

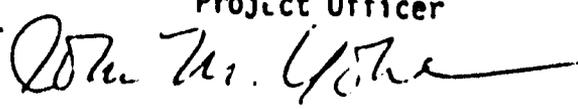
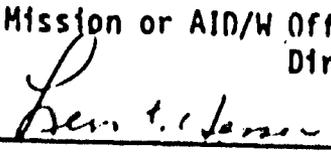
PD-AAN-077

ISN 22395

PROJECT EVALUATION SUMMARY  
(Submit to HQ/PAV after each project evaluation)

1. Mission or AID/W Office Name DS/AGR/CP			Project Number 931-0452
Project Title Inheritance and Improvement of Protein Quality and Content in Sorghum bicolor (L.) Moench			
4. Key project dates (fiscal years) a. Project Agreement Signed FY 1966			5. Total U.S. funding life of project \$ 2,956,000
b. Final Obligation FY 1978			
c. Final input delivered FY 1979			8. Date of this Evaluation Review 10 / 6 / 77 month/day/year
6. Evaluation number as listed in Eval. Schedule	7. Period covered by this evaluation FROM: Month/year 9/18/75 TO: Month/year 10/77		
9. Action Decisions Reached at Evaluation Review, including items needing further study (Note--This list does not constitute an action request to AID/W. Use telegrams, airgram, SPARS, etc., for action)  Extend current project thru March 31, 1979 which time it is anticipated that the current activities will be incorporated into the new Title XII Collaborative Research Project on Sorghum/Millet		10. Officer or Unit responsible for follow-up  DS/AGR/CP and Purdue University	11. Date action to be completed.  March 1979

12. Signatures:

Signature: 	Signature: 
Typed name: John M. Yohe	Typed name: Leon F. Hesser
Date:	Date: 5/31/78

13. SUMMARY - Summarize in about 200 words the current project situation, mentioning progress in relation to design, prospects of achieving purpose, major problems encountered, etc. Significant progress has been made in the development of high lysine sorghum lines with better endosperm characteristics. Mutation induction has been effective in generating several mutants which have both improved protein quality and modified vitreous grains. Two mutants which have high lysine, vitreous endosperm and good agronomic characteristics have been identified. An exhaustive survey of 1300 Ethiopian varieties has been completed and evaluated for protein quality and quantity, tannin content, seed size, and evident seed quality characteristics. Special mention should be made of one of these lines which has repeatedly shown approximately 20 percent protein content in a normal appearing, plump seeded variety. This level of protein is significantly higher than anything documented in sorghum before. Major emphasis has been placed on the agronomic improvement of previously identified high lysine sources of germplasm. A high lysine random-mating population is also being increased for distribution in 1978 to provide germplasm for recurrent selection programs by LDC breeders. Recent major accomplishments in the biochemistry of sorghum tannins have been largely methodological through the development of a simple, but sensitive test for phenolic materials which, it is believed, is the best assay available for sorghum tannin. Rapid techniques are being developed for analytically fractionating sorghum tannins by high performance liquid chromatography. Several simple chemical treatments of whole sorghum grain to determine whether the tannin content can be lowered are being investigated. No major problems have been encountered.

14. EVALUATION METHODOLOGY - Describe the methods used for this evaluation, i.e. was it a regular or special evaluation? was it in accordance with the Evaluation Plan in the PP with respect to timing, study design, scope, methodology and issues? What kinds of data were used and how were they collected and analyzed? Identify agencies and key individuals participating and contributing. This was a regular evaluation. The Project Officer visited with research personnel and observed experiments in the laboratories and fields. A special presentation of research results lasting one and a half days was made. The key individuals who participated and contributed were:

J.D. Axtell, Prof., Plant Genetics  
L.B. Bauman, Prof., Plant Genetics  
M.W. Phillips, Head, Department of Agronomy  
P.P. Cantrell, Assoc., Prof., Plant Genetics  
T. Kelley White, Director of International Programs  
Larry Butler  
Martin Prince  
E. Mertz  
Roy Featherston  
Robert Elkin  
Vic Lechtenberg/G. Ejeta/Stephen Van Scoyoc/Paul Christensen

15. Documents to be revised to reflect decisions noted page 1 (other side:)

Project Paper (PP)    Logical Framework    CPI Network    Financial Plan

PIO/T    PIO/C    PIO/P    Project Agreement    Other

This evaluation brought out ideas for a new project  
a Project Identification Document (PID) will follow.

13. **SUMMARY** - Summarize in about 200 words the current project situation, mentioning progress in relation to design, prospects of achieving purpose, major problems encountered, etc. Purdue University Contract AID/ta/c/1211 entitled "Inheritance and Improvement of Protein Quality and Content in Maize" terminated March 31, 1978. The starting date for this contract was June 30, 1975, but the overall financial support by A.I.D. for the research at Purdue covered approximately an eight-year period.

Although the chief aim of the cooperative undertaking, i.e., increasing the quantity and nutritional value of food crops in developing countries, was not attained, the expenditure of A.I.D. funds can nevertheless be considered as worthwhile. Much knowledge has been added to the field of the breeding genetics, and biochemistry of endosperm of maize; deposition of starch; quality and quantity of protein; associated characters such as oil content and quality, starch composition, and insect and disease resistance; effects of associated genes both singly and in combinations with Opaque-2; and the nutritional values of maize with various qualities of protein.

There have been a total of 109 publications and abstracts of research reports by the Purdue project staff during the period the project was supported by A.I.D. (See Appendix F). This extensive store of knowledge will be of value not only for the continuing research at Purdue but also at other institutions over the world doing research on cereal grains.

Germplasm containing Opaque-2 and a number of other endosperm-conditioning genes, along with various modifying genes, in various genetic backgrounds have been distributed to a large number of LDCs, European countries, and corn breeders in the U. S. and Canada. The Purdue scientists have worked with maize scientists in 13 different LDCs as well as with a number in the Eastern European block. They have trained 21 graduate students, 9 postdoctorates, and 10 trainees representing 7 different countries.

Scientific breakthroughs are unpredictable. They can occur at any time. A.I.D. should maintain liaison with the research which will be continued (although on a reduced basis) at Purdue, and be in position to exploit future findings that could be utilized in the LDCs.

14. **EVALUATION METHODOLOGY** - Describe the methods used for this evaluation, i.e., was it a regular or special evaluation? Was it in accordance with the Evaluation Plan in the PP with respect to timing, study, design, scope, methodology, and issues? What kinds of data were used and how were they collected and analyzed? Identify agencies and key individuals participating and contributing.

The terminal evaluation of Purdue University Contract AID/ta/c/1211 was held at the Department of Agronomy, Purdue University, West Lafayette, Indiana on April 18 and 19, 1978. There was no provision in the Project Statement (1) for such a review. The evaluation was made in accordance with customary procedure with respect to A.I.D. research contracts.

Mr. Keith M. Byergo, Project Manager, provided the members of the Review Team with a number of relevant documents (1 to 9) in a mailing made on March 26, 1978. Dr. David V. Glover, Principal Contract Investigator, complying with a request made by Mr. Byergo sent to each team member, under date of April 7, a copy of a "brief overview of the project developments" (10).

16. Evaluation findings about EXTERNAL FACTORS - Identify and discuss major changes in project setting which have an impact on the project. Examine continuing validity of assumptions. None

17. Evaluation findings about GOAL/SUBGOAL - For the reader's convenience, quote the approved sector or other goal (and subgoal, where relevant) to which the project contributes. Then describe status by citing evidence available to date from / specified indicators and by mentioning progress of other projects (whether or not U.S.) which contribute to same goal. Discuss causes--can progress toward goal be attributed to project, why shortfalls? The sector goal is to increase quantity and nutritional value of crops, and significant increase in per capita production of major food crops in LDCs. See Block 13 for available evidence of contribution to project goal. AID contracts supporting research on sorghum at Texas A & M and the University of Nebraska contribute to the same goal.

Evaluation findings about PURPOSE - Quote the approved project purpose. Cite progress toward each End-of-Project Status (EOPS) condition. When can achievement be expected? Discuss causes of progress or shortfalls. The Project Purpose is to develop varieties of sorghum with improved protein quality, high yield and multiple disease resistance to diseases and insects and make these available to LDCs along with improved techniques of cultural practices.

Sorghum varieties with improved protein quality and also a vitreous endosperm needed for human acceptance have been developed.

19. Evaluation findings about OUTPUTS and INPUTS - Note any particular success or difficulties. Comment on significant management experiences of host contractor, and donor organizations. Describe any necessary changes in schedule or in type and quantity of resources or outputs needed to achieve purpose. The successful research findings developed under this project are stated in Block 13.

Evaluation findings about UNPLANNED EFFECTS - Has project had any unexpected results or impact, such as changes in social structure, environment, technical or economic situation? Are these effects advantageous or not? Do they require any change in plans? The project has not had any unexpected results or impact.

21. CHANGES in DESIGN or EXECUTION - Explain the rationale for any proposed modification in project design or execution which now appear advisable as a result of the preceding findings (items 16 to 20 above) and which were reflected in one or more of the action decisions listed on page 1 or noted in Item 15 on page 2. The research should be planned to terminate under this project after a one year extension and continued under the Title XII Collaborative Research Project on Sorghum/Millet.

The results of this project are very likely to be used in the LDCs but a greater effort by the project personnel is needed to speed up the knowledge transfer more rapidly and effectively.

22. LESSONS LEARNED - What advice can you give a colleague about development strategy-- e.g., how to tackle a similar development problem or to manage a similar project in another country? What can be suggested for follow-on in this country? Similarly, do you have any suggestions about evaluation methodology? Reference is made in the contract to transmitting the research results and materials to LDCs. Linkage relationships and coordination with international, national and regional agencies are programmed to be developed. Heavy emphasis is laid on cooperation with the applicable international centers. This is a good avenue to pursue but has its limitations. Many of the LDCs, which so sorely need the benefits of research, do not have qualified staff to carry out breeding programs, site-specific experiments and screening trials. It is in these countries that the research results available from this and related projects are needed so badly so that the benefits can be extended to the farmers to help them overcome their food deficits. Providing published research information and seeds of improved lines to LDCs is an excellent idea. Unfortunately the "research staffs" in the LDCs where sorghum is a major food crop lack the experience and training to assimilate these research results by carrying out breeding programs or conducting satisfactory yield and screening trials. Visits by project staff members to the LDCs and collaborating more closely with the LDC workers will help overcome these limitations.

SPECIAL COMMENTS or REMARKS (For AID/W projects, assess likelihood that results of project will be utilized in LDC's). See Number 21.