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WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT.
STATUS, ISSUES, AND RECOMMENDATIONS

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Washington State University
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EXECUTIVE SUMMARY

The Western Sudan Agricultural Research Project was originally designed and planned by the Government of Sudan (GOS), U.S. Agency for International Development (AID) and the World Bank (WB). Its purposes were to address Sudanese national and regional agricultural development needs and to tap the great agricultural potential for the rainfed traditional sector of the Western regions to contribute to the local, regional, and national economies and food requirements and well-being of the people of the Sudan. The Consortium for International Development (CID) contracted to provide technical assistance with Washington State University (WSU) as the lead institution with primary implementation responsibilities. In addition to technical assistance, AID also supports a part of the construction costs with the WB providing most capital development requirements along with the purchase and operation of a project aircraft. The GOS supports part of the construction, operations, and other needs.

The project is utilizing a unique approach for the design and implementation of research that is relevant to the Sudan and the rest of sub-Saharan Africa. Emphasis is placed on interfacing national and regional production priorities with the producers' socio-economic environment and capabilities in order to define needs and develop technology that is accepted by the producers and stresses short and long-term benefits. Research on producers' field and pastoralists' herds is emphasized. These efforts are interfaced and coordinated effectively with discipline and commodity research being carried out

by the Agricultural Research Corporation (the project's parent organization), and other national, regional, and international organizations.

Significant progress has been made to refine the agricultural research approach, to develop the necessary supportive infrastructure and to begin the research program. Results are beginning to accrue and relevant data and information are being used by producers and policy makers. Examples of the accomplishments and the validity of the approach are given in depth elsewhere in this presentation and include crop production, livestock production, marketing and related activities. Additional time and support are required, however, for further maturation and institutionalization of the research activities, staff, supportive infrastructure and approach. Needs and problems facing the project are delineated and recommendations to overcome them are presented.

WSARP represents a unique opportunity to test and implement evolving WB and AID strategies addressing food production in the sub-Saharan Africa. Examination of these strategies emphasize the validity of WSARP and the merits of the approach to impact food production in Sudan and elsewhere in a significant way.

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WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT
Status, Issues, and Recommendations

A. Purpose of Presentation

The Western Sudan Agricultural Research Project (WSARP) is jointly funded by USAID, the World Bank and the Government of Sudan. The project has been underway since the AID contract was signed with the Consortium for International Development (CID) in August, 1979. Washington State University (WSU) has had primary implementation responsibilities within CID. During the ensuing time period, the project has made significant progress, but has also encountered problems that have delayed the reaching of its maximum potential. Regardless of this, as indicated by a recent in-country AID research evaluation and by previous evaluations by AID and the World Bank, WSARP has made notable accomplishments and has the potential for making important contributions to Sudan and to Sub-Saharan Africa.

The current AID contract is to be completed on August 14, 1985. This is occurring at a critical time in the project's evolution. This information is provided for the following purposes:

1. To summarize project strategy and the relationship of the present and projected activities with current and projected USAID and World Bank (WB) development strategies.
2. To define project status and accomplishments.
3. To define the requirements for long term sustainability and success of the project.

4. To address recurrent costs needs and mission projections for same.
5. Provide recommendations for decisions being made regarding the project's future.

B. Project Strategy and Relation to USAID and WB Development Strategies

1. WSARP History and Strategy

A brief summary of the history of the project, followed by a review of project strategy and the interface of project strategy with USAID and the World Bank strategies will be presented.

An International Workshop on Agricultural Research and Development in Sudan, a Joint Team (U.S. and Sudanese) review of Sudanese Agricultural needs, and an independent World Bank study of agricultural research needs in Darfur and Kordofan resulted in reports that emphasized the potential for Western Sudan to contribute more to the economy of the nation. These studies recommended the establishment of a research network in Western Sudan to develop and/or adapt technology needed to realize this potential. These reports coincided with a Government of Sudan (GOS) decision to emphasize the rainfed sector and the development of the West. As a result, agreements were signed between GOS and WB and between GOS and USAID in 1978 to provide for external funding for construction of research stations in Darfur and Kordofan, for the purchase and operation of an aircraft, for the provision of technical assistance, for degree and

non-degree training, and for the purchase of commodities and equipment.

Under the WSARP, the Kadugli research station was renovated and new facilities added. Facilities at other locations were designed and a contract for construction was signed. The Kadulgi station has been operational for slightly over two years, while the other stations at El Obeid, El Fasher, Ghazala Gawazet and a Project Support/ARC Liaison Office in Khartoum are nearing completion. Delays in construction of these latter sites have been caused by a number of unforeseen and largely unavoidable factors. It is anticipated, however, that the construction will be completed by August, 1985. Even though the El Obeid Station has not been completed, research activities are being successfully carried out at that site.

The Darfur and Kordofan Regions comprise about one-third of the land area of Sudan, with approximately one-third of the national population. The land and human resources are extensive with agricultural production primarily by the traditional rainfed sector. Mechanized schemes also contribute to production in these regions.

During the last several years, the principal Sudanese exports have been cotton, sorghum, livestock, groundnuts, sesame, gum Arabic, and millet (See Table 1). All of these commodities originate in the West, and with some, the West is the primary site of production. It is estimated that 20.4% of the national total production of sorghum is from Kordofan and Darfur; 89% of the millet; 48.8% of the groundnuts; 44.4% of the sesame; almost 76% of the gum Arabic; 66% of the cattle; 46% of the sheep; 52% of the goats; and

68% of the camels are produced in the West. Livestock are produced almost exclusively by the traditional sector, although 41.9% of the sorghum and 15.7% of the sesame in Southern Kordofan are grown on mechanized schemes.

The rainfed sub-sector's contribution to net agricultural foreign exchange earnings grew from 57 to 81 percent from 1980 to 1982. In this regard, production of most of the commodities listed above, with the exception of cotton, was greater in the traditional sector than from either the irrigated or mechanized schemes (D'Silva, University of Khartoum).

The WSARP is an integral part of the ARC and is currently carrying out research to provide the information necessary to:

- improve agricultural production
- improve and/or prevent degradation of the natural resource base
- provide information relevant to agricultural production and resource utilization to decision and policy makers
- improve the lives of the Sudanese people resident in the West and enhance the regional and national economies.

The Project uses an interdisciplinary systems approach which is producer-oriented, taking into account the socio-economic environment in which the producer lives and works and the crops and livestock which are produced. Constraints are defined and prioritized, as are potential interventions. Information drawn from a wide spectrum of sources, such as ARC, University of Khartoum, the International Agricultural Research

Centers (CIMMYT, ICRISAT, ILCA, ICARDA, AVRDC and IITA) and the CRSPs as well as the Project's own findings are adapted to the producers' needs for optimal acceptance. The WSARP research approach allows flexibility to meet evolving needs and to use developing information and technology to realize opportunities for significant impacts on production in both the short- and long-term. Thus, the WSARP research approach is based upon solid disciplinary capabilities of its own and cooperating scientists; is action oriented with the producer foremost in consideration; is flexible to meet evolving needs and to use improved technology; and is geared to seize opportunities as they occur. This approach differs from more traditional, research station-oriented agricultural research programs in that the needs, interests and capabilities of the producers themselves help to determine the programs and priorities. Improved technologies must be adopted by the producers or potential benefits will not be realized. The Project researchers establish priorities and focus activities based upon short- and long-term goals, benefits and opportunities. The long-term time frame requires a close relationship and knowledge about development activities by GOS and donors in such areas as infrastructure development, involvement of the private sector, etc.

Information generated by project research is being provided to regional and national planners and decision makers. The project represents a regional resource that can be utilized as a part of the total development effort for Western Sudan and the entire country.

As pointed out earlier, the rainfed sector of Sudan has high potential for increased production. The traditional rainfed sector has outperformed the

mechanized schemes in recent years, and has great potential for improvement with minimal foreign exchange inputs. However, the availability of additional inputs may in the short-term require foreign exchange components in order for production increases to be realized. These latter inputs in the short-term may be most effectively provided through donors, and ultimately by the private sector.

Western Sudan is the largest part of the rainfed sector in Sudan, and has still received the least amount of assistance. It therefore has the highest untapped potential. There are four major ecological zones, each of which has some similarities and also considerable differences. Research at Kadugli has shown that concurrent and interrelated different systems exist in Southern Kordofan. Interventions directed to increased production have proven to be specific to the ecological environment in the production systems. This has been recognized in successful research efforts in the U.S. and in India, Turkey and other developing countries, as well as Sudan. Indications are that the most effective research programs focus on the comparative advantages and individualities of ecological zones, but at the same time capitalize on similarities to minimize duplication. In Western Sudan, a focus of activity in each of the four ecological zones has great merit. This was the premise upon which the original design of the project was based and resulted in the definition of four research stations in the West.

Research to date has shown that traditional producers in Western Sudan are highly commercially oriented, but must first meet their food security needs before addressing the market place. In most production systems operating in Western Sudan, including the

mechanized schemes, production of market crops cannot be considered in isolation from subsistence. Crop and livestock enterprises are closely integrated in all systems. Evidence to date indicates that improved complementarity of these enterprises will lead to greater overall increases in production, and can also lead to environmental protection and improvement. Thus, in order to increase production of desirable market crops and livestock, research must sometimes be done on related enterprises and problems which constrain ultimate desired production increases. It is not always cost effective to base research activities on preconceived notions of what is likely to be the best technology to maximize production of a single commodity. Decades of experience in the Sudan, with cotton, sorghum and groundnut production on mechanized schemes, and elsewhere in the world, have clearly demonstrated the fallacy of a "quick fix". Short-term increases in production have not only been marginally cost effective and nonsustainable, but in some instances have led to massive environmental degradation.

The project is pioneering a new way of planning and implementing research in Sudan. This approach melds regional and national production priorities with the socio-economic environment of the producers and interfaces with commodity and discipline research carried out on research stations and by other organizations. It also utilizes effective researcher-extension linkages and capitalizes on the producers' own capacities to disseminate successful technologies, especially important where extension resources are limited. The best technology is worthless if the producers cannot or will not make use of it. The ARC has long had a cadre of highly trained

scientists, with both disciplinary and commodity specialization. However, resources in the Sudan and elsewhere have been spent in developing and testing technologies under research station conditions which are not transferable to the producer. The WSARP has introduced the concept that the scientists have a direct responsibility to focus the resources available for research on those technologies which have the highest potential for impact under present and projected future producer conditions. Thus, the groundwork can be laid for further long-term improvements. Project scientists must work together to screen out approaches and research activities that are superfluous, and concentrate resources and efforts on those few important areas of research that have the greatest potential for payoff (optimal ignorance). The ARC has specialized commodity and discipline-oriented capabilities that can very effectively interface with the WSARP producer-oriented approach. The emphasis on adaptive research on the producers' fields and in herds synergistically relates with project research station efforts, with ARC capabilities, with international agricultural research centers, and other organizations and is the most effective way of utilizing limited resources for optimal gain.

2. Relationship of Project Strategy With That of USAID and the World Bank

Several years ago the Africa Bureau developed and distributed a development strategy for Africa. Recently, a draft revision of this strategy was incorporated into a plan for supporting agricultural research and faculties of agriculture in Africa. Addressed in the draft document is an effort by USAID and other donors to coordinate long-term sustainable

development efforts that emphasizes donor cooperation and coordination in sharply focused efforts. These efforts will be supported in selected countries and will attempt to utilize zonal networks which will link national systems, international agricultural research centers, regional research programs, CRSPs, and other related endeavors. The proposed strategy is directed to circumvent or minimize the adverse physical environment and climate in Africa that has negatively impacted agricultural development, to overcome government policy inadequacies that play a crucial role in agricultural production and to improve administrative capacity for planning and implementing development strategies after relevant ones evolve. The basic institutions required to sustain agricultural development will be addressed since they are weak in most countries in Sub-Saharan Africa. Inherent in all of these considerations and activities is the need for a cadre of trained personnel that can implement appropriate technologies that are either present or will be forthcoming from the research emphasis. Selected countries will be emphasized, with Sudan being one of those countries with the necessary cadre of trained professionals, existing institutions, and a high potential as defined in the draft position paper.

The World Bank published a document on development in Sub-Saharan Africa in August, 1984, entitled "Toward Sustained Development in Sub-Saharan Africa -- A Joint Program of Action". This document defines long-term development constraints as population increases, and inadequate health, education, human resources (as related to more effective planning, policies and management, etc), agricultural research, and conservation.

The World Bank discussion of the inadequacies and needs for agricultural research indicate a failure to provide adequate support for producers of both food and export crops. Emphasized are more effective use of existing research capacity; strategies that raise the returns to agricultural production and give a high priority to support services; the potential for regional efforts; the need for increased, long-term financial support for research; adaptive research emphasizing the whole system of farming and the sustainability of the land; and the need for major research on new crop varieties, techniques for soil moisture conservation, land use, livestock diseases and systems and agro-forestry.

Examination of the previous USAID strategy, the present draft statement of AID Africa Bureau strategy, and the recent World Bank strategy document indicates that the WSARP strategy and approach fits well with all three. The project has in the past and will continue in the future to address institutional development, research, training and the development of high impact technology emphasizing selected, strategic commodities and interactions. A systems approach that emphasizes adaptive research is being applied to focus and interface with more conventional commodity and disciplinary research activities and to provide relevant information to agricultural policy makers. Important consideration is being given to land and water conservation, livestock systems, crop varieties and agro-forestry. This has been the orientation of the project from the outset and is being gradually accepted within ARC.

The necessary project infrastructure has been developed and most elements are now in place to meet the needs of such an approach. Promising research results are

already forthcoming. Continued support over the next several years will ensure the maturation and institutionalization of the approach and its support structure. In this regard, it has been proposed by the project that the project, AID, ARC, World Bank, CID/WSU and other relevant individuals and organizations come together to agree on project long-term support and to establish needs and priorities. Such a coordinated effort would be in agreement with World Bank and USAID strategies.

C. Project Status and Accomplishments

1. Construction Program

The Mission has questioned whether AID will support the completion of construction of El Fasher and Ghazala Gawazet, even though construction support of these stations, plus El Obeid and the Project Support Office in Khartoum, is co-financed by the World Bank (75% World Bank and 25% AID). The construction program as delineated in the WB and AID documentation, including the PP and PP Amendment, indicated the construction of research stations at 4 sites in the West (Kadugli, El Obeid, El Fasher and Ghazala Gawazet) and an ARC liaison and project support office in Khartoum. Principal justification was based upon site-specific research needs and a requirement to provide living, working, and support facilities which would enable the project to attract and retain scientists and technical staff to live and work in the West. In recent months, the project construction program has been stated by the Mission to be excessive and characterized as a housing project.

The construction program, except for Kadulgi, is considerably behind schedule for reasons defined in the Fourth and Fifth Year Annual Reports. These delays have delayed full development of the research program. The cost of the construction, unlike a number of other projects in Sudan, has remained within the original estimates and budget, except for the A&E costs. The latter have escalated due to the longer duration of the supervisory services required.

The Mission recently commissioned a construction value assessment, which has now been completed. The report commends the quality of the construction, reiterates the causes for the delays and recommends that the project, donors and contractor work closely to remedy the causes of the delays. In addition, discussions and planning activities involving the contractor, the A&E firm (Grube-Zimmer, inc), Mission representatives (project officer, engineer and assistant engineer), and World Bank representatives have recently been completed (February 1985). The results indicated satisfaction with the quality of the construction, a completion date of August 1985, and that construction on all stations should proceed without delay. It is our understanding that the latter is the recommendation of the Mission engineer.

2. Research Program

The research program is in its early evolution and will require further support and guidance for it to realize its full potential.

The preceding information indicated the present status and potential of rainfed agriculture in Western Sudan to contribute to the national economy and the current

6-year plan. In order for this potential to be fully realized, the crop and livestock producers must have access to transportation, roads, seeds, fertilizers, seed dressing, vaccines and medicines, as well as facilities and services to meet human social needs. The above described infrastructure is an important requirement for the development of an effective agricultural research capability in the West, as previously noted as a goal by Government and donors in 1978. However, production increases are already possible under present circumstances, and the project research program is designed to capitalize on infrastructural improvement as they become available.

The WSARP research program has demonstrated accomplishments and potential. The Sudanese scientists are just beginning to return from advanced degree training. Additional years of technical assistance and support are needed to fully establish the research program to integrate returning trainees and to institutionalize the systems approach to solving the problems of farmers and pastoralists in Western Sudan.

The project has identified promising interventions which can bring about short-term benefits while fulfilling the long-term objective of achieving sustainable increases in production, and conserving and improving the environment. These results reflect progress to date on the Project's major research thrusts, which are:

- a. Achieving sustainable increases in agricultural production of selected major food and cash crops, in a manner that restores and/or maintains the natural resource base.

- b. Maximizing utilization of the limited water resources for agricultural purposes through harvesting and conservation.
- c. Increasing the complementarity of crop and livestock enterprises to increase the productivity of both.

Technologies identified as promising are being immediately tested under producers' own conditions and then recommended for extension to wider clientele groups. These currently emphasize low inputs, especially those requiring foreign exchange. Those problems for which solutions are not evident will be referred to WSARP and ARC for selected on-station research activities. Recommendations to policy makers will be made from results which show high promise, but require infrastructural or policy changes for realization. Examples of promising preliminary results to date include the following:

- a. Phosphorus supplementation in sheep. This has great possibility in terms of improving productivity of sheep in the West. It is estimated that sheep production could be doubled by supplementation. Sheep are important as a commodity for local consumption, ready cash and export. In 1982 sheep and lambs were the third highest value export commodity. There is not at present an adequate supply of appropriate phosphorus forms in Sudan for extension of this intervention. Facilitation of importation or development of local sources should be encouraged, at least on a trial basis.

- b. Nitrogen-phosphorus fertilization. There is considerable evidence that cereal, legume and forage crop production can be greatly enhanced by the minimal inputs of nitrogen and phosphorus fertilization. The optimal and most cost effective combinations for increased production under Western Sudan's conditions are under study now. The ability of the infrastructure to supply these needs, however, is limited. Therefore, these studies have to depend upon the further development of a supportive infrastructure in order for the total benefits to be realized. The Project is examining alternative ways of increasing and/or maintaining soil fertility through use of appropriate crop rotations, incorporation of legumes in multiple cropping activities, etc., as well as investigating the optimal formulation of fertilizer itself for use in Western Sudan. Such studies could contribute to the reduction or elimination of fallow periods and stabilize crop production.
- c. Seed dressing. The crop producers of Kordofan and Darfur are generally aware of the benefits from the use of anti-microbial seed dressing for seeds that are to be planted. Such products are very limited in availability, however, and this represents an area in which the private sector could provide low cost inputs that could impact favorably on crop production.
- d. Cultural practices. Studies have shown that production can be significantly increased by the incorporation of a package of practices which include improved varieties, planting dates, spacing, early and timely weeding to conserve

moisture, etc. WSARP is developing such practices with low-input requirement for immediate application and generation of short-term benefits. Packages that include other inputs not yet consistently available to producers such as hybrid seed, fertilizer, seed dressing, etc., along with improved cultural practices, are being developed for the future. In this regard, it should be noted that the best combination of such practices appear to be highly site-specific. This is due to both agro-ecological considerations and socio-economic factors which affect labor availability and market situations that determine economic viability. Evidence of the marked difference between appropriate interventions at El Obeid and Kadugli indicate that in Darfur, conditions could also be substantially different. This merits a reconnaissance study at an early opportunity.

- e. New varieties. A number of new varieties, especially the early maturing varieties which have a comparative advantage under below average rainfall conditions, have shown to have potential for improving crop production. These are exemplified by the Sudan-developed Gadam El Hamam and Dabar sorghum varieties and Ugandi millet which are early maturing varieties. Dabar is somewhat later in maturing than is Gadam El Hamam, but has better grain quality and is more acceptable in terms of bread and assida preparation. Two other true breeding sorghum varieties from ARC/ICRISAT outperformed Gadam El Hamam and Dabar in 1983. These are being examined further and are definitely promising. Another potentially important contributor is the

introduction of the hybrid Hageen Dura #1. The WSARP will continue to test this hybrid, and has provided a short-term advisor from the U.S. private sector to assist with seed production. The use of the new hybrid is dependent on a dependable annual source of seed which is not currently available in the West. Also, tests at the University of Khartoum and the Gezira Research Station have shown that Hageen Dura #1 is highly susceptible to striga. Resistance to striga and/or the development of cultural practices to reduce infestation are also important considerations. WSARP is working on overcoming the striga problem in millet and sorghum in collaboration with the IDRC-supported program at the ARC and the University of Khartoum.

- f. Livestock supplementation. Project research has indicated that the lactation period in cattle can be doubled and milk production increased up to fourfold by the provision of a minimal amount of sesame cake as supplementation. This has the potential of improving food security for pastoral household consumption and increasing family income substantially through sale of lactic products, already a major commercial enterprise in the transhumant system. In addition, the resulting improved nutrition of young livestock can decrease mortality, and increase growth and maturation rates. With animal numbers and lactic product production less at risk, there is mounting evidence that market offtake can be dramatically increased. Other factors such as control of animal disease are also important.

- g. Animal-provided Transport. Cooperative research is being carried with the Animal Traction Project in Kadugli supported by the EEC. As a result of WSARP project activities to introduce bullock carts into the Nuba Mountain area near Kadugli, local farmers appear to be very receptive to the adoption of these carts which can provide an important labor-saving device for transport of commodities from the fields, of commodities to market, of water, and many other uses. An important labor constraint can be decreased. Economic studies are now underway. More rapid and effective transport can also open up parts of the clay plains to crop production to which access is currently prohibited by the long distance the villagers have to walk and transport produce on their heads.
- h. Livestock production in Southern Darfur and Kordofan. Livestock production in Southern Darfur and Kordofan is based primarily on a transhumant system with the livestock producers moving their animals out of the southern regions at the onset of the rains to escape mud, flies, and diseases; to graze on the high protein grasses that appear on the northern range during the rainy season; and to access livestock and milk markets in the north. Studies on possible means to redirect or limit this migration are ongoing. The Project has carried out activities which indicate that the southern-most provinces have great potential for increased numbers of livestock produced. This is not being realized, however, because of the adverse impact of fire and because the animals are moved out of this region during the rains. Current research indicates, however, that many of

these constraints to the year-round production of livestock in the south can be alleviated, thus increasing the potential for livestock production dramatically. High potential technologies to date include: seasonal mineral supplementation for large ruminants; seasonal control of external parasites (especially in small ruminants); limited helminth control in young livestock; and the introduction of a dry season controlled grazing system for currently unutilized high potential areas in Southern Kordofan. Current results indicate that introduction of the grazing system alone would increase livestock biomass in Southern Kordofan by 30 to 45%. This could be increased by another 50 to 100% with the incorporation of some of the additional management improvements. A pilot study to test the introduction of the above recommendations is being planned in cooperation with the Regional government. If successful, policy reform for land use in Southern Kordofan could result in greatly increased livestock productivity and relief of damaging ecological pressures on northern ranges. The input-high return interventions discussed above show great promise.

- i. Introduction of legumes into cropping systems. Initial studies have been conducted on the restoration of soil fertility using low input technology. Most promising appear to be the use of multiple purpose leguminous crops for intercropping and rotation. Cowpeas have been shown to yield beneficial soil fertility results while producing a desirable food crop and forage. Pigeon peas and mungbeans appear to offer a high potential alternative in some areas.

Interventions such as these should be tested under both traditional and mechanized conditions in the West as the need for attaining increased production on a sustainable basis, while decreasing the current environmental damage by extensive farming practices is great. Groundnuts, including several lines developed by ARC, have a high potential as a market commodity and yield a high quality forage by-product.

- j. Increasing water-use efficiency. WSARP is giving attention to the identification and testing of various technologies to harvest and conserve the limited water resources in Western Sudan for optimal agricultural use. Those showing promise to date have included mulching, weeding and spacing trials. Also under consideration for 1985 are water harvesting to conserve jebel runoff in Southern Kordofan and non-cracking clay/gardud runoff in Northern Kordofan and Southern Darfur. Although they have not been given priority to date by WSARP, there appear to be several readily applicable technologies for decreasing evaporation losses from hafirs.

In conducting its research program, WSARP has established ongoing cooperative efforts with the IARCs, CRSPs, projects funded by the World Bank and other donors and Sudanese organizations. Effective inter-relationships have been established with the regional governments of Kordofan and Darfur. Thus, cooperation and coordination of efforts have been emphasized.

The project has been continuously monitored by CID/WSU and by the donors. These efforts and the

mid-project external evaluation are described in the Year 4 and Year 5 Annual Reports. A number of recommendations were forthcoming from the mid-project evaluation which were subsequently addressed by the project and CID/WSU. Most of these recommendations have been satisfactorily met, while others have not due to factors taht are beyond the control of CID/WSU and the project.

In addition, the AID Mission contracted for an external evaluation completed in August, 1984. The evaluation report was very supportive of the project's activities, and recommended that support for the present project be extended for an additional five years.

3. Staffing

Sudanese scientists to fill most of the projected scientific positions in WSARP have been identified, some are still in training and a growing number have returned to the project. These individuals have received excellent training, but are inexperienced in the design and conduct of research, especially as being conducted by WSARP. Because of this, TA inputs by experienced U.S. research scientists are needed. This represents one reason for the extension of the current TA activities.

Additional scientists and technicians are required and must be recruited and retained. Uncertainty about future project support influenced by rumours and a lack of communication and coordination between donors and the project have adversely impacted not only recruitment of scientific and technical staff, but also the effectiveness of all associated with the project.

A climate of adversity instead of mutual trust and understanding has been created.

WSARP has had difficulty in hiring technical and trained support staff to live and work in the West. The completion of the research stations, continued donor support, continued development and implementation of a training plan, and internal project training capability will also assist in meeting these staff needs.

U.S. T.A. staff have provided program continuity unusual in most AID projects. Some staff are now in their third tour. Several non-project funded short-term TA inputs have been supported by WSU and other CID universities under the auspices of the strengthening grants and WSU's MOU agreement with USAID, and by university funds.. Additional TDY's would strengthen the research program.

The Mission has recently proposed the immediate elimination of positions for the Senior Research Advisor, the Project Engineer, and the elimination in April of the Administrative Officer position. Since the former two individuals hold AID-approved contracts through 14 August, 1985, and the project will be responsible for salary continuation until that date, this does not seem economically reasonable. In addition, both individuals have nearly five years of experience in their positions in Sudan, and would be invaluable in the training of successors. The administrative position is absolutely essential during the next 6 critical months, when arriving equipment must be cleared, inventoried, and an orderly transfer made of administrative activities to El Obeid and the

new Khartoum office. CID/WSU cannot function without this position adequately staffed.

4. Requirements for Project Success and Sustainability

CID/WSU is concerned about the sustainability of the project beyond the current technical assistance contract, and the smooth and efficient phase down of both dollar and local currency support from the donors. CID/WSU is also concerned about the availability of resources, both human and monetary, to carry out the CID/WSU responsibilities to the end of the contract period. These latter needs are included in the contract. Proposed elimination of the three positions (mentioned above) would jeopardize contract effectiveness. CID/WSU and the Project, through Dr. Dafalla, have indicated that continuation of these positions through August 1985 is necessary. Little monetary savings will be realized and the rationale that elimination of the positions will force the GOS to assume more project responsibility is inconsistent with present project needs and time constraints. CID/WSU is also anxious to work with the donors to assist in the transition from the present contract to an extension, if such occurs.

The following are viewed as essential for long-term project success and sustainability:

- a. Continued donor support over an extended period as articulated in both WB and AID development strategies. The recent external evaluation of the project recommended continued support for an additional five years.

- b. Development and implementation of a strategy involving both central government through the ARC and regional governments for long-term support of the recurrent costs.
- c. Effective project administrative and support capabilities and infrastructure.
- d. Establishment of a stable work environment and funding that are conducive to the recruitment and retention of scientists and technical staff.
- e. Time and activities directed to the integration of returning scientists into the project philosophy and program and for their maturation as established researchers.
- f. Hiring and training of additional scientists and technical staff.
- g. Effective prioritization and conduct of research.
- h. Interface of project activities effectively with other development activities in the West.
- i. Coordination of project activities with the ARC activities, other Sudanese organizations, other projects, IARCs and other national and international organizations.
- j. Mechanisms for dissemination of research findings to the producers through cooperation and coordination with regional and national extension efforts and the private sector.

3. Recurrent Cost/Needs and Mission Projections

The ultimate sustainability of the WSARP research program is clearly dependent on the ability and commitment of the GOS to assume responsibility for the recurrent costs of its operation. However, the determination of what is a reasonable level for long-term support by the GOS and the establishment of a reasonable time frame for assumption of these costs are complex issues, given the present economic realities of Sudan.

A recent communication by the USAID Mission to Sudanese Project Director, Dr. Dafalla, proposed cutbacks and redirection of USAID support to the project. Included as an attachment was an analysis of recurrent costs upon which the proposed cutbacks were based. The communication is attached for reference. The analysis concluded that, based on current operating expenses for Khartoum, Kadugli and El Obeid and projected expenses for the Darfur stations, substantial costs savings could be realized by the elimination of the Khartoum Project Support Office/ARC Liaison Office and concentration of all WSARP activities at Kadugli and El Obeid. However, this analysis was apparently made by persons with limited familiarity with the project and failed to take into account a number of factors which have affected expenditures at each location to date. Furthermore, the analysis does not address the functional consequences of the proposed changes. As a result, the project questions the validity of the conclusions. Project concerns are as follows:

- a. According to the Mission communication, a 1984 audit of the WSARP concluded that "based upon GOS contributions thus far, ...the GOS has not

demonstrated the financial commitment and resources to absorb this increase [of recurrent costs]." According to project documents, the GOS regular budget is responsible for 40% of the aircraft operating costs, 30% of the Sudanese salaries, a portion of clearing and forwarding costs, and a portion of the construction costs. Other development and operating costs were to be financed primarily by the donors. To the best of our knowledge, no amendments to the original agreements have been made which would have required the GOS regular budgets to assume responsibility for additional operating costs up to the current time. Therefore, to base future GOS commitment on their payment of operating expenses to date, when the latter was not required, seems premature. The government has already established a committee which is addressing this issue.

- b. The attached "WSARP Recurrent Cost Analysis" uses estimates of current operating and salary expenses at Khartoum, Kadugli and El Obeid as baseline expenditures and projects potential cost savings on the basis of these figures. Since the project is still in a development stage, using current figures as a baseline results in severe distortions. The most important of these is in the current expenditures for Khartoum. Since the facilities at El Obeid are not yet completed, all administrative and training functions associated with the Project Headquarters are temporarily located in Khartoum. Since these activities were always planned to be located permanently at El Obeid, movement of Project Headquarters staff and activities to El Obeid represents no cost savings

over existing project plans. The project has had to rent office facilities in Khartoum to house the activities of the Project Headquarters and Project Support Unit pending completion of the El Obeid station and the PSU buildings at Shambat. The stated project recurrent cost savings on rental costs for Khartoum are therefore invalid, since such costs will terminate when the PSU building is completed later this spring.

Numerous other costs are currently included under Khartoum expenditures to date which are not valid for projections of future Khartoum budgetary requirements. For instance, all fuel and local vehicle maintenance materials are purchased in Khartoum, regardless of their final destination. Current Khartoum expenditures thus reflect the extraordinary project fuel requirements for transportation of force account materials, of all the imported and locally procured equipment and materials associated with station development and start-up, and support of the construction activities at all sites. Costs associated with the clearing and forwarding of imported materials are also very high during this development stage, but will not continue at this level. While these costs will remain high during the current project year, they will have been projected to decline when the station development phase is completed. However, all fuel and operational supplies will always have to be transported from Khartoum, since supplies in the West are virtually non-existent. Thus the project cost savings indicated in the Recurrent Cost Analysis from withdrawing support from the Khartoum office are illusory. The project does not provide general transportation

support to the ARC now, as implied in the recurrent cost analysis, so cost savings in this area are limited.

- c. Elimination of all support activities from Khartoum is not feasible from an operational standpoint. Because of the limited infrastructural and support capabilities in Western Sudan, it was always recognized that a minimal support office would be required in Khartoum. Aircraft maintenance and scheduling; procurement of fuel and operating supplies; communication, both in-country and international; banking; international travel arrangements; liaison with ministries, donors, the ARC and other cooperating organizations; and a host of other activities can only be carried out effectively, or in some cases, at all, in Khartoum. While project administrative activities will be based in El Obeid, Mr. Osman Abdalla has always been projected to head this small support office (PSU) at Shambat. This facility is also to be used as a liaison office for senior ARC administrators in Khartoum, to ensure that the project activities remain effectively integrated with the ARC. Without this support and liaison capability, effective conduct of project activities in the West would simply not be possible. This has also been the conclusion reached by other projects such as the Western Savannah Development Project.
- d. The Kadugli station is nearing 100% operational status, except that some of the senior scientific staff positions are temporarily filled by expatriates and a few support positions are vacant. The recurrent cost analysis refers to the

potential elimination of five middle and five junior staff positions, but there is no reference to the nature of these positions. As the staffing pattern has been revised several times during the course of the project and is now already cut back to a bare minimum, it is difficult to identify any non-essential positions to cut.

- e. As was done in Kadugli, the EL Obeid station has initiated preliminary research activities prior to completion of the El Obeid facilities in order to move the research program forward as rapidly as possible. The small scientific and support staff are operating out of temporary quarters at the Gum Arabic Research Station and in rented facilities. The horticultural farm satellite station is operational, but not yet completed, and the station farm is not yet developed. Thus, the El Obeid program is still in its embryonic stages and its current expenditures reflect only a fraction of the total operating expenses projected for El Obeid. Most of the scientific staff, for instance, are still abroad for training. The recurrent costs projected in the Mission's analysis appear to bear no relationship to existing project planning budgets. As the basis for these projections is not clear, it is difficult to respond to specific items. However, basing recurrent cost savings on existing operating costs is clearly not feasible for either El Obeid or Khartoum.

- f. Termination of support to the Darfur stations would obviously result in cost savings. Whether this would be the best course from a programmatic and political cost/benefit perspective is less

clear. The level of support required for these stations is considerably lower than for the larger stations in Kordofan. It may be that a portion of the on-station research activities can be conducted in similar physical sites in Kordofan. However, research results from Kadugli and El Obeid have emphasized that the project's strength lies in adapting technologies to the specific requirements of the socio-economic, biological and physical context of the producers. This can only be done by having scientists conduct their adaptive research activities in cooperation with producers, which cannot be accomplished from a distant research station. It is the project's opinion that significant production increases and beneficial environmental impact can be accomplished in the Darfur Region at a reasonable cost. The regional government has been working with the project over the past two years to determine research priorities and focus and has demonstrated regional commitment and support to the project. The Darfur Region has also been among the areas most severely affected by the last two years' drought. To withdraw support at this time would undoubtedly have political repercussions.

In summary, the attached recurrent cost analysis is very useful in raising questions about future project support and identifying areas where clarification of current costs is necessary. However, because of the complexities inherent in basing recurrent operating costs on past and present development costs, the project questions the conclusions reached. It is essential that the question of long-term support be addressed by the project, ARC, and GOS in cooperation

with donors to ensure decisions are based on the best available information.

F. Recommendations

In order to protect the present investment in the project and to realize its potential for contributing to the Sudan and Sub-Saharan Africa, the following recommendations are made:

1. Donors, GOS and project cooperate closely to avoid acting in isolation with limited information;
2. Donor support be provided for an additional 5-10 years, based upon an agreed strategy;
3. Coordinated planning efforts involving GOS, ARC, AID, WB, CID/WSU and WSARP be carried out in the immediate future to determine future directions, priorities, recurrent cost needs, and sources and levels of future support; and
4. TA positions be continued through the current CID contract as defined in the contract and project documents.

25 Feb 1985

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Table 1
TOP TWELVE (BY VALUE) AGRICULTURAL COMMODITIES
EXPORTED FROM SUDAN
1982

RANK (BY VALUE)	COMMODITY	UNIT	QUANTITY	VALUE
				LS. 000's
1.	COTTON	BALES	450,064	121,130
2.	SORGHUM	M.T.	412,768	107,474
3.	SHEEP AND LAMBS	HEADS	560,412	59,053
4.	GROUNDNUTS	M.T.	179,641	53,554*
5.	SESAME	M.T.	76,373	42,864*
6.	GUM ARABIC	M.T.	27,595	38,279
7.	WATER MELON SEEDS	M.T.	42,210	13,678
8.	HIDES AND SKINS	M.T.	5,734	8,913
9.	CATTLE, CAMELS & GOATS	M.T.	17,394	3,115
10.	HARRICOT BEANS	M.T.	3,815	3,035
11.	KERKADEH	M.T.	2,973	2,658
12.	MILLET	M.T.	7,392	2,495

SUB TOTAL				456,248 (94.4%)
OTHER COMMODITIES				26,853 (5.6%)
<u>TOTAL</u>				<u>483,101 (100.0%)</u>

* INCLUDES SEEDS, CAKE, OIL AND MEAL

- SOURCES: 1. APPENDIX III SUDAN FOREIGN TRADE EXPORTS BY COMMODITY 23RD. ANNUAL REPORT, BANK OF SUDAN MARCH 1983.
2. SUDAN GUIDE 1983 - 1984 PLANNING AND MANAGEMENT CONSULTANCY, KHARTOUM

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