

**IKULWE STATION
AGRICULTURAL RESEARCH AND
DEVELOPMENT PROJECTS
2009-2011**

IKULWE STATION AGRICULTURAL RESEARCH AND DEVELOPMENT PROJECTS 2009- 2011

Project : Improving productivity of key crops in the low altitude areas of the zone.

Project Duration : 2 years July 2009 – June 2011

Project Code :

Start Date : July 2009 Planned end date: June 2011

Project Leader : Kaiira Moses

Research Team

Researcher's Name	Responsibility	Approximate time spent %	Institution / Organisation
Kaiira Moses	Setting up trials, supervision data analysis, developing training materials and conducting trainings ,reporting	60	Bugi ZARDI
Wairogo Samuel	Setting up experiments and data collection	40	Bugi ZARDI
NAADS / Local Government Staff	Farmer mobilisation for trainings and plot establishment	5	Bugi ZARDI
Farmers	Providing land and other inputs and managing and participating in experiments on-farm	10	Six districts of the low Altitude Zone

THEMATIC AREA

Technological options that respond to demands and market opportunities.

IMPACT AREA BEING ADDRESSED

Enhanced agricultural productivity and utilization of research outputs

INTRODUCTION

The low adoption and productivity of prioritized crops in the zone has been attributed to poor soil nutrient management, lack of improved varieties and poor crop production practices.

The main causes of lack of quality improved planting materials are lack of cost effective methods of seed multiplication and a sustainable seed delivery system. The apparent poor nutrient status has been attributed to lack of cost effective soil nutrient amendment options for enhancing crop productivity

JUSTIFICATION

The farming systems and livelihood analysis report identifies maize as number one crop for both cash and food with cassava as the main food crop. Other cereals and the legumes are of significant importance as cash crops and for improved nutrition. The crops have also become popular in the zone under the NAADS Programmes as prioritized key enterprises in District plans for uptake pathways.

REFERENCE TO EARLIER WORK

The production and productivity of maize, cassava and groundnuts in the zone is limited by low yielding varieties, declining soil fertility and poor agronomic practices (Farming systems survey, NABUIN 2007).

Research work on the prioritized crops has been done in NASAARI and NACRRI in partnership with CIMMYT, WARDA etc and they have generated elite lines which need multi-location testing through adaptive studies.

Studies conducted by NabZARDI indicate that intercropping is a common practice in the region but the productivity of the systems as practiced by farmers is still very low. The increasing demand for food on limited land resources demands for further studies on intercropping systems

OBJECTIVES

- To adapt varieties of maize, cassava, groundnuts, upland rice and beans in the low altitude areas of the BugiZARDI zone.
- To promote the identified appropriate maize, cassava, groundnuts, upland rice and beans production practices in the sub zone.

EXPECTED OUTPUTS

- High yielding maize, cassava, groundnuts, upland rice and beans varieties with good resistance to pests and diseases recommended for production in the sub zone.
- High quality planting materials for cassava, ground nuts and upland rice availed to uptake pathways.
- Appropriate cost effective soil amendment options for maize production in the zone recommended.
- Validated information on improved production practices for maize, cassava, groundnuts, upland rice and beans packed and availed to uptake pathways.

STUDIES IN THE PROJECT

1. On station variety adaptation and productivity of cassava, maize, groundnuts , upland rice and beans.
2. Multi-locational evaluation and on farm adaptation of promising varieties maize, groundnuts and upland rice in Busoga region.
3. Testing and validation of planting materials multiplication and delivery systems in the sub zone.
4. Determine the fertilizer response and requirements for increased productivity of key crops.

EXPERIMENT 1

On station variety adaptation trails for cassava, maize, coffee, groundnuts, citrus and mangoes.

s/no	Activity	By whom	Milestone
1	Acquisition of materials	Bugi ZARDI Scientists	Elite planting materials of cassava, maize, groundnuts, beans and other inputs acquired by Oct 2009.
2	Laying out of trials	-do-	Experiments laid out at Ikulwe Satellite Station by Nov. 2009
3	Management of experiments	-do-	Appropriate agronomic practices demonstrated
4	Supervision of experiments	-do-	Atleast one supervision carried out per month to see progress & status of experiments.
5	Evaluation & monitoring of trials	-do-	At least two visits made annually by directors to verify results and reports
6	Data collection	-do-	Data made available for

	compilation		analysis.
7	Data entry and analysis	-do-	Generated data analysed.
8	Monthly, quarterly and annually report writing	-do-	Reports on adaptation trials written and availed to stakeholders by 2014.
9	Conducting field days	-do-	One field day conducted every year (2009-2014)
10	Evaluation of study	-do-	

LOCATION / SITE

There shall be five on-station sites to be established at Ikulwe Satellite Station situated in Mayuge District, Mayuge Town Council at an altitude of)

MATERIALS AND METHODOLOGY

MATERIALS

Name	Quantity
Upland rice	20 kg
Beans	30 kg
Cassava stems	4 bags (6 Lines)
Groundnuts (shelled)	35kg (4 Lines)
Maize	20 kg (5 Lines)
Fertilizers	
	200 Kg Urea
	200 Kg DAP
	200 Kg TSP
Dimethoate (EC40) pesticide	10 Litres
Chloropyriphos pesticides (Ant Killer)	10 Litres
Glyphosate Herbicides	8 Litres
Sprayer Pumps (CP15)	1
Weighing scale (200kg)	1

Analytical balance (200gm)	1
Gum boots	5 pieces
Overall coats	5 pieces
Big labels (painted)	6 pieces
Small labels (painted)	120 pieces
Fencing poles	300 pieces
Barbed wires	10 rolls
Assorted nails	25kg

METHODOLOGY

The trials shall be laid out for each crop independently in a complete block design replicated 3 times.

Dimethoate pesticide shall be used at a rate of 50ml per 15 litres of water to control pests in all experimental plots as recommended and Glyphosate herbicide shall be used as a non selective herbicide to control perennial weeds at a rate of 250ml per 15 litres of water, where necessary in all experimental plots before planting. Also termites shall be controlled using chloropyriphos Ant killer prior to planting of crops.

Cassava, groundnuts, beans, upland rice and maize plots shall be 3 x 5 m and the recommended spacing of 1 x 1m, 45 x 10cm, 45x10cm, 30x12.5 cm and 75 x 50cm shall be used respectively. The basal and top dressing fertilizers shall be applied to the crops at rates of or maizegroundnuts, beans andupland rice.

DATA TO BE COLLECTED

Disease Incidences:

The disease incidences shall be recorded weekly in cassava, groundnuts, rice, beans and maize in all the experimental plots.

Plant population:

The number of plants per plot shall be established and recorded at germination and at the end of the seasons.

Biometric and Yield Data

The yield of ground nuts , beans upland rice and maize shall be determined each season in terms of grains / seed weight per hectare and the yield for cassava shall be assessed at the end of the second year by sampling 20 plants per 50 square metres and weighing the fresh tubers. The height of the cassava crop shall be measured on a weekly basis.

The following observations shall be made on all the legume crops: plant height, number of pods, number of seeds per pods and 1000 seed weight to determine the yield. For the rice crop the following data shall be collected: plant height, number of tillers, number of panicles, number of ears per panicle, number of grains per panicle and 1000 grain weight to determine the yield

The economics of each study shall be evaluated in terms of net returns per shilling investment.

Pre treatment observations:

- ❖ Soil nutrient status
- ❖ Slope of the land
- ❖ Perennial weeds existence
- ❖ Shade trees neighboring site
- ❖ Termite ant hills

BUDGET FOR PLANNED ACTIVITIES IN YEAR ONE Experimentt 7.1

S/N	ACTIVITY	ITEM	QUANTITY	RATE(Ush)	AMOUNT(Ush)
1	Procurement of inputs	Upland rice	5 kg	4,000	20,000
		Beans	7.5 kg	4,000	30,000
		Cassava stems	1 bag	10,000	10,000
		Groundnuts (shelled)	8 kg	5,000	40,000
		Maize	5 kg	4,000	20,000
		Fertilizers (Urea)	100 kg	2,400	240,000
		Fertilizers (DAP)	100 kg	2,400	240,000
		Tape measures	5 pieces	5,000	25,000
		Dimethoate (EC40) pesticide	8 litres	20,000	160,000
		Chloropyriphos pesticides (Ant Killer)	4 litres	20,000	80,000
		Glyphosate Herbicides	8 litres	20,000	160,000
		Hand hoes	20	6,000	120,000
		Pangas	10	8,000	80,000
		Wheel barrows	2	60,000	120,000
		Crop tags	300	200	60,000
		Slashers	10	6,000	60,000
		Barbed wire rolls	2	120,000	240,000
		Fence posts	50	2,000	100,000
		Nails	6	6,000	36,000
		Analytical balance	1	400,000	400,000
		Large labels	6	60,000	360,000

		Sub-total			2,601,000
2	Stationery and other goods	Computer cartridges	2	150,000	300,000
		Printing paper reams	2	12,500	25,000
		Ball pens	100	250	25,000
		pencils	24	200	4,800
		Counter books	24	4000	96,000
		Clip boards	2	4,000	8,000
		Photocopying services	502	100	50,200
		Sub-total			509,000
3	Contract works Wages and allowances	(a)Land preparation			
		Bush clearance	4 acres	40,000	160,000
		Ploughing	8 acres	70,000	560,000
		Disc harrowing	4 acres	50,000	200,000
		Sub-total			920,000
		(b) laying out of trials			
		Marking the field	4 acres	25,000	100,000
		Planting	4 acres	50,000	200,000
		Sub-total			300,000
		(c)Field management of trials			
		Weeding of trials	12	50,000	600,000

		Bird scaring in rice trials	4 months	30,000	120,000
		Fertiliser application	4	10,000	40,000
		Herbicide application	4	10,000	40,000
		Pesticide application	4	10,000	40,000
		Slashing around trials	6	15,000	90,000
		Labour to repair fences	2	30,000	60,000
		Sub-total			990,000
		(d) Purchase of stationery and other goods			
		1 Technician	4 SDAs	5,000	20,000
		Motor vehicle hire	1	100,000	100,000
		Fuel/Diesel	40 Litres	2,400	108,000
		Sub total			228,,000
4	Data collection, entry and analysis				
		Data collection	16	30,000	480,000
		Data Entry into computer and processing	2	200,000	400,000
		Data analysis	2	400,000	800,000
		Sub-total			1,680,000
5	Harvesting and processing				
		Harvesting and processing	12	15,000	180,000
		Sub- total			180,000

6	Other Costs	Field day	1	5,000,000	5,000,000
		Sub-total			5,000,000
		GRAND TOTAL YEAR ONE			12,408,000

BUDGET FOR PLANNED ACTIVITIES IN YEAR TWO Experiment 7.1

S/N	ACTIVITY	ITEM	QUANTITY	RATE(Ush)	AMOUNT(Ush)
1	Procurement of inputs	Upland rice	5 kg	4,000	20,000
		Beans	7.5 kg	4,000	30,000
		Cassava stems	1 bag	10,000	10,000
		Groundnuts (shelled)	8 kg	5,000	40,000
		Maize	5 kg	4,000	20,000
		Fertilizers (Urea)	100 kg	2,400	240,000
		Fertilizers (DAP)	100 kg	2,400	240,000
		Tape measures	3 pieces	5,000	15,000
		Dimethoate (EC40) pesticide	8 litres	20,000	160,000
		Chloropyriphos pesticides (Ant Killer)	4 litres	20,000	80,000
		Glyphosate Herbicides	8 litres	20,000	160,000
		Crop tags	300	200	60,000
		Slashers	5	6,000	30,000
		Sub-total			1,105,000
2	Stationery and				

	other goods				
		Duplicating paper reams	2	10,000	20,000
		Spring files	10	1000	10,000
		Ball pens	100	250	25,000
		pencils	24	200	4,800
		Counter books	24	4000	96,000
		Clip boards	2	4,000	8,000
		Photocopying services	502	100	50,200
		Sub-total			214,000
3	Contract works, wages and allowances	(a) Land preparation			
		Bush clearance	4 acres	40,000	160,000
		Ploughing	8 acres	70,000	560,000
		Disc harrowing	4 acres	50,000	200,000
		Sub-total			920,000
		(b) laying out of multiplication gardens			
		Marking the field	4 acres	25,000	100,000
		Planting	4 acres	50,000	200,000
		Sub-total			300,000
		(c) Field management of trials			
		Weeding of trials	12	50,000	600,000
		Bird scaring in rice trials	4 months	30,000	120,000

		Fertiliser application	4	10,000	40,000
		Herbicide application	4	10,000	40,000
		Pesticide application	4	10,000	40,000
		Slashing around trials	6	15,000	90,000
		Labour to repair fences	2	30,000	60,000
		Sub-total			990,000
		(d) Purchase of stationery and other goods			
		1 Technician	4 SDAs	5,000	20,000
		Motor vehicle hire	1	100,000	100,000
		Fuel/Diesel	40 Litres	2,400	108,000
		Sub total			228,000
4	Data collection, entry and analysis				
		Data collection	16	30,000	480,000
		Data Entry into computer and processing	2	200,000	400,000
		Data analysis	2	400,000	800,000
		Sub-total			1,680,000
5	Harvesting and processing				
		Harvesting and processing	12	15,000	180,000

		Sub- total			180,000
6	Other Costs	Field day	1	5,000,000	5,000,000
		Repair of fences	2	50,000	100,000
		Repair of pumps	2	30,000	60,000
		Sub total			5,160,000
		GRAND TOTAL YEAR 2			10,777,000

EXPERIMENT 2

MULTI- LOCATIONAL EVALUATION AND ADAPTATION TRIALS OF PROMISING VARIETIES OF CASSAVA, MAIZE, BEANS, GROUND NUTS AND UPLAND RICE

The low adoption and productivity of prioritized crops in the zone has been attributed to lack of adapted improved varieties and use of poor crop production practices.

. The apparent poor soil nutrients status has been attributed to lack of cost effective soil nutrient amendment options for enhancing crop productivity and adoptions

JUSTIFICATION

NARO has developed various technologies to overcome the constraints leading to low adoptions, production and productivity but there is need to adapt the selected crop varieties in the sub zone.

The crops are a major source of income and the basis for food security in the zone. There is therefore need to carry out multi-locational studies to establish their performance and enhance availability of planting materials and adoptions of technologies.

Cassava, ground nuts and upland rice have become popular in the zone under the NAADS programme as prioritized key as enterprise in District plans for uptake pathways.

REFERENCE TO EARLIER WORK.

The production and productivity of maize, cassava, beans, upland rice and groundnuts in the zone is limited by low yielding varieties, declining soil fertility and poor agronomic practices (Farming systems survey, NABUIN 2007).

Research work on the prioritized crops has been done in NASAARI and NACRRI in partnership with CIMMYT, WARDA etc and they have generated elite lines which need multi-location testing through adaptive studies.

OBJECTIVES

- To adapt varieties of maize, cassava, beans, groundnuts and upland rice in the low altitude areas of the BugiZARDI zone.
- To determine the cost -benefit analysis of upland rice production in the sub-zone
- To promote the identified appropriate maize, cassava, beans, groundnuts and upland rice production practices in the sub zone.

EXPECTED OUTPUTS

- High yielding maize, cassava, groundnuts, beans and upland rice varieties with good resistance to pests and diseases adapted and recommended for production in the sub zone.
- Validated information on improved production practices and economics of production for maize, cassava, groundnuts, beans and upland rice varieties packed and availed to uptake pathways.

LOCATION/SITE

The trials shall be located with one farmer but in circumstances where factors such as availability of land could be limiting then a farmer in the neighborhood shall be selected for the crops under trial.

MATERIALS AND METHODOLOGY:

Materials

Name	Quantity
Maize seed	120 kg
Beans seed	180 kg
Upland rice seed	120 kg (4 Lines)
Cassava stems	24 bags (4 Lines)
Ground nuts (shelled)	200 kg (4 Lines)

Fertilizers (DAP) (UREA)	600 Kg 600 kg
Dimethoate (EC40) pesticide	24 Litres
Chloropyriphos pesticide (Ant killer)	24 litres
Glyphosate Herbicide	24 Litres
Tape measure (50m)	2 pieces
Planting ropes	12pcs
Big labels (painted)	6 pieces
Small labels (painted)	720 pieces
Crop tags	3600 pieces

METHODOLOGY

Trials will be conducted on -farm for the crops (maize, beans, groundnuts cassava and upland rice,) Six farmers trial sites are to be identified from 6 districts within the sub-zone. The identified farmers shall provide land, prepare it, plant and manage the crops throughout the trial period using the available resources Seed, agrochemicals and technical backstopping shall be provided by BugiZARDI scientists.

The experiment will start in July 2009 and data collection shall start immediately and end in June 2011 and the trial shall be laid out for each crop independently in a Complete Randomized Block Design.

Dimethoate pesticide shall be used at a rate of 50 ml per 15 liters of water to control pests in all experimental plots as recommended and glyphosate herbicide shall be used as a non selective herbicide to control perennial weeds a rate of 250 ml per 15 litres of water where necessary in all experimental plots before planting. Termites shall be controlled using chloropyriphos ant killer prior to planting of crops.

Cassava, groundnuts, beans, upland rice and maize plots shall be 4x5m and the recommended spacing of 1x1m, 45x10cm, 45 x 10cm, 30 x 12.5 cm and 75x50cm shall be used respectively. The recommended basal and top dressing rates of different fertilizers shall be applied to the crops at rates of for maize,(Ground nuts),.....(Beans),.....(Upland rice)

S/NO	ACTIVITY	BY WHOM	MILESTONE
1	Identification of participating farmers	BugiZARDI scientists	Participating farmers identified by July 2009.
2	Acquisition of materials	-do-	Elite planting materials of cassava, beans, upland rice, groundnuts, maize and other inputs acquired by September. 2009.
3	Laying out of trials	BugiZARDI Scientists and farmers	Trials laid out at selected farmer's fields by October. 2009.
4	Management of experiments	BugiZARDI Scientists and farmers	Appropriate agronomic practices demonstrated
5	Data collection and compilation	BugiZARDI Scientists	Scientific data collected on vegetative parameters of crops for analysis
6	Supervision of experiment	Bug ZARDI scientists	At least one supervision carried out per month to see progress & status of experiments
7	Evaluation & monitoring of trials	-do-	At least two visits made annually to verify results and reports.
8	Conducting field day	BugiZARDI scientists, farmers and other scientists	2 field days organized for farmers by May 2011
9	Monthly, quarterly and annual report writing		Reports on adaptation trials written and availed to stakeholders by 2010
10	Developing and distribution of posters, pamphlets and	BugiZARDI scientists	posters, pamphlets and other materials developed and distributed by June 2011

	other materials		
11	Conducting radio talk shows and publications	BugiZARDI scientists	Radio talk shows and publications made
12	Evaluation study	BugiZARDI scientists, farmers, policy makers and other researchers	Final report made on adaptation studies and recommendations to uptake pathways finalized by 2011

DATA TO BE COLLECTED

Disease Incidences:

The pests and disease incidences shall be recorded weekly in cassava, groundnuts, beans, upland rice and maize in all the experimental plots.

Plant population:

The number of plants per plot shall be established and recorded at germination and at the end of the seasons.

Biometric and Yield Data

The yield of ground nuts , beans upland rice and maize shall be determined each season in terms of grains / seed weight per hectare and the yield for cassava shall be assessed at the end of the second year by sampling 20 plants per 50 square metres and weighing the fresh tubers. The height of the cassava crop shall be measured on a weekly basis.

The following observations shall be made on all the legume crops: plant height, number of pods, number of seeds per pods and 1000 seed weight to determine the yield. For the rice crop the following data shall be collected: plant height, number of tillers, number of panicles, number of ears per panicle, number of grains per panicle and 1000 grain weight to determine the yield

The economics of each study shall be evaluated in terms of net returns per shilling investment.

Pre treatment observations:

- ❖ Soil nutrient status

- ❖ Slope of the land
- ❖ Perennial weeds existence
- ❖ Shade trees neighboring site
- ❖ Termite ant hills

BUDGET FOR PLANNED ACTIVITIES IN YEAR ONE Experiment

7.2

S/N	ACTIVITY	ITEM	QUANTITY	RATE(₦)
1	Procurement of	Upland rice	20 kg	₦

BUDGET FOR PLANNED ACTIVITIES IN YEAR ONE Experiment 7.2

S/N	ACTIVITY	ITEM	QUANTITY	RATE(Ush)	AMOUNT (Ush)
1	Procurement of inputs	Upland rice	20 kg	4,000	80,000
		Beans	30 kg	4,000	120,000
		Cassava stems	4 bag	10,000	40,000
		Groundnuts (shelled)	32 kg	5,000	160,000
		Maize	20 kg	4,000	80,000
		Planting ropes	12	3000	36,000
		Fertilizers (Urea)	300 kg	2,400	720,000
		Fertilizers (DAP)	300 kg	2,400	720,000
		Tape measures	5 pieces	5,000	25,000
		Dimethoate (EC40) pesticide	8 litres	20,000	160,000
		Chloropyriphos pesticides (Ant Killer)	4 litres	20,000	80,000
		Glyphosate Herbicides	12 litres	20,000	240,000
		Crop tags	600	200	120,000
		Large labels	6	60,000	360,000
		Sub-total			2,941,000
2	Stationery and other goods				
		Printing paper reams	2	12,500	25,000
		Ball pens	50	250	12,500
		pencils	36	200	7,200
		Counter books	24	4000	96,000

		Clip boards	6	4,000	24,000
		Photocopying services	500	100	50,000
		Sub-total			214,700
3	Contract works wages and allowances	(a)Laying out trials in 6 districts			
		Marking and planting 6 trials	12	80,000	960,000
		Hire of vehicles	8	100,000	800,000
		Fuel	8	144,000	1,152,000
		Allowances to technicians	16 days	55,000	880,000
		Sub-total			3.792,000
		(b) Purchase of stationery and other goods			
		1 Technician	4 SDAs	5,000	20,000
		Motor vehicle hire	1	100,000	100,000
		Fuel/Diesel	40 Litres	2,400	108,000
		Sub total			228,,000
		(c) Follow up supervision of trials			
		Scientists	12	70,000	840,000
		Technicians	12	55,000	660,000
		Driver	4 Nights	45,000	180,000
		Hire of vehicle	6	100,000	600,000
		Fuel/Diesel	360 litres	2,400	864,000
		Sub total			3,144,000
		(e) Evaluation & Monitoring			
		Directors of Institutes, Scientists &			

		Technicians			
		Scientists	3	70,000	210,000
		Directors	6	90,000	540,000
		Drivers	6	45,000	270,000
		Fuel/Diesel	280 litres	2,400	672,000
		Sub total			1,692,000
4	Data collection, entry and analysis	Data recorders	96	20,000	1,920,000
		Data Entry into computer and processing	2	100,000	200,000
		Data analysis	2	300,000	600,000
		Sub-total			2,720,000
5	Other Costs	Field day	1	1,200,000	1,200,000
		Sub-total			1,200,000
		GRAND TOTAL FOR YEAR ONE			15,468,300

BUDGET FOR PLANNED ACTIVITIES IN YEAR TWO (Experiment 7.2)

S/N	ACTIVITY	ITEM	QUANTITY	RATE(Ush)	AMOUNT(Ush)
1	Procurement of inputs	Upland rice	40 kg	4,000	160,000
		Beans	60 kg	4,000	240,000
		Cassava stems	8 bags	10,000	80,000
		Groundnuts (shelled)	64 kg	5,000	320,000
		Maize	40 kg	4,000	160,000
		Planting ropes	24	3000	72,000
		Fertilizers (Urea)	600 kg	2,400	1,440,000
		Fertilizers (DAP)	600 kg	2,400	1,440,000
		Tape measures	12 pieces	5,000	60,000
		Dimethoate (EC40) pesticide	24 litres	20,000	480,000
		Chloropyriphos pesticides (Ant Killer)	8 litres	20,000	160,000
		Glyphosate Herbicides	24 litres	20,000	480,000
		Crop tags	1000	200	200,000
		Large labels	6	60,000	360,000
		Sub-total			5,652,000
2	Stationery and other goods				
		Printing paper reams	2	12,500	25,000
		Ball pens	50	250	12,500
		pencils	36	200	7,200
		Counter books	24	4000	96,000

		Clip boards	6	4,000	24,000
		Photocopying services	500	100	50,000
		Sub-total			214,700
3	Contract works wages and allowances	(a) Laying out trials in 6 districts			
		Marking and planting 6 trials	24	80,000	1,920,000
		Hire of vehicles	12	100,000	1,200,000
		Fuel	12	144,000	1,728,000
		Allowances to technicians	24 days	55,000	1,320,000
		Sub-total			3,792,000
		(b) Purchase of stationery and other goods			
		1 Technician	4 SDAs	5,000	20,000
		Motor vehicle hire	1	100,000	100,000
		Fuel/Diesel	40 Litres	2,400	108,000
		Sub total			228,000
		(c) Follow up supervision of trials			
		Scientists	18	70,000	1,260,000
		Technicians	18	55,000	990,000
		Driver	6 Nights	45,000	270,000
		Hire of vehicle	12	100,000	1,200,000
		Fuel/Diesel	480 litres	2,400	1,152,000
		Sub total			4,872,000
		(e) Evaluation & Monitoring			

		Directors of Institutes, Scientists & Technicians			
		Scientists	6	70,000	420,000
		Directors	12	90,000	1,080,000
		Drivers	12	45,000	540,000
		Fuel/Diesel	400 litres	2,400	960,000
		Sub total			3,000,000
4	Data collection, entry and analysis	Data recorders	192	20,000	3,840,000
		Data Entry into computer and processing	4	100,000	400,000
		Data analysis	2	600,000	1,200,000
		Sub-total			5,440,000
5	Other Costs	Field days in 3 districts	3	1,200,000	3,600,000
		Sub-total			3,600,000
		GRAND TOTAL FOR YEAR TWO			24,098,000

EXPERIMENT 3

TESTING AND VALIDATION OF PLANTING MATERIALS MULTIPLICATION AND DELIVERY SYSTEMS IN THE ZONE.

INTRODUCTION

The low adoption productivity of prioritized crops in the zone has been attributed to lack of improved varieties and poor crop production practices. The main causes of lack of improved planting materials are lack of skills amongst the farmers, cost effective methods of seed multiplication and a sustainable seed delivery system.

JUSTIFICATION

NARO has developed various technologies to overcome the constraints leading to low adoptions, production and productivity but there is need to promote and sustainably avail the planting materials to uptake pathways in the zone.

REFERENCE TO EARLIER WORK.

The production and productivity of cassava, beans, groundnuts and upland rice in the zone is limited by the low yielding varieties, declining soil fertility and poor agronomic practices (farming systems survey, NABUIN 2007).

Research work on the prioritized crops has been done in NASAARI and NACRRI in partnership with CIMMYT, WARDA etc and they have generated elite lines which need multi-location testing through adaptive studies.

Studies conducted by NabZARDI also indicate that the above crops are becoming important in the zone due to high demand locally and internationally but availability of improved planting materials is still a big challenge.

OBJECTIVE

- To promote the identified appropriate groundnuts, cassava, upland rice and beans production practices in the sub zone.

EXPECTED OUTPUTS

- High quality planting materials for groundnuts, cassava, beans and upland rice availed to uptake pathways.
- Validated information on improved production practices for cassava, beans, ground nuts and upland rice packed and availed to uptake pathways.

LOCATION/SITE

The multiplication shall be located with one farmer but in circumstances where factors such as availability of land could be limiting, then a farmer in the neighborhood shall be selected for the other crop

MATERIALS AND METHODOLOGY:

Materials

Name	Quantity
Cassava stems	84 bags (MH/97-2961)
Ground nuts (shelled)	480 kg (sere nut 3)
Fertilizers	300 kg TSP
Dimethoate (EC40) pesticide	12 liters
Chloropyriphos pesticide (Ant killer)	12 liters
Glyphosate Herbicide	24 liters
Planting ropes	6pcs
Sprayer Pumps (15 Litres)	12 (CP-15)

Large labels	12 pieces
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METHODOLOGY

Twelve farmers for on farm seed multiplication sites for cassava and groundnuts will be identified from 6 districts within the sub-zone. The identified farmers shall be members of farmer groups actively growing the above crops, having adequate land in one block for one acre of each of the crops and ready to provide the necessary labour and other inputs required to manage the crops.

The experiment will start in July 2009 using the selected crop varieties in the on- station adaptation studies at Ikulwe station and data collection shall start immediately after crop emergency for 2 years

Dimethoate pesticide shall be used at a rate of 50ml per 15 liters of water to control pests in all experimental plots as recommended and Glyphosate herbicide shall be applied in all experimental plots before and after planting to control the perennial weeds. The termites shall be controlled using chloropyriphos Ant killer prior to planting of the cassava.

Cassava and groundnuts plots shall be one (1.0) acre each and the recommended spacing of 1x1m and 45x10cm shall be used respectively. The recommended basal rate of shall be applied to the groundnuts.

At harvest time twice the groundnuts seed and 10 times the cassava planting materials given to the farmers shall be recovered and passed on to other farmers within the group or new groups for further dissemination to uptake pathways. The project will however directly support only 6 farmers every season.

It is hoped that within 2 years of the study, a total of 12, 24, 48 and 96 farmers shall directly benefit in the subsequent seasons respectively from the groundnuts pass on, making a total 756 acres of ground nuts and at least 300,000 kg of seed availed to uptake pathways in 2 years.

Equivalent cassava planting material shall be passed on to 10 other farmers in another group at the end of each year and at least 1332 acres of cassava shall have been established by June 2011

S/NO	ACTIVITY	BY WHOM	MILESTONE
1	Identification of participating farmers	BugiZARDI scientists	Participating farmers identified by July 2009.
1	Acquisition of materials	-do-	Promising planting materials of cassava and groundnuts seed acquired by Oct. 2009
2	Laying out of multiplication gardens	BugiZARDI Scientists and farmers	Multiplication gardens laid out at selected farmer's fields by October 2009
3	Management of multiplication gardens	BugiZARDI Scientists and farmers	Appropriate agronomic practices demonstrated
4	Supervision of multiplication gardens	BugiZARDI scientists	At least one supervision carried out per quarter to see progress & status of multiplication gardens
5	Evaluation & monitoring of trials	-do-	At least four visits made annually to verify results and reported
6	Data collection compilation	-do-	Data made available for analysis
7	Data entry and analysis	-do-	Generated data and analysis done
8	Monthly, quarterly and annually report writing	-do-	Reports on multiplication gardens written and availed to stakeholders by 2011
9	Conducting radio talk shows and publications	-do-	Radio talk shows and publications made
10	Conducting field days	BugiZARDI Scientists and farmers and other scientist	One field day conducted every year (2009-2011)
11	Evaluation of study	BugiZARDI Scientists farmers, policy makers and other researchers	Final report made on planting material multiplication and delivery studies finalized by 2011

DATA TO BE COLLECTED

Disease Incidences:

The Disease Incidences shall be recorded weekly in the cassava and groundnuts plots of all the experimental plots.

Plant population:

The percentage crop germination shall be determined at establishment and crop stand observed every month in all multiplication gardens.

Yield Data:

Disease Incidences:

The pests and disease incidences shall be recorded weekly in cassava and groundnuts in all the experimental plots.

Pretreatment Observation:

- ❖ Perennial weeds existence
- ❖ Shade trees neighboring site
- ❖ Termite ant hills

BUDGET FOR PLANNED ACTIVITIES IN YEAR ONE Experimentt 7.3

S/N	Activity	Item	Qty	Rate (Ush)	Amount
1	Procurement of inputs				
		Cassava stems	84 bags	10,000	840,000
		Groundnuts seeds	480 kg	5000	2,400,000
		Fertilizers (TSP)	300 kg TSP	3000	900,000
		Pesticides (Dimethoate/chloropyriphos)	24	20,000	480,000
		Glyphosate herbicide	24	20,000	480,000
		Sprayer Pumps (CP-15)	12	200,000	2,400,000
		Planting ropes	12	3,000	36,000
		Big labels (painted)	12 pieces	60,000	720,000
		Sub total			5,340,000
2	Stationery and other goods				
		Note books	2dozens	18,000	36,000
		Pens	50	250	12,500
		Markers	4 packets	6,000	24,000
		Masking tapes	4	3,000	12,000
		Sub total			84,500
3	Allowances and wages				
		(a) Identification of participating farmers			

	Scientists	6	70,000	420,000
	Technicians	6	55,000	330,000
	Extension staff	6	12,000	72,000
	Hire of vehicle	6	100,000	600,000
	Fuel (Diesel)	360 litres	2,400	864,000
	Sub Total			2,286,000
	(b) laying out of multiplication gardens			
	Scientists	12	70,000	840,000
	Technicians	12	55,000	660,000
	Extension staff	12	10,000	120,000
	Driver	12	45,000	540,000
	Hire of vehicle	12	100,000	1,200,000
	Fuel /Diesel	300 Litres	2,700	1,620,000
	Sub Total			2,480,000
	(c) Purchase of stationery and other goods			
	1 Technician	4 SDAs	5,000	20,000
	Fuel/Diesel	40 Litres	2,700	108,000
	Driver	4 SDAs	5,000	20,000
	Sub total			148,000
	(d) Follow up supervision of multiplication sites			
	Scientists	6	70,000	420,000
	Technicians	12	55,000	660,000
	Driver	4 Nights	45,000	180,000

		Hire of vehicle	6	100,000	600,000
		Fuel/Diesel	360 litres	2,400	864,000
		Sub total			2,724,000
		(e) Data Collection			
		Data recorders	24	20,000	480,000
		Sub Total			480,000
		(e) Evaluation & Monitoring			
		Directors of Institutes, Scientists & Technicians			
		Directors	4	90,000	360,000
		Scientists	4	70,000	280,000
		Technicians	2	55,000	110,000
		Drivers	2	45,000	90,000
		Fuel/Diesel	180 litres	2,700	486,000
		Sub total			1,326,000
5	Other Costs				
		Data Entry into computer and processing	1yr	200,000	200,000
		Data Analysis	1	500,000	500,000
		Radio Talk Shows	2	800,000	1,600,000
		Field day for districts	2	2,000,000	4,000,000
		Sub total			2,300,000
		TOTAL FOR YEAR 1			21,168,500

BUDGET FOR PLANNED ACTIVITIES IN YEAR TWO Expt 7.3

S/N	Activity	Item	Qty	Rate (Ush)	Amount
1	Procurement of inputs				
		Cassava stems	84 bags	10,000	840,000
		Groundnuts seeds	480 kg	5000	2,400,000
		Fertilizers (TSP)	300 kg TSP	3000	900,000
		Pesticides (Dimethoate/chloropyriphos)	24	20,000	480,000
		Glyphosate herbicide	24	20,000	480,000
		Sprayer Pumps (CP-15)	12	200,000	2,400,000
		Planting ropes	12	3,000	36,000
		Big labels (painted)	12 pieces	60,000	720,000
		Sub total			5,340,000
2	Stationery and other goods				
		Note books	2dozens	18,000	36,000
		Pens	50	250	12,500
		Markers	4 packets	6,000	24,000
		Masking tapes	4	3,000	12,000
		Sub total			84,500
3	Allowances and wages				
		(a) Identification of participating farmers			

	Scientists	6	70,000	420,000
	Technicians	6	55,000	330,000
	Extension staff	6	12,000	72,000
	Hire of vehicle	6	100,000	600,000
	Fuel (Diesel)	360 litres	2,400	864,000
	Sub Total			2,286,000
	(b) laying out of multiplication gardens			
	Scientists	12	70,000	840,000
	Technicians	12	55,000	660,000
	Extension staff	12	10,000	120,000
	Driver	12	45,000	540,000
	Hire of vehicle	12	100,000	1,200,000
	Fuel /Diesel	300 Litres	2,700	1,620,000
	Sub Total			2,480,000
	(c) Purchase of stationery and other goods			
	1 Technician	4 SDAs	5,000	20,000
	Fuel/Diesel	40 Litres	2,700	108,000
	Driver	4 SDAs	5,000	20,000
	Sub total			148,000
	(d) Follow up supervision of multiplication sites			
	Scientists	8	70,000	560,000
	Technicians	12	55,000	660,000
	Drivers	6	45,000	270,000

		Hire of vehicle	8	100,000	800,000
		Fuel/Diesel	480 litres	2,400	1,152,000
		Sub total			3,342,000
		(e) Data Collection			
		Data recorders	24	20,000	480,000
		Sub Total			480,000
		(e) Evaluation & Monitoring			
		Directors of Institutes, Scientists & Technicians			
		Directors	4	90,000	360,000
		Scientists	4	70,000	280,000
		Technicians	2	55,000	110,000
		Drivers	2	45,000	90,000
		Fuel/Diesel	180 litres	2,700	486,000
		Sub total			1,326,000
5	Other Costs				
		Data Entry into computer and processing	1yr	200,000	200,000
		Data Analysis	1	500,000	500,000
		Radio Talk Shows	2	800,000	1,600,000
		End of project meeting	1	2,000,000	2,000,000
		Sub total			4,300,000
		TOTAL FOR YEAR 2			19,786,500

EXPERIMENT 4

DETERMINE FERTILIZER RESPONSE AND REQUIREMENTS FOR INCREASED PRODUCTIVITY OF KEY CROPS.

STUDY 1: The Performance of maize based intercropping systems with legumes at different fertiliser levels

INTRODUCTION

The low adoption and productivity of prioritized crops in the zone has been attributed to poor soil nutrient management, lack of improved varieties and poor crop production practices.

The apparent poor soil nutrient status has been attributed to lack of cost effective soil nutrients amendment options for enhancing crop productivity.

JUSTIFICATION

NARO has developed various technologies to overcome the constraints leading to low adoptions, production and productivity but there is need to adapt the selected crop varieties and determine cost effective nutrient amendment options in order to promote the technologies to uptake pathways.

The high rate of growth in human population in the country has counteracted the increase in food production and no other challenge is more critical than providing food to an ever increasing demand. Intensive cultivation to increase yield per unit area over given time through intercropping is one of the alternative propositions. The multiple uses of maize call for increased productivity and with the introduction of hybrid maize, the potential of maize intercropped with legumes which is a common practice amongst Ugandan farmers can be fully exploited by adopting suitable management practices such as fertilizer management.

Legumes are important integral components of the Busoga farming system and a paramount source of proteins in the diet. The low productivity of legumes is mainly because they are grown on marginal lands with low inputs and poor management practices. To meet the increasing demand for pulses in Uganda, it is necessary to boost the productivity by adopting suitable cropping systems such as intercropping as there is little scope for increasing the area under their production.

Pairing the rows without affecting the plant population of maize and introducing a legume as a bonus crop is the proposed way forward to get optimum productivity from the intercropping systems.

REFERENCE TO EARLIER WORK

A lot of literature is available on intercropping of maize with different legumes, but information on intercropping maize with beans and groundnuts under different levels of fertilisers is limited. The spatial arrangement of component crops often influences the productivity of intercropping. The arrangements are of low monetary inputs which involve little or no additional costs. Variation in spacing within and between rows is always the criterion. The available information pertaining to the influence of pairing rows on the performance of maize is reviewed briefly.

Anand Reddy and Bheemaih (1991) recorded no significant difference in the length and girth of maize cobs, number and weight of grains per cob due to pairing of rows. Several researchers also observed that change of planting geometry of maize due to intercropping did not have effect on the grain yield of maize (Ramasamy *et al*, 1996)

Sharma *et al.* (1996) observed that optimum plant population of blackgram in maize under separate fertiliser recorded 58.4 and 57.9 % seed yield reduction of the intercrop at half and the recommended fertiliser doses to it respectively. The grain yield of paired rows of maize was not affected by intercropping. They further observed that the maize grain yield increased with nitrogen and phosphorus levels and was maximum under separate fertiliser treatments. The seed yield of legume intercrops also increased at higher fertiliser levels and was maximum under the recommended fertiliser dose (20 kg N and 17.5 kg

OBJECTIVES

1. To explore the possibility of intercropping different legumes like beans and groundnuts in maize under a paired row spatial arrangement in the low altitude areas of the BugiZARDI zone
2. To assess the relative yield advantage and economics of intercropping systems with sole cropping at the recommended and half dose of fertilizer levels to base and intercrops respectively.
3. To determine cost effective soil nutrient amendment options for enhancing maize productivity

4. To promote the identified technologies under the maize based intercropping systems to uptake pathways in the sub-zone

EXPECTED OUTPUTS

- Possibilities of intercropping different legumes like beans and groundnuts in maize under a paired row spatial arrangement in the low altitude areas of the BugiZARDI zone explored
- Appropriate cost effective soil amendment options for maize based intercropping systems with legumes in the zone recommended.
- Yield advantage and cost benefit analysis for maize based intercropping with legumes under paired rows determined for the sub-zone
- Productivity of maize based intercropping with legumes under paired rows established for the Busoga zone , promoted and availed to uptake pathways

LOCATION / SITE

There shall be five on-station sites to be established at Ikulwe satellite station situated in Mayuge District, Mayuge Town Council at an Altitude of
 eet() above sea level.

MATERIALS AND METHODOLOGY:

Materials

Maize seed	8 kg
Ground nuts seed (Serenut - 2)	12 kg
Ground nuts seed (Serenut - 3)	12 kg
Bean seeds	12 kg
Fertilizers	
	200kg DAP
	200kg Urea
Dimethoate (EC40) Pesticide	4 Litres
Chloropyriphos pesticide(Ant Killer)	6 Litres
Glyphosate Herbicide	4 Litres
Sprayer Pump (CP15)	1
Weighing scale (200kg)	1
Gum boots	3 pcs
Overcoats	3 pcs
Big labels (painted)	1 pc
Small labels (painted)	0pcs
Fencing poles	500pcs
Barbed wires	10 rolls
Assorted nails	10kg

METHODOLOGY:

The trials shall be laid out in a complete block design replicated 3 times. Dimethoate pesticide shall be used at a rate of 50ml per 15 litres of water to control pests in all legume crops and Glyphosate herbicide shall be used as a non selective herbicide to control perennial weeds at a rate of 250ml per 15 litres of water, where necessary in all experimental plots before planting. The termites shall be controlled using chloropyriphos ant killer prior to planting of crops.

All the plots for sole and intercropped treatments shall be 3 x 5 m and the basal and top dressing fertilizers shall be applied to the crops at the recommended rates

The experiments shall be laid out in a randomized block design replicated 3 times with 12 treatments as follows:

T1: Sole maize on convectional planting (75x30 cm)

T2: Sole paired maize (50/100x30 cm) +F1

T3: Paired rows of maize (50/100x30 cm) with 2 rows of beans +F1

- T4: Paired rows of maize (50/100x30 cm) with 2 rows of beans + F2
 T5: Paired rows of maize (50/100x30 cm) with 2 rows of beans + F3
 T6: Paired rows of maize (50/100x 30 cm) with 2 rows of groundnuts-1 + F1
 T7: Paired rows of maize (50/100x 30 cm) with 2 rows of groundnuts -1+F2
 T8: Paired rows of maize (50/100 x 30 cm) with 2 rows of groundnuts-1 + F3
 T9: Paired rows of maize (50/100 x 30 cm) with 2 rows of ground nuts-2 + F1
 T10: Paired rows of maize (50/100 x 30 cm) with 2 rows of ground nuts-2 + F2
 T11: Paired rows of maize (50/100 x 30 cm) with 2 rows of ground nuts-2 + F3
 T12: Sole beans (45 x 10cm) with recommended fertilizers level.
 T13: Sole ground nuts-2 (45 x 10 cm) with recommended fertilizer level
 T14: Sole ground nut-3 (60 x 15 cm) with recommended fertilizer level

Where, fertilizer levels:

- F1: Recommended fertilizer dose to base crop
 F2: Recommended fertilizer dose to base crop and half the recommended dose to intercrop
 F3: Recommended fertilizer dose to both base and intercrop

The varieties to be used will be maize (6H, Beans (Nabe 4), groundnuts (Sere nut 2 & 3) (Gap filling and thinning shall be done to maintain a uniform population in all treatments.

	ACTIVITY	BY WHOM	MILESTONE
1.	Acquisition of materials	BugiZARDI Scientist	Elite planting materials of maize, Beans, groundnuts and other inputs acquired by August 2009
2.	Laying out of experiments	-do-	Experiments laid out at Ikulwe Satellite Station by August, 2009
3.	Management of experiment	-do-	Appropriate agronomic practices demonstrated
4.	Supervision of experiments	-do-	At least one supervision carried out per month to see progress & status of experiments.
5.	Evaluation & monitoring of experiments.	-do-	At least two visits made annually to verify results and reports.
6.	Data collection compilation	-do-	Data made available for analysis.
7.	Data entry and analysis	-do-	Generated data analysis
8.	Monthly, quarterly and annually report writing	-do-	Reports on experiments written and availed to stakeholders day 2011
9.	Conducting field days	Bugi ZARDI Scientists, farmers and other scientists.	One field day conducted every year (2009-2011)
10.	Evaluation of study	Bugi ZARDI Scientist, farmers, policy makers and other researchers.	Final report made on studies and recommendations to uptake pathways finalized by 2011.

DATA TO BE COLLECTED

Five plants of each crop, from individual plots having equal competition from all sides shall be randomly selected and tagged for biometric observations. In maize the following data shall be collected: plant height, number of green leaves per plant, number of days to 50 percent teazeling, length of cobs, girth of cobs, number of grains per cob, weight of grains per cob, 100 grain weight.

In legumes under sole and intercropping patterns, the following observations shall be made: plant height, number of pods, number of seeds per pods and 1000 seed weight to determine the yield. The economics of sole and intercropping systems shall be evaluated in terms of net returns per hectare, net returns per shilling invested and relative net returns using the prevailing market prices.

The Disease Incidence shall be recorded weekly in the crops.

Pre-treatment Observation:

- ❖ Soil nutrient status
- ❖ Slope of the land
- ❖ Perennial weeds existence
- ❖ Shade trees neighboring site
- ❖ Termite ant hills.

BUDGET FOR PLANNED ACTIVITIES IN YEAR ONE Experimentt 7.4

S/N	ACTIVITY	ITEM	QUANTITY	RATE(Ush)	AMOUNT(Ush)
1	Procurement of inputs				
		Maize seed	4 kg	4,000	16,000
		Ground nuts seed (Serenut - 2)	6 kg	5,000	30,000
		Ground nuts seed (Serenut – 3)	6kg	5,000	30,000
		Bean seeds	6 kg	4,000	24,000
		Harvesting polythene bags	20	1,000	20,000
		Crop tags	120	100	12,000
		Fertilizers			
			100kg DAP	3,000	300,000
			100kg Urea	3,000	300,000
		Dimethoate (EC40) Pesticide	2 Litres	20,000	40,000
		Chloropyriphos pesticide(Ant Killer)	3 Litres	20,000	60,000
		Glyphosate Herbicide	2 Litres	20,000	40,000
		Sprayer Pump (CP15)	1	200,000	200,000
		Weighing scale (200kg)	1	500,000	500,000
		Gum boots	3 pieces	20,000	60,000
		Overcoats	3 pieces	40,000	120,000
		Big labels (painted)	1 pieces	60,000	60,000
		Fencing poles	300pcs	2,000	600,000
		Barbed wires	10 rolls	120,000	1,200,000

		Assorted nails	10kg	6,000	60,000
		Sub-total			3,672,000
2	Soil sampling and testing				
		Soil sampling	2 seasons	10,000	20,000
		Soil testing	12 samples	10,000	120,000
		Transport to NARL	4	30,000	120,000
		Allowances to technicians	4	55,000	220,000
		Sub total			480,000
3	Stationery and other goods	Printing paper reams	2	12,500	25,000
		Ball pens	100	250	25,000
		Pencils	24	200	4,800
		Counter books	12	4000	48,000
		Clip boards	2	4,000	8,000
		Photocopying services	400	100	40,000
		Sub-total			150,800
4	Contract works Wages and allowances	(a) Land preparation			
		Bush clearance	1 acre	40,000	40,000
		Ploughing	2 acre	70,000	140,000
		Disc harrowing	2 acres	50,000	100,000
		Sub-total			280,000

		(b) laying out of experiments			
		Marking the field	1 acres	25,000	25,000
		Planting	1 acres	50,000	50,000
		Sub-total			75,000
		(c) Field management of trials			
		Weeding of trials	8	50,000	400,000
		Fertiliser application	4	10,000	40,000
		Herbicide application	4	10,000	40,000
		Pesticide application	4	10,000	40,000
		Slashing around trials	6	15,000	90,000
		Labour to establish fences	2	200,000	400,000
		Sub-total			1,010,000
		(d) Purchase of stationery and other goods			
		1 Technician	4 SDAs	5,000	20,000
		Motor vehicle hire	1	100,000	100,000
		Fuel/Diesel	40 Litres	2,400	108,000
		Sub total			228,,000
5	Data collection, entry and analysis				
		Data collection	8	30,000	240,000
		Data entry into computer and processing	2	200,000	400,000
		Data analysis	2	400,000	800,000

		Sub-total			1,440,000
6	Harvesting and processing				
		Harvesting and processing	6	15,000	90,000
		Sub- total			90,000
7	Testing for nutrient uptake in stover and grains		180 samples	10,000	1,800,000
		Vehicle hire to NARL	2	100,000	200,000
		Fuel to NARL	120 litres	2,400	288,000
		Sub total			1,920,000
8	Other Costs	NIL			
		GRAND TOTAL YEAR ONE			9,345,800

BUDGET FOR PLANNED ACTIVITIES IN YEAR TWO Expt 7.4

S/N	ACTIVITY	ITEM	QUANTITY	RATE(Ush)	AMOUNT(Ush)
1	Procurement of inputs				
		Maize seed	4 kg	4,000	16,000
		Ground nuts seed (Serenut - 2)	6 kg	5,000	30,000
		Ground nuts seed (Serenut - 3)	6kg	5,000	30,000
		Bean seeds	6 kg	4,000	24,000
		Harvesting polythene bags	20	1,000	20,000
		Crop tags	120	100	12,000
		Fertilizers			
			100kg DAP	3,000	300,000
			100kg Urea	3,000	300,000
		Dimethoate (EC40) Pesticide	2 Litres	20,000	40,000
		Chloropyriphos pesticide(Ant Killer)	3 Litres	20,000	60,000
		Glyphosate Herbicide	2 Litres	20,000	40,000
		Assorted nails	4kg	6,000	24,000
		Sub-total			896,000
2	Soil sampling and testing				
		Soil sampling	2 seasons	10,000	20,000
		Soil testing	12 samples	10,000	120,000
		Transport to NARL	4	30,000	120,000

		Allowances to technicians	4	55,000	220,000
		Sub total			480,000
3	Stationery and other goods	Printing paper reams	2	12,500	25,000
		Ball pens	100	250	25,000
		Pencils	24	200	4,800
		Counter books	12	4000	48,000
		Clip boards	2	4,000	8,000
		Photocopying services	400	100	40,000
		Sub-total			150,800
4	Contract works	(a) Land preparation			
	Wages and allowances				
		Bush clearance	1 acre	40,000	40,000
		Ploughing	2 acre	70,000	140,000
		Disc harrowing	2 acres	50,000	100,000
		Sub-total			280,000
		(b) laying out of experiments			
		Marking the field	1 acres	25,000	25,000
		Planting	1 acres	50,000	50,000
		Sub-total			75,000
		(c) Field management of trials			
		Weeding of trials	8	50,000	400,000

		Fertiliser application	4	10,000	40,000
		Herbicide application	4	10,000	40,000
		Pesticide application	4	10,000	40,000
		Slashing around trials	6	15,000	90,000
		Labour to establish fences	2	200,000	400,000
		Sub-total			1,010,000
		(d) Purchase of stationery and other goods			
		1 Technician	4 SDAs	5,000	20,000
		Motor vehicle hire	1	100,000	100,000
		Fuel/Diesel	40 Litres	2,400	108,000
		Sub total			228,000
5	Data collection, entry and analysis				
		Data collection	8	30,000	240,000
		Data entry into computer and processing	2	200,000	400,000
		Data analysis	2	400,000	800,000
		Sub-total			1,440,000
6	Harvesting and processing				
		Harvesting and processing	6	15,000	90,000
		Sub- total			90,000
7	Testing for		180 samples	10,000	1,800,000

	nutrient uptake in stover and grains				
		Vehicle hire to NARL	2	100,000	200,000
		Fuel to NARL	120 litres	2,400	288,000
		Sub total			1,920,000
7	Other Costs	End of project meeting	1	1,000,000	1,000,000
		Repair of fences	2	100,000	200,000
		Brochures, pamphlets etc	1	2,000,000	2,000,000
		Sub-total			3,200,000
		GRAND TOTAL YEAR TWO			9,694,800