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## Report on a review mission to the CPHP programme of research on sorghum utilisation in India (Projects R6767, R6686, and R6687)

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**Report on a review mission to the CPHP programme of research on sorghum  
utilisation in India**

**(Projects R6767, R6686, and R6687)**

**Alan Marter**

**Revised March 1998**

**Report on a review mission to the CPHP programme of research on sorghum utilisation in India (Projects R6767, R6686, and R6687)**

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## Summary

1. The original two year programme includes an extensive schedule of activities and outputs. However, Dr Halls arrival to take up his post in India was delayed for six months and reorganisation within ICRISAT has limited participation by their staff as well as imposing severe restrictions on recruitment for the NRI programme team. As a consequence the ambitious programme of outputs originally envisaged is not feasible within the original time frame.
2. A revised schedule is therefore proposed ending in December rather than July 1998 at an additional gross cost in 1998/99 of £33,917. In net terms the cost over the programme lifetime is £28,917 since savings of £5,000 are made in 1997/98, this represents an additional cost of approximately 6.3%. The three projects within the programme comprise five main components - data surveys, storage analysis, consumption analysis, industrial utilisation and synthesis of policy findings. All these components are retained, although a number of revisions are suggested together with staffing proposals.
3. Under data surveys the main proposal is to cut the questionnaire survey from 11 to 7 districts (Akola, Amravathi, Nanded, Bijapur, Pune, Solapur, Mahbubnagar), with a completion date of end February (rather than June under the present rate of progress). Dr Dayakar will continue to lead and Dr Rana has indicated a continued NRCS commitment of in excess of 50% of Dr Dayakars time to the programme as a whole. The cut in size of surveys will not jeopardise the integrity of analysis with respect to partial budget calculations and is likely to have only a minimal effect on the diversity of issues that can be analysed by modelling (e.g. for the five models developed in consultation with ICRISAT).
4. To assist in the analysis of the questionnaire survey, a consultant should be recruited through ICRISAT. Dr Hall is to draft TOR, and Dr Kelley has been requested to expedite action as soon as possible. Once recruited the consultant will be located at NRCS and will work with Dr Dayakar. An assistant to work with Dr Dayakar on the questionnaire survey should also to be recruited.
5. The informal survey programme is on schedule and no changes of significance are proposed.
6. Post harvest losses/storage studies should also continue to the original schedule (without further additions) with Dr Hodges to continue lead.
7. Work on consumption aspects should include a visit by Dr Dayakar to the UK in March/April to analyse national sample survey (NSS) data with the assistance of NRI personnel. Other urban studies of consumption will be supervised by Dr Brough with a particular focus on consumption amongst poorer groups and within the sorghum "heartland" area.
8. Study of the industrial utilisation prospects for sorghum (in animal feed, starch and brewing), represent a key area of research. To facilitate the work a brief study of



wholesale marketing of sorghum grain should be added to the programme, including identification of major components in marketing margins. Options for inclusion of stover marketing should also be considered.

9. More focused work on potential for industrial use should be undertaken by a team including ICRISAT, NRCS, NRI and other consultants. Work will include broad projections of demand in end use sectors and basic price relationships for alternative raw materials, plus analysis of views of managers in the industries concerned.

10. ICRISAT are to make available Mr Parthasarathy for 25% of his time in FY1998/99 to work on components in 8 and 9 above. Dr Kelley has been requested to confirm Mr Parthasarathy's availability.

11. The final phase of policy analysis includes a range of major publications. For these and other outputs agreed under the project, lead authors will be held responsible for production to the required standard and to schedule. Dr Kelley has been requested to comment and advise on analysis to the extent this is feasible given his ICRISAT work and responsibilities.

12. At the request of Dr Poulter, an aide memoir essentially covering the above summary points, has been circulated to research managers in India and the UK in advance of this report. (see Annex 7)

## **Introduction**

The aim of the mission was to review progress on project components to date, to identify any strategic changes of direction or approach in the work programme, and to assess capacity for producing outputs on schedule. (Full TOR are given in Annex 1).

There are three projects within the programme covering Utilisation (R6687), Post Harvest Losses/Storage (R6767) and Consumption (R6686). To varying degrees these projects share five common components within the programme as a whole - data surveys (both informal and questionnaire); storage analysis; consumption issues; industrial utilisation and potential; analysis and development of policy conclusions.

A brief outline of key issues affecting the sorghum sector in India is provided at Annex 2 (drawing upon work by Day, Hall, Kelley, Marsland and others). This indicates that the most important components of the NRI programme are the data surveys (especially the development of partial budgets), and potential for industrial use. Issues concerning consumption remain of some significance (especially in the context of poverty agenda), whilst storage issues have only modest importance. Analysis and development of policy agenda remain fundamental to the programme. The proposed resourcing of activities (see Annex 5) over the remaining lifetime of the project, broadly reflects this relative importance between the five components.

### **Progress with project components:**

The original programme of work was planned to be of two years duration, and incorporated an ambitious range of activities and outputs within its three project components. However the arrival of Dr Hall was delayed for six months and the initiation of the programme coincided with a major review within ICRISAT and a subsequent series of cuts in staffing levels. The latter in turn have resulted in the imposition of a strict regime with respect to recruitment, effectively making it a difficult and time consuming process.

As a consequence of these events work on the programme has been delayed and it has subsequently proved very difficult to develop a full team of the required calibre. Cuts at ICRISAT have constrained the extent to which their staff have been available to the project - levels agreed under the MOU have not been fully met. Equally, attempts by Dr Hall to recruit outside have been subject to lengthy negotiations because of the virtual ban on ICRISAT recruitment.

Under these circumstances the ambitious programme originally envisaged was never going to be feasible within the original time frame - an extension and rationalisation of programme activity were therefore the focus of the review mission. The revised programme of activities discussed in detail below (and summarised in Annex 3), are framed within a programme extended to December 1998 (rather than July). This enables a more even (and feasible) scheduling of activities, adequate time for individual components, and for timing of critical path components - where outputs from one activity feed in to those of another.

Aims, activities and outputs for the three projects have been combined within a single logical framework as shown in Annex 4. The annex provides both the original project components (January 1997) and the revised framework incorporating findings of this review mission. Time bound outputs in the revised framework correspond with milestones for the remaining work under the programme.

The proposed changes lead to an increase in budget requirements in 1998/99 of £33,917, attributed solely to the project on utilisation. (Details of the proposed spending pattern of the remainder of the programme are given in Annex 5). However, in net terms the cost over the programme lifetime is only £28,917 since savings of £5,000 are made in 1997/98 as a result of rescheduling. This net figure represents around 6.3% of the combined project budgets under the programme, and whilst a significant sum, it is felt to be justified given the impact on the range and quality of outputs that will now be achievable.

The increase in costs largely reflects the expense extending the project for a further 6 months, including a major component of staff costs (Dr Hall) - around £17,000 and also costs of office operation (around £5,700) see Annex 5. Additional costs also arise from the addition of a short wholesale marketing study costed at £6,500 for staff time with additional travel and subsistence costs. Savings do arise from the reduced number of questionnaire survey sites, however the costs of these activities are largely reflected by staff costs for Dr Dayakar that are covered by NRCS. Savings on CPHP funded components are therefore small.

## **Component 1 : Questionnaire and PRA surveys**

### **Questionnaire surveys:**

26 districts have been identified as key sorghum areas for study either because of their past or present importance as areas of sorghum production. 11 of these districts were randomly chosen for the questionnaire survey, (with 6 randomly selected villages in each district and 10 households per village i.e. totals of 66 villages and 660 households). The rationale for a total of 11 was based upon perceived data needs for the programme the initial time frame and resources available to the project. Surveys are being undertaken under the supervision of Dr Dayakar (NRCS) using teams of university students, and three Districts have been completed to date.

The data questionnaire has been revised several times since the original draft by Dr Sherington, but appears to be comprehensive and well-framed (in particular for information feeding in to partial budget analysis). Surveys have been completed quite effectively, although there is a need to ensure that random selection of households is rigorously implemented at village level. Data entry has not yet started.

Given the resources currently available to this formal survey, implementation of one per month appears the most that is feasible, and as a consequence a full programme of 11 would not be completed before June 1998.

Analysis of the data from the survey will present problems given the current team resources available, this is especially the case with respect to economic and econometric analysis.

**Recommendations:** The survey should be cut from 11 to 7 Districts (Akola, Amravathi, Nanded, Bijapur, Pune, Solapur and Magbubnagar), including 3 Rabi and 3 Kharif areas, plus one mixed zone. (These Districts will also coincide with all the PRA Districts.) The target will be to complete all Districts by the end of February 1998. Data entry should commence as soon as possible using the data processor available to the team and bought in services as necessary.

An econometrician should be appointed as soon as possible, to be located at NRCS, working with Dr Dayakar. The first priority for data analysis should be the production of partial budgets for sorghum and alternative crops. Econometric analysis (e.g. involving the five models developed in consultation with ICRISAT), should follow. A survey assistant should be appointed to assist Dr Dayakar.

**Action points:** Dr Dayakar to continue to manage field surveys. Dr Hall to liaise with Dr Dayakar on random sampling. Dr Hall to initiate action on data entry. Dr Hall to draft TOR for data analyst to be passed through Dr Kelley. Dr Kelley to expedite recruitment as quickly as possible. Dr Hall to initiate recruitment of survey assistant liaising with Dr Rana.

#### **PRA surveys:**

Of the 11 randomly selected districts selected for the questionnaire survey, 6 have been purposefully selected for informal surveys (covering 2 villages per district). Studies have been completed in three of the six Districts, via the programme team of research assistants, and external inputs (ITDG, NRI and private consultants). The work programme has been intensive, but sustainable, and the project component is on schedule.

A problem that has been faced is the relatively constrained analytical capability of some of the programme team and weaknesses in writing up - although both these issues are being addressed via inputs from Dr Hall, Dr Brough and Mary Underwood. Discussion with the team members also indicated a desire for more time for discussion of findings and for write-up.

The final synthesis of survey findings is scheduled for March and April 1998.

**Recommendations:** The project component should proceed as planned.

**Action points:** Dr Hall to consider options for increasing discussions with and support for write-up by the programme team. Dr Hall to consider the format for integrating outputs from the PRA and questionnaire surveys. In synthesising

information particular attention should be paid to stover utilisation, which might otherwise be underplayed.

## **Component 2: Post harvest losses/storage**

The data collection exercise for this work has been largely completed - with one further series of samples to cover Rabi sorghum. Sample and data collection has been integrated successfully via the PRA survey - although for the main PRA survey this has necessitated the addition of households in order to gain the required cross section of wealth categories, (i.e. storage over significant periods is confined to a minority of wealthier households). Analyses of samples are being successfully implemented by participating institutions.

A proposal has been made to add to the programme in order to develop a quality index using pre-prepared samples for farmers to give views on quality. It should be noted that technical analysis of losses to date have indicated that losses arising from post harvest factors are small, and that farmers perceptions of losses are that they are relatively unimportant.

**Recommendations** The project component should continue as originally planned. The additional work on the quality index does not appear to be justified given the limited degree of post harvest losses being identified by the research and the low priority given to losses by farmers. ICRISAT has attempted similar approaches to that proposed for the quality index - with very little success. The PRA team is in any event fully stretched in its programme.

**Action points** The research should continue as originally planned

## **Component 3 : Consumption issues**

Relatively limited activity (outside of data collected under the PRA), has been undertaken. Two brief surveys, one by a paid consultant and one by a research assistant, have been completed on urban consumption in slum areas of Hyderabad. Otherwise planned survey work on consumption issues appears to lack focus.

A second strand of activity has involved attempts to obtain access to disaggregated data from the National Sample Survey (NSS), i.e. data down to District level that could complement field survey information. Obtaining access has been time consuming but is now apparently close to success. Access to this data will represent an ongoing asset for sorghum research beyond the lifetime of the NRI programme. However there is a need to first assess the quality of NSS data survey approaches and implementation. There is also a need to avoid the danger that the extensive data will encourage an over-diffuse range of research simply because information is available.

**Recommendations:** Further survey work should focus upon urban consumption patterns - particularly in sorghum “heartland” areas and amongst the poorest urban

dwellers more generally. In both cases it is likely that sorghum consumption will remain more significant (despite declining trends in average consumption). Work should clarify the role of PDS rice and wheat, free market rice and wheat, and the main Rabi and Kharif sorghum varieties/grades.

As part of the programme of work agreed with NRCS, Dr Dayakar is due to visit the UK for a one month assignment. This will comprise an assessment of the NSS data that is available, with support e.g. from statistics and SSD staff. Analysis of NSS information should focus upon urban consumption data, especially amongst poorer households and in sorghum "heartland" areas. The aim will be to examine major aspects of consumption only. The wide variety of further analyses that could be made using the data lies outside the remit of the programme, but may well be of interest to ICRISAT, NRCS and others in developing their own programmes.

**Action points:** Dr Hall to liaise with Dr Brough over the design and implementation of urban consumption surveys. Dr Dayakar to pursue contacts to assess quality of NSS data collection prior to his departure to UK. Mr Marter to identify suitable co-workers at NRI (e.g. statisticians and members of SSD).

#### **Component 4: Industrial utilisation**

Some background information on industrial utilisation is available via the work of Dr Somani (summarised in his publication "An overview of the potential of sorghum and millets for industrial use in India"). A programme of work to identify opportunities for sorghum utilisation in starch, animal feed, and brewing has also been drawn up by Mr Norvell. However it has proved difficult to find a suitable consultant to undertake the work. The latter has arisen in part because public sector bodies have been the focus for attempted recruitment to date.

**Recommendations :** The workplan developed by Mr Norvell, with minor modifications, should form the basis for future work on the issue. The work divides into two components : possible demand projections and price relationships, and a marketing/industry survey.

Work on the industrial use survey, and the programmes' activities more generally, would be assisted by a brief review of wholesale marketing of grains - to identify main origins and destinations of trade sorghum. It is therefore recommended that a short study should be implemented and that the work could also include a brief review of marketing margins. Consideration could additionally be given to a review of stover marketing, although the latter is probably more fragmented than grain marketing.

The industrial survey should also be preceded by a review of work by Somani (and others e.g. Kelley), and discussion with key informants (e.g. Somani, Dr Rana), to obtain initial industrial contacts. The purpose of the survey will be to identify the general scale of demand by major end use sectors and approximate trends in price relationships. The project will thus be able to identify options for future more detailed research (if any), beyond the lifetime of the current programme.

**Action points :** Mr Marter to determine the availability of Mr Marsland to undertake the proposed wholesale market review and Dr Kleih to undertake market projections. Mr Marter to review options for a consultant to lead the market/industrial survey team, and to suggest minor modifications to the work programme drafted by Mr Norvell.

### **Component 5: Policy review and programme outputs**

A background paper (by Mr Day) has been completed which sets out the major implications for sorghum utilisation arising from current policies.

The final phase of the project entails drawing together the outcomes of the 4 components above and synthesising conclusions. Much will depend upon the results of partial budget analysis which will indicate the relative competitiveness of sorghum in relation to other crops. Similarly the industrial potential survey will be of particular significance in assessing future options for utilisation of sorghum grain.

Outputs are to be produced in a series of forms: publications under ICRISAT titles, NRI reports, peer reviewed journal articles and data bases. (A list of proposed outputs is provided at Annex 6, with details of timing of outputs provided in Annexes 3 and 4). A final workshop is planned to discuss and disseminate main findings with key stakeholders.

**Recommendations :** The provisional list of outputs /publications should be confirmed as soon as possible. Lead authors should be held responsible for the production of outputs to the required standard and on schedule.

**Action points :** Dr Hall should confirm the proposed publications and associated responsibilities with lead authors as soon as possible. Dr Hall should also initiate his own publications programme and take particular care to review such commitments in the light of other programme responsibilities. Dr Kelley is requested to provide guidance and comment on key outputs as they are being produced, to the extent that his ICRISAT commitments allow him to do so.



## **Annex 1**

### **Terms of Reference:**

The overall purpose of the visit is to review progress to date and to investigate the need for rescheduling or extension of the project. It is anticipated that a review of this nature will also be a useful opportunity to examine the content and scope of the work and make suggestions for realignment as appropriate.

### **Specific terms of reference:**

1. Review project work plans, written outputs and progress reports (To be undertaken in the UK)
2. Discuss the progress and approach of the project with UK based staff who have made inputs to the project. This will include Sue Brough, Mary Underwood, Neil Marsland, Nick Norvel, Rick Hodges and Ulrich Kleih.
3. Discuss the progress and approach of the project with Andy Hall and collaborators at ICRISAT, and the National Research centre for Sorghum(NRCS) in India
4. Based upon 1 to 3 assess the progress of the project against agreed outputs and project milestones.
5. Comment on the research approach and scope adopted by the project, and, where appropriate, make suggestions for realignment
6. Based on 4 and 5, in consultation with Andy Hall and ICRISAT and NRCS collaborators, make recommendations for a strategy to achieve agreed project outputs. If appropriate, make recommendations for rescheduling of activities, project funding and the finish date of the project
7. Present the agreed strategy in a brief report and circulate CPHP managers for consideration, and to Andy Hall and the project leaders of the three projects.

The work is to be undertaken during the period 6 October to 19 December, involving a visit of approximately one week to India during the week beginning 30 November 1997. Inputs will include up to one week preparatory work and report writing and one week travelling with associated travel and subsistence costs.



## Annex 2

### Strategic issues relating to Sorghum in India

The area under sorghum and sorghum production have been declining on a long term basis within the three States covered by the programme. Factors underlying this trend include limited success in raising yields despite adoption of hybrids for the Kharif crop, and increased competition especially from irrigated crops (rice, wheat, oilseeds), that have benefited from subsidised irrigation water.

Demand factors have also contributed to sorghums decline. As incomes have risen (on average) per capita consumption has declined (since income is inversely correlated to demand i.e. sorghum is an “inferior” commodity). This trend has been exacerbated by competition from subsidised wheat and rice (under the PDS system) which have further undermined sorghum consumption. Whilst sorghum is used in a number of industrial applications (e.g. animal feed and starch ), little is know about current levels of use which has also been constrained by past legislation prohibiting non-food use of sorghum, as well as competition from established raw materials (e.g. maize and cassava)

However, average trends in production and consumption conceal a number of variations. In sorghum “heartlands” production has actually increased in some areas, whilst there is emerging evidence that consumption may remain important amongst the poorest groups (in both rural and urban areas).

To understand the residual options for sorghum production it is necessary to examine relative competitiveness of alternative crops at the farm level, together with farmers own-consumption needs. One scenario is that in the medium term at least there may be moves to reduce the level of input subsidies - specifically on energy/irrigation water - which could enhance the competitiveness of sorghum.

Information on utilisation appears to point to a residual role in direct consumption, plus uncertain but possibly large potential in industrial applications. Whilst subsidised PDS rice and wheat represents a major threat to continuing sorghum demand, the variability in access to and ration size from PDS, means that in some areas and for some groups sorghum may remain important (in particular for the poorest who may not qualify for ration cards and hence slip through the safety net ).

Legislation banning the use of sorghum for industrial use is still on the statute book in some states but is increasingly being interpreted more flexibly. Future opportunities will rest in part upon sorghums price competitiveness vis a vis competing crops. However there may also be important additional issues - e.g. the cost of converting processing equipment to handle alternative raw materials; possible offsetting technical problems e.g. tannins in sorghum in the case of livestock feed; the scale, quality and seasonality characteristics of raw materials required; and also the (often unfavourable) image associated with sorghum.

If opportunities for industrial uses do appear more favourable a range of possible research agenda thus appear to have potential, including the likely production scenarios to supply such use (i.e. there may be preference amongst manufacturers for supplies from a smaller number of large scale producers, rather than by existing small scale producers). Handling characteristics of sorghum could also become an issue.

The brief sketch of issues above highlights the significance of project components with the NRI programme. In particular it shows the importance of survey data feeding in to partial budget analysis of the competitiveness of sorghum production at farm level. Similarly the opportunities and constraints associated with industrial usage in particular appear highly significant. An area that might be less well covered is represented by stover utilisation. Already regarded in many areas as being of equivalent importance to production of sorghum for grain, the long term likely reliance on animal draft power, coupled with rapid expansion in dairying feed requirements, could represent a significant component affecting the competitiveness of sorghum in the medium and longer term.

### Annex 3 Timetable of activities, reporting, staff inputs

	Dec	Jan	Feb	Mar	Apr	My	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Informal survey</b>													
Hall	Part	Part	Part	Full	Part								
Brough													
Underwood													
RAs (5)													
Report No 6				*	*								
<b>Formal survey (field)</b>													
Dayakar	Part	Part	Part										
NRCS assistant													
<b>Analysis of formal survey</b>													
Dayakar	Part	Part	Part	Part		Part	Part	Part					
Research fellow													
Hall						Part	Part	Part	Part				
Data entry													
DPA													
NRCS assistant													
Report No 7							*						
Report No 8									*				
Report No 9								*					
<b>Storage survey</b>													
Jayraj (IGSI)													
Hodges					Part								
Hall													
Report No 11				*									
Report No 12						*							
<b>Consumption data analysis (UK)</b>													
Dayakar					Full								
Marsland / NRI													
DPA													
Report					*								
<b>Urban consumption survey</b>													
Brough													
Hall						Part							
RAs (2)													
Report No 16							*	*	*	*			
<b>Market survey</b>													
Marsland													
Report No 13				*									
<b>Industrial background</b>													
Kleih /NRI													
Report				*									
<b>Industrial potential</b>													
NRI economist													
Dayakar								Full	Full				
NRI agro-process													
Report No 15									*				

	Dec	Jan	Feb	Mar	Apr	Ma	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Policy work</b>													
Hall								Full	Full	Full	Full	Part	
Report No 17											*		
Report No 15									*				
Report No 20										*			
<b>Workshop</b>													
Hall												Part	
Brough													
RAs													

For report references and details, see Annex 6

#### **Annex 4: Original and revised logical frameworks for the programme (incorporating Projects R6767, R6686 and R6687)**

The three projects which make up the sorghum utilisation research programme in India all originally had separate logical frameworks. Sorghum a and b both shared common goals and purposes and the outputs of sorghum b contributed to some extent to the outputs of sorghum a. Sorghum c had a different goal and purpose, although these actually represented a contribution to the those of sorghum a and b.

During the initial planning phase of the programme, in order to integrate the three projects, a logical framework for the whole programme was developed. The goal and purpose of sorghum a and b were retained, but indicating that these encompassed the scope of the goal and purpose of sorghum c. At this planning phase 8 activities were identified which would lead to broadly similar outputs described in the three original project logical frameworks.

As the programme of research has evolved the statement of outputs has changed in three ways.

Firstly the specific output relating to the analysis of food safety aspects of tradition foods has been removed. At the time of preparing the original project memoranda it had been anticipated that this would be a major factor influencing sorghum utilisation. However discussions with both researchers and consumers in India clearly indicated that this is an issue of marginal relevance to the sorghum utilisation debate and that other more influential factors were at work. It was therefore decided to concentrate efforts on analysis of major factors affecting sorghum utilisation.

Secondly it was felt more useful to focus outputs into 5 key areas corresponding to the major thrusts of the research activities that had been developed for the integrated programme. These are as follows:

- Factors affecting farm level utilisation
- Policy impacts on utilisation
- Factors affecting urban utilisation
- The impact of post-harvest losses on patterns of utilisation at the farmer level.
- Factors affecting actual and potential industrial utilisation.

Describing outputs in these terms allows a much clearer articulation of the types of position paper milestones which are needed to allow the outputs to contribute to the overall programme purpose.

The final change concerned the database output. Originally envisaged as containing all the data collected by the programme, it has become apparent as data have been collected that there is a need for separate databases. This has particularly been the case for a large body of district level consumption data which was previously not thought to be available.

**(I) Original programme framework for research on factors affecting the improved utilisation of sorghum in India. January 1997**

(Incorporating projects: Sorghum in India (a) Technical, policy, economic and social factors affecting improved utilisation (R6687). Sorghum in India (b) Quality and safety of traditional foods (R6686). Sorghum in India (c) Post-harvest losses and quality of sorghum for food and feed in rural India, with particular reference to high yielding varieties (R6767).

<b>Narrative Summary (NS)</b>	<b>Measurable Indicators (OVI)</b>	<b>Means of Verification (MOV)</b>	<b>Important Assumptions</b>
<b>Goal</b>			
Efficiency of small-scale agro-processing improved, including associated on-farm grain storage, marketing and credit systems.	umber of livelihoods benefiting from sustained uptake of improved storage, marketing and agro processing methods increased by 10% in target areas.	Reports of target institutions, national production statistics, evaluation of RNRRS.	Enabling environments (policies, institutions, markets, incentives) for widespread adoption of strategies exists.
<b>Purpose</b>			
Country and commodity strategies developed to support sustainable small scale agro-processing activities and projects, including associated strategies for on-farm grain storage, marketing and credit systems.	By July 1998 validated strategies available and adopted by research workers, social scientists and policy makers.	Reports on policies and research programmes of key GoI Institutions	The strategies developed are such that GoI institutions are able and willing to adopt them.  Adoption of country and commodity strategies will result in improved efficiency of agro processing.
<b>Outputs of programme</b>			
1. Database of statistics and qualitative information on past, current and future trends in the utilisation of sorghum for human food, animal feed and industrial uses in the specified States. This includes information of key grain characteristics, in addition to yield, which affect the utilisation of sorghum.	Framework for database developed by end Sept 1996.  Published information entered by end of December 1996.  Grey literature and information gained through research surveys and appraisals added at intervals.  Database completed by end December 1997.	Quarterly reports to Programme Manager for Q2 and Q3 in 1996/97.  Published copies of the database available on request by December 1997.	Information exists or can be obtained and coherent conclusions can be drawn.  The conclusion are of a nature that will allow realistic strategies to be developed.

<p>2. Detailed analysis of factors affecting the production and utilisation of sorghum at the farm level</p>	<p>PRA surveys completed in 12 villages, and questionnaire survey completed in 66 villages by December 1997</p> <p>Information added to database by December 1997</p> <p>Position paper prepared by December 1997</p>	<p>Quarterly reports to Programme Manager throughout 1996 and 1997. Position papers available on request and findings summarised in Annual Report to NRD 1998.</p>	
<p>3. An analysis of constraints in traditional food preparation methods from a food safety perspective.</p>	<p>Rural and urban survey work completed by December 1997</p> <p>Information added to database by December 1997</p> <p>Position paper prepared by December 1997.</p>	<p>Quarterly reports to Programme Manager throughout 1996 and 1997. Position papers available on request and findings summarised in Annual Report to NRD 1998.</p>	
<p>4. An analysis of the way in which the current policy environment affects the demand for sorghum in relation to other agricultural products.</p>	<p>Detailed research plans and hypotheses developed by end September 1996.</p> <p>Internal working reports on structured interviews and desk research produced at regular intervals until end September 1997.</p> <p>Position papers completed by end of December 1997.</p>	<p>Quarterly reports to Programme Manager throughout 1996 and 1997. Position papers available on request and findings summarised in Annual Report to NRD 1998.</p>	
<p>5. An assessment of the likely future demand for sorghum as: i) human food (rural and urban); ii) animal feed (grain and stover), and iii) industrial raw materials, including for export.</p>	<p>Position papers completed by December 1997.</p>	<p>Published position paper available on request.</p>	
<p>6. Analysis of farmers', consumers', and traders perceptions of sorghum storage losses and quality, and choice of varieties for food and feed. Parallel technical evaluation of storage losses and quality deterioration.</p>	<p>Participatory appraisal of perceptions completed by Oct 1997.</p> <p>Grain sampling completed by Oct 1997.</p> <p>Grain analysis completed by Dec 1997</p>		
<p>7. Ranked list of researchable constraints to improved utilisation of sorghum, including those associated with on-farm grain storage, marketing and credit.</p>	<p>Ranked list of researchable constraints agreed at workshop by July 1998.</p>	<p>Published list of researchable constraints available on request.</p>	

Activities			
<p><b>1. On farm utilisation</b> Determine the current role and importance of sorghum in the livelihoods of the poor, and identify factors responsible for changes in production and utilisation of the crop in competition with other food/fodder/feed/cash crops. Quantitative and qualitative survey methods will be used.</p> <p><b>2. On farm storage</b> Assess the relative importance of sorghum on-farm grain losses and quality deterioration in the context of improved utilisation, by comparing technical evaluations with farmer/consumer perceptions and preferences. Participatory appraisals and physical grain analysis methods will be used</p> <p><b>3. Industrial utilisation</b> Through industry and market surveys estimate existing industrial utilisation of sorghum ; identify the key technical and non-technical constraints to improved utilisation in competition with alternative industrial raw materials; and comment on the impact of alternative utilisation strategies on the livelihoods of rural and urban producers and consumers. Develop broad growth projections and undertake interviews with key informants in targeted industrial sectors.</p> <p><b>4. Urban utilisation</b> Determine the current role and importance of sorghum in the diets of the urban poor, and identify factors responsible for changes in consumption over time. Identify the impact of improved/increased sorghum consumption on the livelihoods of the urban poor. Quantitative and qualitative survey methods will be used.</p> <p><b>5. Traditional foods and food safety</b> Document traditional methods of sorghum preparation and assess associated food safety constraints in both rural and urban areas.</p> <p><b>6. Policy analysis</b> Characterise the main policy factors affecting the production and utilisation of sorghum and predict how changes in the policy environment would alter the comparative advantages to end users of sorghum in relation to other agricultural products.</p>	<p><b>Budget (£000) 96/97</b></p> <p>UK Staff cost 95.1</p> <p>Capital 8.5</p> <p>Travel and Subs 33.1</p> <p>Other cost 30.3</p> <p>Total 167</p> <p><b>Budget (£000) 97/98</b></p> <p>UK Staff cost 148.5</p> <p>Capital 0</p> <p>Travel and Subs 36</p> <p>Other cost 41.6</p> <p>Total 226.1</p> <p><b>Budget (£000) 98/99</b></p> <p>UK Staff cost 45.1</p> <p>Capital 0</p> <p>Travel and Subs 7.9</p> <p>Other cost 23.0</p> <p>Total 76.0</p>	<p>Project quarterly reports.</p> <p>Annual reports to NRD.</p> <p>Internal working reports.</p> <p>Final technical report.</p> <p>Proceedings of workshops.</p> <p>Published Papers.</p>	<p>Local collaborators able to provide inputs as planned;</p> <p>Suitable participatory support is forthcoming for research surveys and rural appraisals.</p>



<p><b>7. Synthesis and strategy development</b>  Analyses and synthesis of data and findings collected in 6 research components into a research strategy for future sorghum utilisation research India. This will include a ranked list of researchable constraints which will be validated at a workshop with collaborators and stakeholders.</p> <p><b>8. Database</b>  Key information relating to the past, current and future trends in the utilisation of sorghum and the pivotal factors for change, collected from secondary and primary sources in the 7 components above will be placed on a database.</p>			
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**(I) New programme framework for research on factors affecting the improved utilisation of sorghum in India. February 1998**

<b>Narrative Summary (NS)</b>	<b>Measurable Indicators (OVI)</b>	<b>Means of Verification (MOV)</b>	<b>Important Assumptions</b>
<b>Goal</b>			
Efficiency of small-scale agro-processing improved, including associated on-farm grain storage, marketing and credit systems.	Number of livelihoods benefiting from sustained uptake of improved storage, marketing and agro processing methods increased by 10% in target areas	Reports of target institutions, national production statistics, evaluation of RNRRS.	Enabling environments (policies, institutions, markets, incentives for widespread adoption of strategies exists.
<b>Purpose</b>			
Country and commodity strategies developed to support sustainable small scale agro-processing activities and projects, including associated strategies for on-farm grain storage, marketing and credit systems.	By December 1998 validated strategies available and adopted by research workers, social scientists and policy makers.	Reports on policies and research programmes of key GoI Institutions	The strategies developed are such that GoI institutions are able and willing to adopt them.  Adoption of country and commodity strategies will result in improved efficiency of agro processing.
<b>Outputs of programme</b>			
1. General database of statistics and qualitative information on past, current and future trends in the utilisation of sorghum for human food, animal feed and industrial uses in the specified States including information of key grain characteristics, in addition to yield, which affect the utilisation of sorghum.  Database of district level consumption statistics.	Framework for database developed by end March 1998.  Published information entered by end of December 1998.  District level consumption data collated, and cleaned by June 1998  Grey literature and information gained through research surveys and appraisals added at intervals.  Database completed by end December 1998.	Quarterly reports to Programme Manager for Q1, Q2 and Q3 in 1998/9.  Published copies of the database available on request by December 1998.	Information exists or can be obtained and coherent conclusions can be drawn.  The conclusion are of a nature that will allow realistic strategies to be developed.

<p>2. Detailed analysis of factors affecting the production and utilisation of sorghum at the farm level.</p>	<p>PRA surveys completed in 11 villages, and questionnaire survey completed in 42 villages by March 1998</p> <p>Information added to database by December 1998</p> <p>Position papers:</p> <ol style="list-style-type: none"> <li>1. Sorghum utilisation in India: pilot study by March 1997</li> <li>2. Indicators of household food security by July 1997.</li> <li>3. 11 PRA village case studies by April 1998.</li> <li>4. Sorghum utilisation in the livelihoods of the rural poor: an overview of PRA studies by May 1998</li> <li>5. Factors affecting the production and consumption of sorghum: a synthesis of quantitative survey June 1998</li> <li>6. Economic analysis (including partial budgets) of factors affecting production and consumption by August 1998.</li> <li>7. Factors affecting the role and importance of sorghum in the livelihoods of the rural poor: synthesis by July 1998</li> </ol>	<p>Quarterly reports to Programme Manager throughout 1996 - 1998. Position papers available on request and findings summarised in Annual Report to NRD 1998.</p>	
<p>3. An analysis of the way in which the current policy environment affects the demand for sorghum in relation to other agricultural products.</p>	<p>Detailed research plans and hypotheses developed by end September 1996.</p> <p>Background papers completed by March 1997.</p> <p>Policy analysis of farm budget data completed by August 1998.</p> <p>Position papers:</p> <ol style="list-style-type: none"> <li>1. Agricultural policy interventions in India: implications for utilisation: background by March 1998</li> <li>2. Sorghum utilisation: emerging patterns and research issues by December 1998</li> <li>3. Sorghum utilisation in the SAT of India and the</li> </ol>	<p>Quarterly reports to Programme Manager throughout 1996 -1998. Position papers available on request and findings summarised in Annual Report to NRD 1998.</p>	<p>Recruitment of and data analyst to assist in economic and econometric analysis of questionnaire survey data</p>

<p>5. A critical analysis of the role and importance of sorghum in the diets of the urban poor.</p>	<p>implications for the livelihoods of the poor: policy options, by September 1998</p>	<p>Quarterly reports to Programme Manager throughout 1996 -1998. Position papers available on request and findings summarised in Annual Report to NRD 1998</p>
<p>6. Analysis of farmers', consumers', and market perceptions of sorghum storage losses and quality, and choice of varieties for food and feed. Parallel technical evaluation of storage losses and quality deterioration.</p>	<p>Pilot studies completed by December 1997</p> <p>Urban site selection based on district level consumption data completed by May 1998</p> <p>Surveys completed in 3 urban areas by September 1998</p> <p>Position papers:</p> <p>Factors influencing the consumption of sorghum as food in India by March 1997</p> <p>Urban case study reports completed by September 1998</p> <p>Sorghum utilisation and the urban poor: implications for policy, completed by October 1998</p> <p>Participatory appraisal of perceptions completed by March 1998.</p> <p>Grain sampling completed by February 1998.</p> <p>Grain analysis completed by April 1998</p> <p>Position papers</p> <ol style="list-style-type: none"> <li>1. Pilot study on sorghum storage by March 1997</li> <li>2. Farmers perceptions in relation to qualitative and quantitative sorghum grain losses by March 1997</li> <li>3. Grain quality analysis reports by March 1998</li> <li>4. Farmers perceptions and technical analysis of grain quality by May 1998</li> </ol>	<p>Quarterly reports to Programme Manager throughout 1996 -1998. Position papers available on request and findings summarised in Annual Report to NRD 1998</p>

<p>7. An assessment of the likely future demand for sorghum as an industrial raw material and the impact of alternative utilisation options on the livelihoods of the poor</p>	<p>Market study of sorghum grain flows and destination by April 1998</p> <p>Background study on industrial utilisation to identify key target sector by May 1998</p> <p>Survey of target industrial sectors undertaken by August 1998</p> <p>Position papers:</p> <ol style="list-style-type: none"> <li>1. Report on sorghum marketing system by April 1998</li> <li>2. Factors affecting the industrial utilisation of sorghum: an agenda for further research by August 1998</li> <li>3. Implications for industrial sorghum utilisation options for the poor by August 1998</li> </ol>	<p>Quarterly reports to Programme Manager throughout 1996 -1998. Position papers available on request and findings summarised in Annual Report to NRD 1998</p>	
<p>8. Ranked list of researchable constraints to improved utilisation of sorghum, including those associated with on-farm grain storage, marketing and credit.</p>	<p>Ranked list of researchable constraints agreed at workshop by December 1998.</p> <p>Work shop proceedings by March 1999.</p>	<p>Published list of researchable constraints available on request.</p>	

Activities			
<p><b>1. On farm utilisation</b> Determine the current role and importance of sorghum in the livelihoods of the poor, and identify factors responsible for changes in production and utilisation of the crop in competition with other food/fodder/feed/cash crops. Quantitative and qualitative survey methods will be used.</p> <p><b>2. On farm storage</b> Assess the relative importance of sorghum on-farm grain losses and quality deterioration in the context of improved utilisation, by comparing technical evaluations with farmer/consumer perceptions and preferences. Participatory appraisals and physical grain analysis methods will be used</p> <p><b>3. Industrial utilisation</b> Through industry and market surveys estimate existing industrial utilisation of sorghum ; identify the key technical and non-technical constraints to improved utilisation in competition with alternative industrial raw materials; and comment on the impact of alternative utilisation strategies on the livelihoods of rural and urban producers and consumers. Develop broad growth projections and undertake interviews with key informants in targeted industrial sectors.</p> <p><b>4. Urban utilisation</b> Determine the current role and importance of sorghum in the diets of the urban poor, and identify factors responsible for changes in consumption over time. Identify the impact of improved/increased sorghum consumption on the livelihoods of the urban poor. Quantitative and qualitative survey methods will be used.</p> <p><b>5. Policy analysis</b> Characterise the main policy factors affecting the production and utilisation of sorghum and predict how changes in the policy environment would alter the comparative advantages to end users of sorghum in relation to other agricultural products.</p>	<p><b>Budget (£000) 96/97</b></p> <p>UK Staff cost 95.1</p> <p>Capital 8.5</p> <p>Travel and Subs 33.1</p> <p>Other cost 30.3</p> <p>Total 167.0</p> <p><b>Budget (£000) 97/98</b></p> <p>UK Staff cost 148.5</p> <p>Capital 0.0</p> <p>Travel and Subs 36.0</p> <p>Other cost 41.6</p> <p>Total 226.1</p> <p><b>Budget (£000) 98/99</b></p> <p>UK Staff cost 63.0</p> <p>Capital 0.0</p> <p>Travel and Subs 6.8</p> <p>Other cost 32.3</p> <p>Total 102.8</p>	<p>Project quarterly reports. Annual reports to NRD. Internal working reports. Final technical report. Proceedings of workshops. Published Papers.</p>	<p>Local collaborators able to provide inputs as planned; Suitable participatory support is forthcoming for research surveys and rural appraisals.</p>

<p><b>6. Synthesis and strategy development</b>  Analyses and synthesis data and findings collected in 6 research components into a research strategy for future sorghum utilisation research India. This will include a ranked list of researchable constrains which will be validated at a workshop with collaborators and stakeholders.</p> <p><b>7. Database</b>  Key information relating to the past, current and future trends in the utilisation of sorghum and the pivotal factors for change, collected from secondary and primary sources in the 6 components above will be placed on a database.</p>			
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## **Annex 5: Budget implications of proposed project rescheduling**

### **Budget for 1997/98**

£5,000 to be returned from projects A , in FY 1997/98

### **Budget for 1998/99**

#### **Sorghum A (Wood)**

Staff costs:

Hall	23,456
Wood	4,000
Marsland	6,500
Industrial economist	7,500
Technologist	5,000

Direct costs:

Local consultants	2,500
Workshop	5,000
Urban survey	1,000
Industry survey	1,000
Hall allowances etc.	7,020
Hall accommodation	3,600
Hall freight and flights	4,200
Office + car	4,000
Local staff	7,200
T&S	4,000

Total 85,976

Existing allocation 52,059

**Additional budget required 33,917**

#### **Sorghum B (Brough)**

Staff costs

Brough 9,500

Direct costs



T&S	2,000
Total	11,500
Existing allocation	11,598
<b>Additional budget required</b>	<b>Nil</b>

**Sorghum c (Haines)**

Existing allocation	12,401
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**No addition required to existing budget of 12,401**

**Gross total increase required for all projects in 1998/99 = £33,917**

**Net total over programme lifetime allowing for savings in 1997/98 = £28,917**

## Annex 6: Proposed publications

Title	Lead authors	Status
1. <i>Sorghum utilisation in India: Pilot study</i>	Marsland	Draft
2. <i>Factors influencing the consumption of sorghum as food in India</i>	Marsland	Draft
3. <i>Background study on indicators of household food security</i>	Marsland	Draft
4. <i>Sorghum utilisation: Emerging patterns and research needs</i>	Hall & Brough	Draft
5. PRA village case studies (12)	RA, Underwood, Brough, Hall	Draft 6
6. <i>Sorghum utilisation in the livelihoods of the rural poor: an overview of PRA studies</i>	Hall, Underwood & Brough	
7. <i>Factors affecting the production and consumption of sorghum: a synthesis of quantitative survey</i>	Dayakar & Research fellow	
8. <i>Modelling of production consumption factors</i>	Research fellow Dayakar & Kelley	
9. <i>The factors affecting the role and importance of sorghum in the livelihoods of the rural poor (A synthesis of rural field work)</i>	Dayakar, Hall & Brough	
10. <i>Pilot study of the production and storage of sorghum by small farmers in Karnataka and Maharashtra</i>	Marsland	Draft
11. Grain quality analysis reports	Hodges	
12. <i>Farmers perceptions and technical analysis of grain quality</i>	Hodges and Hall	
13. Report on sorghum marketing systems and market flows	Marsland	
14. Background report on industrial utilisation	Kleih	
15. <i>Factors affecting the utilisation of sorghum in selected agro-industrial sectors: an agenda for further research</i>	Dayakar & ??????	
16. <i>Implications of sorghum utilisation options for the poor</i>	Hall	
17. Urban utilisation case study reports	RAs & Brough	
18. <i>Sorghum utilisation and the urban poor: implications for policy</i>	Brough & Hall	
19. <i>Agricultural policy interventions in India: implications for research on sorghum utilisation</i>	Day	Draft
20. <i>Sorghum utilisation in the SAT of India and the implications for the livelihoods of the poor : policy options.</i>	Hall & Dayakar	

## Publications at this level may also be also be used in NRI publications and or IDS ODI network publications

## **Annex 7**

### **Aide Memoir : CPHP programme of research on sorghum utilisation**

Circulation:

Dr Brough  
Dr Dayakar  
Dr Haines  
Dr Hall  
Dr Kelley  
Dr Poulter  
Dr Rana  
Mr Wood

Please see below a list of major points arising from the review mission which I undertook at the request of Dr Nigel Poulter. These points have been agreed verbally with collaborators in India during the mission, and also via telephone contact with Dr Poulter. Staffing issues in particular are highlighted. A fuller report will follow shortly.

1. The questionnaire survey will be cut from 11 to 7 districts (Akola, Amravathi, Nanded, Bijapur, Pune, Solapur, Mahbubnagar), with a completion date of end February - Dr Dayakar to continue to lead. Dr Rana has indicated a continued commitment of in excess of 50% of Dr Dayakar's time to the programme as a whole.
2. To assist in the analysis of the questionnaire survey, a consultant will be recruited through ICRISAT. Dr Hall to draft TOR, Dr Kelley requested to expedite as soon as possible. Once recruited the consultant will be located at NRCS and will work with Dr Dayakar.
3. An assistant to work with Dr Dayakar on the questionnaire survey is to be recruited via NRCS. Dr Hall to initiate, with Dr Rana's assistance.
4. Storage studies will continue to the original schedule (without further additions) - Dr Hodges to continue lead.
5. Dr Dayakar will visit UK in March/April to analyse national consumption survey data with the assistance of NRI personnel. Other urban studies of consumption will be supervised by Dr Brough.
6. A brief study of marketing of sorghum grain will be added to the programme and undertaken using NRI staff (Mr Marsland), including identification of major components in marketing margins. Options for inclusion of stover marketing are to be considered.
7. Studies of potential for industrial use are to be undertaken by a team including ICRISAT, NRCS, NRI and other consultants. Work will include projections of

demand and price relationships (Dr Kleih), and analysis of views from managers in the industries concerned (wider team).

8. ICRISAT are to make available Mr Parthasarathy for 25% of his time in FY1998/99 to work on components in 6 and 7 above. Dr Kelley is requested to confirm Mr Parthasarathy's availability.

9. The final phase of policy analysis includes a range of major publications. For these and other outputs agreed under the project, lead authors will be held responsible for production to schedule. Dr Kelley to comment and advise on analysis to the extent this is feasible given his ICRISAT work and responsibilities.