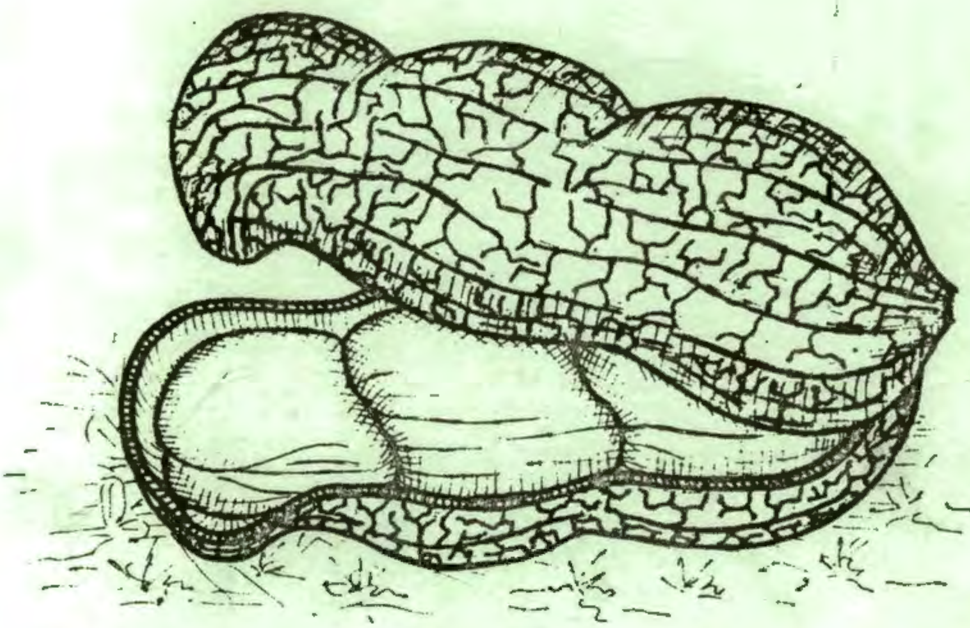
S. Dillabough HQ

ANNUAL REPORT OF THE GROUNDNUT IMPROVEMENT PROJECT 1982–1983

U.E.M.-MOZAMBIQUE

PRESENTED BY:

A. D. Malithano
K. V. Ramanaiah
B. S. Chilengue
G. A. Panguene



EDITOR: A. D. Malithano

UNIVERSIDADE EDUARDO MONDLANE

INTERNATIONAL DEVELOPMENT RESEARCH CENTRE
P.O. BOX 257
MAPUTO MOZAMBIQUE

C O N T E N T S

INTRODUCTION

The Fourth Annual Report of the Groundnut Improvement Project gives information on the activities of the Project during the first year of Phase II which commenced on 1 January, 1983 after a critical review of the progress and achievements made in Phase I. The continued financial support of the Project by the People's Republic of Mozambique (RPM) and the International Development Research Centre (IDRC) is an indication that the Project met its obligations to carry out research on groundnuts according to the proposals agreed upon by the Government and IDRC.

In Phase I, the Project acquired valuable research information on groundnuts and in Phase II, these results are being fed to the farmers and put into practice. For instance, the use of fertilizers and early planting are some of the recommendations the small farmers have taken up.

In view of the fact that good quality groundnut seed is in very short supply, the Project has recommended superior varieties of groundnut to the National Seed Enterprise (ENS) to be multiplied and distributed to the farmers. As a short-gap measure, the Project recommended the multiplication of a local, partially improved groundnut population. The Project itself took up the whole task of multiplying the seed for the ENS. This shows how closely linked the Project is with the national agricultural institutions. Furthermore, all matters concerning groundnuts are placed in the hands of the Project which is an indication of the level of confidence the Ministry of Agriculture has in the Project.

The training of Mozambican national scientists included extension workers of cashew who work in the same ecological zones as those of groundnut production and their contribution to groundnut extension services is quite evident.

A third Field Assistant trained in the Project, was sent to the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) for further training and has now returned with

/...

enthusiasm and desire to make his contribution to Mozambique. The training of Field Assistants received at ICRISAT is of direct application to solving problems farmers face in groundnut production.

The crop year beginning June 1982 to May, 1983 was marked by severe drought in Central and Southern Mozambique to the extent that farmers lost all their crops, and genetic erosion of many cultivated crops was quite considerable. Because of the drought, the research activities of the Project were also affected. Some rain-fed experiments are excluded in this report because of complete crop failure.

Once again, we wish to thank the University Eduardo Mondlane (UEM) and the International Development Research Centre (IDRC) for their continued financial support to the Project. We are also indebted to the National Institute of Agricultural Research (INIA) and to the National Seed Enterprise (ENS) for providing land and other infrastructures. We also wish to thank all the persons directly or indirectly involved in the work of the Project.

A.D. Malithano
Project Advisor

K.V. Ramanaiah
Agronomist

/...

PROJECT PERSONNEL

A.D. Malithano, Ph.D., Research geneticist/plant breeder, Project Advisor and Professor of plant breeding.

K.V. Ramanaiah, Ph.D., Research agronomist and Professor of agronomy.

R. Uaiene, student/counterpart.

D. Marriote, student/counterpart.

B.S. Chilengue, Field Assistant.

E. Maluco, Field Assistant.

A. Panguene, Field Assistant.

R. Zunguza, Driver/Field Helper.

SUMMARY OF RESEARCH ACTIVITIES

Village surveys

These have been conducted mainly in two geographical zones, important in groundnut production. The surveys showed that groundnuts are mainly grown by small-scale farmers. In the South, short season, non-dormant populations of groundnuts are predominant whereas in the North long season dormant types are grown. In the North, farmers also grow short season groundnut populations and prefer these because they are more productive than the long season groundnuts. Also the former provide food earlier in the season than the latter.

The village surveys have helped the Project to formulate research priorities and methodology and our work program is based on information obtained from farmers such that results accruing from research will have direct application to the farmers.

Local and exotic groundnut germplasm collection and evaluation

In an effort to establish a Groundnut Breeding Program in Mozambique, a large number of accessions of both local and exotic germplasm have been obtained through planned expeditions in shouthern and northern Mozambique; in the major groundnut production zones where a valuable source of genetic variability in this crop exists. The local accessions are a valuable asset to Mozambique which has suffered from consecutive droughts and flooding resulting in genetic erosion of groundnut and other crops. Introductions of exotic germplasm have been made. These accessions are being screened and evaluated for yield and other agronomic characters so that their potential for breeding and commercial production can be established and recommendations for their utilization made. Preliminary data indicate that yield of exotic germplasm is higher in the North than in the South and the local germplasm has the same yield potential as the exotic one.

/...

Rapid screening of germplasm

One hundred accessions of groundnut varieties, pure lines and segregating materials were evaluated. The results showed that there were significant differences in the performance of the entries in many agronomic characters such as yield, disease resistance, maturity, plant habit, type of pods and seed colour.

Variety trials

Long season varieties were evaluated in northern Mozambique where the rains are regular and prolonged. Introductions from Senegal and Upper Volta were superior to other exotic and local varieties. Yields of over 3,000 kg/ha were obtained without applying fertilizers, fungicides and insecticides.

Short season varieties were evaluated in the North as well as in the South. The results showed that the yields in the North are much higher than in the South.

Advanced yield trials

Varieties that performed well in the variety yield trials were further tested under farming system approach using different levels of fertilizers. The soil nutrient status of research stations is very high and fertilizers gave no response to yield. However, there were significant differences in the yield of the varieties.

Date of planting and plant density

Early planting at the onset of the rains in the months of August/September in the South, at a plant density of 330,000 plants/ha of erect varieties gave the highest yields. Late planting subjected the crop to disease and insect attack resulting in low yields. In the North, the recommended date of planting is mid-November to early December depending on the initiation of the rains.

/...

Fertilizer trials

Most soils in Mozambique are deficient in soil nutrients. Trials were conducted to assess the response of groundnut to zinc phosphate and superphosphate. The results showed that yields of groundnuts were higher in the treated plots than in the controls in soils with low fertility levels and which have been under groundnut annually.

On-farm trials

On-farm trials, introducing one factor at a time, were conducted in collaboration with farmers of agricultural cooperatives near Maputo. Application of single superphosphate at the rate of 40kg/ha of P_2O_5 gave 3,500kg/ha of unshelled groundnuts, i.e. three times that of control plots.

Biological nitrogen fixation

Application of Rhizobium as a means of increasing soil nitrogen and thereby increasing yields of groundnuts was not effective in soils with high nitrogen levels.

This practice is not recommended on state farms and agricultural research stations.

Based on field observations, there are areas in Mozambique where groundnuts are deficient in effective nodules. Field trials will be conducted in order to identify areas suitable for Rhizobium application.

/...

EVALUATION AND CHARACTERISATION OF GROUNDNUT GERMPLASM

Introduction

The Project has well over 350 accessions of local and exotic groundnut germplasm which have not been evaluated in detail. Preliminary studies on flowering, plant type and maturity were made during multiplication of the accessions. During the 1982/3 crop season, more detailed studies of the germplasm was initiated at Umbeluzi Agricultural Research Station.

Materials and Methods

In order to study the accessions in detail, only 100 entries were selected. These were mainly of the var. Fastigiata which are early maturing, erect and of the type grown in Southern Mozambique. The field design was a randomized complete block with two replicates. Plots consisted of four rows 5.00m long at a spacing of 0.45m between rows and 0.20m between plants. Irrigation was applied to initiate germination and whenever necessary. Data were collected on a number of traits from emergence up to harvest (Table 1).

Results and discussions

The results showed that there were significant differences in the performance of the entries in many agronomic characters such as yield, disease resistance, maturity, plant habit, number of pods/plant, number of seeds/pod, etc. (Table 1). There is positive correlation between number of pods/plant and yield. Cultivars with high number of pods/plant also gave high yields.

The yield of local accessions, especially of selections made from land races from Inhambane was quite high (Table 1).

/...

The local germplasm also show very high resistance to early leaf spot although the disease incidence was low. A few exotic cultivars were resistant to rust.

The yield of early maturing cultivars was higher than that of late maturing ones which should further be tested in the north where agro-climatic conditions are suitable for this type of groundnut.

Cultivar JH60xPI 259747 was heavily attacked by Hilda patruelis.

Cultivar 55-437 gave highest number of pods/plant.

Cultivars Ah 143, Ah 137, FESR-8P12-B_1+B+B, Ah65xChico, FESR 5-P12-B_1-B_2-B_1-B_1, Marracuene A and Ah 209 mature while foliage is still green. This is an important character for farmers who keep livestock as they can use the haulms as fodder.

Cultivar Ah 209 nodulated profusedly such that the tap and secondary roots were completely covered.

All the plants of cultivar Hanyane died.

Since the trial was irrigated, data obtained, especially on yield, are likely to be different from those under rain-fed crop production. However, during 1982/3 crop-growing season, groundnut could only be grown under irrigation because of drought.

This experiment will be repeated in order to obtain conclusive results.

/...

Table 1. Evaluation and characterization of groundnut germplasm at Umbeluzi - 1982/83 crop season

Cultivar	Origin	Days to germination	Days to first flowering	Days to 50% flowering	Days to first appearance of Early leaf spot	Days to first appearance of rust	Days to maturity	% Early leaf spot at harvest	% rust at harvest	Growth habit	Sub spp.	Botanical variety	No. pods/plant	No. seeds/pod	Seed colour	Plant ht. (cm)	Plant ht. (cm)	Plant ht. (cm)	No. branches	Yield (kg/ha)
hinjinguiri	Mozambique	11	24	29	53	55	120	0.5	.15	S/E	F	F	43	2	R	46	53	53	5	2186
ICAC 2748 x Chico	ICRISAT	11	24	28	50	61	102	0	5	E	F	V	21	2-3	C	41	51	52	5	1897
elecção Homoine	Mozambique	11	26	28	50	81	105	0	5	E	F	V	27	2	R	48	53	54	6	1875
.5 x Chico	ICRISAT	7	31	35	81	57	104	0	10	E	F	V	61	2	C	30	33	37	6	1858
e 3	Upper Volta	9	26	31	77	58	117	0	5	E	F	F	42	2	R	46	51	52	5	1811
h 202	Mozambique	7	28	32	54	87	104	1.0	20	E	F	V	29	2	B	34	39	40	5	1797
h 134	Mozambique	11	25	29	53	50	104	2	5	E	F	V	35	2	R	31	37	37	-	1725
latimule	Mozambique	11	26	33	50	53	102	5	20	S/E	F	V	41	2	C	29	30	38	6	1719
h 192	Mozambique	9	23	30	43	56	105	0	20	P1	h	h	26	2	C	36	39	38	5	1685
N 115B	Upper Volta	11	26	29	53	41	104	1	15	E	F	F	28	2	C	37	41	42	7	1669
MH1 x SM5	ICRISAT	11	27	33	77	77	103	2	15	E	F	V	22	2	B	43	32	36	5	1653
nhambane B	Mozambique	11	31	32	50	54	102	0.5	2	E	F	V	48	2	C	32	35	38	5	1639
96	India	11	22	26	43	54	114	10	0.5	E	F	F	14	2	C	25	33	35	6	1637
9.63.2.5	Tanzania	9	27	32	77	58	100	0.5	50	E	F	F	28	2-3	C	29	35	36	4	1625
Marrumbene	Mozambique	11	23	28	41	53	110	0	10	S/E	F	V	36	2	R	34	31	36	4	1606
h B254 x MH2	ICRISAT	11	23	30	41	41	104	5	10	E	F	V	21	2	R	32	49	49	4	1597
rgentina x Chico	ICRISAT	7	27	33	55	58	104	2	15	E	F	V	36	2	C	25	31	32	5	1592
Valência	USA	9	31	33	95	59	110	1	10	S/E	F	F	53	2	C	35	42	44	6	1576
h 229	Mozambique	11	25	28	53	50	105	5	25	E	F	V	45	2	C	25	33	34	6	1561
5714	Senegal	11	30	30	52	62	109	1	20	E	F	V	39	2	C	28	33	34	5	1558
White Spanish	USA	9	28	40	51	56	106	10	35	E	F	V	33	2	C	37	42	41	4	1525
Spanish 18-38	USA	11	28	29	64	54	106	1	10	E	F	V	45	2	C	32	37	37	5	1519
augh x Starr	ICRISAT	11	24	28	50	53	110	1	0.5	E	F	F	-	2	C	39	49	52	5	1508
RPM 68	Mozambique	9	24	28	77	56	110	1	10	E	F	V	41	2	C	34	35	38	5	1503
MH1 x MH2	ICRISAT	7	28	32	45	58	102	0	10	E	F	F	39	2	C	35	41	43	5	1494

E = erect, V = Vulgaris, F = Fastigiata, h = hypogaea, S/E = semi-erect, P_1 = procumbent 1
P_2 = procumbent 2, D_2 = decumbent 2, D_3 = decumbent 3, B = black colour, C = cream, VB = Virginia Bunch, r = red, ht = height

Table 1. Evaluation and characterization of groundnut germplasm at Umbeluzi – 1982/83 crop season

Cultivar	Origin	Days to germination	Days to 1st flowering	Days to 50% flowering	Days to 1st appearance Early leaf spot	Days to 1st appearance of rust	Days to maturity	% Early leaf spot at harvest	% rust at harvest	Growth habit	Sub spp.	Bot. Var.	No. pods/plant	No. seeds/pod	Seed colour	Plant ht "n" (cm)	Plant ht "n+1" (cm)	Plant ht "n+1" (cm)	No. branches	Yield (kg/ha)
Robut 33-1	India	9	33	35	75	60	120	0	10	VB	h	h	18	2	C	26	38	37	5	1486
Ah 6279 x Spancross	ICRISAT	7	31	36	58	58	100	0	20	E	F	V	-	2	C	36	41	43	-	1481
Virginia R26	USA	9	28	32	51	81	100	5	35	E	F	V	46	2	C	34	38	38	4	1472
AM/665	USA	11	28	30	48	56	98	1	20	E	F	V	38	2	C	31	35	38	5	1456
Ah 139	Mozambique	7	29	33	49	56	114	0.1	34	E	F	V	26	2	C	34	50	38	5	1447
69.62.2.5.	Tanzania	9	25	30	73	54	106	5	20	E	F	V	29	2	C	38	40	46	4	1447
Janjuro	Mozambique	12	24	29	66	55	112	0	20	E	F	V	28	2	C	33	38	39	5	1406
Natal common	South Africa	11	26	28	77	65	112	1	20	E	F	V	30	2	C	40	46	45	4	1400
Chibututuine	Mozambique	7	26	32	81	58	104	0.5	35	E	F	V	40	2	R	54	60	63	4	1397
CN 94C	Upper Volta	11	27	32	50	53	104	0	10	E	F	F	23	2	C	33	36	35	5	1392
Starr	USA	9	30	33	55	58	110	20	10	E	F	V	38	2	C	33	40	39	6	1376
Tamnut	USA	9	30	33	47	56	110	2	10	E	F	V	37	2	C	28	33	36	4	1376
Ah 140	Mozambique	9	25	28	48	51	119	0	0.1	S/E	F	V	35	2	C	35	41	43	5	1362
Jonca	Mozambique	7	28	31	82	82	105	2	10	E	F	V	28	2	C	32	35	36	5	1357
Bebiano Branco	Mozambique	9	29	32	81	56	112	2	15	E	F	V	43	2	C	34	40	43	6	1340
RPM 128	Mozambique	7	30	35	81	58	110	2	10	E	F	F	26	2	C	35	39	36	5	1339
72-R x Chico	ICRISAT	11	26	29	41	53	103	1	10	E	F	F	39	2	C	33	35	35	6	1303
Southeast	USA	7	31	36	69	60	103	0	10	E	F	V	48	2	C	34	38	40	5	1303
FESR-8P12-B1-B1-B1	ICRISAT	-	-	-	-	-	114	-	-	E	F	F	-	2	-	24	29	29	6	1300
69.29.2	Tanzania	9	31	34	50	78	110	0.1	35	E	F	F	-	2	C	36	37	37	5	1272
668/73	Zimbabwe	7	25	30	81	58	104	0	4	E	F	V	36	2-3	C	37	38	40	5	1272
Ah 223	Mozambique	7	28	32	57	81	103	0	5	E	F	V	14	2	C	29	34	35	4	1272
Inhambane A	Mozambique	11	28	32	50	53	103	0	5	E	F	V	53	2	C	29	35	40	5	1225
TS 18-1	Upper Volta	11	27	29	53	53	103	0	15	E	F	V	24	2	C	32	44	44	6	1180
Ah 188	Mozambique	9	31	34	48	51	110	1	20	E	F	V	32	2	C	34	37	37	-	1178

E = erect, V = Vulgaris, F = fastigiata, h = hypogaea, S/E = semi-erect, P_1 = precumbent 1, P_2 = precumbent 2, D_1 = Decumbent 1. D_2 = Decumbent 2, D_3 = Decumbent 3, B = black, C = cream, V.B. Virginia Bunch, r = red, ht = height.

Table 1. Evaluation and characterization of groundnut germplasm at Umbeluzi – 1982/83 crop season

Cultivar	Origin	Days to germination	Days to 1st flowering	Days to 50% flowering	Days to 1st appearance of Early leaf spot	Days to 1st appearance rust	Days to maturity	% Early leaf spot at harvest	% rust at harvest	Growth habit	Sub spp.	Bot. Var.	No. pods/plant	No. seeds/pod	Seed colour	Plant ht "x" (cm)	Plant ht "y" (cm)	Plant ht "z" (cm)	No. branches	Yield (kg/ha)
Gurpombo	Mozambique	11	26	28	46	58	100	0	5	E	F	V	42	2	R	44	47	49	5	1172
Comet x MH2	ICRISAT	7	26	33	45	58	102	5	10	S/E	F	V	36	2	B	31	39	36	5	1161
FESR-8P12-B1+B1+B+B1	ICRISAT	11	30	34	77	77	104	–	–	–	F	V	26	2	R	22	30	37	3	1161
PI 337407	ICRISAT	11	27	29	61	41	104	0	15	E	F	F	32	2	C	29	34	36	5	1117
Malimba	Malawi	11	29	34	77	61	117	0	10	E	F	V	30	2-3	C	35	40	41	5	1094
Tatui	USA	9	29	33	47	60	116	0	35	S/E	F	V	49	2	C	35	40	38	5	1089
Ah 126	Mozambique	9	32	35	49	57	–	–	–	P1	h	h	–	2-3	C	25	42	44	5	1075
KH 197A	Upper Volta	7	29	36	81	58	105	1	20	E	F	V	29	2	R	33	38	38	4	1064
2.5 x PI 259747A	ICRISAT	9	26	30	48	–	120	0	0	S/E	F	V	5	1-3	C	25	33	36	5	1064
Chongoene 57A	Mozambique	9	27	39	77	77	104	0	5	E	F	V	53	2	C	29	35	35	5	1033
57-422	Senegal	7	31	36	58	82	104	5	35	D3	h	h	17	2	C	27	28	26	–	1011
Ah 6279 x TG-16	ICRISAT	11	27	29	41	61	105	0	1	E	F	V	18	2	B	43	48	48	5	972
CN 116A	Upper Volta	11	29	32	41	83	100	0	50	E	F	F	31	2	B	30	35	36	6	950
Ah 168	Mozambique	–	–	–	–	–	–	–	–	D3	h	h	6	2-3	C	33	33	40	3	942
69.99.1.2.4	Tanzania	7	27	32	81	59	104	5	20	E	F	V	22	2	C	37	42	43	4	911
JH 60 x PI 279748	ICRISAT	11	29	32	41	61	110	0	0.5	E	F	F	22	2	B	34	38	50	5	908
69.17.6	Tanzania	7	31	37	81	58	110	0	5	E	F	V	22	2	C	36	39	39	5	906
TMV4 x Chico	ICRISAT	–	–	–	–	–	–	–	–	E	F	V	–	2	C	20	33	33	5	878
Ah 65 x Chico	ICRISAT	11	29	32	41	61	110	0	5	D1	h	h	6	3	C	27	50	50	3	875
Ah 123	Mozambique	11	31	30	45	54	110	0	10	D1	h	h	13	2	C	23	45	47	5	861
JH 171 x Chico	ICRISAT	7	30	32	82	82	102	0	35	S/E	F	V	34	2	C	22	27	26	5	806
69-351	Tanzania	7	30	35	73	58	104	0.5	20	E	F	F	37	2	C	29	37	38	5	800
FESR-5P12-B1+BH B1	ICRISAT	7	27	28	77	77	100	20	35	P1	h	h	10	2	C	25	32	33	5	786
TS 32-1	Upper Volta	9	30	33	77	77	110	0.5	10	E	F	F	21	2	C	26	34	36	4	766
Ah 143	Mozambique	9	30	36	48	60	117	0	15	D2	h	h	7	2	C	24	37	37	3	693

E = erect, V = vulgaris, F = fastigiata, h = hypogaea, S/E = semi-erect, P_1 = procumbent 1, P_2 = procumbent 2, D_1 = decumbent 1, D_2 = decumbent 2, D_3 = decumbent 3, B = black, C = cream, V.B. = Virginia Bunch, r = red, ht = height.

Table 1. Evaluation and characterization of groundnut germplasm at Umbeluzi – 1982/83 crop season.

Cultivar	Origin	Days to germination	Days to 1st flowering	Days to 50% flowering	Days to 1st appearance of Early leaf spot	Days to 1st appearance of rust	Days to maturity	% Early leaf spot at harvest	% rust at harvest	Growth habit	Sub spp.	Bot Var.	No. pods/plant	No. seeds/pod	Seed colour	Plant ht "n" (cm)	Plant ht "[illegible]" (cm)	Plant ht "n+1" (cm)	No. Branches	Yield (kg/ha)
KH 241 D	Upper Volta	11	31	34	79	62	118	0	2	S/E	F	F	36	2	C	22	29	29	4	680
Mafassane Nhacoongo	Mozambique	9	30	37	77	58	121	1	5	S/E	F	V	39	2	C	28	40	37	4	667
Ah 195	Mozambique	9	31	37	46	56	115	10	35	E	F	V	10	2	–	25	42	43	5	661
Ah 209	Mozambique	9	31	38	48	43	113	10	20	D1	h	h	8	2	C	27	50	51	4	627
Ah 196	Mozambique	11	34	39	41	56	110	–	–	P1	h	h	–	2	–	33	37	37	6	603
FESR-8P11-B1+B1+B1	ICRISAT	11	26	40	–	–	113	0	0	D2	h	h	19	2	–	29	36	37	7	581
Marracuene A	Mozambique	11	26	32	41	54	110	0	10	S/E	F	V	40	2	R	32	43	45	5	558
FESR-P11-B2+B1+B1	ICRISAT	11	29	32	41	50	110	0	0	E	F	V	24	2-3	–	34	36	34	5	544
Ah 151	Mozambique	9	32	35	49	59	117	0	5	D1	h	h	6	2	C	29	50	49	4	542
Ah 138	Mozambique	11	30	31	43	54	115	0	10	D1	h	h	6	2	C	29	51	50	3	454
Ah 181	Mozambique	11	33	37	41	54	115	0	10	D1	h	h	34	2	C	26	61	54	4	439
Ah 207	Mozambique	7	32	37	51	63	150	0	20	P1	h	h	25	2	C	33	40	46	5	407
Ah 137	Mozambique	11	30	32	47	54	116	0	5	D3	h	h	10	1-3	C	29	43	45	5	404
Ah 147	Mozambique	9	31	34	43	60	116	–	10	–	h	h	5	2-3	–	32	52	54	5	344
Marracuene B	Mozambique	11	31	32	79	62	104	0	5	S/E	F	V	49	2	C	36	43	43	5	333
Ah 252	Mozambique	11	34	36	43	60	105	20	5	D1	h	h	15	2-3	C	22	36	40	8	281
Napalala	Mozambique	9	26	29	81	56	130	0	10	D3	h	h	7	2-3	C	35	46	48	4	264
Ah 150	Mozambique	9	32	35	43	56	116	0	5	D1	h	h	–	1-3	C	27	58	52	–	260
Tomo	Mozambique	7	32	41	43	69	130	0	5	D1	h	h	50	2-3	C	26	48	48	4	253

E = erect, V = vulgaris, F = fastigiata, h = hypogaea, S/E = semi-erect, P_1 = precumbent 1, P_2 = precumbent 2,
D_1 = decumbent 1, D_2 = decumbet 2, D_3 = decumbent 3, B = black, C = cream, V.B. Virginia Bunch, r = red, ht = height

V A R I E T Y T R I A L S

Introduction

During the 1982/3 growing season,variety trials were conducted at Marracuene,in the South and at Namialo, Ribaue and Nampula, in the North.

Materials and methods

Both local and exotic cultivars were evaluated for yield and the methods used are the same as in the previous years. Date of sowing and harvesting are presented in Table 1 and experimental design and plot size are presented in Table 2.

Results

The season 1982/3 was characterized by drought in the South and experiments conducted in sandy soils failed completely.

Experiment at Marracuene

An exotic cultivar Ah 15714 gave highest yield (Table 3). Other cultivars which performed well were Southeast, Valencia, Ts 32-1, Starr, White Spanish, AM/665, Bebiano Branco, Spanish 18-38, Gaug 1xNCAC529, and 668/73.

Experiment at Namialo

The season 1982/3 was normal at Namialo and Nampula in as far rainfall was concerned; but termites were a big problem. One experiment at Namialo was completely destroyed by termites. Termites attack in the other experiment was not serious, but evidently affected yield of groundnut. Table 4 shows that cultivar 668/73 obtained from Zimbabwe gave the highest yield. The other cultivars which gave high yields were Florrunner, 57-422,59-127, Local and Jonca. The cultivars Florruner and

/...

57-422, performed well in the previous season too and cultivar 57-422 was recommended for commercial production. Florrunner, although high yielding, was not recommended for commercial production because of its prostrate nature which makes its harvesting difficult,especially if planted on the flat like farmers do in the North.

Application of single superphosphate had no effect on yield of groundnut.

Experiment at Ribaue

This experiment was conducted by CRED,but the Project provided seed of cultivars. The cultivars which gave the highest yields were 57-422 and 69-101 obtained from Senegal (Table 5). The cultivar 57-422 performed well across environments and over years. However,cultivar RPM-12 which has been recommended for the North did not perform well at this site.

Application of single superphosphate did not increase the yield of groundnut because on research stations and state farms in Mozambique, soil fertility is high. Therefore, fertilizer experiments should be conducted on farmers' fields where soil fertility is low.

Experiment at Nampula

The groundnut was attacked by termites and, therefore, yield of the cultivars was affected. However, Table 6 shows that cultivars 668/73, Florruner, 57-422 gave high yields.

Cultivar recommendations

Based on data for this season,the following cultivars are recommended for the North: 668/73, 57-442, 59-127, 69-101 and RMP-12 and for the South, the following cultivars are recommended: Ah 15714, Southeast, Valencia, Ts 32-1 and Starr.

/...

Table 1. Dates of sowing and harvesting of groundnuts.

Season	Location	Sowing	Harvesting	No. of days from sowing to harvesting
1982/3	Namialo	12/12/82	4/04/83	113
	Ribaue	11/12/82	10/04/83	120
	Nampula	23/12/82	28-29/03/83	96

Table 2. Experimental design, size and no. of plots and spacing used for experiments during 1982/3 crop growing season

Season	Location	Design	r	p	Plot Size gross	net	No. rows/ plot	Spacing
1982/3	Marracuene	R B D	3	20	8.10m^2	3.60m^2	6	45cmx10cm
1982/3	Namialo	Split-plot	5	8	18.00m^2	7.20m^2	8	45cmx20cm
1982/3	Ribaue	R B D	5	6	18.00m^2	7.56m^2	8	45cmx20cm
1982/3	Nampula	Split-plot	4	8	9.00m^2	3.60m^2	4	45cmx20cm

r = No. replicates

p = No. plots/replicate

Table 3. Yield of groundnut at Marracuene

Cultivar	Origin	Yield (kg/ha)	Duncan Test	Growth habit
Ah 15714	Senegal	1022	a	Erect
Southeast	USA	842	ab	"
Valencia	USA	755	abc	"
Ts 32-1	Senegal	717	abc	"
Starr	USA	710	abcd	"
White Spanish	USA	679	abcde	"
AM/665	USA	661	abcde	"
Bebiano Branco	Mozambique	628	abcde	"
Spanish 18-38	USA	584	abcde	"
Gaug 1xNCAC 529	ICRISAST	576	abcde	Semi-erect
668/73	Zimbabwe	575	abcde	Erect
Jonca	Mozambique	488	abcde	"
Te 3	Senegal	469	abcde	"
Ah 139	Mozambique	389	bcde	"
Bebiano Encarnado	"	388	bcde	"
Tamnut	USA	350	bcde	"
Virginia R26	USA	206	cde	"
Ah 207	Mozambique	111	de	Prostrate
Ah 150	"	107	e	"
Selecçao Homoine	"	91	e	Erect

Table 4. Yield of groundnut at Namialo

Cultivar	Origin	Yield (kg/ha)	Duncan Test	Growth habit
668/73	Zimbabwe	2570	a	Erect
Florrunner	USA	2431	b	Prostrate
57-422	Senegal	2175	c	Erect
59-127	Senegal	1991	d	Semi-erect
Local	Mozambique	1933	de	Prostrate
Jonca	Mozambique	1829	e	Erect
69-101	Senegal	1551	f	Semi-erect
Manipintar	USA	1065	g	Prostrate

Table 5. Yield of groundnut at Ribaue

Cultivar	Origin	Yield (kg/ha)	Duncan Test	Growth habit
57-422	Senegal	1600	a	Semi-erect
69-101	Senegal	1130	b	"
RMP-12	Upper Volta	770	c	"
Ah 175	Mozambique	720	c	-
Local	Mozambique	680	c	Postrate
Senegal	Senegal	650	c	Semi-erect

Table 6. Yield of groundnut varieties at Nampula, 1982/83 crop season.

Cultivar	%age plant stand at harvest	%age ELS at harvest	%age Rosette at harvest	Yield (kg/ha)
668/73	71	0.5	0.6	1028
Florrunner	69	1.3	4.0	972
57-422	68	0.3	4.2	875
59-127	56	0.5	6.1	796
Local Nampula	57	0.6	3.4	773
Jonca	47	0.8	7.4	713
69-101	64	0.2	0.7	631
Manipintar	52	0.5	7.2	444

ELS = Early leaf spot

EFFECT OF DATE OF PLANTING AND PLANT POPULATION ON THE YIELD OF GROUNDNUT

Introduction

This is an on-going experiment and the objectives are as follows:

- to find suitable time to plant groundnut.
- to study effects of plant population x variety x date of planting interaction on the yield of groundnut.

Materials and methods

The trial was conducted at Marracuene State Farm and Umbeluzi Agricultural Research Station during the 1982/83 crop growing season. The experiment was a randomised block design with four replicates and a net plot of $10m^2$ was harvested. At Umbeluzi, a local variety, Bebiano Branco (V_1) and an exotic variety, Starr (V_2) were planted and harvested on three different dates as follows:

D_1 - early, planted on 24 August, 1982 and harvested on 28 December 1982.

D_2 - normal, planted on 23 September, 1982 and harvested on 14 January, 1983.

D_3 - late, planted on 1 November, 1982 and harvested on 7 February, 1983.

At Marracuene two local varieties, Bebiano Branco (V_1) and Bebiano Encarnado (V_2) were also planted and harvested at three different dates as follows:

D_1 - early, planted on 10 August, 1982 and harvested on 23 December, 1982.

/...

D_2 - normal, planted on 22 October, 1982 and harvested on 16 February, 1983.

D_3 - late, planted on 1 November, 1982 and harvested on 3 March, 1983.

The spacing was 45cm x 10cm giving a population of 222,000 plants/ha. (P_1) and 30cm x 10cm giving a plant population of 333,000 plants/ha. (P_2). Altogether there were twelve treatments as follows:

T_1 - $D_1P_1V_1$
T_2 - $D_1P_1V_2$
T_3 - $D_1P_2V_1$
T_4 - $D_1P_2V_2$
T_5 - $D_2P_1V_1$
T_6 - $D_2P_1V_2$
T_7 - $D_2P_2V_1$
T_8 - $D_2P_2V_2$
T_9 - $D_3P_1V_1$
T_{10} - $D_3P_1V_2$
T_{11} - $D_3P_2V_1$
T_{12} - $D_3P_2V_2$

The experiment at Umbeluzi was irrigated. The soil texture was sandy loam; being high in nitrogen, phosphorus and potassium. The soil texture at Marracuene was sandy, being low in mineral nutrients. The experiment at Marracuene was not irrigated.

/...

Results and conclusions of experiment at Umbeluzi

Data on yield of groundnut are presented in Table 1. Early- and normal-sown groundnut gave higher yields than the late-sown crop. The late-sown crop was attacked by diseases and insect pests and did not recover from the damage so caused. The rosette attack was so severe that infected plants did not produce any pods. The vegetative growth of early-sown groundnut was quite advanced at the time the diseases and insect pests appeared so that the damage caused was not significant. At higher plant density, plants attacked by rosette were fewer than at low plant density. This result is the same as in the previous year.

The difference in yield between the two plant densities was very significant. Density of 333,000 plants/ha at a spacing of 30cm x 10cm, gave higher yields than density of 222,000 plants/ha in both varieties and at three dates of planting. In the late-sown groundnut, the difference in yield between the two plant densities was visually obvious.

The two varieties performed differently from the previous season. The exotic variety, Starr yielded more than the local variety, Bebiano Branco. However, result on the performance of these varieties is not conclusive.

Results and conclusions of experiment at Marracuene

Data on yield of groundnut are presented in Table 1. Early- and normal-sown groundnut gave higher yields than the late-sown crop. The incidence of rosette disease was very high in the late-sown crop so that yield of groundnut was very much reduced. Drought was very severe at flowering time in the late-sown crop and affected the yield of groundnut more than in the other two treatments, early and normal, since the pods were already mature.

/...

Higher density of 333,000 plants/ha gave higher yields than density of 222,000 plants/ha in both varieties and at three dates of planting. In the late-sown groundnut, the yield of groundnut was extremely low.

The two local varieties performed differently; variety Bebiano Branco gave higher yields than variety Bebiano Encarnado. This result confirms the observations made by small-scale farmers that, under drought condition, the variety Bebiano Branco performs better than the variety Bebiano Encarnado.

Table 1. Yield of unshelled groundnut at Umbeluzi and Marracuene during the 1982/83 crop season

Date of Sowing	Treatment No.	Treatment Designation	Yield unshelled groundnut (kg/ha) Umbeluzi	Yield unshelled groundnut (kg/ha) Marracuene
Early	T_1	$D_1P_1V_1$	1329	950
	T_2	$D_1P_1V_2$	1690	834
	T_3	$D_1P_2V_1$	2100	1080
	T_4	$D_1P_2V_2$	2372	829
Normal	T_5	$D_2P_1V_1$	1503	1101
	T_6	$D_2P_1V_2$	1820	823
	T_7	$D_2P_2V_1$	1674	1169
	T_8	$D_2P_2V_2$	1752	944
Late	T_9	$D_3P_1V_1$	155	360
	T_{10}	$D_3P_1V_2$	144	275
	T_{11}	$D_3P_2V_1$	1217	926
	T_{12}	$D_3P_2V_2$	1167	715

/...

PERFORMANCE OF GROUNDNUT VARIETIES UNDER VARIED FERTILITY LEVELS AT DIFFERENT LOCATIONS IN MOZAMBIQUE

Objectives

To select groundnut varieties suitable for different agro-climatic zones where groundnuts are **traditionally grown.**

To study response of groundnut varieties to varied fertility levels.

To study the resistance/tolerance of groundnut varieties to pests and drought.

Materials and methods

Design: Split plot
Replications: 5
Net plot: 7.20 m^2

Main treatment

F_0 - control - no fertilizer applied

F_1 - 40 kg/ha P_2O_5 in the form of single superphosphate

F_2 - 20 kg/ha N+ 40 kg/ha P_2O_5 in the form of urea and single superphosphate, respectively.

Sub-treatments

V_1 - Tamnut

V_2 - Starr

V_3 - Virginia R-26

V_4 - White Spanish

V_5 - Bebiano Branco

V_6 - Jonca

The experiment was irrigated.

/...

Results

- Data are presented in Table I
- There is no effect of fertilizer application on groundnut yields under high soil fertility level at Umbeluzi and under irrigated conditions.
- Variety, Jonca gave highest yield followed by Bebiano Branco.
- The varieties, Virginia R-26 and White Spanish gave lowest yields.
- The performance of varieties is entirely different from the results obtained in the year 1981, under irrigated conditions.
- Because of high soil fertility level at the experimental site, there was no response to fertilizers during both crop seasons of 1981 and 1982.

/...

Table 1a. Yield of groundnut at Umbeluzi - 1982/83 Season

Variety	Mean yield (kg/ha)		
	F_0	F_1	F_2
Tamnut	2482	2517	2552
Starr	2690	2430	2395
Virginia R-26	2370	2256	2187
White Spanish	2604	2256	2083
Bebiano Branco	2777	2447	2830
Jonca	2656	2743	2777

Table 1b. Mean yield of groundnut under different fertility levels.

Fertility level	Mean yield (kg/ha).
F_0	2597
F_1	2442
F_2	2471

ON -FARM TRIALS

Introduction

During farm surveys, phosphorus deficiency symptoms were observed in groundnuts grown by small-scale farmers. On State farms and agricultural research stations, the soils have very high level of phosphorus and application of phosphatic fertilizers did not give any increase in yield. For this reason, the Groundnut Improvement Project initiated experiments on farmers' fields and cooperatives in 1981.

Objectives

- To find effect of phosphatic fertilizers on the yield of groundnut.
- To gain experience in working with small-scale farmers.
- To explore possibilities of recommending chemical fertilizers to rainfed groundnut growers.
- As there are no agricultural extension services, on-farm trials would serve as pre-extension demonstrations.

Procedures and methods

In 1981, the Project made an effort to work with small-scale farmers and cooperatives and succeeded in conducting a few on-farm trials; but it was difficult to obtain yield data because of the following reasons:

- severe drought caused crop failure
- it was difficult to convince farmers of our intentions to conduct research and not to disposses them of their land.

However, initial contacts with farmers gave us the opportunity to learn how to convince them to work with us. These contacts also helped students of the Faculty of Agronomy to develop interest in contacting farmers, work with them, listen to their opinion on fertilizer application to groundnut and conduct demonstration type of on-farm trials.

The soils at the sites where these trials were conducted are sandy loam with neutral $_p$H reaction and low in nitrogen and phosphorus; but high in potassium.

A dose of 40kg/ha of P_2O_5 in the form of single superphosphate was used because if found economical, farmers could afford to buy such small quantity of fertilizer.

The fertilizer was applied using placement method and collaborating farmers were trained on the spot on how to distribute the fertilizer evenly. Where farmers used animal-drawn plough, the fertilizer was applied in the furrows. The fertilizer was also broadcast and incorporated into the soil by using a hand hoe. The farmers learnt the technique of fertilizer application very quickly.

Local groundnut varieties were planted in these trials. In some cases the Project provided seed for the experiment otherwise farmers used their own seed. All the trials were conducted under rain-fed conditions except one experiment at Salamanga, in the district of Matutuine where one of the farmers irrigated his crop.

Results and conclusions

Data on yield of groundnut are presented in Tables 1 and 2. The yield difference between treated and untreated plots was enormous and spectacular.

The farmers noticed the difference in pod yield between treated and untreated plots visually.

/...

There was a visible effect of residual phosphorus on crops that followed such as cowpea and maize.

There is a big demand of fertilizers at cooperative farms where these trials were conducted.

A video tape film on groundnut production by small-scale farmers, giving details of success of these on-farm trials, was made by the Department of Social Communication in collaboration with the Project.

/...

Table 1. Effect of phosphorus on yield of groundnut at Zonas Verdes, 1982.

Site No.	Yield (kg/ha)	
	Control	Treated
1	1000	3600
2	900	3500
3	1200	4000
4	200	1000
5	80	900
6	900	3600
7	1500	3500
8	2000	3800
9	1000	3400
10	900	1900

Table 2. Effect of phosphorus on yield of groundnut at Zonas Verdes, 1983.

Site No.	Yield (kg/ha)	
	control	Treated
1	750	2500
2	1000	2500
3	950	2500
4	900	1500
5	456	607
6	1636	3771

/...

EXTENSION SERVICES

On-farm trials

On-farm trials were conducted in collaboration with individual farmers and members of farm cooperatives. They were advised on technical aspects and provided with fertilizers, but did all the operations themselves. In some cases they were given groundnut varieties for the trial otherwise they planted their own seed. Only one variable was introduced at a time (e.g. fertilizer) so that there were no interacting factors to confuse the farmer. The field was divided into two parts, one part was treated with 40kg/ha of P_2O_5 in the form of 16% single superphosphate and the other did not receive any fertilizer (control).

The yields in treated plots were significantly higher than in the control. The results were very convincing to the farmers especially as they did all the operations themselves. The sites were also used for educational purposes. Undergraduate students of the Faculty of Agronomy and Forestry, thus, got in touch with farmers and saw the effect of improved farm practices both on yields and on farmers' enthusiasm towards improvement. The experiment also helped national technicians to acquaint themselves with on-farm trials. The most important aspect of this experiment was that it convinced the administrators of the "Zonas Verdes" (green zones) on how small quantities of fertilizer could increase the yield of groundnuts.

Mass Communication - radio broadcasting

Through the initiative of the Ground Improvement Project, a mass communication program was launched early in 1983. Written scientific and advisory information, meeting the level of understanding of the small-scale farmers, was broadcast on the national radio. Staff members of the Faculty of Agronomy and Forestry have participated actively in this program, each one presenting the subject of his specialization.

In collaboration with the Department of Social Communication (Gabinete de Comunicaçao Social), the Project has made a video film entitled, "Groundnut for the Best Yields". The film shows an intimate relationship between the small-scale farmer and the Project and how the latter is giving technical advice to farmers so that they achieve high yields in groundnuts.

Advisory Services

The local situation of groundnut production in Mozambique has been studied in some detail and is now clear. Thus, the Project is in a position to give advice to national and international organizations on planning of agricultural projects involving groundnuts or improvements on cultural practices and methods of crop production. We have information concerning the distribution of groundnut land races, important groundnut-growing areas, diseases, pests, production and marketing. Different aspects of groundnut production have been studied and documented, thus, making the Groundnut Improvement Project the "INFORMATION CENTRE" on groundnuts and groundnut production in Mozambique. We are able to draw from our source of information and give advice to whoever needs such services. In this way we have given useful advice to the following:

Institut de Recherches pour les Huiles et Oleagineux (IRHO), a French scientific research institute with its headquarters in Paris. IRHO will multiply groundnuts in Mozambique of varieties tested and recommended by the Project. The Project has already multiplied 10 tons of seed of short season varieties Murrumbene and Bebiano Branco. Groundnut seed of RMP-12 and Natal Common, planted in January on 20 ha. and 45 ha., respectively is yet to be harvested. All this seed will be handed over to IRHO for further multiplication.

International Fund for Agricultural Development (IFAD) of FAO, has sought our advice on groundnut production in Mozambique so as to enable them to plan and program their work on groundnut seed multiplication at the level of small-scale farmers.

/...

The National Seed Enterprise (ENS) has been the chief beneficiary on information, advice and service given by the Project on groundnut varieties to be imported, chemical treatment of seed before planting, fertilizer application, irrigation, spacing, weeding, diseases and harvesting. The Project has worked hand in hand with the Director of the National Seed Enterprise in all aspects of seed multiplication.

National Directorate of Agriculture (UDA) is responsible for all matters concerning agriculture in Mozambique. The Project has worked in close collaboration with the Director of UDA on matters concerning groundnut seed multiplication.

The Green Zones of Maputo give advice and assist small-scale farmers on vegetable and fruit production. Since these farmers also grow groundnuts, the Project has given valuable technical advice to them on how best to grow groundnuts and obtain high yields. We have worked intimately with these farmers such that a video film "Groundnut for the Best Harvest", involving these farmers and the Project has been produced and will be televised on the national TV.

Publication

The Project has presented papers at International Workshops and Conferences in Tanzania, India, Kenya, Egypt and Malawi. Publications have also been made in the local magazine, Tempo, and an article has been prepared for a local agricultural journal, Agricultura. Work of the Project will also be presented by senior agricultural scientists of the Ministry of Agriculture at an agricultural conference in Portugal in April, 1984.

SEED MULTIPLICATION

There is a severe shortage of groundnut seed in Mozambique especially in the southern part of the country in the provinces of Maputo, Gaza and Inhambane. Normally, the small-scale farmers keep enough seed for planting the following season, but due to irregular rainfall, consecutive droughts and floods over the past ten years, groundnut production has been severely reduced. During the crop growing period of 1982/83, the drought was so severe that all the crops dried up and consequently, the farmers had no seed to plant.

In Mozambique, there are no commercial groundnut cultivars and although the Groundnut Improvement Project has evaluated and identified superior cultivars of groundnuts, these cannot be put into commercial production right now due to insufficient seed. In order to solve the problem of seed shortage, the Project recommended ENS to buy seed of groundnut from farmers in the province of Inhambane in and around Nhacoongo. This recommendation was based on data of variety trials which showed that cultivars selected from groundnut land races from this area, e.g. Bebiano Branco, performed equally well as exotic cultivars. This led to the assumption that in these land races the frequency of genes and that of superior genotypes for yield was quite high. This assumption has been verified by the fact that a large number of local cultivars that are high yielding come from this area. Thus, instead of buying seed of exotic cultivars which have not been tested thoroughly well in Mozambique, it was decided to buy groundnut land races generally referred to as Bebiano Branco and Bebiano Encarnado and multiply them for distribution to the farmers.

/...

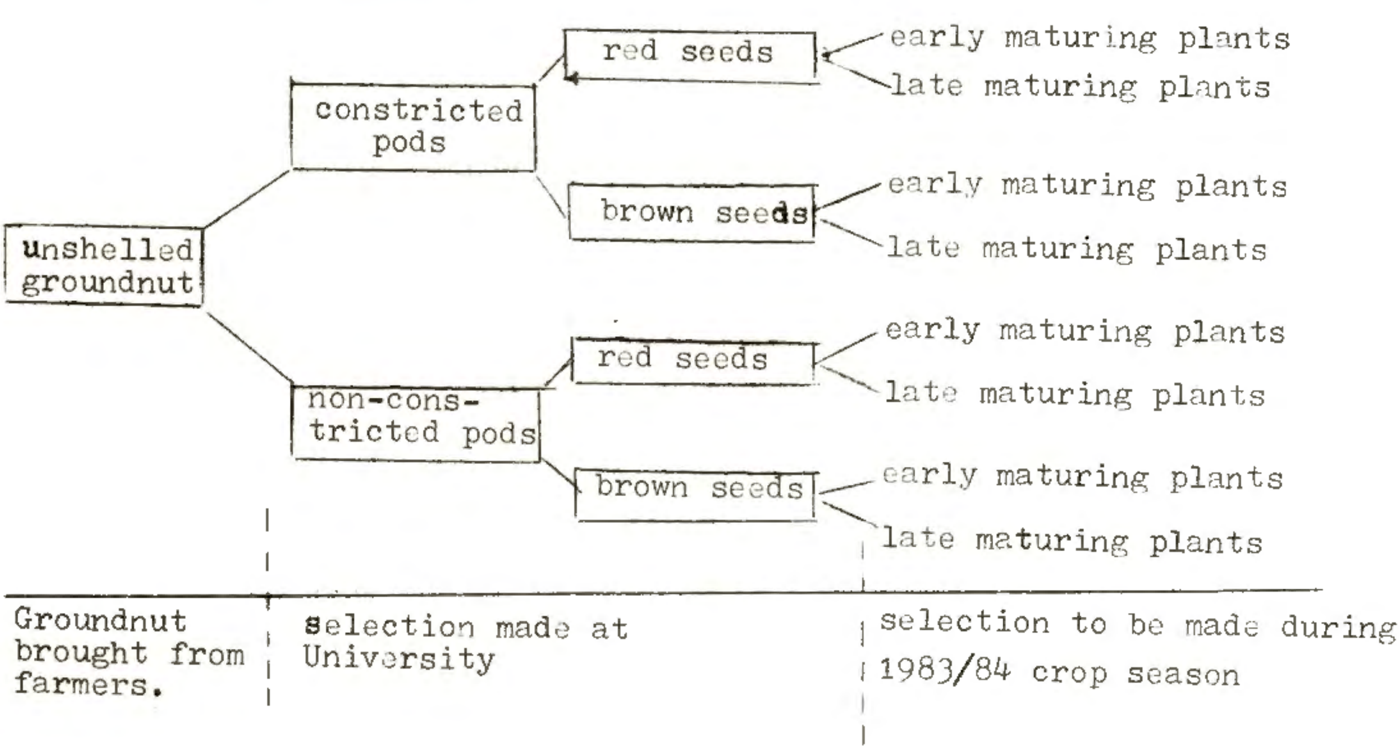
Mass Selection

The groundnut was classified according to the place of origin, namely Nhacoongo and Murrumbene, in the Province of Inhambane and Matimule, in the Province of Gaza. Preliminary mass selection was based on pod type and seed colour. Constricted pods were separated from non-constricted ones and red kernels were separated from cream-brown kernels. Thus, each population was sequentially divided into four different "pure lines" with respect to the characters in question.

Seed of each "pure line" was planted separately and during the vegetative phase of the crop, abnormal and diseased plants were destroyed. Due to lack of irrigation water, the crop suffered from water stress, thus plants not adapted to drought were eliminated. The final result was that uniformity in plant type in each "pure line" was emerging.

At harvest, further selection of plants with constricted and non-constricted pods was made. The process of selection will continue in cycles while at the same time the improved "pure lines" will be evaluated for yield. Fig. 1 shows the selection method applied.

Fig. 1. Mass selection of groundnut



Sowing

Sowing started on 13 September and ended on 15 December 1982. The four populations of groundnut, namely, Nhacoongo, Murrumbene and Matimule were planted by hand on a private farm at Umbeluzi. The seeds were planted along the sides of ridges so that small quantities of irrigation water was sufficient for seed germination and subsequent irrigation required only minimum quantity of water. The spacing between ridges was 45cm and within the ridge was 10cm. The seed rate was about 60kg/ha. and the total area planted was 1.5 ha.

Irrigation

Application of water was by surface irrigation. Water from the River Umbeluzi was pumped up to a certain point from where it was led through canals by gravity. As the land was not level, there were irregularities in the supply of water. Irrigation was obrigatory because of drought, but as the water level in the river was low, it was not possible to irrigate when it was necessary to do so. As a result, the groundnut suffered from water stress causing a drop in yield.

Roguing

During the vegetative period of the crop, abnormal and diseased plants were eliminated. Rosetted plants as well as plants attacked by Verticilium wilt were also removed. At harvest, all dead plants were removed first and the healthy plants were harvested separately.

Official visit

The farm was visited by the Commission for the Implementation of the Production of Basic Seed on 15th Janaury, 1983, accompanied by the Director of the National Seed Enterprise, Eng. Admir Pancas Bay. The Commission recommended that seed multiplication should be made on a farm where there was guarantee of

/...

of irrigation water and with infrastructures necessary for seed multiplication. A Mozambican attached to seed multiplication as well as other support staff should be recruited.

Yield

Date of planting and irrigation influenced the yield of groundnut. Plots that were planted early and received sufficient quantity of irrigation water gave higher yields than those which were planted late and received less quantity of water at the critical vegetative phase of the crop. On average, the yield was 1000 kg/ha. This seed will be multiplied in 1983/4 growing season and mass selection will be continued and will include selection for early and late maturing plants and high number of pods/plant.

/...

T R A I N I N G

Training of counterparts

The Groundnut Improvement Project has achieved tangible results in its training program. Three graduate students, now responsible agriculturists holding responsible position in agriculture or working in agricultural development program have passed through the Project. Two more graduates are now under-going training in various aspects of groundnut production with a bias towards breeding and agronomy.

Training of graduate students

The senior scientists of the Project give courses in plant breeding and field crops to graduate students. The Project also participates in other fields of training students such as"Activities of July and January" and research projects for final year students.

Training of Field Assistants

Three field assistants have been trained in the Project and subsequently, underwent training at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India. These three field assistants had very little or no knowledge at all of agriculture and the related sciences; but after training, their scientific knowledge has increased and their contribution to agricultural development in Mozambique is quite considerable.

Training of Field Workers

The Project is constantly up-grading field workers that show potential and interest in their work first by giving them in-service training and then sending them to ICRISAT. Two such workers have been ear-marked and are now receiving training.

/...

In general, all the workers of the Project receive some basic training, especially in handling the various groundnut varieties they are working with. They are also exposed to all aspects of groundnut production.

Training of Farmers

Our training also goes down to the level of the farmers with whom we work in their fields or those of the cooperatives, giving them simple instructions on groundnut production technology.

Training of District Agricultural Supervisors

The Project was given the responsibility by the Secretary of State for Cashew to train district agricultural supervisors working in the cashew growing zone in Mozambique where groundnuts are also grown. An intensive course, with syllabus, was organised and given to the candidates nominated by the Secretary of State for cashew. The course lasted for a period of one week.

/...

EDUCATIONAL TOUR BY FINAL YEAR STUDENTS OF THE FACULTY OF AGRONOMY, UNIVEERSIDADE EDUARDO MONDLANE, MAPUTO, MOZAMBIQUE

Introduction

An educational tour to India by the final year students of the Faculty of Agronomy took place from 15 January to 18 February, 1983.

Objectives of the Study Tour

- to acquaint the students with the research activities of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India by undergoing a short course at that institute.

- to familiarise the students with research and extension network in the national agricultural programs of India.

- to acquaint the students with the culture and peasant farmers of India.

Participants

The following persons participated in the study tour:

Dr. K.V. Ramanaiah	-	Leader and organiser
Eng.[a] Luisa Santos	-	Deputy leader
Paulo Zucula	-	Students' leader
Manuel Moraes	-	Treasurer
Leonor Pontes	-	Treasurer
Maris do Ceu Silva	-	student
Marina de Noronha Pancas	-	student
Enoque Nhancale	-	student
Firmino Mucavele	-	student
Julio Quadros	-	student
Carlos Barnabe Zandamela	-	student
Estanislau da Silva	-	student

/...

Funds for the tour

The study tour was financed by the International Development Research Centre (IDRC) which provided per diem including travel expenses outside Mozambique, and the University which provied funds for return tickets to India.

Organization

The students were organized into three groups and each group was given the responsibility of studying, in detail, one of the following aspects:

1. Research and extension in India and experiences applicable to Mozambique.

2. Basic technology
   a) animal traction
   b) other simple rural technology.

3. Groundnut crop production in India and experiences applicable to Mozambique.

These groups of students had the opportunity of getting "in depth" information on the above aspects and, on their return, transmitted information so obtained to other colleagues in Mozambique.

Course at ICRISAT

A well planned short, but intensive course took place from 18-29 January, 1983 at ICRISAT. The students received information on technology available at ICRISAT.

/...

Visits to Agricultural Institutions, Farms and Villages

After training at ICRISAT, the students visited the following institutions in India:

1. All India Co-ordinated Rice Improvement Program, Hyderabad.
2. All India Co-ordinated Sorghum Improvement Program, Hyderabad.
3. Operational Research Project of Dryland Agriculture Project (ICAR), Hyderabad.
4. Andhra Pradesh Agricultural University Campus, Rajendranagar.
5. Regional centre of Indian Agricultural Research Institute on oil seed crops, Hyderabad.
6. Agricultural Research Institute, Rajendranagar.
7. Seed Technology Research Laboratory, Rajendranagar.
8. Grape Research Station, Rajendranagar.
9. Andhra Pradesh State Seed Development Corporation, Hyderabad.
10. Agricultural Research Station, Garikapadu.
11. Regional Research Station, Lam.
12. Cashewnut Research Station, Bapatla.
13. Banana Research Station, Kovuur.
14. Agricultural Research Station, Ambazipet.
15. Regional Research Station, Razole.
16. Agro-Industrial Exhibition, Hyderabad.
17. Central Institute for cotton Research, Nagput.
18. Indian Agricultural Research Institute, New Delhi.

/...

In addition to visiting the above-mentioned institutes, the students visited many villages, contacted farmers, visited their farms and discussed with agricultural extension personnel in order to acquaint themselves with extension network. They saw the animal-drawn agricultural implements, made by the village artisans, in operation.

Some of the farm visits were very impressive, especially when the students saw small-scale farmers producing hybrid cotton seed and hand-pollinated the flowers themselves, sugar from sugarcane, etc. The students learnt many things through farm visits, interacted with farmers and saw how a small-scale farmer contributed to the national food production when extension services and inputs were made available to him.

They saw the social life of India by visiting cultural and tourist centres of interest and related to the history of Mozambique.

Another significant aspect of the tour was to study, in detail, how technology passes through various phases from research station-operational research-on-farm trials-mini-kit program-demonstration, etc. By interacting with Indian farmers and researchers, the students also studied how the farming systems approach operates, the process of its development and transfer of technology to the farmers.

Seed production, processing and distribution network were also studied.

/...

Conclusions

The students identified an Indian farmer as one who is overcoming the problem faced by farmers of third world countries. How he is overcoming the problems and becoming self sufficient by applying locally developed technology was an interesting aspect of this study tour. The students admired the Indian achievement in food self-sufficiency through coordinated effort by farmers, researchers and administrators. The students felt that this approach was an important one and should be transferred to Mozambique. Another aspect of interest to the students was how Indian research was oriented towards low-cost technology.

In general, this tour created a very good impression in the minds of future agriculturalists of Mozambique who are now occupying responsible positions such as agricultural research scientists, directors, teachers, etc.

Acknowledgements

The students, the University Eduardo Mondlane and the People's Republic of Mozambique wish to thank the IDRC for providing funds for the tour. Similar programs are planned and it is hoped that the IBRC and other international organizations will provide financial assistance.