

**IRAQ:**

**COUNTRY REPORT  
TO THE FAO INTERNATIONAL  
TECHNICAL CONFERENCE  
ON PLANT GENETIC RESOURCES**

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# CHAPTER 1

## Introduction

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Since ancient days Iraq was known as the valley of the two rivers Mesopotamia. Its bountiful land, fresh waters, and varying climate contributed to the creation of deep-rooted civilization that had fostered humanity from its affluent fountain since thousand of years.

Iraq is situated between longitudes (38° 48'E) and between latitudes (29°37 N). In length from north-west to south-east it approximates (1,000 Km) and in width about (500 Km). The widest region from the Jordan to the Persian border near Rawandoz will be about 750 Km. In area it covers about 4,444,500 sq. Km. more than half of this area, comes strictly under the arid zone. Being not far away (about 400 Km.) from the Mediterranean Sea on the west, about 1,000 Km. from the Red Sea on the south-west and almost same distance from Black Sea on the north and practically touching the Arabian Gulf at its southern limit. Its climate is considerably influenced by the atmospheric condition of these vast water sheets.

The climate of Iraq in general is arid and continental having very hot summers and severe cold winters with less rainfall in the south and in the middle and much rainfall in the north. The precipitation on the northern part of the country is sufficient to support the winter crops, while in the middle and in the south part of Iraq cultivation depends on irrigation both in the winter and in the summer. In the desert area precipitation is very low and usually it rains during the winter months.

No doubt, Iraq occupies an excellent geographic position where it encompasses mountainous areas in which temperature drops below zero, desert areas of very high temperatures, and pelagic humidity impregnated areas.

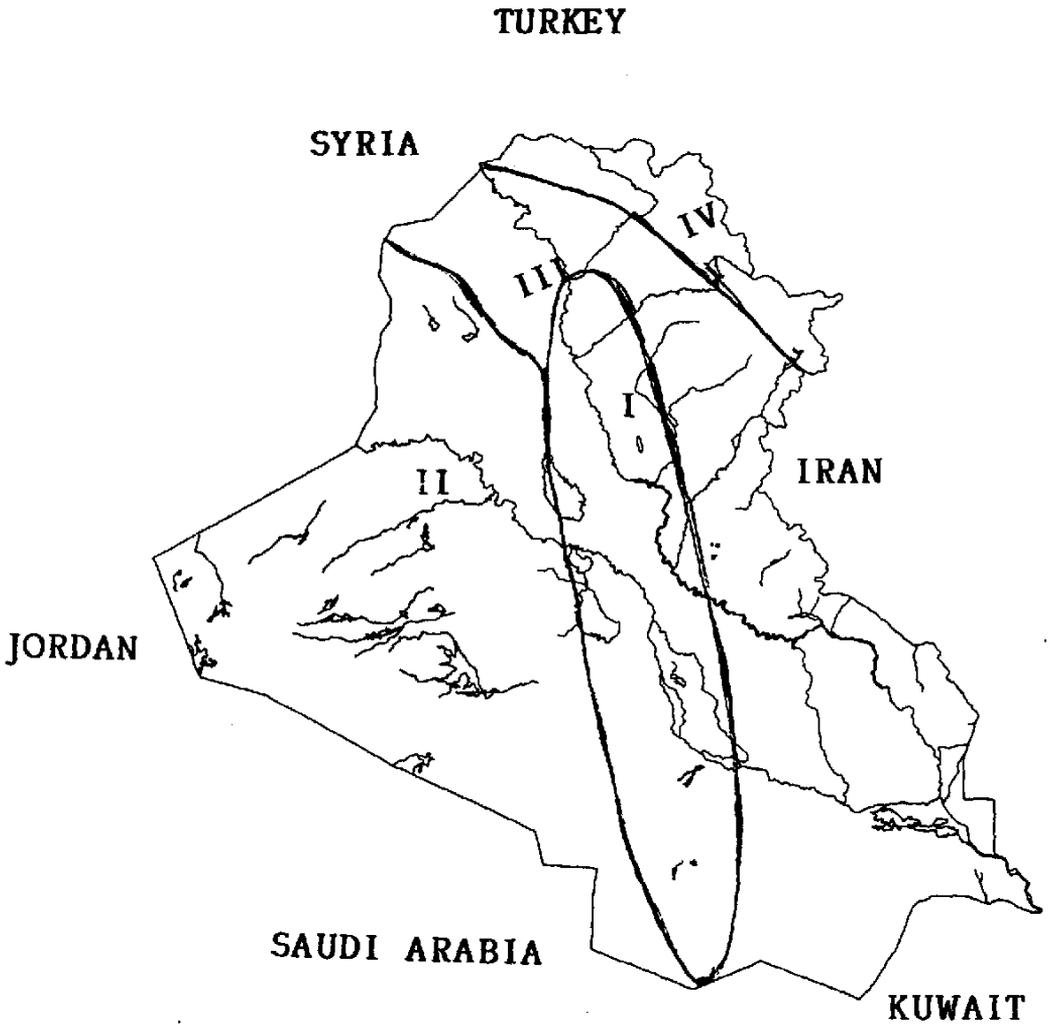
All these factors gave Iraq a special geographic characteristic scarcely acquired by any other country. The enjoyment of such a peculiar geographic position by Iraq led to the creation of different environments that helped considerably in the diversification of its agriculture.



Iraq may primarily be divided into four main physical regions, these are:

1. The Lower Mesopotamia.
2. The Desert Regions.
3. The Upland Hilly Regions.
4. The Mountain Regions.

**FIG. 1 AGRO ECOLOGICAL REGION OF IRAQ**





The major agricultural crops constitute: Dates, Wheat, Barely, Maize, Rice, Cotton, and other industrial crops. Many vegetables are grown like Tomatoes, Potatoes, Egg-plant, Cauliflower, Cabbage, Lettuce, Melon and water melon, Cucumber, Beans, Okra, Onion, Pepper, etc. The main fruit plants are: Apples, Pears, Plums, Figs, Pomegranates, Apricot, Oranges, Lemons and Grapes and Olives; also a good number of plants are grown for ornamental, forestry and medical purposes. Aquatic vegetation in the marshy tract of south Iraq is dominant. In the northern mountains high altitude flora forms a dominant feature of vegetation i.e. pastures and forages are found extensively.

Iraq is considered a region of rich plants genetic resources and bio-diversity. A brief profile of seed supply system in the country is as follows.

The agriculture research center evolve the seed of respective crop varieties. This seed goes to agriculture department for foundation seed production, then foundation seed is made available to seed companies i.e. Iraqi see production company and Mesopotamia seed company. The seed companies multiply the seed on farmer field under the supervision of Seed Testing and Seed Certification Department. This seed is then purchased by the seed companies at 30 40% premium. This seed is clean, dried and packed and sold to the farmers.



## CHAPTER 2

# Indigenous Plant Genetic Resources

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The Plant Genetic Resources activities were started in 1977 by the ministry of Agriculture, on a limited scale and with few scientific staff. A genebank facility was built at Abu-Gharib Baghdad with the assistance of FAO/IPGRI. The collection activities were started in 1989. In total 4 collecting expeditions were undertaken, which helped to assemble one thousand four hundred accessions of different crops. Due to the limited staff and facilities the exploration and collection work was not organized in a systematic way. There is an urgent need to realize not only the scientific community but also to the administrators the major role of Plant Genetic Resources in crop improvement programmes and to acquire financial and technical support for conservation of Iraq genetic diversity. The collections being maintained in the genebank are being maintained in working collections. There is a demand of a time to undertake genetic resources activity in the country to:

- To collect and document the status of important species.
- Programmes and measures for the management of these natural resources.
- To enlist important threatened species on country level.



List of crop accessions which were collected and conserved in the gene-bank are presented in:

**Table 1 Germplasm Status**

| SN. | Crops                          | N. of accessions |
|-----|--------------------------------|------------------|
| 1   | <i>Triticum eastovum</i>       | 330              |
| 2   | <i>Triticum durum</i>          | -                |
| 3   | Wild- wheats                   | 290              |
| 4   | <i>Hordeum vulgare</i>         | 86               |
| 5   | Wild-barleys                   | 40               |
| 6   | <i>Cicer arietinum</i>         | 30               |
| 7   | <i>Lens culinaris</i>          | 22               |
| 8   | <i>Zea mays</i>                | 10               |
| 9   | <i>Sorghum bicolor</i>         | 5                |
| 10  | <i>Vicia faba</i>              | 22               |
| 11  | <i>Vigna radiata</i>           | 10               |
| 12  | <i>Vigna unguiculata</i>       | 10               |
| 13  | <i>Citrulus vulgaris</i>       | 6                |
| 14  | <i>Cucurbita pepo</i>          | 13               |
| 15  | <i>Cucumis sativus</i>         | 25               |
| 16  | <i>Cucurbita maxima</i>        | 25               |
| 17  | <i>Abelmoschus esculantum</i>  | 25               |
| 18  | <i>Solanum melongena</i>       | 9                |
| 19  | <i>Lagenaria vulgaris</i>      | 5                |
| 20  | <i>Medicago radiata</i>        | 12               |
| 21  | <i>Medicago orbicularis</i>    | 12               |
| 22  | <i>Daucus carota</i>           | 5                |
| 23  | <i>Seasum indicum</i>          | 5                |
| 24  | <i>Lycopersicon esculantum</i> | 12               |
| 25  | <i>Raphanus sativus</i>        | 9                |
| 26  | <i>Phaseolus vulgaris</i>      | 2                |
| 27  | <i>Beta vulgaris</i>           | 3                |
| 28  | <i>Brassica rapa</i>           | 6                |
| 29  | <i>Trifolium alixanderieum</i> | 5                |
| 30  | <i>Trifolium angustifolium</i> | 3                |



## 2.1 GENETIC RESOURCES OF FRUIT TREES

The northern part of Iraq is a rich center of diversity for a number of stone fruits, both domesticated and wild. Evergreen fruit trees, including date palm predominate in the central and southern parts of the country. A country-wide programme was launched by the State Board for Agricultural Research and Faculties of Agriculture to collect, characterize and evaluate the genetic resources of Pomegranates, Pistachio, Grapes, Olives and Apples. Field genebanks have been established, at a small scale, for some of these fruit trees. The datepalm enjoys a favorable position in Iraq. In early 1980s, the number of date palm trees was around 30 million, however it declined dramatically ever since. Nevertheless, major efforts have been initiated for the proper conservation and propagation of this tree. Traditional (offshoots) and new propagation methods (tissue culture) have been utilized to maintain and finally enhance the genetic diversity and cultivation of date palms in Iraq.

## 2.2 GENETIC RESOURCES OF VEGETABLE CROPS

In Iraq harbors a tremendous wealth of vegetables adapted to various ecogeographical regions of the country. A nation wide project was initiated in 1986 with the following objectives:

- a. Survey, collect and evaluate Plant Genetic Resources of vegetables.
- b. Enhance yield potential through pure line selection.
- c. Distribution of improved lines to farmers.

The project managed to cover the following vegetable crops: Tomato, eggplant, okra, watermelon, melon, onion, cucumber, garlic, lettuce, cabbage, pepper, guard and carrots.

As a result of this project, landraces of these vegetable crops have been collected and conserved; the genetic diversity of most crops, especially the cross-pollinated ones, has been improved and high yielding, adapted lines, derived from these landraces have been developed increased and distributed to farmers.



## 2.3 FOREST GENETIC RESOURCES

The germplasm collection of forest species have not begun yet. The characteristic vegetation of the forest zone is *Quercus*. The forest formation are of three main categories: *Quercus aegilopidis*, *Q. aegilopidis-infectoria* and *Q. infectoria-libani*, while in restricted mountain district there are a few small isolated areas of a fourth forest formation dominated by *Pinus halepensis var. brutia*. Other species of forest trees which are grown on mountainous are:

- *Juniperus oxycedrus*,
- *Pistacia mutica*,
- *Prunus orientalis*.

It is being planned to collect germplasm of fruit trees which are necessary for rootstocks and propagation purposes, such as Apple, Pear, Peach, Apricot, Plum, etc. For this activities we are looking forward for collaborative project within the country or abroad.

## 2.4 OTHER WILD SPECIES AND WILD RELATIVES OF CROP PLANTS

There are several wild species of wheat and barley which need to be collected immediately and conserved in addition to this there are other cultivated crops/landraces which also request immediate attention. Anyhow the following wild progenitors of crops were collected during the field trips.

*Triticum dicoccoides*

*T. araraticum*

*T. boiticum*

*T. arartu*

*Aegilops triunicalis*

*Ae. crassa*

*Ae. umbellata*

*Ae. biunicalis*

*Ae. speltoides*

*Hordeum spontaneum*

*H. bulbosum*



## 2.5 LANDRACES (FARMER'S VARIETIES) AND OLD CULTIVARS

Saberbeq is a bread wheat landrace which is under cultivation in the northern part of Iraq due to its drought tolerance and quality of bread. Although this is very susceptible to rust and low yielder. There is a breeding programme to improve this cultivar through breeding and mutation. Where as in case of barley local landrace *Aswad* is under cultivation in the Northern part of Iraq. It is under cultivation since long as there is no breeding programme in the country. Now the efforts are under way to improve landrace both for yield and disease. There are several vegetable landraces which are still under cultivation. Recently a project to collect these vegetable landraces for their purification and improvement etc. has start in the country. These efforts will prove beneficial the assemblage of several vegetable landraces for its future utilization in breeding programme.



## CHAPTER 3

# Conservation Activities

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### 3.1 *IN SITU* CONSERVATION

Presently Iraq does not have any *in situ* Conservation activities in the country but it is being planned through a collaborative project of *in situ* Conservation of Biodiversity of fertile crescent of Iran, Iraq, Syria, Jordan and Lebanon under the supervision of IPGRI. It is expected that cereal crop landraces, fruit and forest genetic resources will be conserved on priority.

### 3.2 *EX SITU* CONSERVATION

Within country 1,400 Sample of cereals, oil seed crops, medicinal plants etc. were collected and conserved in the genebank. In addition to this 5,000 acc. of wheat (Spring) were acquired from USA for breeding programme. These are also being maintained in the national genebank of Iraq at Abu Gharib. Presently this project is not financially secure and needs special attention both for equipments and funds. The principal purpose of storing seeds of economically important plants in gene banks is to preserve seed stocks for the current and future use of plant breeders, cytogeneticist, taxonomists, and other researchers and scientists. In maintaining our genebank collection, the following steps are being followed:

- a. Registration of seed sample.
- b. Seed cleaning.
- c. Seed moisture-content monitoring.
- d. Seed viability testing prior to cold storage.
- e. Seed packing.
- f. Seed storage.
- g. Monitoring viability.
- h. Distribution on request.
- i. Regeneration of accessions whose viability has become low.



1,400 accessions which were collected during the field trips stored in the genebank. The first collection was made in 1975 by Mr. M.N. Hussain, of the Botany Directorate, who covered all the regions of Iraq. The plant genetic resources unit is situated at Abu-Ghraib, about 20 Km west of Baghdad, and is adjacent to many other departments belonging to the State Board for Agricultural Research, who are directly or indirectly associated with the crop improvement programme.

The local collection generally comprises landraces and indigence cultivars. The sample of cereals germplasm has been duplicated at Bari-Italy. Some wild wheat samples has been duplicated at Izmir, Turkey and Kyoto-Japan. In addition to ICARDA-GRU, Aleppo-Syria.

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### **3.3 EVALUATION AND CHARACTERIZATION**

Characterization of the cereals accessions were carried out Abu Gharib according to IPGRI's descriptors. The data has been maintained on the crop registers and available to the user community, but it has not been published due to the lack of facilities and funds. The evaluation data need to generated with the help of breeders and other researchers in the country. But for this purpose the germplasm evaluation laboratory is needed to be established. The International collaboration in this field could prove very effective till we established evaluation lab in the country.

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### **3.4 REGENERATION**

Due to the deteriorating condition of the genebank all the material has been duplicated at ICARDA both for conservation and rejuvenation. Anyhow the seed viability of conserved stock is also monitored regularly for multiplication and regeneration.



### 3.5 STORAGE FACILITIES

The plant genetic resources unit has a cold store of 40 sq. meter capable of housing a minimum of 10,000 cans. Each can has the capacity to hold about half kg. seed of different crops. The cold store is cooled by two cooling units which have so far not proved to be very effective and reliable.

In the winter months the cold store can run at 5°C but during the three hottest months it may run at 10°C. The cold store is insulated and fitted with a cold room door. There are two defreezers for long term conservation. But there is no control over the humidity in the genebank and also there is no stand by electric generator. Therefore the cold storage room suffers from high humidity and temperature fluctuation, which has adverse effect on seed viability.

The germplasm is stored in Cans/Aluminum plastic bags (as supplied under REM-5) in cardboard trays with capacity to hold 10 cans, and the cans are stored at two level in the shelves. The other facilities include a large laboratory, two offices. There are ample germplasm multiplication facilities both at Abu-Ghraib adjacent to the buildings and at the Botanic Garden at Zafaraniya. In addition, the National Herbarium of Iraq, belonging to Botany Research Department, is participating in identification of accession samples. The difficulties are also experienced for multiplication/ rejuvenation of cross pollinated crops germplasm to maintain the genetic integrity of a bulk population sample. Presently the space isolation is being practice for multiplication.

Many crop germplasm stored accessions have been grown for evaluation and multiplication like wheat, wild wheat, barely and many other cereals and vegetable crops by the genetic resources unit. The collaborative efforts of commodity programme are required to enhance the utilization of local germplasm.



### 3.6 DOCUMENTATION

We use for the time being the accession record sheets for documentation of our collections. These sheets contain the important characterization data which are necessary for researcher and plant breeder to know the desirable traits of an accession.

Our plant genetic resources unit is intending to computerize the samples of the gene-bank. We make the information available to users, either by letters or personal communication. As soon as we computerize the genetic resources information. The printed information copies will be circulated to the respective crop breeder and other researchers. To achieve this objective IPGRI WANA office has recently provided a computer.



## CHAPTER 4

# In-Country Uses of Plant Genetic Resources

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The plant genetic resources of cereals, food legumes, vegetables and industrial crops have been used for improving crop production as follows:

- a. Improving local varieties-cultivars for their agronomic traits.
- b. Adaptation of germplasm to local needs.
- c. Breeding for salt and drought tolerance.

The national plant breeding programme mainly depend on the availability of genetic variability in hand. Therefore for achieving the above said objective there is a need to assemble more genetic variability as the present conserved stock do not represent the whole spectrum of genetic variability of the country.

The basic objects of collection, conservation and evaluation of plant genetic resources together with the endorsement of basic and allied technologies is for agricultural development in the country. The plant cell and tissue culture techniques will be used for improving plant crops. The increasing pressure population on limited food, fibers and industrial crops requires more efficient plant genetic resources and biodiversity, conservation programme, and efficient breeding programme.

The most important crop-species which has been requested from GRU, Iraq for its utilization by the national commodity programmes and abroad are:

Cultivated wheat, Wild wheat, Cultivated and wild barely, Rice, Maize and sorghum, Chickpea, Cotton, Tomatoes, Faba bean, Forage species, Sunflower.

It is worth mentioning here that cotton, wild wheat and some medicinal plants have not been exploited by the breeders and other researchers in the country. This could be due to the economic condition of the country or lack of breeding activities on these crops. The farmer are the custodian of different landraces, therefore they are linked to genetic resources. Anyhow there is no community seedbank in the country.



For the last three years mainly cereal germplasm was utilized by the breeders and during this period the germplasm was also supplied outside the country i.e. Japan, Russia, Italy, Czechoslovakia, ICARDA Syria.

For cereal, Atomic energy commission, IPA, Agriculture Research Center, College of Agriculture's breeders were the main user of cereal germplasm. The Medicinal plants, Forages, and most of the wild species has not been used in the country, since its collection.

Assistance is needed to improve the utilization of plant genetic resources in the following disciplines:

- a. Well-trained personal in collection and conservation of plant genetic resources.
- b. Qualified plant breeders.
- c. Apparatus: like grain counter, single head thresher, moisture tester and spare parts for cooling units.
- d. Budget for repair and maintenance of equipment.
- e. Other facilities like PGR literature and manuals (e.g. International Rules for Seed Testing).
- f. Computer for documentation of genetic resources information.

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## 4.1 CROP IMPROVEMENT PROGRAMME AND SEED DISTRIBUTION

The ultimate objective of a plant breeding is to increase the crop production per unit areas and to evolve disease resistant cultivars. In this regard the breeders are working for the improvement of local cultivars/landraces. The Plant breeding activities are not adequate in vegetables, Forages, Legumes and horticultural crops. All the Plant Breeding work is being carried out by the Government fund and at present there is no private seed company in this business. The plant breeder's product is supplied to the farmer gradually with the help of public funded seed companies.



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## **4.2 BENEFITS DERIVED FROM THE USE OF PLANT GENETIC RESOURCES**

Wheat and barely varieties developed by the Agriculture Research Center and biological center of Atomic energy commission by exploring the local germplasm were released and made available to the farmer which occupy about 15-20 % area under cultivation and is spreading year by year.

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## **4.3 USE OF FOREST GENETIC RESOURCES**

There is no activity going on in this area but it is expected that in near future some seed production activity will start for the improvement of country economy.



## CHAPTER 5

# National Goals, Policies, Programmes and Legislation

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The plant genetic resources activities are organized by the national project on plant genetic resources. It is the only programme which is responsible for collection, characterization and conservation of local landraces and wild relative of crops in the country. The project is funded by the ministry of the agriculture. This project is a single and lacks coordination with the respective commodity programmes in the country.

The main object of the Government to run this project is to increase the productivity and to have collaboration with international Agriculture Research Centers for exchange of genetic material. Presently there is no national committee on Plant Genetic Resources to supervise and guide the function of Plant Genetic Resources, but we are planning to create this committee for better collaboration and coordination.

The head of GRU is responsible to ministry of agriculture. The head of GRU is not considered at par with the breeder, horticulturist and pathologist etc. The position of the head of GRU is secure and ministry of agriculture could abolish this unit. The ministry of agriculture approves its annual budget. Due to financial crises in the country the budget fluctuate accordingly, from year to year.

There is no legislation regarding genetic resources collections. The exchange of the germplasm is made on mutual sharing basis. The head of GRU has been permitted by the ministry of agriculture to supply the seed samples upon request within the country and abroad.

There are qualified personnel for conducting researchers work, one of them is IPA Center for Agricultural Researches. This center has achieved reasonable success in plant breeding especially in cereals and food legumes.

Atomic Energy Foundation activities regarding utilization of plant genetic resources are distinguished particularly in cereal and industrial crops. Other units which are belonging to some Universities have a programmes to improves important crops like wheat, barely, rice, corn, cotton, and many others agricultural crops. Active cooperation is expected to emerge regarding collection, conversation and utilization of the plant genetic resources in near future.



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## 5.1 TRAINING

GRU of Iraq is neither adequately staffed with scientific manpower nor they have given ample opportunity of training on different disciplines of plant genetic resources. The staff need to be trained in the field of collection, conservation, documentation, seed health agronomy etc. In these fields if a training be organized within the country it will be rather more than beneficial. At GRU men and women are equally involved in all plant Genetic Resources activities.

A year ago one scientist has been shifted to other department which is called Mesopotamia Company. This has further weakened the genetic resources activities in the country. The most available skills in our national programme is in the field of plant taxonomy, and these plant taxonomists identify many of our collections. We have no discrimination regarding training so men and women equally involved in training programmes in large at all levels.

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## 5.2 NATIONAL LEGISLATION

The Iraqi quarantine laws do not affect the import or export of genetic resources material and we are satisfied with the present situation, as we have not experienced any crop disaster in the country.

The government's laws do not restrict the planting of imported material in the field. The government does not provide any incentive for the cultivation of traditional varieties. The Government encourages the provision and cultivation of certified seed of commercially important crop varieties.

The government of Iraq is in agreement with ICARDA for exchange of germplasm and training of scientists.

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## 5.3 OTHER FACILITIES

The fertilizer, insecticide and agriculture machinery are provided to the farmer at subsidized rates. The Plant Genetic Resources scientists are neither involved in the planning of major projects. The Plant Genetic Resources scientists are neither involved in the planning of major agricultural projects nor during the appraisal process.



# CHAPTER 6

## International Collaboration

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### 6.1 FAO GLOBAL SYSTEM

Iraq is a member of FAO global system on plant genetic resources. The GRU was benefited by acquiring cooling units seed drier and training. The government of Iraq signed the international undertaking and believe that genetic resources are heritage of mankind and should be available freely for human benefit. The government of Iraq agree to the establishment of International fund as a part of global system for the improvement of Genetic Resources facilitates in the country and training of manpower.

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### 6.2 INTERNATIONAL AGRICULTURAL RESEARCH CENTER

One of our plant genetic resources unit's aim is the fair and equitable exchange of plant genetic resources with international institutions. Iraq enjoy good relation with International Agricultural Research Centers i.e. IPGRI, CIMMYT, IRRI, ICARDA, ICRISAT. The following genetic resources activities were accomplished in collaboration with IARCs.

- Collection of crop germplasm had been conducted sometime in the past with the collaboration of ICARDA's specialist. Collection was done through field trips in different parts of the country.
- Conservation of crop germplasm have been done at National genebank and at IARC for long term conservation of genetic stock. Many crops accessions like wheat, barely, food legumes, and industrial crops were sent abroad for duplication.
- Multiplication and evaluation of crop germplasm have been accomplished with ICARDA.
- Germplasm Exchange: Our plant genetic resources is already exchanging germplasm with other institutes such as ICARDA, ACSAD, or FAO etc.



## CHAPTER 7

# National Needs and Opportunities

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- a. Building up a new genebank for both intermediate and long term storage along with allied facilities.
- b. Equipment for laboratory, seed processing, drying room, field equipments, and field cars.
- c. Providing expertise and training courses in the field of genetic resources as well as opportunities to attend international conferences, workshops, financial support to the local collecting missions and supporting local training courses.



## CHAPTER 8

# Proposal for a Global Plant of Action

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The proposal for global plan of action are as follow:

- Identification the threatened areas in order to give priority for collection.
- More support in term of equipment, and training course to the national programmes.
- Establishment of seed health unit in the genebanks.
- Exchange of germplasm through IPGRI.
- Publishing global germplasm catalogue.
- Regional seminars and meetings.
- Training national staff.