Brief introduction

A result of a need to address the food security situation for;

- **Refugees in small settlement camps with small farming plots**
- **Small - holder farmers in impoverished semi-arid areas**

Where typical scenario is:-

- **High demands for food & cash income**
- **Low rainfall, drought, Poor soils,**
- **Political instability**
- **Poverty**
- **Low- negligible incomes**
- **Dependency on food-aid**
- **Increasing death tolls**
- **Population boom & Malnutrition esp among children**

Plausible interventions

Should be;

Low cost, sustainable, crop productivity enhancing & also easy to adopt technologies such as;-

- **Modification of current cropping systems through**

Intercropping nutritionally balanced common staples

Intercropping, Why?

- Cultivation of more than one crop species on same piece of land is a popular practice in Uganda as elsewhere in semi-arid tropics.
- Practiced for yield stability, crop loss risk prevention, soil erosion and weeds & pest & disease control
- Intercropping known for increasing yield per unit area
- Return to cropping as the resettlement program for formerly displaced persons takes shape

Intercropping pigeon pea and sweet potato (*Ipomoea batatas L.*) to achieve greater productivity

Kaggwa, R.,Gibson, R.W., Tenywa, J. S. , Osiru, D. S. O. and Potts, M.

Sweet potato (*Ipomoea batatas*):

- **One of Uganda's major staples, grown throughout the country.**
- **Often as a mono crop**
- **Important for household nutrition and is gaining commercial status.**

Sweet potato sole cropped

Sweet potato ridges, furrows left-bare

Sweet potato (*Ipomoea batatas*) & Pigeon pea (*Cajanus cajan)*

- **Both well suited to marginal areas of southern and East Africa; and widely cultivated in a variety of cropping systems**
- **Are cheap sources of food, perform well on poor soils, are common rotation crops**
- **Food security crops for famine vulnerable E. & N. Uganda**

Common intercrops include:

Pigeon pea /Maize/Millet, Maize/Beans, Cassava/Beans, **Maize /Beans**

Intercropping

Examples of **intercrops** **Sweet potato /maize, cassava/maize**

Sweet potato – pigeon pea intercropping:

- No recorded history of pigeon pea-sweet potato intercropping in Uganda though the practice exists

Intercropping could:

- Narrow yield gap from production constraints like Low soil fertility, pests, diseases, poor agronomic practices & inefficient production systems (Okware,2001)
- Benefit all sweet potato and pigeon pea growing areas in East and southern Africa such as Malawi and Zimbabwe that suffer from food insecurity due to drought and low fertility soils.

Sweet potato – pigeon pea intercropping cont'd:

- Is low cost, not burdening farmers with costly external inputs,
- Also easy to adopt especially since it requires few changes in current cropping practices.
- Could improve efficiency of production by enhancing soil fertility through N–fixation & nutrient recycling.
- Also has potential for labour optimisation, diet enrichment & crop loss risk reduction.

General objective

- Improve land productivity in Uganda by incorporating pigeon pea in the sweet potato cropping system

Specific objectives

- Establish agronomic optima for sweet potato plus pigeon pea mixtures in eastern Uganda such as intra-row spacing
- To estimate Land Equivalent Ratio (LER) as a measure of overall system productivity

Method

Study site

- Serere Agricultural and Animal Production Research Institute over 3 cropping seasons: 2005A, 2005B, 2006A

Treatments:

Sweet potato was planted on ridges either with or without pigeon pea [variety Sepi 1] planted in the furrows at 20, 30 or 40 cm.

2 yellow fleshed sweet potato varieties (local) were compared:

- Ajibir (a / spreading morpho-type)
- Araka (a vertical / erect type)

Nature of expt. - Factorial by varieties
Design - RCBD; Reps- 4
Weeding frequency -2 times

Data collection & analysis

At harvest, on;

- Pigeon pea: grain yield, seed weight, seeds per pod, & number of pods per plant
- Sweet potato: Root tuber yield, Tuber dry matter content

Analysis: Genstat, ANOVA to test real differences between treatments, least significant difference (LSD) at 5% probability level to separate Means

Land equivalent ratios (LERs) used to compute the productivity of the system (Mead and Willey ,1980).

LER = LP + LM = (Ypp sp/Ypp + Ysp pp/Ysp)

Results and discussion:

Results and discussion:

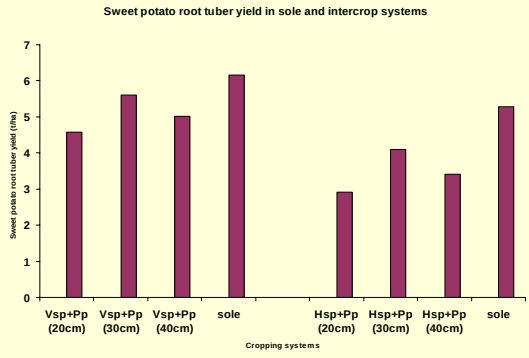
Sweet potato:

Mean tuber yield (t/ha) for 2005A, B, & 2006A :

- Sole crops of both varieties had higher total yields and yields per plant than intercropped sweet potato.
- Highest root tuber yields among intercrops of both varieties were with pigeon pea at 30cm intra-row spacing.
- Araka variety, the compact morphotype, yielded better than Ajibir, both as a sole and intercropped.

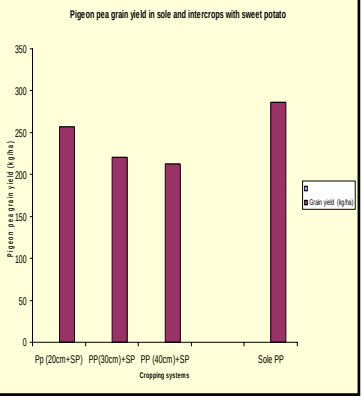
Sweet potato results cont'd:

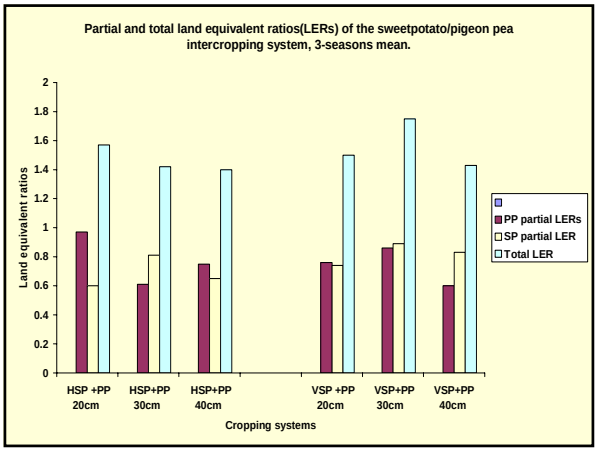
- Also showed a decrease in yields per plant with reduced pigeon pea plant population.
- Cropping seasons, sweet potato varieties, pigeon pea/ intra-row spacing, and season- varietal interaction led to significant differences in total root tuber yield & individual per plant yields.
- However the season x pigeon pea/intra-row spacing interactions were generally not significant.



Pigeon pea yield

- Pigeon pea grain yield was highest in the sole crops followed by
- Intercrops at 20cm intra-row spacing (high pigeon pea plant population)
- Varied significantly among the 3 cropping seasons (Figure).





Cropping system productivity /Land equivalent ratio (LER):

All intercrop spacings gave (LERs) >1, hence intercropping sweet potato and pigeon pea increases land productivity.

- Total (LERs) for yield over the three cropping seasons (2005A, 2005B & 2006A) ranged between 2.09 and 1.14.
- Highest yield advantage from intercrops was at closer spacing, 20 and 30cm, suggests use of closer pigeon pea intra-row spacing to increase intercropping yield advantage.

Practical implications

Sweet potato /pigeon pea intercropping should be encouraged because :-

- It has a yield advantage over monocropping & reduces risk.
- It is a low cost 'input' favourable to small-holder farmers.
- Results of trials elsewhere and with other cropping combinations suggest the presence of pigeon pea will sustain crop productivity by N-fixation & nutrient recycling – continuations of our trials are examining this.

Acknowledgements

I thank,
Natural Resource Institute (Sweet potato virus project); Richard Gibson
International Potato Center (CIP); Mike Potts
Thank you for listening