

Rec'd 1 July 2002  
PROJECT COMPLETION SUMMARY SHEET

DATE Sheet Completed: 30th June 2002

<b>Project Title:</b>	Groundnut rosette disease management	
<b>DFID Project Reference No:</b>	R7445	
<b>Programme:</b>	Crop Protection Programme	
<b>Programme Manager (Institution):</b>	Dr Frances Kimmins (NRIL)	
<b>Sub-Contractor (project leader's institution)</b>	Natural Resources Institute, University of Greenwich	
<b>Production System:</b>	Semi-Arid	
<b>Programme Purpose:</b>	Impact of significant pest on production from cereal (particularly sorghum) based systems minimised	
<b>Commodity Base:</b>	Rice-based cropping systems	
<b>Beneficiaries:</b>	Smallholder farmers in the eastern-central part of Uganda	
<b>Target Institutions:</b>	Serere Agricultural and Animal Research Institute; Department of Agriculture; NGOs such as AT (Uganda) and SOCADIDO	
<b>Geographic Focus:</b>	Uganda	
<b>Total Cost:</b>	£378,451	
	<b>Planned</b>	<b>Actual</b>
<b>Start Date:</b>	1 <sup>st</sup> July 1999	1 <sup>st</sup> July 1999
<b>Finish Date:</b>	30 <sup>th</sup> June 2002	30 <sup>th</sup> June 2002

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### 1. Project Purpose:

The purpose of this project was to improve the livelihoods of smallholder farmers in four districts in northeastern Uganda through the development and promotion of sustainable systems of groundnut production. A 'needs assessment' exercise commissioned by DFID in 1998 recognised the importance of groundnuts for both subsistence and income generation. The needs assessment report also identified groundnut rosette disease and aphids as serious constraints to production. The project was designed to address these constraints through strategic and applied approaches focusing primarily on the development of groundnut varieties. The aim was to develop and promote varieties that would combine pest and disease resistance with other key characteristics demanded by farmers.

The project was designed to build on previous research to identify new sources of resistance to aphids and to groundnut rosette disease in order to ensure that the resistance incorporated into newly deployed varieties is durable. An additional objective was to develop screening methodologies that would enhance the efficiency of groundnut improvement programmes. In parallel with these efforts, the project aimed to evaluate and promote promising breeding lines of groundnut that are currently available. This would be achieved by working closely with researchers, agricultural extension agents, non-government organisations and farmers with the ultimate goal of devising a self-sustaining seed production system.

### 2. Outputs:

A large-scale household survey was conducted in three districts in the Teso system and this led to the completion of an *electronic database* that was made available to project collaborators and other interested organisations. The database is a compilation of social and economic data related to groundnut production, with particular reference to groundnut rosette disease. The survey identified that farmers consider several traits when selecting a groundnut variety, including drought resistance, duration, quality characteristics, yield and pest and disease resistance. This information was fed back into the breeding programme at SAARI and used to refine the criteria used for assessing new breeding lines. Other important findings from the survey related to how farmers obtain information on farming practices. These findings were used to guide the project's dissemination strategy. The key point is that different approaches are needed to reach different categories of farmers.

*The Ugandan Seedboard approved two high-yielding, short-duration, rosette-resistant groundnut varieties for release in March 2002. The seed of one variety, Serenut 4T (ICG 12991) is tan-coloured whereas that of Serenut 3R (ICGV-SM 93530) is red. Therefore, farmers will be able to choose the appropriate variety to meet local market requirements. The short duration of the varieties will allow farmers to grow two crops of groundnut a year and thus to significantly enhance their income potential. These varieties are expected to be widely adopted and to emulate the success of Serenut 2, released in 1999 following research conducted in the previous project (R6811). Evaluation of the varieties together with other candidate lines in large numbers of on-farm trials has demonstrated that farmers appreciate their qualities. Serenut 3R was particularly favoured because of the large numbers of seeds that it produces and because it resembles a popular local variety (Erudurudu) in appearance.*

*The capacity of SAARI to improve groundnut production in the Teso system was significantly improved. This was achieved through a combination of formal training and informal knowledge transfer during the course of project activities. Capacity building was institutionalised through the establishment of a collaborative framework for groundnut improvement, primarily through the involvement of ICRISAT in Malawi, but also through the participation of the Department of Agriculture and several non-government organisations (NGO's). The ICRISAT groundnut breeder, who made annual visits to Uganda, provided formal training. The SAARI groundnut breeder also visited ICRISAT in Malawi on two occasions to receive training. Formal training was given by the NRI biometrician to SAARI staff in the planning, design, analysis and management of on-farm trials.*

*Mechanisms of resistance were evaluated and determined in a range of groundnut genotypes. Hybrid groundnut breeding lines were developed through crossing parents with different types of resistance and these will be available to researchers in Uganda for further crop improvement efforts. Of particular interest was a study of Serenut 4T (ICG 12991), which confirmed that it was resistant to the aphid vector through the mechanisms of non-preference and antibiosis. Detailed feeding studies revealed that virus transmission might be inhibited through the collapse and death of plant cells at the feeding site. Complementary research led to the development of a practical field-based method for evaluating vector resistance in groundnut. In addition, molecular markers were identified linked to the vector resistance gene in ICG 12991 and a basic genetic linkage map for groundnut, the first of its type, was developed.*

*A groundnut production manual was compiled and a total of one thousand copies were sent for distribution to agricultural extension agents and NGO staff. Initial reaction to the manual strongly suggests that additional copies will be requested. As well as recommended groundnut production practices, the manual includes information on post-harvest activities such as drying, curing and storage where farmers' knowledge gaps were identified. Provision has been made for leaflets on current varieties to be enclosed within the manuals. These leaflets are being produced by the SAARI groundnut breeder through a linked project. New knowledge generated in the project was disseminated to stakeholders at two workshops and a summary of each workshop was distributed to participants.*

### **3. Contribution of Outputs to Project Goal:**

The outputs developed and promoted by the project have contributed significantly to the goal of developing and promoting improved disease control strategies for groundnut production in the Teso system in Uganda. In a wider context, the outputs will assist a substantial number of smallholder farmers to increase their income. This will be achieved primarily through the availability of new short-duration, disease-resistant groundnut varieties that were produced in the project. In parallel with these improved varieties, new knowledge generated by the project is being disseminated through several means, including a groundnut production manual.

Considerable attention has been devoted during the project to enhancing institutional capacity within Uganda to help ensure that the gains made from the research will be sustainable. At one level, training and informal knowledge transfer in appropriate disciplines has enhanced the capability of SAARI scientists to conduct high quality research. By forging strong links between SAARI and ICRISAT in Malawi, this research capability will be maintained in future years to the

benefit of groundnut improvement programmes in Uganda. The project has also identified an important new researchable constraint, the groundnut leaf miner. Project staff assisted SAARI researchers to develop a research proposal that has been funded by the DFID Client-Oriented Agricultural Research and Dissemination project.

The second means by which institutional capacity has been enhanced is through the establishment of a self-sustaining system of groundnut seed multiplication and distribution. This involves the creation of linkages between government and non-government agencies. A key feature is the role played by NGO's in delivering seed to farmers who stand to benefit most from growing it. One of the project collaborators, AT (Uganda) has successfully applied for additional funding to facilitate the farmer to farmer transfer of new rosette-resistant groundnut varieties through an innovative approach. It is anticipated that by the end of this three-year project a total of 9,000 farmers will have participated in seed multiplication, leading to the production of 1100 mt of groundnuts. In addition, 2,000 farmers will have received training in seed production and storage.

Groundnut rosette disease is a serious constraint to groundnut production in West Africa. It is believed that the impact of the project could be further developed through the application of a similar approach to that taken in Uganda. Consequently, it is planned to develop a research proposal involving the international partners and institutions in West Africa to conduct a two-year programme to evaluate and promote rosette-resistant varieties.

#### **4. Publications:**

NAIDU, R.A., KIMMINS, F.M., DEOM, C.M., SUBRAHMANYAM P., CHIYEMBEKEZA, A.J. and VAN DER MERWE, P.J.A. (1999) Groundnut Rosette: A Virus Disease Affecting the Sustainability of Groundnut Production in Sub-Saharan Africa. *Plant Disease* **83**: 700-709.

NAIDU, R.A. , KIMMINS, F.M., HOLT, J., ROBINSON, D.J., DEOM, C.M. and SUBRAHMANYAM P.(1999). Spatio-temporal separation of groundnut rosette disease agents. *Phytopathology* **89**:934-939.

MERWE, VAN DE, P.J.A., SUBRAHMANYAM, P., KIMMINS, F.M. and WILLEKENS, J. (2001). Mechanisms of resistance to groundnut rosette. *International Arachis Newsletter* **21**: 43-45.

PAGE, W.W., EPIERU, G., KIMMINS, F.M.,BUSOLO-BULAFU, C. and NALYONGO P.W. (2000). The groundnut leaf miner *Aproerema modicella*: a new pest in eastern districts of Uganda. *International Arachis Newsletter* **20**: 64-66.

SUBRAHMANYAN, P., VAN DER MERWE, P.J.A., REDDY, L.J., CHIYEMBEKEZA, A.J., KIMMINS, F.M. and NAIDU, R.A. (2000). Identification of elite short-duration rosette resistant lines in world germplasm collections. *International Arachis Newsletter* **20**: 46-50.

#### *Presentations*

WILLEKENS, J., KIMMINS, F.M. and Naidu, R.A. (2002) Vector resistance to control groundnut rosette virus disease in Sub Saharan Africa. VII th International Plant Virus Epidemiology Symposium, Aschersleben, Germany, 12-17 May 2002. (Abstract).

CHANCELLOR, T.C.B. (2002). Groundnut rosette management: livelihood, capacity building and promotional issues. CPP Semi-arid cluster meeting, Natural Resources Institute, 7 January 2002.

OVERFIELD, D. (2001) Socio-economic survey of groundnut production practices in the Teso system. Special seminar, Serere Agricultural Research Station, Soroti, Uganda, 28 September 2001.

KIMMINS, F (2000). Deployment of groundnut rosette resistant genotypes and potential impact on small holder livelihoods. 7<sup>th</sup> Regional Groundnut Workshop, 5-8<sup>th</sup> December 2000, Benin (ICRISAT).

NAIDU, R. A., KIMMINS, F.M., SUBRAHMANYAM, P., VAN DER MERWE, P. J. A and ROBINSON, D. J. (August 1999). Age and inoculum dosage dependent resistance in groundnut cultivars to rosette disease agents and vector. Poster abstract at American Phytopathological Society Meeting.

NAIDU, R.A., KIMMINS, F.M., ROBINSON, D.J., SUBRAHMANYAM, P. and VAN DER MERWE, P.J.A. (1999). Plant age and inoculum dose dependent resistance in peanut cultivars to groundnut rosette virus disease and aphid vector. *Phytopathology* **89**: S55 (Abstract)

ROBINSON D. J., NAIDU R. A. and KIMMINS F. M. (1999). Aspects of the epidemiology and control of groundnut rosette disease. International Symposium on legume viruses. Australia, August 1999. (Abstract)

#### *Pamphlets*

PAGE, W.W., BUSOLO-BULAFU, C.M., VANDER MERWE, P.J.A. and CHANCELLOR, T.C.B. (2002) Groundnut Manual for Uganda: Recommended Groundnut Production Practices for Smallholder Farmers in Uganda. Chatham, UK: Natural Resources Institute. 17pp.

#### *Proceedings*

ANON (2000) Papers presented at the stakeholder workshop on the selection, evaluation and small-scale seed multiplication of new groundnut varieties. Mbale, Uganda, 24 to 25 February 2000. 25 pp.

ANON (2002) Proceedings of the stakeholder workshop on groundnut rosette disease management . Kumi, Uganda, 13 March 2002. 41 pp.

### **5. Internal Reports:**

NAIDU, R.A. (2002) Report on a visit to Groundnut Rosette Disease Management Project, Uganda and United Kingdom, 9 to 23 March. University of Georgia, Athens, USA. 6 pp.

CHANCELLOR, T.C.B. (2002) Report on a visit to Groundnut Rosette Disease Management Project, Uganda, 10 to 17 March. Natural Resources Institute, University of Greenwich, Chatham, UK. 3 pp.

CHANCELLOR, T.C.B. (2002). Groundnut rosette management: livelihood, capacity building and promotional issues. CPP Semi-arid cluster meeting, Natural Resources Institute, 7 January 2002.

OVERFIELD, D., PAGE, W.W., BUSOLU BULAFU, C. AND JEFFRIES, D. (2002). Groundnut rosette disease management: participatory on-farm trial report. Natural Resources Institute, Chatham. 26pp.

PAGE, W.W., CHANCELLOR, T.C.B. and OVERFIELD, D. (2001) Report on a visit to Groundnut Rosette Disease Management Project, Uganda, 20 September to 3 October 2001. Report 8636. Natural Resources Institute, University of Greenwich, Chatham, UK. 4 pp.

OVERFIELD, D. (2001) Groundnut Production and Marketing in Eastern Uganda: Analytical Results of Recent Survey Work in the Teso Farming System. Natural Resources Institute, University of Greenwich, Chatham, UK. 37 pp.

OVERFIELD, D. (2001) Briefing note on TESO groundnut survey. Natural Resources Institute, Chatham. 11 pp (Briefing note)

PAGE, W.W. and OVERFIELD, D. (2001) Report on a visit to Groundnut Rosette Disease Management Project, Uganda, 28 June to 8 July 2001. Report 8400. Natural Resources Institute, Chatham. 4 pp. (BTOR)

VAN DER MERWE, P.J.A. (2001) Progress report on the groundnut rosette disease management project. ICRISAT, Lilongwe, Malawi. 14 pp.

PAGE, W.W. OVERFIELD, D. and JEFFRIES, D. (2001) Report on a visit to Groundnut Rosette Disease Management Project, Uganda, 18 to 29 January 2001. Report 7966. Natural Resources Institute, Chatham. 3 pp. (BTOR)

KIMMINS, F. (2000) Report on a visit to Groundnut Rosette Disease Management Project, Uganda, 24 September to 3 October 2000. Natural Resources Institute, Chatham. 4 pp. (BTOR)

OVERFIELD, D. (2000) Report on a visit to Groundnut Rosette Disease Management Project, Uganda 4 to 10 July 2000. Report 7478. Natural Resources Institute, Chatham. 5 pp. (BTOR)

PAGE, W.W. (1999) Report on a visit to Groundnut Rosette Disease Management Project, Uganda 19 to 30 September 1999. Report 6681. Natural Resources Institute, Chatham. 6 pp. (BTOR)

OVERFIELD, D. (1999) Report on a visit to Groundnut Rosette Disease Management Project, Uganda 21 to 30 September 1999. Report 6679. Natural Resources Institute, Chatham. 28 pp. (BTOR)

KIMMINS, F. (1999) Report on a visit to Groundnut Rosette Disease Management Project, Uganda 4 to 11 September 1999. Natural Resources Institute, Chatham. 6 pp. (BTOR)

**9. Name of author of this report:** Dr Tim Chancellor      **Date:** 30/06/2002