RP 14434

ICRISAT
Legumes Program

In-House Review
Project Reports
For
16 April 1987 (only)

ICRISAT RESEARCH PROJECT PROGRESS REPORT

1. Project Number : G-108 (95) IC

2. Project Title : Exploitation of wild Arachis species for the improvement of the cultivated groundnut

3. Project Scientists : A.K. Singh
D.C. Sastri
J.P. Moss

4. Period covered by report:

From: January 1986 To: January 1987

5. Summary of Progress Report

Introgression from wild species

a. Species compatible with Arachis hypogaea

Species identified as having resistance have been incorporated in the crossing schedules. Species and hybrids have been treated with colchicine to produce autotetraploids and amphiploids. Hybrids at triploid, tetraploid and hexaploid levels have been produced, and crossed and backcrossed to A hypogaea. Triploids, and hexaploids with poor seed set, have been planted in the field for improved pod set.

Chromosomes have been counted in hybrids and backcrosses, and meiotic regularity checked in selected hybrids.

Disease screening of early generation material in 1986 Rainy Season identified 1888 selections, among which were 349 genotypes resistant to late leafspot.

An analysis of the different routes showed that the amphiploid route has produced a wide range of valuable material, and is a useful means of introgression from wild species.

Material produced earlier has been grown under normal, diseased rainy season conditions, and with foliar diseases controlled by Daconil. Most lines, though resistant, gave a slight increase in yield when sprayed, but some showed a decrease, and some showed a large increase.

Five lines have been entered into AICORPO trials.

b. Species not normally compatible with A. hypogaea.

To achieve transfer of in vitro grown hybrid (Arachis hypogaea x

A. sp. 276233) shoots to screenhouse, they were grafted on to 2-3 week old groundnut seedlings. Scions of both species, A. hypogaea and A. sp. 276233, when grafted on groundnut seedlings were found to be established in over 95% of the grafts and all such established scions showed good and normal growth. Eighty three percent of the hybrid shoots from test tubes were found to be established when grafted on to groundnut seedlings, but only 27% of them showed growth. About 12% of such grafts could survive up to 7 months before dying.

Shoots from these established and growing grafts were subsequently re-grafted for multiplication. Ninety one percent of the 62 grafts attempted were established and 77% grew. Wherever scions have shown growth, new shoots have been and are bring grafted again on new seedlings. Very few grafts have survived.

6. Publications:

Singh, A.K., A. Venkateshwar, T.P.S. Rau and J.P. Moss. 1986. Modified C and QF chromosome banding for Arachis L chromosomes. Current Science, 55:(18) 942-944.

Singh, A.K. 1986. Allien gene transfer in groundnut by ploidy and genome manipulations. Genetic Manipulation in Plant Breeding 207-209.

Singh, A.K. 1986. Utilization of wilt relatives in the genetic improvement of Arachis hypogaea L. 7. Autotetraploid production and prospects in interspecific breeding. Theor Appl Genet (1986) 72:164-169.

Stalker, H.T. and J.P. Moss. 1987. Speciation, cytogenetics and utilization of Arachis species. Adv. Agron. 40: Accepted.

Moss, J.P. and H.T. Stalker. n.d. Responses of peanut cultivars and explants to in vitro culture. Plant Cell Reports: accepted.

Singh, A.K., H.T. Stalker and J.P. Moss. n.d. Cytogenetics and use of alien genetic variation in groundnut improvement. In T. Tsuchiya and P.K. Gupta (eds.), Chromosome Engineering in Plants: Genetics, Breeding and Evaluation. In Review.

Singh, A.K. 1986. Utilization of wild relatives in the genetic improvement of Arachis hypogaea. 8. Synthetic amphidiploids and their improtance in interspecific breeding. Theor Appl. Genet (1986) 72:433-439.

7. Work plan for next year:

1. Transfer of resistance to early leaf spot and groundnut

rosette virus.

2. Transfer of resistance to TSWV.

3. Transfer of intersectional hybrid callus to soil by:

   (a) Induction of roots on shoots
   (b) Grafting
   (c) Somatic embryogenesis

ICRISAT RESEARCH PROJECT OUTLINE - TRAINING

1 **Submitted by :** J.P. MOSS **Date :** 3/4/87

2 **Project No. :** G103

3 **Program (s) :** LEGUMES

4 **Discipline(s)/Subprogram(s) :** GROUNDNUT CYTOGENETICS

5 **Project Title :** Anther culture for haploid production in groundnut

6 **Project Location :** Cytogenetics Laboratory

7 **Objective and Scope :** To develop techniques to accelerate breeding programs (Primarily groundnut but also chickpea and pigeonpea) by using anther culture to produce haploids.
Haploids will also be valuable in genetic analyses of important traits eg. disease and pest resistance.

8 **Expected contribution of this project to ongoing approved research :**

Will considerably decrease time to achieve homozygosity in breeding programs.

9 **Scientific Staff names :**

(a) **Project Scientist :**

J.P. MOSS

(b) **Scholar or Fellow : (Indicate Level) (MSc, PhD, PostDoc): Name(s)**

POST DOC. Y. SUBHADRA

(c) **Cooperating Scientist names :**

A.K. SINGH S.N. NIGAM D.A. van RHEENEN LAXMAN SINGH

(d) **Support staff :** **Man-years**

Research Associate (s)	0.5
Field Assistant(s)	0.5
Field Attendent(s)	-

10 (a) Date to start : MAY 19[illegible]

(b) Date of completion : MAY 1989

11 Anticipated Supervisor (s) : [illegible].F. MOSS

12 Recommendation of Project Scientist: Priority (1,2,3,4,5,6,7,8,9)

Priority 1

[signature]

Signature/date

13 Recommendation of ~~Subprogram~~/Group Leader:Priority (1,2,3,4,5,6,7,8,9)

Priority 1

[signature]

Signature/Date

14 Recommendation of Program Director : Priority (1,2,3,4,5,6,7,8,9)
High Low

Priority 1 [illegible]

[signature] [illegible]

Signature/Date

15 Recommendation of Deputy Director General

Signature/Date

16 Received by Principal Training Officer :

Signature/Date

ACTION :

Form "A"

COLLABORATIVE PROJECT

Project No. : Co-G-3 (81), Linked with Proj. No.G-108 (85)IC

Project Title : Use of wild species of *Arachis* in groundnut improvement

Name of the Collaborative Institute(s):

University of Reading, U.K.

Name of Scientists responsible for the project:

(a) Collaborative Institute(s)

I. J.E. Jones, J. B. Pickersgill

(b) ICRISAT

I. J.F. Moss, I. G.L. Singh, I. D.D. Dastri

Duration:

a. Date of Start : March 1981
b. Date of Completion : continuing

Objectives:

Hybridization between cultivated groundnut and incompatible wild species of *Arachis* section *Erectoides*

Source of funds: Previously ODA, then EEC
Currently applying for further funding

Progress so far:

Pollen from *Arachis* sp. nov. germinated on *batizocoi* stigmas with an unusual ring of hairs which restricts the access of pollen grains. Embryos and endosperm develop well in two intersectional *Arachis* crosses proceeds normally for the first 7 days. Peg culture in *Arachis* was attempted, the excised tip of peg used, 2mm in length, was able to grow in culture.

Remarks

The eventual aim of this project is to make available for breeders desirable characters that are not possible by conventional means. It is complementary to the ICRISAT major cytogenetics projects and is important for continuation of useful linkages.

FOR ROUGH DRAFT AND DATA ENTRY USE ONLY - NOT FOR FINAL TYPING

ICRISAT ANNUAL PROJECT PROGRESS REPORT 1 Number: G-113(85)IC

Period: 01 to 12/1986

Title: Evaluation of nutritional and food quality of groundnut

Progress Report:

Data obtained from oil and protein content analyses of 5913 germplasm lines compiled and circulated. Data on additional 928 germplasm lines under compilation.

Five thousand breeding populations analysed for oil and protein contents and several lines with oil content greater than 50% identified for further studies.

Proximate and amino acid compositions determined on selected ICRISAT lines. ICGS 21 found to show higher net protein utilization than other lines.

Preliminary results indicated negative association between oil and protein contents. The association of 100-seed mass with oil and protein contents was non-significant.

Training: Number of people: Nil % of project resources: Nil

Work Plan for next year:

We will continue to monitor advanced breeding lines for their chemical composition, oil content, and oil and protein quality. Biological evaluation will be carriedout in pre-released varieties.

We will investigate genotype x environment interaction on various quality parameters before embarking on directed breeding efforts.

In-house review recommendations	The points in discussion highlights to be borne in mind while carrying out the work plans.

Publications: (enter JA or CP number only)

1. JA 311

2. Grain Quality and Biochemistry Progress Report 1/86.

ICRISAT Research Project Progress Report

1. Project Number : G-113 (85) IC

2. Project Title : Evaluation of nutritional and food quality of groundnut

3. Project Scientists : R. Jambunathan

S.L. Dwivedi

S.N. Nigam (from 1987)

K.L. Sahrawat (")

4. Cooperating Scientist: V.R. Rao

5. Period covered by this report: January 1985 to December 1986

6. Date of start 1985 Years revised: 1986

Year of completion : 1990

7. Summary of progress report:

We have analysed 5913 germplasm accesions for their oil and protein contents and reported results in the progress report. Similar information on additional 928 accession is being compiled for distribution. We have also analysed about 5000 breeding lines for their oil and protein contents.

We carried out studies on various aspects of Nuclear Magnetic Resonance (NMR) spectrometer s performance and the close relationship between soxhlet and NMR values was monitored periodically.

We determined proxmate and amino acid compositions on seven ICRISAT advanced breeding lines. True digestibility, biological value, net protein utilization, and protein efficiency ratio determinations were also carried out in five of these lines. ICGS 21 was found to show higher net protein utilization than other lines.

We analysed 5 groundnut breeding lines for their sugar content.

Our preliminary results showed negative association between oil and protein contents. The association of 100-seed mass with oil and protein content was non-significant. However, a variation in oil content upto a maximum of 6% was observed in graded seed samples of the same genotype.

8. Publications:

1. Jambunathan, R., Madhusudana Raju, S., and Barde, S.P. 1985. Analysis of oil content of groundnut by Nuclear Magnetic Resonance Spectrometry. Journal of the Scince of Food and Agriculture 36:162-166.

2.

Analyses of groundnut germplasm accessions for their oil, protein and moisture contents, (May 1980-December 1985, Grain Quality and Biochemistry Progres Report 1/86).

9. Work plan for next year:

We will continue to monitor advanced lines for their chemical composition, oil content, oil and protein quality. Biological evaluation will be carried out on selected lines. A detailed plan has been prepared to investigate the genotype x environment interaction on various quality parameters. Our future thrust in the breeding program for any quality factor will depend on the outcome of the results from this experiment.

ICRISAT RESEARCH PROJECT OUTLINE - TRAINING

1 **Submitted by :** R. Jambunathan **Date :** 5 March 1986

2a **Project No.** : TY-G-6 (86)
b Limited Proj. no. : 6-112 (85)IC

3 **Program (s)** : Biochemistry Nutrition/Groundnut

4 **Discipline(s)/Subprogram(s)** : Biochemistry/Breeding

5 **Project Title :** Evaluation of nutritional and food quality of groundnut.

6 **Project Location :** Patancheru

7 **Objective and Scope:** 1. Determine the protein and oil content in groundnuts. 2. Determine the proximate composition of groundnuts including vitamins, sugars and protein quality using chemical methods. 3. Determine the oil quality including fatty acid composition in groundnuts. 4. Initiate and standardize taste panel evaluation studies.

8 **Expected contribution of this project to ongoing approved research :**
To understand various aspects that govern the food quality and to analyze groundnut samples for their fatty acid composition.

9 **Scientific Staff names :**

(a) **Project Scientist :**
R. Jambunathan and S.L. Dwivedi

(b) **Scholar or Fellow : Indicate Level (MSc, PhD, PostDoc) :Name(s)**
Post Doctorate Research Fellow, T.L. - to be appointed.

(c) **Cooperating Scientist names :**
V. Ramanatha Rao

(d) **Support staff :** **Man-years**

Research Associate (s)	2.0
Field Assistant(s)	
Field Attendent(s)	1.0

10 (a) Date to start : 1986

(b) Date of completion : 1987 or 1988

11 Anticipated Supervisor(s): R. Jambunathan
S.L. Dwivedi

12 Recommendation of Project Scientist: Priority (1) 2,3,4,5,6,7,8,9)

Recommended

Signature/date

13 Recommendation of subprogram/group leader: Priority (1) 2,3,4,5,6,7,8,9)

Recommended

Signature/date

14 Recommendation of Program Leader: Priority (1) 2,3,4,5,6,7,8,9)
High Low

Highest priority - This was the major recommendation of the RDK review in previous years and must be implemented at the earliest possible date

Signature/date

15 Recommendation of Director of Research :

Recommended

Signature/date

16 Received by Training Officer :

Signature/date

ACTION :

ICRISAT Research Project Outline

1. Project Number: G 801(86)SD

2. Old Project Number:

3. Program: Groundnut

4. Discipline(s)/Subprogram(s): Pat

5. Project Title: Ecology of vector and viruses of ro· sease

6. Project Locations:

Malawi Chitedze

7. Scientific Staff Names:

(a) Discipline/Subprogram Leader Names:

K R Bock (KRB)

(b) Project Scientist Names — Scientist-Years

K.R. Bock (KRB) 0.30

(c) Cooperating Scientist Names

(d) Supporting Staff:

Research Associate(s)	0.30
Field Assistant(s)	0.60
Field Attendant(s)	0.00

8. (a) Date of Start: 1984

(b) Years Revised·

(c) Year of Completion. 198?

9. Objectives and Scope:

To determine the seasonal origins of rosette disease by identifying dry season hosts of the vector Aphis craccivora and reservoirs of the casual viruses in southern Africa.

10. Keywords:

Rosette disease
Ecology
Vector
Viruses
Glasshouse testing

11. Technique in brief (Methodology):

(a) In Malawi: (i) Physical search for the vector, especially at the height of the dry season (October), in possible habitats (riverine vegetation, evergreen forest) and in 'hot-spot' areas (the Phalombe Plain). (ii) Vector preference for and susceptibility of seedlings of tree and shrub species of wide distribution throughout the groundnut areas of Africa; by collection of seeds in the field and inoculation and testing of seedlings in the glasshouse. (iii) Monitoring the vector throughout the year by water trapping and by exposure of bait plants and bait plots. (b) Regionally: in cooperation with national programs, an attempt to assess the importance of volunteer populations of groundnut in dry season carry over of vector and virus.

12. Source of Funds: ICRISAT IDRC

13. Cost Estimates: (Direct) 1985 1986 1987

Operational (recurring)

(a) Labor

(b) Travel

(c) POL

(d) Supplies

TOTAL

Capital (non-recurring

Indirect Costs

14. Land Requirements (ha)

Location

Chitedze

15. Review of past background and present status:

A great deal of previous work has been done on a search for dry season hosts of the vector which may also be reservoirs of rosette (Farrell and Adams 1965, 1966, 1967; Adams 1967): none of the several vectors hosts contained rosette in the field or proved susceptible to rosette on inoculation. These previous studies were confined to herbaceous or woody harbaceous hosts occurring on the Lilongve Plain in Central Malawi. Some observational work has been done on dry season survival of both vector and virus on groundnut volunteersn in South Africa (Storey and Bottomley, 1928) and Tanzania (Evans, 1954) but assessment quantitatively in a regional context has not been made. The field ecology of both vector and virus thus remains largely if not entirely unknown. It is important that this gap in knowledge is filled, particularly as it might well lead to further development of regional strategies for ultimate control.

16. Existing linkage with other centers or research projects:

Attempts are in progress to involve national programs of the region to survey for dry season volunteers, to monitor first seasonal arrival of vectors and rosette, and by means of off-season plots, to monitor vector and virus during the dry season. Such a program cannot be coercive and will depend on the interest of the region's few pathologists. The Tobacco Research Station, Kutsaga, Harare, is to monitor vector trapping throughout the year in cooperation with our Malawi program.

17. Likely future course of development:

18. Availability of training facility:

Approval Date: 06-SEP-1986

ICRISAT Research Project Outline

1. Project Number: G 802(86)SD

2. Old Project Number:

3. Program: Groundnut

4. Discipline(s)/Subprogram(s): Pat

5. Project Title: Screening for resistance to rosette disease

6. Project Locations:

Malawi Chitedze

7. Scientific Staff Names:

(a) Discipline/Subprogram Leader Names:

K R Beck (KRB)

(b) Project Scientist Names: Scientist-Years

K.R. Bock (KRB) 0.30

(c) Cooperating Scientist Names:

(d) Supporting Staff:

Research Associate(s)	0.30
Field Assistant(s)	1.60
Field Attendant(s)	0.00

8. (a) Date of Start: 1984

(b) Years Revised:

(c) Year of Completion: 198

9. Objectives and Scope:

1. Development and utilisation of effective disease nursery techniques: field screening of large populations. 2. Studies on the inheritance of resistance to the two component viruses: detailed evaluation of resistance of specific crosses under controlled (glasshouse) conditions.

10. Keywords:

Rosette disease
Screening
Resistance
Inheritance
Glasshouse
Virus

11. Technique in brief (Methodology):

1. Field screening: establishment of disease nurseries involving infector rows and introductions of viruliferous aphids. 2. Inheritance studies: standardized inoculation of progenies of selected susceptible x resistant crosses; resistant individualls tested for virus and virus transmissibility by simple grafting and vector feeding experiments.

12. Source of Funds: Core

13. Cost Estimates: (Direct)

	1985	1986	1987
Operational (recurring)			
(a) Labor			
(b) Travel			
(c) POL			
(d) Supplies			
TOTAL			
Capital (non-recurring			
Indirect Costs			

14. Land Requirements (ha)

Location			
Chitedze	0.10	0.10	0.10

15. Review of past background and present status:

Berchoux (1960) reported that resistance is governed by two independent recessive genes. Subsequent unconfirmed and unpublished reports indicate that resistance may not be as simply inherited. Nutman, Roberts and Williamson (1964) indicated that symptomless, resistant plants contained groundnut rosette virus, but that the virus could not be acquired by the aphid vector. The present study described here sets out to re-examine inheritance critically and to study further the virus content of symptomless apparently resistant plants derived from a range of crosses. The field screening of large numbers of plants derived from resistant x susceptible crosses though included here is regarded mainly as a routine (but important) exercise.

16. Existing linkage with other centers or research projects:

17. Likely future course of development:

18. Availability of training facility:

Approval Date: 06-SEP-1986

ICRISAT Research Project Outline

1. **Project Number:** G-XXX(86)SD

2. **Old Project Number:** None

3. **Program:** Legumes

4. **Discipline(s)/Subprogram(s):** Brd/Path

5. **Project Title:** Breeding for resistance to groundnut rosette disease.

6. Project Locations:

   Malawi

7. Scientific Staff Names:

   (a) Discipline/Sub-Program Leader Names:

S.N. Nigam	(SNN)
K.R. Bock	(KRB)

   (b) Project Scientist Names:

		Scientist-Years
S.N. Nigam	(SNN)	-----
K.R. Bock	(KRB)	-----

   (c) Cooperating Scientist Names:

D. Greenberg	(DG)
P. Subrahmanyam	(PS)

8. (a) Date of Start (mo/yr): XX/1983

   (b) Years Revised: -----

   (c) Date of completion (mo/yr): XX/1995

9. Objectives and Scope: (10 lines maximum)

   1. To breed rosette resistant genotypes adapted to various agroclimatic zones of southern Africa; more emphasis will be given to incorporate resistance in early maturing varieties.

   2. To study inheritance of groundnut rosette disease.

10. Keywords: (Maximum 7)

Groundnut
Rosette
Breeding
Inheritance
Southern Africa
Aphid

11. Technique in brief (Methodology): (15 lines maximum)

1. Resistant sources from West Africa will be obtained and their resistance to the chlorotic rosette disease will be confirmed in Malawi before using them in a crossing program.

2. Segregating populations will be screened in a field disease screening nursery. Survivors in the field will be retested in the glasshouse. Resistant populations will be grown in the field disease screening nursery till F_5-F_6 generations.

3. Promising lines will be evaluated for yield potential under normal and late planting conditions.

4. Selected lines will be evaluated in a regional adaptation trial.

15. Review of past background and present status: (2- lines max.)

Rosette resistant varieties have been developed in Burkina Faso, and Senegal. In southern Africa, Malawi has released a rosette resistant variety RG1. This variety has not become very popular with the farmers because of certain drawbacks it has. At present no active rosette resistance breeding is being carried out in southern Africa. Most of the rosette resistant varieties released so far belong to medium or late maturing group.

We need to incorporate rosette resistance in maturing lines and breed varieties adapted to different agroclimatic conditions of southern Africa.

16. Existing linkage with other centers or research projects: (8 lines maximum)

Scottish Crop Research Institute

G-802(86)SD

17. Likely future course of development: (8 lines maximum)

1. Breeding efforts will continue to incorporate resistance in desirable backgrounds.

2. Rosette resistant varieties adapted to the southern African conditions will become available in due course.

18. Availability of training facility: (4 lines maximum)

In hybridization, breeding methods

Project Scientist Discipline Head Program Director

APPROVED

DATE: DEPUTY DIRECTOR OR DAT.

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ICRISAT ANNUAL PROJECT PROGRESS REPORT: 1 Number: G-XXX(86)SD

Period: 01 to 12/1986

Title: Breeding fo resistance to groundnut rosette disease

Progress Report:

We carried out a detailed investigation on the inheritance of resistance to rosette disease. Preliminary results obtained from the field screening of parents, F1, F2 and back cross generations supported our earlier observations of double recessive nature of resistance and of absence of the reciprocal differences involving parents of different botanical types. Final results will become available after the glasshouse testing.

Twenty-six new F2 populations and 161 F2 plant and 35 F2 bulk progenies retained from the previous season were screened in the field screening nursery. In the F2 generation we identified 20 symptomless plants and in the F3 - 5 symptomless plants belonging to the sequential branching group. There were several plants selected in the alternate branching group.

Training: Number of people: Nil % of project resources: Nil

Work Plan for next year:

Remainder F2 and BC F2 seed of the plants in the inheritance study, retained after the glasshouse testing, will be progeny rowed.

New crosses with sequential branching parents and resistant sources will be made. More hybrid seed will be produced to generate large F2 populations.

F2, F3, F4 generations will be screened in the disease screening nursery.

In-house review recommendation: Nil

Publications: (enter JA or CP number only)

CP - 319

ICRISAT Research Project Outline

1. Project Number: G 803(86)SD

2. Old Project Number:

3. Program: Groundnut

4. Discipline(s)/Subprogram(s): Pat

5. Project Title: Screening for and research into resistance to early leaf spot

6. Project Locations:

Malawi Chitedze

7. Scientific Staff Names:

(a) Discipline/Subprogram Leader Names:

K.R. Bock (KRB)

(b) Project Scientist Names:

		Scientist-Years
K.R. Bock	(KRB)	0.40

(c) Cooperating Scientist Names:

(d) Supporting Staff:

Research Associate(s)	0.40
Field Assistant(s)	0.80
Field Attendant(s)	0.00

8. (a) Date of Start: 1984

(b) Years Revised:

(c) Year of Completion: 1987

9. Objectives and Scope:

1. Screening for resistance to early leaf spot. 2. An attempt to trace possible mechanisms of tolerance in high-yielding apparently tolerant lines. 3. To screen other Arachis species for resistance to early leaf spot.

10. Keywords:

Early leaf spot
Resistance
Tolerance
Screening
Fungicides

11. Technique in brief (Methodology):

Routine screening of the ICRISAT breeder's fields at Chitedze for resistance to ELS by regular scoring (using the ICRISAT 1-9 scale and also recording in detail rate and intensity of leaf fall). Studies of level and possible mechanisms of tolerance in apparently tolerant high-yielding lines by utilizing various levels of fungicidal control and recording in detail rate and intensity of leaf fall in relation to stage of crop growth.

12. Source of Funds: Core

13. Cost Estimates: (Direct)

	1985	1986	1987
Operational (recurring)			
(a) Labor			
(b) Travel			
(c) POL			
(d) Supplies			
TOTAL			
Capital (non-recurring			
Indirect Costs			

14. Land Requirements (ha)

Location			
Chitedze	6.00	6.00	6.00

15. Review of past background and present status:

Lines reported as containing at least some detectable level of ELS resistance in other parts of the world appear to be totally susceptible in Southern Africa. In spite of an apparently high degree of foliar susceptibility, several high yielding lines have been identified: these possibly contain some level of tolerance. In a situation where resistance cannot be detected visually, it seems both desirable and necessary to study these high yielding lines in an attempt to trace possible mechanisms for tolerance, assuming tolerance is present.

16. Existing linkage with other centers or research projects:

17. Likely future course of development:

18. Availability of training facility:

Approval Date: 06-SEP-1986

ICRISAT Research Project Outline

1. **Project Number:** G-XXX(86)SD

2. **Old Project Number:** None

3. **Program:** Legumes

4. **Discipline(s)/Subprogram(s):** Brd/Path/Cyto

5. **Project Title:** Breeding for resistance to early leaf spot

6. **Project Locations:**

   Malawi

7. **Scientific Staff Names:**

   (a) Discipline/Sub-Program Leader Names:

S.N. Nigam	(SNN)
K.R. Bock	(KRB)

   (b) Project Scientist Names: Scientist-Years

S.N. Nigam	(SNN)	-----
K.R. Bock	(KRB)	-----

   (c) Cooperating Scientist Names:

A.K. Singh	(AKS)
J.P. Moss	(JPM)
L.J. Reddy	(LJR)

8. (a) Date of Start (mo/yr) : XX/1985

   (b) Years Revised : - - -

   (c) Date of completion (mo/yr) : XX/1995

9. Objectives and Scope: (10 lines maximum)

   1. To breed early leaf spot resistant varieties adapted to different agroclimatic zones of southern Africa.

   2. To incorporate early leaf spot-resistance in other foliar diseases resistant varieties.

10. Keywords: (Maximum 7)

Groundnut
Early leaf spot
Screening
Southern Africa
Foliar Diseases

11. Technique in brief (Methodology): (15 lines maximum)

1. Germplasm lines and breeding material including unselected near tetraploid interspecific material obtained from ICRISAT Center and elsewhere will be screened under field conditions.

2. Promising lines will be identified and inter-crossed with each other and with other varieties to improve the level of resistance and breed resistant varieties.

15. Review of past background and present status: (20 lines max.)

Early leaf spot is the most important foliar disease in southern Africa. It occurs every year regularly and causes serious yield losses. Chemical control is available but is expensive due to various reasons. Resistance to early leaf spot has been reported in both cultivated and wild Arachis species. However, these cultivated sources could not maintain their resistance under Chitedze conditions in Malawi. They all defoliated heavily much before harvest. Wild Arachis species are under investigation.

Few germplasm and breeding lines have been identified which retain more foliage and for longer duration before eventually getting defoliated like succeptible genotypes. Such genotypes are being inter-crossed.

16. Existing linkage with other centers or research Projects: (8 lines maximum)

G-803(86)SD
G-101(85)IC
G-108(85)IC

17. Likely future course of development: (8 lines maximum)

Groundnut populations/lines with resistance/tolerance to early leaf spot will be produced. Early leaf spot resistance will be transferred to other foliar diseases and rosette resistant varieties/populations.

18. Availability of training facility: (4 lines maximum)

In hybridization, screening methods, and selection procedures.

Project Scientist Discipline Head Program Director

APPROVED

DATE: DEPUTY DIRECTOR GENERAL

FOR ROUGH DRAFT AND DATA ENTRY USE ONLY - NOT FOR FINAL TYPING

ICRISAT ANNUAL PROJECT PROGRESS REPORT 1. Number: G-XXX(86)SD

Period: 01 to 12/1986

Title: Breeding for resistance to early leaf spot

Progress Report:

We assessed several thousand germplasm lines and breeding populations including interspecific derivatives and found them highly susceptible to the diseases. These included resistant sources reported from the U.S.

Of the 15 Arachis wild species planted in the field, on visual scoring, we found three, A. sp. 30003, A. chocaense, and A. sp. 30085 highly promising.

In collaboration with the pathologists, we identified several germplasm and breeding lines where rate of defoliation was low. We also carried out a response to spray trial on some selected lines.

Training: Number of people: Nil % of project resources: Nil

Work Plan for next year:

Lines identified as slow defoliating will be intercrosses with each other to improve the level of resistance to early leaf spot.

ICRISAT germplasm lines will be bulked in a systematic way and the field screening will be conducted to cover 11000 lines in one season.

Unselected interspecific derivatives will be obtained from the Center and screened in Malawi.

We will continue to select for high yield under heavy early leaf spot disease pressure.

In-house review recommendation: Nil

Publications: (enter JA or CP number only)

CP - 221

ICRISAT Research Project Outline

1. **Project Number:** G-xxx(86)SD

2. **Old Project Number:** None

3. **Program:** Legumes

4. **Discipline(s)/Subprogram(s):** Brd/

5. Project Title: Breeding for specific adaptation and requirements.

6. Project Locations:

   Malawi

7. Scientific Staff Names:

   (a) Discipline/Sub-Program Leader Names:

   S.N. Nigam (SNN)

   (b) Project Scientist Names: Scientist-Years

   S.N. Nigam (SNN)

   (c) Cooperating Scientist Names:

   D. Greenberg (DG)
   & ICRISAT Center breeders

8. (a) Date of Start (mo/yr): xx/1982

   (b) Years Revised: ---

   (c) Date of completion (mo/yr): xx/1995

9. Objectives and Scope: (10 lines maximum)

   1. To breed varieties adapted to different agroecological zones and suited to different requirements of the region.

   2. To supply segregating populations and advanced breeding lines to national programs.

   3. To organize regional yield trials.

10. Keywords: (Maximum 7)

Groundnut
Southern Africa
Regional yield trials

11. Technique in brief (Methodology): (15 lines maximum)

1. Use of established crop breeding techniques using identified sources with the desired characteristics.

2. Introduction of advanced generation breeding material from ICRISAT Center and elsewhere.

15. Review of past background and present status: (20 lines max.)

Groundnut improvement in the region has heavily relied on "introduction". The majority of the varieties released in the southern African countries are either direct "introduction" or "re-selection" in the introduced material. With the exception of Zimbabwe and to some extent of Malawi, very little hybridization has been carried out in the region.

There are several biotic and abiotic constraints limiting groundnut production in the region. It is, therefore, important that a long term strategy is devised which will lead to the production of better adapted varieties.

16. Existing linkage with other centers or research projects (8 lines maximum)

1. G-xxx(86)SD, "Germplasm introduction, evaluation documentation, and exploitation".

2. All material programs in southern Africa.

3. G-105(85)IC

17. Likely future course of development: (8 lines maximum)

    1. Hybridization and selection will continue.

    2. A linkage will be established and material exchanged with groundnut programs at ISC and east & central Africa.

    3. A regional testing network will be established.

18. Availability of training facility: (4 lines maximum)

In hybridization, field experimentation, and breeding techniques.

Project Scientist Discipline Head Program Director

APPROVED

DATE: _____ DEPUTY DIRECTOR GENERAL

ICRISAT Research Project Outline

1. Project Number: G-XXX(86)SD

2. Old Project Number: None

3. Program: Legumes

4. Discipline(s)/Subprogram(s): Brd/GRU

5. Project Title: Germplasm, introduction, evaluation, documentation, and exploitation

6. Project Locations:

   Malawi

7. Scientific Staff Names:

   (a) Discipline/Sub-Program Leader Names:

   S.N. Nigam (SNN)

   (b) Project Scientist Names: Scientist-Years

   S.N. Nigam (SNN) -----

   (c) Cooperating Scientist Names:

   V.R. Rao (VRR)

8. (a) Date of Start (mo/yr) : xx/1982

   (b) Years Revised : - - -

   (c) Date of completion (mo/yr): xx/1995

9. Objectives and Scope: (10 lines maximum)

   1. To introduce carefully selected germplasm material in the region and evaluate them for various morpho-agronomic characters including pests and diseases resistance.

   2. To increase the diversity of genetic material available in the region.

   3. Highly promising germplasm lines will be entered in the regional yield trials.

   4. This will also lead to the build up of a gene bank in due course in southern Africa.

10. Keywords: (Maximum 7)

Groundnut
Germplasm
Southern Africa
Introduction

11. Technique in brief (Methodology): (15 lines maximum)

1. Carefully selected germplasm lines will be introduced in Malawi from ICRISAT Center and elsewhere.

2. They will be evaluated in observational plots for various morpho-agronomic characters including pests and diseases resistance. This information will be documented in the Germplasm Accession Register.

3. Promising germplasm lines wil be evaluated in replicated yield trials for 2 seasons before they enter regional yield trials.

4. Other lines will be stored in a cold room & periodically rejuvenated.

5. Pests and diseases resistant lines will be used in crossing programs.

15. Review of past background and present status: (20 lines max.)

Many of the national programs have lost their germplasm due to various reasons. Germplasm collections, which are available in the region, have not been properly evaluated and documented.

Many of the prevalent varieties in the region are either introductions or selections from the introduced material. It has been suggested by some workers that the material obtained from the south American region seems to have built in adaptability to southern and central African conditions.

16. Existing linkage with other centers or research projects: (8 lines maximum)

G.XXX(86)SD, "Breeding for specific adaptation and requirements".

17. Likely future course of development: (8 lines maximum)

1. Selected introduction of the germplasm will continue.
2. This project will help in consolidation, evaluation, and documentation of scattered germplasm collections available in the region.
3. Over a period of time a a gene bank will develop in the region.
4. Promising introduced material may be released as variety in the region.

18. Availability of training facility: (4 lines maximum)

In evaluation of various morpho-agronomic characters.

Project Scientist Discipline Head Program Director

APPROVED

DATE: DEPUTY DIRECTOR GENERAL

FOR ROUGH DRAFT AND DATA ENTRY USE ONLY - NOT FOR FINAL TYPING

ICRISAT ANNUAL PROJECT PROGRESS REPORT 1 Number: G-XXX(86)SD

Period: 01 to 12/1986

Title: Germplasm introduction, evaluation, documentation, and exploitation.

Progress Report:

We have evaluated systematically about 1200 germplasm lines and 32 Arachis wild species. This includes material obtained from ICRISAT Center, and Mozambique, Zambia, and Tanzania national programs.

Many promising germplasm lines in spanish, valencia, and virginia groups have been identified. Many of the valencias have done exceedingly well over years at Chitedze.

Training: Number of people: Nil % of project resources: Nil

Work Plan for next year:

We will continue with the selected introduction of germplasm.

Promising germpasm lines will be grouped together as per their botanical types and evaluated in larger plots before their inclusion in regional yield trials.

Promising lines already identified will be entered in regional yield trials. A new regional yield trial with valencia type material will be started.

In-house review recommendation: Nil

Publications: (enter JA or CP number only)

CP - 221

CP - 319

ICRISAT Research Project Outline

1. **Project Number: G-xxx(87)BD**

2. **Old Project Number: None**

3. **Program: Legumes**

4. **Discipline(s)/Subprogram(s): Brd/Path**

5. **Project Title: Regional Cooperation**

6. Project Locations:

   Malawi and other SADCC countries

7. Scientific Staff Names:

   (a) Discipline/Sub-Program Leader Names:

K.R. Bock	(KRB)
S.N. Nigam	(SNN)

   (b) Project Scientist Names: **Scientist-Years**

K.R. Bock	(KRB)
S.N. Nigam	(SNN)

   (c) Cooperating Scientist Names:

   ICRISAT Scientist at the Center

8. (a) Date of Start (mo/yr): xx/1984

   (b) Years Revised: ---

   (c) Date of completion (mo/yr): xx/1995

9. Objectives and Scope: (10 lines maximum)

   1. To organize workshops and specialist meetings

   2. To disseminate formation thro newslett rther publications.

   3. To assist and strengthen national progra through training, visits and consultancies.

10. **Keywords: (Maximum 7)**

Regional Cooperation
SADCC
Groundnut
Workshop
Newsletter
Specialists Meeting

11. Technique in brief (Methodology): (15 lines maximum)

1. Organisation of workshops and meetings as per ICRISAT procedures and requirements of the host and participating countries.

2. Publication of Regional Groundnut Newsletter.

3. Training at ICRISAT Center/Local training at the Regional Program.

4. Visits and consultancies.

15. Review of past background and present status: (20 lines max.)

In the past coordination of efforts at the regional level was lacking. Since the inception of ICRISAT regional program the following regional activities have been organized:

1. Regional Groundnut Workshops - 1984, 1986

2. Breeders Group Tour - 1985

3. Pathologists Group Tour - 1987

4. Regional Groundnut News - an annual newsletter

5. Visits to Botswana, Mozambique, Tanzania, Zambia, and Zimbabwe.

16. Existing linkage with other centers or re. projects: (8 lines max.)

1. National programs of the SADCC countries

2. All regional program groundnut projects.

17. Likely future course of development: (8 lines maximum)

1. We will continue to organize workshops and meetings at regular intervals.

2. As facilities develop, we may run short term specialised training at the program.

3. We will continue to coordinate regional cooperative activities.

18. Availability of training facility: (4 lines maximum)

Nil

Project Scientist Discipline Head Program Director

APPROVED

DATE: DIRECTOR GENERAL

ICRISAT RESEARCH PROJECT OUTLINE

1. Project Number: G XXX (87) IS

2. Old Project Number: -

3. Program: Groundnut

4. Discipline: Agr./Pat.

5. Project Title: Evaluation of the various cropping systems of groundnut in the West African Region.

6. Project Locations: ISC, Bengou, Benin, Burkina Faso, Mali, Nigeria, Senegal, Other countries.

7. Scientific Staff Names:

a) Discipline/Sub-Program Leader Name:

Agr	B.J. Ndunguru	(BJN)

b)Project Scientist Names:

			Scientist-Years
Agr	B.J. Ndunguru	(BJN)	0.3
Pat	P. Subrahmanyam	(PS)	0.05

c) Cooperating Scientist Names:

Agr	C. Renard	(CR)
SS	M.C. Klaij	(MCK)
SC	A. Bationo	(AB)
CL	M.V.K. Sivakumar	(MVKS)
Agr	P.G. Serafini	(PGS)
	National Programs	

d) Supporting Staff:

Research Associate(s)	0.35
Field Assistant(s)	0.35
Field Attendant(s)	0.85

8. (a) Date of start: 06/1987

(c) Date of completion: 12/1991

9. Objectives and Scope:

1. To survey the agronomic practices of groundnut in various countries in the West African Region.

2. To test these practices and seek ways of improving them in order to increase groundnut production.

10. Keywords:

Cropping Systems

Intercropping

Ridge/Flat

Fertilizers

Tillage/Land-forming

Groundnut plant type

11. Technique in brief (Methodology):

It is intended to carry out a survey of agronomic practices for groundnut production in the region. Trials on intercropping, fertilization and the use of open ridges, tied ridges and raised beds are to be initiated, and compared with flat cultivation. Plant population studies as well as dates of sowing are to form part of the investigations. An important addition is the evaluation of bunch- and runner- type groundnuts and assess their relative utilization of moisture and yielding capabilities when grown as mixtures or in pure stands, and to assess the influence of these practices on disease development.

12. Source of Funds: CORE 100%

13. Cost estimates: (Direct) 1987 1988 1989

14. Land requirements (ha)

Location:

ISC 0.3 ha

Bengou 0.3 ha

15. Review of past background and present status:

In West Africa the production of groundnuts has declined partly due to unfavourable climatic conditions, characterised by frequent drought and high temperatures and a decline in soil productivity following continuous cultivation. Availability of water is by far the most important of all th climatic factors that influence groundnut production in the region.

Among the agronomic principles necessary for producing a good groundnut crop are the use of recommended varieties, the planting of quality seeds, the preparation of good seed beds, timely sowing, maintenance of optimum plant population, the appropriate use of fertilizers, the application of effective measures for the control of weeds, insects and diseases and timely harvesting.

It is intended to review to what extent these agronomic packages have bee utilized to stabilize and intensify productivity and reduce risks and cro losses. An assessment of the relative merits and demerits of intercroppin fertilization and water conservation techniques form part of the study.

16. Existing linkage with orther centers or research projects:

This project will be closely linked with the proposed projects on variability and drought.

17. Likely future course of development:

Development of appropriate agronomic packages for groundnut production.

18. Availability of training facility:

This is to be developed at a later stage.

Project Scientist Sub-Program Leader Program Leader

APPROVED

Date_____

_____
Director of Research

ICRISAT RESEARCH PROJECT OUTLINE

1. Project Number: G XXX (87) IS

2. Old Project Number: -

3. Program: Groundnut

4. Discipline: Brd

5. Project Title: Adaptation of groundnut types for specific environments and requirements in the West African region.

6. Project Locations: Bengou, ISC, National Programs.

7. Scientific Staff Names:

a) Discipline/Sub-Program Leader Name:

Brd	D.C. Greenberg	(DCG)

b) Project Scientist Names:

			Scientist-Years
Brd	D.C. Greenberg	(DCG)	0.15

c) Cooperating Scientist Names:

Brd	S.N. Nigam	(SNN)
Brd	S.L. Dwivedi	(SLD)
	National Programs	

d) Supporting Staff:

Research Associate(s)	0.15
Field Assistant(s)	0.15
Field Attendant(s)	0.3

8.a. Date of Start: 06/1987

b. Date of completion: 12/1989

9. Objectives and Scope:

Screening of confectionery-type groundnut lines from ICRISAT Center and other groundnut programs for adaptation under West African conditions. Identification of crossing parents for a breeding program for confectionery groundnut types for West African conditions with a view to stimulate local and possible export markets for groundnut production. Investigation of Valencia types for acceptability. Selection of genotypes with earliness and/or drought tolerance for drier areas and longer-duration material for wetter areas.

10. Key words:

Confectionery groundnut
Adaptability
Markets
Acceptability
Valencias

11. Techniques in brief (Methodology):

Replicated variety trials, including the Internation confectionery groundnut trials to identify possible potential varietal releases and possible crossing parents. Future crossing and selection program for drought tolerant, short-season lines of reasonable confectionery quality also with resistance to Aspergillus flavus, rosette, late leafspot and rust.

12. Source of Funds: Core 100%

13. Cost estimates: 1987 1988 1989

14.Land requirements (ha)

Location:			
Bengou	0.9	1.0	1.2
ISC	0.9	1.0	1.2
National Programs			0.5

15. Review of past background and present status:

Groundnut production has deelined in the West African region because of the loss of markets for oil-type nuts. Selection of adapted confectionery-type groundnuts could stimulate local markets for the crop and possibly open up export markets, provided that quality standards for aflatoxins could be met.

16.Existing linkage with other centers or research projects:

Collaborative research exists between the ICRISAT Center groundnut program and the University of Bonn, the peanut CRSP and commercial confectionery organisations.

17.Likely future course of development:

Screening, hybridization and selection for the desired combinations of confectionery quality, adaptation to West African conditions and resistance to Aspergillus flavus.

18. Availability of training facility:

Possible opportunities for student research when problems and potentials are more closely evaluated.

Project Scientist | Sub-Program Leader | Program Leader

APPROVED

Date : _____ Director of Research

ICRISAT RESEARCH PROJECT OUTLINE

1. Project Number: G XXX (87) IS

2. Old Project Number: -

3. Program : Groundnut

4. Discipline: Brd / Agr / Phy / Pat / CL

5. Project Title: Strategies for the evaluation and management of the effects of drought on groundnut production.

6. Project Locations: ISC, Bengou, National Programs.

7. Scientific Staff Names:

a) Discipline/Sub-Program Leader Name:

Brd	D.C. Greenberg	(DCG)

b) Project Scientist Names:

			Scientist-Years
Brd	D.C. Greenberg	(DCG)	0.3
Agr/Phy	B.J. Ndunguru	(BJN)	0.3
Pat	P. Subrahmanyam	(PS)	0.05

c) Cooperating Scientist Names:

Phy	J.H. Williams	(JHW)
CL	M.V.K. Sivakumar	(MVKS)
	National Programs	

d) Supporting Staff:

Research Associate(s)	0.65
Field Assistant(s)	0.65
Field Attendant(s)	1.5

8. a. Date of Start: 06/1987

b. Date of completion: 12/1991

9. Objectives and Scope:

Investigation of the importance and nature of drought as a factor limiting groundnut yields and limiting the extent of groundnut cultivation. Evaluation of methods for screening for drought tolerance using earliness, physiological drought resistance and indeterminacy to escape drought during critical phases of development. Initiation of a selection and breeding program for drought tolerance and adaptability under Sahelian conditions. To investigate the effects of drought on Aspergillus flavus invasion, aflatoxin contamination and pod rots. To investigate any relationship between photoperiod response and drought tolerance.

10. Keywords:

Drought effects
Drought tolerance
Earliness
Drought escape
Adaptability
Aflatoxins
Photoperiod

11. Technique in brief (Methodology):

Study of climatological data to identify critical periods of drought in Sahelian climate during the groundnut growth cycle. Testing of drought tolerant germplasm from ICRISAT Center. Development of techniques to screen germplasm and breeding material for tolerance to drought as it occurs in the Sahel. Use of off-season irrigation facilities to simulate drought conditions for germplasm screening and selection. Initiation of a crossing program to combine drought tolerance with other characteristics [illegible] effect. of drought on Aspergillus flavus invasion, aflatoxin contamination and pod rots.

12. Source of Funds: Core 100%

13. Cost estimates: 1987 1988 1989

14. Land requirements (ha)

Location:			
ISC	2.0	2.5	3.0
Bengou	2.0	2.0	2.0
National programs		0.5	1.0

15. Review of past background and present status:

Drought is clearly a major factor limiting groundnut yields and production in the Sahel and neighbouring regions. Variability in the rainfall pattern may well be at least as important as total moisture shortage. Genotypes tolerant to early-season and mid-season droughts have been identified at ICRISAT Center. There is also a breeding program at ICRISAT Center to select genotypes having a combination of earliness and reasonable dormancy, which could be valuable under the erratic rainfall duration found in the Sahel region.

16. Existing linkage with other centers or research projects:

Evaluation of drought tolerant material from ICRISAT Center has already begun. It is anticipated that linkages will be set up with the peanut CRSP and IRHO programs in West Africa. The involvement of national programs should increase as techniques and germplasm are developed.

17. Likely future course of development:

As the nature of the drought problem is understood in closer detail, it is anticipated that screening techniques for drought tolerant germplasm and breeding lines will be refined, leading to a breeding program for drought tolerance under Sahelian conditions.

18. Availability of training facility :

Techniques need to be developed and problems need to be evaluated before a training facility is anticipated.

Project Scientist | Sub-Program Leader | Program Leader

APPROVED

Date : _____

Director of Research

ICRISAT RESEARCH PROJECT OUTLINE

1. Project Number: G XXX (87) IS

2. Old Project Number: -

3. Program: Groundnut

4. Discipline: Pat / Brd

5. Project Title: Investigations on foliar diseases of groundnut.

6. Project Locations: Sadore, Bengou, Maradi, Samaru, Ouagadougou, Abidjan, Bamako, Bambey, Cameroun.

7. Scientific Staff Names:

a) Discipline/Sub-Program Leader Name:

Pat P. Subrahmanyam (PS)

b) Project Scientist Names: Scientist-Years

Pat P. Subrahmanyam (PS) 0.30

Brd D.C. Greenberg (DCG) 0.15

c) Cooperating Scientist Names:

CL M.V.K. Sivakumar (MVKS)

ICRISAT Center

IRHO/ORSTOM

Peanut CRSP

National Programs

d) Supporting Staff:

Research Associate(s) 0.45

Field Assistant(s) 0.45

Field Attendant(s) 0.9

8. a) Date of Start: 06/1987

b) Date of Completion: 10/1990

9. Objectives and Scope:

1. To determine the relative importance of foliar diseases in the region.

2. To assess the yield losses from foliar diseases.

3. Epidemiological studies on major foliar diseases.

4. To develop screening methods for resistance.

5. To develop genotypes with resistance to foliar diseases.

6. To test the stability of resistance.

7. To identify pathotypes in major foliar pathogens if they exist.

10. Key words:

Leaf spots
Rust
Foliar diseases
Crop loss assessment
Epidemiology
Disease resistance

11. Technique in brief (Methodology):

1. Distribution and relative importance of various foliar diseases of groundnut in West Africa through disease surveys.

2. Assessment of crop losses using specific chemicals.

3. Effects of plant population, cropping systems and microclimate on foliar disease development.

4. Field and laboratory techniques for screening germplasm and breeding lines for resistance, and utilization of resistance using appropriate breeding methods.

5. Testing the stability of resistance through multilocational trials in the region.

6. Identification of pathotypes of major foliar pathogens in collaboration with scientists in the IRHO.

12. Source of Funds: Core 100%

13. Cost estimates: 1987 1988 1989

14. Land requirements (ha)

Location:	
ISC	1.0
Bengou	1.0
Maradi	1.0
Other locations	0.2 each location

15. Review of past background and present status:

The distribution and relative importance of various foliar diseases has yet to be determined through systematic disease surveys in all major groundnut growing areas in the West African region. Information on crop losses and epidemiology of foliar diseases is scant. It is intended to estimate yield losses and study the factors affecting disease development in different locations in Niger.

Field and laboratory screening methods developed at ICRISAT Center will be tested in the region and will be modified if necessary. Initially, breeding populations and germplasm lines resistant to rust and late leaf spots at ICRISAT Center will be tested through multilocational trials for their adaptability in the region. Combining resistance to foliar diseases and groundnut rosette will receive high priority. The occurence and distribution of pathotypes of all major foliar pathogens will be determined.

16.Existing linkage with other centers or research projects:

1. Cooperative research with scientists in the national programs in the region is being established. Excellent research linkages with the peanut CRSP scientists from Texas A & M University have been established. Cooperation with scientists at IRHO, Montpellier on the identification of pathotypes is being explored.

17. Likely future course of development:

18. Availability of training facility:

Training on diagnosis of groundnut diseases, survey methods, and yield loss assessment methods can be provided.

Project Scientist Sub-Program Leader Program Leader

APPROVED

Director of Research

ICRISAT RESEARCH PROJECT OUTLINE

1. Project Number: G /XX (87) IS

2. Old Project Number: -

3. Program: Groundnut

4. Discipline: Pat / Brd / Agr

5. Project Title: Management of aflatoxin contamination in Groundnut.

6. Project Locations: Sadore, Bengou, Kaolack, Samaru, Ouagadougou, Bamako, Cameroun.

7. Scientific Staff Names:

a) Discipline/Sub-Program Leader Name:

Pat	P. Subrahmanyam	(PS)

b) Project Scientist Names:

			Scientist-Years
Pat	P. Subrahmanyam	(PS)	0.20
Brd	D.C. Greenberg	(DCG)	0.15
Agr	B.J. Ndunguru	(BJN)	0.10

c) Cooperating Scientist Names:

Pat	Ahmadu Ba	(AB)
Pat	R.N. Strange	(RNS)
	ICRISAT Center	
	Peanut CRSP	
	National Programs	

d) Supporting Staff:

Research Associate(s)	0.45
Field Assistant(s)	0.45
Field Attendant(s)	1.0

8. Date of Start: 06/1987

Date of completion: 10/1990

9. Objectives and Scope:

1. To estimate the levels of aflatoxin contamination in groundnut samples collected from farmers and markets in the region.

2. To test the performance of groundnut genotypes with resistance to seed invasion and/or aflatoxin production under local situations.

3. Integration of genetic resistance and agronomic practices in controlling aflatoxin contamination.

10. Key words:

Aflatoxin
Mycotoxin
Aspergillus flavus
Resistance
Agronomic practices

11. Techniques in brief (Methodology):

1. Groundnut samples will be collected from farmers and local markets in the region, and the levels of Aspergillus flavus invasion and aflatoxin contamination will be determined.

2. The performance of groundnut germplasm and breeding lines with resistance in seed invasion by Aspergillus flavus and/or aflatoxin production will be evaluated through multilocational trials.

3. Laboratory and field screening of germplasm for resistance to Aspergillus flavus and/or aflatoxin production and utilization in a breeding program.

4. Integrating genetic resistance and improved agronomic practices, especially post-harvest practices, in reducing aflatoxin contamination.

12. Source of Funds: Core 100%

13. Cost estimates: 1987 1988 1989

14. Land requirements (ha)

Location:

ISC	0.5
Bengou	0.5
Other locations	0.1 at each location

15. Review of past background and present status:

Aflatoxin contamination in groundnut is a serious quality problem in many groundnut growing countries in West Africa. Various crop handling and storage methods have been designed to reduce aflatoxin contamination in groundnut. However, these methods have not been fully adopted by farmers in the region. It has therefore become necessary to investigate the possibilities of genetic resistance in the hope of developing cultivars with resistance to seed invasion by A. flavus and/or aflatoxin production. Considerable progress has been made in identification of sources of resistance, especially at ICRISAT Center, in the USA and in Senegal. It is intended to test the performance of these genotypes through multilocational trials in the region. More emphasis will be given to evalute them under severe drought situations and under poor storage conditions.

16. Existing linkage with other centers or research projects:

Useful contacts are being established with scientists in the peanut CRSP and TDRI, and with scientists in national programs.

17. Likely future course of development:

18. Availability of training facility:

None at the present time; possibilities for training or student projects may develop as specific approaches are identified.

Project Scientist Sub-Program Leader Program Leader

APPROVED

Date :_____ Director of Research

ICRISAT RESEARCH PROJECT OUTLINE

1. Project Number: G XXX (87) IS

2. Old Project Number: -

3. Program : Groundnut

4. Discipline: Pat / Brd

5. Project Title: Distribution and management of diseases of groundnut caused by viruses, viroids and prokaryotes..

6. Project Locations: ISC, Bengou, Samaru Bobo Bambey.

7. Scientific Staff Names:

a) Discipline/Sub-Program Leader Name:

Pat	P. Subrahmanyam	(PS)

b) Project Scientist Names:

		Scientist-Years
Pat	P. Subrahmanyam	0.20
Brd	D.C. Greenberg	0.15

c) Cooperating Scientist Names:

D.V.R. Reddy	(DVRR)
K.R. Bock	(KRB)
SCRI	
National Programs	

d) Supporting Staff:

Research Associate(s)	0.35
Field Assistant(s)	0.35
Field Attendant(s)	0.7

8. a. Date of Start: 06/1987

b. Date of completion: 10/1990

9. Objectives and Scope:

1. To determine the relative importance of various diseases of groundnut caused by viruses, viroids and prokaryotes in the region.

2. To investigate yield losses from and epidemiology of peanut clump.

3. To develop genotypes with resistance to peanut clump and groundnut rosette.

10. Key words:

Virus diseases

Disease surveys

Crop loss assessment

Epidemiology

Disease resistance

Serology

Electron microscopy.

11. Technique in brief (Methodology):

1. Determination of distribution and relative importance of various diseases of groundnut caused by viruses, viroids and prokaryotes through systematic disease surveys in the region.

2. Diagnosis through studies obn host range, serology and electron miroscopy in close collaboration with scientists at ICRISAT Center, IRHO and SCRI.

3. Estimation of yield losses from peanut clump through multilocational trials in Niger.

4. Investigations on the effects of environmental factors on peanut clump disease development.

5. Screening of germplasm for resistance to peanut clump and groundnut rosette in "hot spots" or by developing disease nurseries and incorparation of resistance using appropriate breeding methods.

12. Source of Funds: Core 100%

13. Cost estimates: 1987 1988 1989

14. Land requirements (ha)

Location:

ISC 0.5

Other locations 0.1

15. Review of past background and present status:

Virus diseases are considered to be one of the major yield-limiting factors of groundnut in West Africa. It is intended to undertake disease surveys in all major groundnut growing areas in the region and determine their distribution and relative importance. The technology developed at ICRISAT Center will be utilized in disease diagnosis. Development of groundnut varieties with resistance to major diseases will receive high priority. Rosette-resistant lines identified in West African programs and in the ICRISAT regional groundnut program in Malawi will be assembled and evaluated in Niger. Screening of germplasm for resistance to peanut clump will be undertaken in Niger. Combining resistances to foliar diseases and groundnut rosette will receive high priority in our breeding programs.

16. Existing linkage with other centers or research projects:

Cooperative research work with scientists in the national programs in the region is being established. Cooperation with scientists at IRHO, Montpellier and SCRI, UK is being established.

17. Likely future course of development:

18. Availability of training facility :

None at the present time, but the possibility of training or student projects may develob as techniques and problems are evaluated.

Project Scientist Sub-Program Leader Program Leader

APPROVED

Date :_____ Director of Research

ICRISAT RESEARCH PROJECT OUTLINE

1. Project Number: G XXX (87) IS

2. Old Project Number: -

3. Program: Groundnut

4. Discipline: Agr / Pat / Brd

5. Project Title: Evaluation and management of factors causing variability of groundnut growth in the Sahel.

6. Project Locations: ISC, Bengou.

7. Scientific Staff Names:

a) Discipline/Sub-Program Leader Name:

Agr	B.J. Ndunguru	(BJN)

b) Project Scientist Names:

			Scientist-Years
Agr	B.J. Ndunguru	(BJN)	0.3
Pat	P. Subrahmanyam	(PS)	0.2
Brd	D.C. Greenberg	(DCG)	0.1

c) Cooperating Scientist Names:

SC	A. Batiano	(AB)
CL	M.V.K. Sivakumar	(MVKS)
Agr	P.G. Serafini	(PGS)
Ent	M.J. Lukefahr	(MJL)

ICRISAT Center

National Programs

IRHO/ORSTOM

Peanut CRSP

d) Supporting Staff:

Research Associate(s)	0.6
Field Assistant (s)	0.6
Field Attendant (s)	1.4

8. a) Date of Start: 06/1987

b) Date of Completion: 12/1989

9. Objectives and Scope:

To better understand and attempt to control growth variability in groundnut.

10. Key words:

Growth Variability
Edaphic factors
Abiotic factors
Biotic factors

11. Technique in brief (Methodology):

Field and pot trials will be conducted at ISC and Bengou. Treatments will include inorganic fertilizers, farmyard manure, fungicides and nematicides in various combinations. Physical and chemical properties of the soil as well as plant tissue will be analyzed. Some measurements on water use and water use efficiencies may be also undertaken. Nematode populations in soils will be monitored through the season. The incidence of peanut clump disease in different soil treatments will be indexed.

12. Source of Funds: Core 100%

13. Cost estimates: 1987 1988 1989

14. Land requirements (ha)

Location:

ISC 0.5

Bengou 0.2

15. Review of past background and present status:

Large variations in groundnut crop growth are common in the Sahel. The factors that contribute to this crop variability are not fully elucidated. Variations often occur within distances as short as a meter and the distribution appears to be random. Severely stunted chlorotic plants with poor shoot and root growth and very poor pod development are found adjacent to healthy vigorous plants. It is speculated that both biotic and abiotic factors may be involved. Among the abiotic factors Al toxicity, Al-induced P deficiency, K and Mg deficiencies as well as Mn toxicity have been suspected as being the potential causes in millet, but the situation is not clear in groundnut. The role of biotic stress factors such as nematodes and viruses has not been adequately investigated.

16. Existing linkage with other centers or research projects:

This project will be closely linked with cropping systems and plant nutrition projects.

Cooperation with scientists in IRHO/ORSTOM is being established.

17. Likely future course of development:

The project is expected to play an important role in the identification of the causes of variation in yields. Once these have been identified then methods of overcoming the problem will be developed.

18. Availability of training facility:

None at the present time. However as the project takes off some training facilities may be incorporated.

Project Scientist Sub-Program Leader Program Leader

APPROVED

Date : _____ Director of Research

ICRISAT RESEARCH PROJECT OUTLINE

1. Project Number: M XXX (87) IS
2. Old Project Number: -
3. Program: Pearl Millet Improvement, Sorghum and Groundnut Improvement.
4. Discipline: ENT/M/G/S/
5. Project Title: Surveillance of pest infestation levels on millet, sorghum and groundnut.
6. Project Locations: ISC, Bengou, Kambeinse, National Programs.
7. Scientific Staff Names:

   a) Discipline/Sub-Program Leader Name:

Prd.	K. Anand Kumar	(KAK)
Agro.	B.J. Ndunguru	(BJN)
Prd.	C.M. Pattanayak	(CMP)

   b) Project Scientist Names:

Ent.	M.J. Lukefahr	(MJL)	0.25 SY

   c) Cooperating Scientists:

Millet	Scientists	
Sorghum	Scientists	
Groundnut	Scientists	
Resource Management	Scientists	
Entomologist	K.F. Nwanze	(KFN)
Farm Operations	P. Serafini	(PGS)

   d) Supporting Staff:

Research Associate	0.50
Observateurs	2.0

8. Date of Start: 1/87

   a. Date of completion 1989

9. Objectives and Scope:

   a) A detection and monitoring program, both at research stations and farmers fields as appropriate, of pest populations on millet, sorghum, and groundnuts will be initiated. This will include soil insects and plant pests. Availability of this information will permit changes, if needed, in research emphasis.

   b) To assist ICRISAT scientists in West Africa in their plant protection needs and develop appropriate recommendations for control of insect pests.

10. Key words:

    Insect pests, monitoring, detection programs, beneficial pest control, plant protection.

11. Technique in brief (Methodology):

    At regular intervals throughout the growing phases of these crops, a specified unit area (research areas, cover crop areas, farmers fields) will be examined to determine presence of insect pests in soil, and all plant parts. Beneficial arthropods in sampling area will also be recorded. Populations will be expressed in numbers per unit area. Sample size will depend on populations but a maximum of 5 samples per field is initially envisaged.

12. Source of Funds: Core 100%

13. Cost estimates: -

14. Land requirements (ha)

Location			
ISC	0.2	0.2	0.2
Bengou	0.25	0.25	0.25

15. Review of past background and present status:

The total pest complex of sorghum and groundnuts have not been exhaustively studied. A continous sampling program is needed to document pest and beneficial arthropods as well as measuring the density and population fluctations during the growing season.

Since the groundnut program at ISC is recently initiated, it is important to determine the seasonal incidence and abundance of different insect complexes that are associated with this crop.

16. Existing linkage with other centers or research projects:

ICRISAT Center, ICRISAT and National Programs in West Africa, Protection des Vegetaux, MRD, Government of Niger

Peanut CRSP-Burkina Faso; CIRAD Scientists.

17. Likely future course of development:

a. Develop a data base on insect pest and beneficial arthropods that will provide useful information and possibily a predictive system of pest outbreaks.

b. Develop a policy for pest control for ICRISAT locations in West Africa.

18. Availability of training facility:

In identification, estimation, indcidence, and abundance of pests.

ICRISAT Research Project Outline

1. **Project Number:** GR-114(85)IC

2. **Old Project Number:** GRU-GN-1 and 3 (76)

3. **Program:** Genetic Resources

4. **Discipline(s)/Subprogram(s):** GR / G

5. **Project Title:** Collection and assembly of Arachis Genetic Resources from National and International sources; classification and documentation

6. **Project Locations:**

Patancheru India Burma Thailand Indonesia
China Malagasay Zaire West Afria Egypt
Sudan Brazil Bolivia Peru Angola

7. Scientific Staff Names:

(a) Discipline/Subprogram Leader Names:

M.H. Mengesha	(MHM)
W.H. Skrdla	(WHS)

(b) Project Scientist Names:

		Scientist-Years
V. Ramanatha Rao	(VRR)	0.40

(c) Cooperating Scientist Names:

R.W. Gibbons	(RWG)
J.P. Moss	(JPM)
K.E. Prasada Rao	(KEPR)
S. Appa Rao	(SAR)
P. Ramanandan	(PR)

(d) Supporting Staff:

Research Associate(s)	0.40
Field Assistant(s)	1.00
Field Attendant(s)	1.00

8. (a) Date of Start: 1976

(b) Years Revised: 1979 1981 1983 1985

(c) Year of Completion: 1989

9. Objectives and Scope:

a) To collect Arachis genetic resources from priority areas including India. b) To assemble the worlds Arachis genetic resources from national and international centers of conservation. c) To classify the available collection based on acceptable botanical and agronomic characteristics. d) To document passport data and publish germplasm lists.

10. Keywords:

Genetic Resources
Collection
Assembly
Priority areas
Resources centers
Passport data
Landraces

11. Technique in brief (Methodology):

1) Priority areas of collection will be explored to prepare plans of activity for collection of cultivated and wild Arachis. 2) GRU/ICRISAT scientists will join collection expeditions organized by IBPGR, CENARGEN/ EMBRAPA and other agencies. 3) Independent and specific collection missions will be undertaken by ICRISAT scientists both in India and abroad 4) usual collection methods will be followed giving due attention to ecological and population variability. 5) The existing conservation centers are identified and material will be transferred to ICRISAT through correspondence. 6) Evaluation data will be used to classify the existing collection and the same will be published.

12. Source of Funds: Core 100.00

13. Cost Estimates: (Direct)	1985	1986	1987
Operational (recurring)			
(a) Labor			
(b) Travel	6.20	5.00	5.00
(c) POL			
(d) Supplies	0.40	0.50	0.50
TOTAL	6.60	5.50	5.50
Capital (non-recurring	0.40	0.50	0.50
Indirect Costs			

14. Land Requirements (ha)

Location			
Patancheru	0.50	0.50	0.50

15. Review of past background and present status:

Since 1976, 5148 accessions have been assembled from sources in Indi which includes introductions, reselections from such introductions experimental types developed in India. Through transfers from abro 5040 accessions have been assembled at ICRISAT. This includes material from NCSU, Raleigh; Texas A&M University, Sephenville; SRPI, Experiment in USA; ISRA/CNRA, Bambey, Senegal; DATS, S. Africa; CRI, Bogor, Indonesia; ARS, Naliendale, Tanzania, and CBI, Harare, Zimbabve. ICRISAT scientists collected 627 cultivars from groundnut growing regions in India. Progress has been made in the collection programs in a number of countries such as Malavi, Somalia, Burma, Malaysia, Zambia, Gambia, Philippines, Mozambique, Tanzania, Ghana, Brazil, S. Africa, Zimbabve, Rwanda, Nigeria, and Sierra Leone. ICRISAT scientists participated in three Arachis collection expeditions organized by CENARGEN/EMBRAPA in collaboration with IBPGR in Brazil. Passport data on 33 descriptors have been computerized for 10,000 accessions.

16. Existing linkage with other centers or research projects:

IBPGR, Rome; CENARGEN/EMBRAPA, Brasilia, Brazil Prof. Krapovickas, IBONE, Corrietes and INTA, Manfredi, Argentina National programs in source countries New joint and collaborative research programs will be initiated with National Universities and research institutes Texas A&M University, Stephenville Center, USA

17. Likely future course of development:

Filling the gaps in the collection; transfer of material from known sources collection of groundnut cultivars from India and abroad will continued. In 1985-86 collections in Burma, Brazil, Mali, Tanzania and India are being planned. Computerization of data and classification of work will continue. Genetic stocks will be documented and published. Plans for collection of wild Arachis will be made in collaboration with CENARGEN and IBPGR .

18. Availability of training facility:

The project offers training facility in germplasm identification, sampling and preliminary classification methods

Approval Date: 09-JUL-1985

ICRISAT Research Project Outline

1. **Project Number:** GR-115(85)IC

2. **Old Project Number:** GRU-GN-2

3. **Program:** Genetic Resources

4. **Discipline(s)/Subprogram(s):** GR / G

5. **Project Title:** Maintenance and evaluation of groundnut germplasm

6. **Project Locations:**

Patancheru

7. Scientific Staff Names:

(a) Discipline/Subprogram Leader Names:

M.H. Mengesha	(MHM)
W.H. Skrdla	(WHS)

(b) Project Scientist Names:

		Scientist-Years
V. Ramanath Rao	(VRR)	0.60

(c) Cooperating Scientist Names:

D.V. Raghava Reddy	(DVRR)
P.S. Subrahmanyam	(PS)
V.K. Mehan	(VKM)
P.A. Amin	(PWA)
J.H. Williams	(JHW)

(d) Supporting Staff:

Research Associate(s)	0.60
Field Assistant(s)	2.00
Field Attendant(s)	1.00

8. (a) Date of Start: 1976

(b) Years Revised: 1979 1981 1983 1985

(c) Year of Completion: 1989

9. Objectives and Scope:

a) To maintain genetic resources of Arachis. b) To evaluate available accessions. c) To document and publish evaluation data. d) To distribute germplasm.

10. Keywords:

Maintenance
Conservation
Rejuvenation
Characterization
Descriptors
Screening
Documentation

11. Technique in brief (Methodology):

Growing the available accessions for rejuvenation and multiplication. Only pods picked from plants are used.New accessions in PEQUÁ are space planted. Wild arachis, specially the rhizomatous material is maintained in concrete rings in cooperation with cytogeneticists. Evaluating the accessions for various botanical and agronomic characters. Collaboration with breeders, pathologists, virologists, entomologists, physiologists and biochemists to identify new and desirable genotypes. Documenting the results of characterisation and screening and publishing the same. Storing the seed material in appropriate cold storage. Distributing the seed material to interested scientists.

12. Source of Funds: Core 100.00

13. Cost Estimates: (Direct)	1985	1986	1987
Operational (recurring)			
(a) Labor	9.10	9.10	9.10
(b) Travel	0.80	0.20	0.20
(c) POL	0.50	0.50	0.50
(d) Supplies	7.30	6.50	6.50
TOTAL	17.70	16.30	16.30
Capital (non-recurring	7.30	6.50	6.50
Indirect Costs			

14. Land Requirements (ha)			
Location			
Patancheru	4.00	4.00	3.00

15. Review of past background and present status:

So far 52,159 samples have been rejuvenated, multiplied and evaluated at Patancheru. Observations on 30 descriptors were recorded for over 8,500 accessions. Continued our collaboration with concerned scientists in screening the germplasm for diseases, pests and drought resistance and quality. A number of wild Arachis accessions have been found to have high degree of resistance to various diseases and pests. The wide range of variation now available looks promising and expanding. Cultivated groundnut and seed producing wild species accessions are rejuvenated by growing out. The rhizomatous material is maintained as single plants. So far only 7,400 accessions are stored in ideal medium-term storage. A basic collection of 700 accessions was constituted which needs to reconstituted due to be expanded variability.

16. Existing linkage with other centers or research projects:

International Board for Plant Genetic Resources (IBPGR), Some All India Coordinated Research Project on Oilseeds (AICORPO) National Research Centers for Groundnut (NRCG) and other Indian Research Institutions

17. Likely future course of development:

Transfer to medium and long term storage as and when they are ready. Evaluation and screening for morphological and agronomic characteristics will continue. The existing working collection will be reconstituted. The problem of dormancy and viability will be given more attention. The need for multilocation evaluation is realized and attempt will be made on such lines which will depend on the ICRISAT's Program in Africa. Efforts will be made in meristem culture storage of wild Arachis sp. and other storage methods.

18. Availability of training facility:

The maintenance and evaluation of groundnut is a good medium for training. We will continue to support the training program with our activities.

Approval Date: 09-JUL-1985