</b>	<b>60</b>	<b>50</b>	<b>30</b>	<b>20</b>
<b>Bambara nut</b>	<b>0.5</b>	<b>40</b>	<b>50</b>	<b>40</b>	<b>15</b>	<b>10</b>
<b>Sweet potato</b>	<b>0.9</b>	<b>40</b>	<b>15</b>	<b>30</b>	<b>70</b>	<b>40</b>
<b>Frafra potato</b>	<b>0.25</b>	<b>30</b>	<b>5</b>	<b>20</b>	<b>15</b>	<b>5</b>
<b>Vegetables</b>	<b>0.9</b>	<b>70</b>	<b>70</b>	<b>40</b>	<b>80</b>	<b>50</b>

**Table 3: Characteristics of common Frafra potato varieties by respondents**

<b>Characteristics</b>	<b>Varieties</b>		
	<b>Black type</b>	<b>Red type</b>	<b>White type</b>
<b>Colour</b>	<b>Black peel, white flesh</b>	<b>Red peel, white flesh</b>	<b>White peel and flesh</b>
<b>Maturity</b>	<b>4-5 months</b>	<b>4-5 months</b>	<b>4-5 months</b>
<b>Yield</b>	<b>Yield higher</b>	<b>Moderate yield</b>	<b>Moderate yield</b>
<b>Potential yield</b>	<b>12 to 20 bags/ha</b>	<b>9 to 16 bags/ha</b>	<b>9 to 16 bags/ha</b>
<b>Consumer preference</b>	<b>Most preferred (size)</b>	<b>Preferred</b>	<b>Preferred</b>
<b>Taste</b>	<b>Very good</b>	<b>Good</b>	<b>Good</b>
<b>Tuber size</b>	<b>Large</b>	<b>Medium</b>	<b>Medium</b>
<b>Soil fertility</b>	<b>Widely adapted</b>	<b>Poorly adapted</b>	<b>Moderately adapted</b>
<b>Market value</b>	<b>High</b>	<b>Moderate</b>	<b>Moderate</b>
<b>Ease of peeling</b>	<b>Easy to peel</b>	<b>Difficult to peel</b>	<b>Easy to peel</b>
<b>Storage shelf life</b>	<b>Poor</b>	<b>Good</b>	<b>Good</b>
<b>Dry weight</b>	<b>High dry moisture</b>	<b>Watery flesh</b>	<b>Less moisture</b>



**Table 4: Overall ranking of critical constraints in Frafra potato production**

<b>Identified constraints</b>	<b>Matrix ranking</b>	<b>Overall rank</b>
<b>Lack of elite varieties</b>	<b>*****</b>	<b>7</b>
<b>Labour-intensive operations</b>	<b>*****</b>	<b>6</b>
<b>Poor soil fertility</b>	<b>*****</b>	<b>5</b>
<b>Low yield</b>	<b>****</b>	<b>4</b>
<b>High postharvest losses</b>	<b>***</b>	<b>3</b>
<b>Lack of planting materials</b>	<b>**</b>	<b>2</b>
<b>Pest and diseases</b>	<b>**</b>	<b>2</b>
<b>Limited market access</b>	<b>*</b>	<b>1</b>

Farmers were first asked to identify the important constraints, and further rank the identified constraints from most important to least important.

# **Current research Interventions**

- **Both adaptive trials and FFS on GAP for FP (agronomy, PVS, IPM, Intercropping, ISFM and postharvest managements ) is ongoing under various RTIMP and WAAPP programmes**
- **Germplam conservation and characterization of cultivated morphotypes of FP is ongoing at CSIR-PGRRI, and CSIR-SARI**

A photograph of a potato multiplication site. The image shows several rows of young potato plants growing in a field with reddish-brown soil. A wooden post is stuck in the ground, holding a white rectangular sign with handwritten text. The sign reads: "WAAAPP: 2A", "FRAFRA POTATO GERMPLASM", and "MULTIPLICATION SITE-MANGA". The background shows more rows of plants extending into the distance under bright sunlight.

WAAAPP: 2A  
FRAFRA POTATO GERMPLASM  
MULTIPLICATION SITE-MANGA

**Table 5a: rapid appraisal of crop improvement targets requiring research and extension in Frafra potato**

<b>Areas requiring improvement</b>	<b>Target areas</b>	<b>What specific improvement is required</b>
<b>1. Crop improvement</b>	<b>All varieties</b>	<b>Replace the existing 3 landraces</b>
<b>2. Production practices</b>	<b>Extension</b>	<b>Disseminate agronomic technologies to improve yield</b>
<b>3. Genetic conservation</b>	<b>Research</b>	<b>Germplasm collection, characterization and conservation</b>
<b>4. Vegetative, molecular and In-vitro techniques</b>	<b>Research</b>	<b>Molecular, budding, and approach, cleft and splice grafting methods,</b>
<b>5. Maturity period</b>	<b>All varieties</b>	<b>Reduce maturity from 4-5 months to 3 months</b>
<b>6. Taste</b>	<b>All varieties</b>	<b>Increase sweetness and starch level, reduce moisture content of red type</b>
<b>7. Size</b>	<b>All varieties</b>	<b>Genetic methods to increase tuber size</b>

**Table 5b: rapid appraisal of crop improvement targets requiring research and extension in Frafra potato**

<b>8. Agronomic practices</b>	<b>Extension</b>	<b>Cultivar selection, time of planting, spacing, fertilizer rate</b>
<b>9. Ease of peeling</b>	<b>All varieties</b>	<b>Peel should be easy to rape off</b>
<b>10. Sensory colour</b>	<b>Black type</b>	<b>More bright-colour sensory appeal, orange-colour flesh</b>
<b>11. Fibrousness</b>	<b>All varieties</b>	<b>Eliminate or increase natural dormancy period</b>
<b>12. Shelf life</b>	<b>All, black type</b>	<b>Introduce improved storage and processing methods</b>
<b>13. Nutritional</b>	<b>Research</b>	<b>Bio-fortification with vitamins, orange-flesh colour</b>
<b>14. Utilization</b>	<b>Extension</b>	<b>Increase awareness and utilization among consumers</b>
<b>15. Value addition</b>	<b>Processing</b>	<b>Evaluate parboiling, blanching, dehydration, roasting and frying options, packaging</b>
<b>16. Training</b>	<b>Extension</b>	<b>Good Agricultural Practices (agronomy, pest management, soil fertility and postharvest managements)</b>

# Conclusion

**FP faces genetic erosion from its close substitute, sweet potato, which is much easier to cultivate**

**However, interventions to achieve household food security should not rely on only a few major staple crops**

**Specific NUS need to be identified in national agricultural food policies, this should emanate from district work-plans of where they are utilized.**

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- **CSIR-SARI, CSIR-PGRI and the UE and UW Regional Directorates of Agriculture need to collaborate to accelerate research and technology dissemination on FP**
  - **There is need synchronize interventions by WAAPP 2A and RTIMP to achieve reasonable success.**
  - **Processing tubers into stable preservable products using low-cost roasting, blanching and drying methods should be evaluated.**

**Thank You**

