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PROGRAMME PLANNING

COUNTRY AND INTERCOUNTRY PROGRAMMES AND PROJECTS

CONSIDERATION AND APPROVAL OF GLOBAL AND INTERREGIONAL PROGRAMMES AND PROJECTS

Project recommendation of the Administrator

Assistance for a global project

Technology Transfer on Food and Forage Legumes in West Asia and North Africa
(GLO/85/001)

Estimated UNDP contribution	\$1,000,000
Duration:	Three years
Executing agency:	UNDP

I. BACKGROUND

1. The International Center for Agricultural Research in the Dry Areas (ICARDA) in the Syrian Arab Republic is part of the network of international agricultural research centres sponsored by the Consultative Group on International Agricultural Research (CGIAR). The primary concern of ICARDA is rainfed agriculture in a region that includes much of the vast arid and semi-arid areas of North Africa and West

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Asia. This region has a Mediterranean-type climate, with hot, dry summers and relatively cool, moist winters. Those parts of the region receiving ICARDA's attention are limited in their opportunities for agricultural improvement by a lack of water, having annual rainfall values ranging from 600 mm. down to 200 mm. or even less, making sustained agriculture difficult.

2. From Pakistan in the east to Morocco in the west, most of the countries in ICARDA's region are struggling to feed themselves. In most years, they fall short of the goal. The region's chronic food deficit is among the most serious in the world. With population growing rapidly and the cost of food imports rising along with general price inflation, the people of the area are having to eat less.

3. In its effort to increase food production and raise rural living standards in the region, ICARDA maintains programmes for the improvement of three principal groups of food crops: basic cereals, including bread wheat, durum wheat, barley and triticale; legumes, including lentil, chick-pea and faba (or broad) bean; and forages. As an essential complement to the crop programmes, the farming systems programme develops improved techniques and technologies for exploiting the high-yield potential of improved crop varieties acceptable to traditional farmers.

4. ICARDA researchers are also studying the relationships between soils and crops and the potential for management of soil water and nutrients under the various climatic conditions in the region. The major emphases of this research are nitrogen and phosphorus fixation, nitrogen mineralization and subsequent use of nutrients by crops in various rotations under different conditions of soil fertility and moisture. Specific studies of traditional and potential cropping systems, including crop-livestock mixtures, are important for the integration of the centre's crop improvement, agronomy and livestock-management research. Studies on weed control will enable researchers and farmers to compare the relative benefits of the increased crop production resulting from eliminating weeds, with the value of weeds as livestock feed.

5. In order to achieve the above goals, ICARDA has established the following objectives:

- (a) To develop and conduct research in improved cropping, livestock and cropping-livestock systems;
- (b) To serve as an international centre for research into the improvement of barley, lentils and faba beans;
- (c) To serve as a regional centre, in co-operation with other appropriate international agricultural research centres, for research in other crops of major importance to the region, such as wheat and chick-peas;
- (d) To collaborate with and foster co-operation and communication among other national, regional and international institutions in the development of adaptation, testing and demonstration of improved crops, farming and livestock systems; and
- (e) To foster and support training in research and other activities carried out in the furtherance of its objectives.

6. Several research activities of ICARDA are carried out in close collaboration with the Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT), dealing with wheat and barley, and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) relating to farming systems and food legumes. Both CIMMYT and ICRISAT are currently receiving substantial UNDP assistance under the global programme designed to help increase food production in developing countries. ICARDA's principal research station has been established in Aleppo near Damascus, Syrian Arab Republic, on a 950 hectare site where experimental trials are already under way. Permanent buildings are being constructed and will be completed in different stages. Co-operative research agreements have been made with the Governments of Cyprus, Egypt, Jordan, Pakistan, the Sudan and Tunisia. Similar arrangements will be made with other countries in the region. ICARDA's research on maximizing the utilization of soil nitrogen through legume/cereal crop rotations and efficient use of available water in the arid and semi-arid regions of the countries being served by ICARDA has the potential for substantially increasing food production.

7. The soil, water and nutrients research referred to above forms the main thrust of the UNDP-sponsored effort at ICARDA since July 1978. To date, this project has conducted research on five sites, representing a range of different rainfall characteristics. Crop yields have been increased with application of phosphate fertilizer under very dry conditions. It has also been demonstrated that under less than 300 millimetres of rainfall, a fallow system contributes to a build-up of available soil nutrients, particularly nitrogen. In light of these studies, dry areas under 300 mm of rainfall may have more potential than had been thought previously, and it is possible their major yield increases of specific crops can be attained economically. However, these investigations are presently being conducted in the vicinity of the main station near Aleppo, and they have to be extended to other areas and countries in the region to conclusively demonstrate the potential. With the experience gained during the last five years of the UNDP grant, ICARDA is confident that the methods used can be further refined and extended to other regions, thereby contributing to significant production increases of crops being grown under very dry regions which are dependent almost exclusively on very limited rainfall.

8. Since July 1983 UNDP assistance has enabled ICARDA to continue, expand and intensify the research and training programmes in improved efficiency of soil water use and enhancement of biological nitrogen fixation through legumes. While it is usually believed that the main role of the fallow system is to conserve water, ICARDA's studies have shown that more important to traditional methods of management is the accumulation of mineralized nitrogen which is available to the next cereal crop. This is the reason why food, pasture or forage legumes, which are able to fix atmospheric nitrogen in root nodules and therefore do not deplete the stock of mineralized nitrogen in the soil, are the best choice of crops to replace fallow. Part of ICARDA's scientific resources is devoted to increasing the yields and quality of three food legume crops - faba beans, lentils and chickpeas. All three are able to fix atmospheric nitrogen, so they produce seed which provide a relatively cheap, good quality protein food, even in soils that are deficient in nitrogen. For this reason, they are important food crops in West Asia and North Africa, as well as in other developing regions where, because of latitude or

altitude, the climate is similar. In addition to their role in nutrition, the inclusion of any of these three legume crops in cereal-based rotations improves productivity of the whole cropping system and reduces dependence on nitrogen fertilizer, while their by-products serve as valuable animal feed. ICARDA dedicates part of its resources to the improvement of another large group of cultivated legumes; those that provide pasture and forage for sheep.

9. UNDP's support of specific research in the soil/water/nitrogen studies outlined above will come to an end in June 1985. While these activities will be continued with assistance from other sources, further UNDP support for a period of three years, beginning 1 July 1985, is requested for an expanded programme of training, focusing entirely on food and forage legume crops, biological nitrogen fixation and the role of legumes in dryland agriculture systems.

II. THE PROJECT

10. The main purpose of the project is to enable ICARDA to further strengthen national research institutions through an expanded programme of training and technology transfer dealing with food and forage legumes. Specifically, the project has three main goals:

- To strengthen research capabilities of national institutions in countries where the potential is good for increasing crop and livestock production, by the extended use of food, pasture and forage legumes, in place of fallow;
- To promote appropriate adaptation of new technologies for the production of food and forage legumes from ICARDA, by providing new materials and know-how to national scientists and institutions and by providing technical support and assistance on a continuing basis; and
- To promote, by the development of training and research networks, the active exchange of materials, information and ideas among national programmes.

11. ICARDA's plan of work for the improvement of food and forage legumes has three closely linked components: a research component; collaboration between the Center and national programmes for the planning and conduct of research and training; and a training component. Only the last two are included in the request for UNDP assistance; the research component is part of the on-going core research programme at ICARDA and is at present funded from other core sources.

12. The following are the main parts of the on-going core research programme at ICARDA with which the extended training activities will be associated:

(i) the development and testing of high yielding varieties of food legumes with good seed quality and resistance to diseases and pests; (ii) use of existing genetic resources of vetch, peas and lathyrus, as a source of forage crops with improved herbage and seed yield, and the selection and breeding of varieties

resistant to the major foliar and root diseases of the region; (iii) identification of adapted strains of medic or other annual legumes for use in crop systems in which self-regenerating pasture legumes alternate with cereal crops; (iv) studies of seasonal changes in native soil micro-flora as an aid to selection of superior Rhizobium strains for diverse environmental conditions (soils and climate); (v) determination of the Rhizobium requirements of food, pasture and forage legumes and their interactions with sites; selection of superior Rhizobium strains and the development of effective inoculation procedures; (vi) development of methods to recognize individual strains of Rhizobium species (e.g. intrinsic antibiotic resistance patterns; use of diagnostic methods as a means of monitoring the fate of inoculant strains in field trials; (vii) study of the effect on nitrogen fixation of damage to nodules, caused by Sitona weevil, and the development of economic methods of control; (viii) formulation of improved management practices that will make the best use of the combination of superior legume host plant and Rhizobium strains; (ix) studies of the effects on soil, cereal crop and animal performance of food, pasture and forage legumes in crop rotations; and (x) development of technology for the production of seed of food, pasture and forage legumes.

13. Collaboration with national programmes will focus on the transfer of new plant materials and technology from the Center to national programmes, through the establishment of training and research networks. While ICARDA will plan to use its on-going research programme as a working example wherever possible, a principal objective of the project will be to strengthen the capability of national institutions to conduct work on food, pasture and forage legumes as productive alternatives to fallow. Training and collaboration activities will be designed for a range of participant groups, from senior scientists and research planners to research technicians. Part of the collaborative activity will be in the form of annual workshops aimed at senior regional scientists and research planners. The first three such workshops will address the topics of (i) biological nitrogen fixation in dryland legume crops; (ii) the role of food, pasture and forage legumes in cereal/legume crop rotations in the region; (iii) genetic resources and their utilization for legume crop improvement.

14. Although ICARDA will assume financial and organizational responsibility for the workshops outlined above, it will identify other regional and national institutes to act as hosts for at least two of the three proposed workshops. Collaborative activities will include monitoring tours by ICARDA and senior regional and national scientists, to give on-the-spot guidance, travelling workshops similar to those now conducted jointly for cereals by ICARDA/CIMMYT and national programmes. A conscious effort will be made by ICARDA to link the activities of the training and research networks developed by virtue of this project with other similar networks that are active and developing (e.g. the Rainfed Agriculture Information Network (RAIN), to be sponsored by the United States Agency for International Development (USAID), initially to serve countries in West Asia and North Africa, and in which ICARDA will play a principal role).

15. The training component will consist of the following: (a) residential training courses for research technicians and assistants, consisting of classroom, practical laboratory and field training; (b) special subject, short courses and in-country courses for periods of from one to three weeks; (c) training for

post-graduate fellowships to conduct thesis research (Ph.D. and M.Sc.) related to regional and national priorities, under the supervision of ICARDA scientists. Wherever possible, the students will be registered with regional universities; and (d) two two-year fellowships for positions of assistant training officers, one of which will be funded by the proposed UNDP project, one from other core sources. The goal of this part of the programme is to strengthen the training capabilities of national programmes by providing an intensive training experience for future training officers in the design, development, implementation and evaluation of training activities.

16. The Administrator intends, through contractual arrangements between ICARDA and UNDP, to entrust the implementation of this project to ICARDA with the clear understanding that the Directorate of ICARDA will seek the advice of the Food and Agriculture Organization of the United Nations (FAO). As in the past, UNDP will follow closely all the developments in this global project and, together with FAO, will participate in the Project Advisory Committee which will be established for the project. A concerted effort will be made for linking the activities to be undertaken at the country and intercountry levels. The Project Advisory Committee normally will meet at a time deemed appropriate by ICARDA and UNDP to appraise on-going activities and to advise on future direction. Specialists from other international centres will be invited, as appropriate, to serve the Committee.

17. Midway in the course of the project, UNDP, in consultation with ICARDA, might decide to schedule an evaluation of project activities to be undertaken by a team of two or three independent consultants. Such an evaluation, if needed, could be undertaken in conjunction with one of the Project Advisory Committee meetings mentioned in paragraph 16. In any event, towards the completion of the project, a thorough evaluation of the results and accomplishments of the project will be mounted by UNDP, in consultation with ICARDA, to be carried out by independent and prestigious consultants.

18. The proposed support to be extended to ICARDA by UNDP during the first full year during 1986 represents 20 per cent of the total running core budget of the relevant programmes of the Institute, which is estimated at \$ 5 million. During the project period 1985-1988, the proportion is expected to remain approximately the same. The balance of ICARDA's budget is being financed by other members of the Consultative Group on International Agricultural Research. UNDP will not contribute towards any capital expenditures which might be made by ICARDA in addition to its regular budget.

19. The expenditure component of the proposed UNDP contribution is:

Subcontract	900 000
Direct costs	<u>100 000</u>
Total	<u><u>1 000 000</u></u>
