

# Focus on Seed Programs

## The Seed Industry in Iraq

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### Introduction

Iraq is an important primary and secondary center of domestication for many crops such as wheat, barley, lentil, chickpea and medics. The country has a great potential for agricultural development with a total area of 44 million ha, of which 11 million ha is estimated to be arable land. About 22% of the population, estimated at 23 million in 1997 is involved in agriculture.

At present approximately 2.8 million ha is rainfed and is classified into three different zones based on annual rainfall: (a) > 450 mm/year (0.1 million ha); (b) 250-450 mm/year (0.7 million ha); and (c) 200-250 mm/year (2 million ha). The rainfed area is planted with wheat, barley and food legumes.

The irrigated area is approximately 2.1 million ha which is allocated as shown below to winter and summer crops (Table

1).

Table 1. Area allocation of irrigated lands

| Cropping period        | Area in ha ('000) |
|------------------------|-------------------|
| Winter crops           |                   |
| Cereals                | 1, 100            |
| Vegetables & Forages   | 600               |
| Fruit production       | 40                |
| Summer crops           |                   |
| Rice                   | 110               |
| Maize                  | 140               |
| Vegetables and Forages | 230               |

About 6.1 million ha of agricultural land is affected by salt particularly in irrigated areas.

Cereal production occupies about 95% of the arable land. Area under cultivation and production of major crops are shown in Tables 2 and 3, respectively.

Table 2. Area cultivated (ha) with major crops during 1990-1995 ('000)

| Crop   | 1990  | 1991  | 1992  | 1993  | 1994  | 1995  |
|--------|-------|-------|-------|-------|-------|-------|
| Wheat  | 1,996 | 2,517 | 1,677 | 2,013 | 1,806 | 1,535 |
| Barley | 1,995 | 2,412 | 2,012 | 2,314 | 1,535 | 1,389 |
| Rice   | 79    | 86    | 95    | 110   | 163   | 175   |
| Maize  | 77    | 118   | 141   | 160   | 70    | 75    |
| Total  | 4,147 | 5,133 | 3,925 | 4,597 | 3,574 | 3,174 |

*Source:* FAO, 1995

Although, there is great potential, the country imports 3.8 million tonnes of grain per year which accounts for 89% of total national requirement of about 4.2 million tonnes. The economic embargo since 1990 has severely affected import of agricultural products. The Government strongly supports production of food crops such as wheat, barley, rice, etc. The effort to expand agricultural production is supported through provision of inputs, particularly seed, fertilizers, machinery and implements. The Government also encourages domestic production by paying higher prices for locally produced commodities.

Table 3. Cereal production (tonnes) during 1990-1995 ('000)

| Crop   | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|--------|------|------|------|------|------|------|
| Wheat  | 1196 | 1477 | 1006 | 1187 | 1342 | 1236 |
| Barley | 1854 | 768  | 1509 | 1562 | 971  | 892  |
| Rice   | 228  | 189  | 180  | 206  | 383  | 315  |
| Maize  | 173  | 236  | 260  | 280  | 128  | 90   |
| Total  | 3451 | 2670 | 2955 | 3235 | 2824 | 2533 |

*Source:* FAO, 1995

### National Seed Policy

In Iraq, the importance of seed was recognized as early as 1927 when legislation was issued to encourage the use of improved seed for cotton. A major development in the seed sector happened in 1968 when the Government established seed production farms and promoted seed certification activities. In the same year, the FAO project on seed production and

certification was started. This was followed by the five-year plan (1969-1974) aimed at production of improved seeds of wheat, barley, rice, maize, cotton and other crops. Since 1975 there is a national law and regulations for variety testing, release and registration.

In 1990, the Government endorsed a national seed program to streamline and strengthen the seed sector recognizing the role of seed as one of the least expensive,

but most productive inputs in increasing crop production. In 1995, it set up a National Seed Board (NSB) which is chaired by the Minister of Agriculture to advise the Government on seed issues. The Board develops policy guidelines and monitors its implementation by agricultural research institutions such as the IPA Agricultural Research Center, the State Board for Agricultural Research (SBAR), Agricultural and Biological Research Center (ABRC), Rabii Agricultural Research Center and Agricultural Colleges as well as seed production and marketing companies. These institutions succeeded in establishing and strengthening agricultural research, seed production and supply in the country.

## **Agricultural Research and Crop Improvement**

The Government gives priority to the agricultural sector to meet self-sufficiency in food production. As a result, there is strong support to agricultural research and several institutions are involved in research and variety development. The agricultural research institutes are responsible for variety development, evaluation and maintenance as well as Breeder Seed production.

### **Variety Development**

Agricultural research and variety development is the domain of the public sector and focuses on strategic crops mainly cereals and legumes. The IPA Agricultural Research Center (IPARC) is responsible for variety development of crops such as cereals (barley, wheat, rice, maize), food legumes (lentil, chickpea, faba bean) and industrial crops (peanut, soybean, sunflower). The State Board for Agricultural Research (SBARC) is responsible for cereals, vegetables and cotton. The Agricultural and

Biological Research Center (ABRC) also develop varieties of cereals and industrial crops. The agricultural colleges play a lesser role in variety development and at present there is no private plant breeding in the country.

There are two breeding strategies for developing new varieties. The short-term goal focuses on introduction and screening nurseries to select and evaluate genotypes that are adapted to the climatic conditions of the country. Introductions are made from international agricultural research centers such as ICARDA, CIMMYT and ICRISAT or from other regional institutes or through exchange with NARS from the region (Cyprus, Jordan, Syria and Yemen).

The long-term plan is to develop and handle segregating populations to identify early or advanced generations for local adaptation. The Agricultural and Biological Research Center use mutation-breeding techniques to develop new varieties.

Each agricultural research center has stations representing different agro-ecological regions to conduct the breeding and selection programs. They evaluate segregating materials, pure lines or varieties in observation trials for 1 to 2 years based on maturity groups for yield and yield components, resistance to major pests and quality characters. After observation trials, the yield trials are conducted for 2-3 years to identify promising materials in 2-3 stations. Promising lines will be further tested in on-farm trials using farmer's management practices.

### **Variety Release and Registration**

Variety registration and release is the responsibility of the National Committee for Registration and Release of Agricultural

Varieties (NCRRV) which is chaired by the Deputy Minister of Agriculture.

The Committee was established in 1992 under Ministerial Decree No. 9; it has the force of law and set the terms and conditions for variety registration and release. The Committee is composed of representatives of agricultural research institutes, the certification agency, agricultural colleges and the Ministry of Agriculture. Candidate varieties are evaluated based on the technical reports submitted by the breeders.

The procedures for variety registration and release mechanism are as follows:

Prior to registration and release, breeders should submit the description and agronomic performance of the variety. The report should also include the performance of the variety under farmers' conditions compared with local checks. Agronomic characters such as time to flowering and maturity, yield and yield components, resistance to major diseases and insect pests and quality characters are the main criteria for evaluation.

When submitting the report to the NCRRV, breeders should plant the variety on an area not less than 1 ha in at least three locations in the target region and one or more locations in farmers' fields.

The NCRRV appoints a technical committee composed of breeders, agronomists and pathologists from the research institutes and universities to evaluate the new variety. The committee at least visits these variety trials twice before submitting a final report to the NCRRV. According to this report the variety would either be accepted for registration and

release or rejected.

The number of varieties released during the last seven years by agricultural research centers is given in Table 4.

Table 4. Number of varieties released in Iraq ('1991-98)

| Crop           | Number of Varieties |
|----------------|---------------------|
| Wheat          | 24                  |
| Barley         | 16                  |
| Rice           | 4                   |
| Triticale      | 1                   |
| Maize          | 9                   |
| Sorghum        | 1                   |
| Chickpea       | 1                   |
| Lentil         | 2                   |
| Soya bean      | 1                   |
| Phaseolus bean | 1                   |
| Sunflower      | 5                   |
| Safflower      | 1                   |
| Linseed        | 1                   |
| Sesame         | 3                   |
| Rape seed      | 1                   |
| Vegetables     | 43                  |
| Cotton         | 1                   |
| Tobacco        | 1                   |
| Fruit trees    | 3                   |
| Total          | 119                 |

### Variety Maintenance

Variety maintenance including parental materials for hybrids is carried by the agricultural research center such as the IPA Agricultural Research Center, the Seed Technology Center of the Agricultural and Biological Research Center.

## Seed Production

Cereal seed supply is a major goal in the national program. The total national cereal seed demand for wheat, barley, rice and maize is estimated to be over 300,000 tonnes per year (Table 5). The formal sector is anticipated to supply 25% of this requirement for self-pollinated crops. At present, however, the formal sector provides only 10% of the national seed demand. About 90% of seed for planting is used from farm saved seed. There

are problems arising from planting low quality seed including poor germination, high weed infestation and deterioration in varietal purity.

The agricultural research centers are responsible for production of Breeder and Foundation Seed. The Iraqi Company for Seed Production (ICSP) and Mesopotamia Seed Company (MSC), are parastatal companies responsible for large-scale commercial production of later generations (Tables 6 and 7).

Table 5. Area cultivated (ha) and amount of seed required (tonnes) for major crops in 1995

| Crop   | Area in ha ('000) | Seed rate kg/ha | Seed required ('000) | 25% renewal ('000) |
|--------|-------------------|-----------------|----------------------|--------------------|
| Wheat  | 1,535             | 100             | 154                  | 38                 |
| Barley | 1,389             | 100             | 139                  | 35                 |
| Rice   | 175               | 120             | 21                   | 5                  |
| Maize  | 75                | 32              | 2                    | 1                  |
| Total  | 3,174             |                 | 316                  | 79                 |

Registered, Certified and Commercial Seed are produced through contract growers who are selected by the State Board for Seed Testing and Certification (SBSTC) in collaboration with the seed producing companies. Seed growers and fields are selected based on specific criteria to ensure proper agronomic practices such as crop rotation, isolation, etc. Seed growers who do not conform to the regulations of the certification agency are cancelled from contract seed production. At present, three agricultural research centers, three companies and about 1500 growers are primarily involved in production of various seed classes nation wide.

Some seed companies import seed from abroad for further multiplication and

distribution in the country.

## Seed Processing and Storage

The Iraqi Company for Seed Production, Mesopotamia Seed Company and Seed Technology Center are responsible for seed processing. There are 17 seed processing centers distributed throughout the major seed production areas of the country (Table 8). In addition, there is one cotton delinting plant.

Cereal seed is cleaned, treated and packaged in 50kg polypropylene or gunny bags for distribution.

The storage facilities are located at the seed processing centers and are also used as the main distribution points.

Table 6. Seed production of major crops during 1990/91-1995/96

| Crop   | Seed class | 1990/91 | 1991/92 | 1992/93 | 1993/94 | 1994/95 | 1995/96 |
|--------|------------|---------|---------|---------|---------|---------|---------|
| Wheat  | Foundation | 423     | 74.8    | 117.5   | 159     | 182     | 315     |
|        | Registered | 215     | -       | -       | 120     | 342     | 727     |
|        | Certified  | 19380   | 30503   | 17649   | 11452   | 14322   | 11411   |
| Barley | Foundation | 74.1    | 113     | 58      | 112.7   | 109     | 24      |
|        | Registered | -       | -       | -       | 468.4   | 60      | 49      |
|        | Certified  | 1300    | 196     | 848.6   | -       | 278     | 152     |
| Rice   | Foundation | 76.0    | 17.7    | 22.3    | 49      | 35.8    | NA      |
|        | Registered | 60      | -       | -       | -       | 1156    | NA      |
|        | Certified  | 858     | 6000    | 5551    | 4490.7  | 13986   | NA      |
| Maize  | Foundation | 20      | 10      | 16      | 19.5    | 52.25   | NA      |
|        | Registered | 120     | 103     | 1.31    | 832.4   | 556.5   | NA      |
|        | Certified  | 1860    | 1786    | 996     | 739.7   | 1300    | NA      |

Table 7. Wheat and barley seed production (tonnes) during 1996/97 - 1998/99 ('000)†

| Organization             | 1996/97 |      |       | Total | 1997/98 |      |       | Total | 1997/99 |      |       | Total |
|--------------------------|---------|------|-------|-------|---------|------|-------|-------|---------|------|-------|-------|
|                          | F       | R    | C     |       | F       | R    | C     |       | F       | R    | C     |       |
| IPA-ARC                  | 305     | 797  | 467   | 1568  | 211     | 44   | 34    | 289   | 136     | 36   | -     | 172   |
| Seed Technology Center   | 323     | 194  | 1067  | 1584  | 602     | -    | -     | 602   | 561     | 1435 | -     | 1996  |
| Mesopotamia Seed Company | 83      | 14   | 3854  | 3952  | 79      | 2297 | 9385  | 11761 | -       | 312  | 3241  | 3553  |
| Iraqi Seed Company       | 142     | 448  | 14998 | 15588 | 14      | 4711 | 19349 | 24074 | 66      | 2684 | 22904 | 25654 |
| Total                    | 853     | 1453 | 20386 | 22692 | 906     | 7052 | 28768 | 36726 | 763     | 4467 | 26145 | 31375 |

NB: † F, R and C are Foundation, Registered and Certified Seed, respectively

Table 8. Available seed processing facilities in Iraq

Location      Seed Companies

|              | Mesopotamia Seed Company | Iraqi Seed Company | Seed Technology Center |
|--------------|--------------------------|--------------------|------------------------|
| Al-Taamim    | 1                        | 1                  | -                      |
| Baghdad      | 2                        | 1                  | 1                      |
| El-Khadisya  | 1                        | 1                  | -                      |
| Misan        | -                        | 1                  | -                      |
| Mosul        | 4                        | 1                  | -                      |
| Salah Eddine | -                        | -                  | 1                      |
| Wasit        | 1                        | 2                  | -                      |
| Total        | 9                        | 7                  | 2                      |

## Seed Marketing and Distribution

**S**eed marketing and distribution are centrally planned and coordinated by the National Seed Board. In Iraq only certified seed can be officially marketed.

The Agricultural Supply Company (ASC) coordinates the marketing and distribution of vegetable seed produced by local research centers.

Seed prices are based on cost of production and a profit margin. The price paid to the contract growers is based on the grain price and a premium of 50-100% for Foundation, 35-75% for Registered, 25-50% for Certified and 10-25% for Commercial Seed. There is an additional incentive for seed with 97% purity and low moisture content for cereals. Farmers can get credit which is available from the Agriculture Credit Bank to buy agricultural inputs including seed.

## Seed Import and Export

**T**he SBSTC is responsible to coordinate the import, marketing and distribution of vegetable seed imported from abroad. The varieties imported should be tested in Iraq and released according to Decree No 9 of 1991. Moreover, the seed must meet minimum quality standard (germination) as recommended by Act No. 83 of 1974 and free of diseases. In Iraq, about 90% of the total vegetable seed need is imported by the Agricultural Supply Company (20%) and the private sector (80%). The seed import is supervised and controlled by the State Board for Seed Testing and Certifications. The guidelines for seed import are as follows:

- seed should not be imported or offered for sale without proper phytosanitary certificates
- seed must be tested and certified before

distribution

- import is allowed only for varieties approved for cultivation in the country

The SBSTC has launched an intensive campaign to enforce these guidelines among the seed traders.

During the past five years, Iraq exported alfalfa and clover seed and imported sunflower and vegetable seed. The quantity of vegetable seed imported during 1998 was about 200 tonnes, mainly of tomato, cucumber, pepper, eggplant and watermelon.

## Seed Quality Control

**S**eed quality control was started from 1962 and the seed testing laboratory was affiliated to ISTA in 1975. In 1994, the government established the State Board for Seed Testing and Certification (SBSTC) as an autonomous organization authorized for seed quality control and certification. It has four regional branches in Khadisyah, Nineveh, Salah Eddine and Wasit provinces. They operate seed quality control within the provinces and have seed testing facilities. The certification scheme covers wheat, barley, rice, maize, sorghum, lentil, chickpea, potato and tomato.

There are four classes for seed production of self-pollinated crops: Breeder, Foundation, Registered and Certified Seed. For cross-pollinated the multiplication has three generations only.

All seed crops are subjected to field inspection by SBSTC (Tables 9 and 10). Seed production fields are inspected 3 times i.e. twice during the growing period and once at full maturity. The field inspectors also supervise the seed harvesting and delivery operations at the processing plants.

Table 9. Area of seed crop inspected in 1998 crop season

| Crop           | Area inspected (ha) | Area Accepted<br>High grade | Commercial |
|----------------|---------------------|-----------------------------|------------|
| Wheat & Barley | 168892              | 92063                       | -          |
| Rice           | 7289                | 6382                        | -          |
| Maize          | 13261               | 12486                       | -          |
| Chickpea       | 100                 | 100                         | -          |
| Lentil         | 502                 | 502                         | -          |
| Cotton         | 11839               | 795                         | 10724      |
| Tomato         | 2537                | -                           | 2523       |
| Potato         | 7536                | 6906                        | -          |

The seed is sampled by inspectors and submitted to the SBSTC laboratories for quality tests including physical purity,

germination, moisture content and seed health (Table 11). Sampling and testing are carried out according to ISTA rules.

Table 10. Number of seed samples tested in 1998

| Seed quality test | Number of tests |
|-------------------|-----------------|
| Purity            | 30,439          |
| Number count      | 4,788           |
| Seed weight       | 36              |
| Moisture content  | 25,747          |
| Germination       | 3,792           |
| Health            | 11,166          |
| Total             | 75,968          |

### Constraints in the Seed Sector

**T**here are several constraints hindering the development of the national seed sector. These constraints are evident

in agricultural research, variety development, evaluation and release; seed production, processing, marketing and distribution; and seed quality control. They are of technical, regulatory and policy nature



as described below.

### **Variety improvement**

- Inadequate variety evaluation/testing system (VCU)
- Lack of appropriate DUS testing system
- Inadequate variety maintenance procedures to produce good quality Breeder Seed
- Low adoption of new varieties by farmers

### **Seed Production**

- lack of research to address seed technology related problems
- low participation of private companies in seed sector, particularly in vegetables

### **Seed Processing**

- Technical/operational problems in managing seed plants leading to variety mixtures during processing
- Lack of appropriate seed storage facilities

### **Seed Marketing**

- Fixed seed prices limiting options to operate based on market forces
- Large quantity of unsold stock due to high seed prices as a result of high production costs
- Heavy losses by seed companies leading to subsidies from the state
- Inappropriate credit policies for farmers to borrow and purchase inputs
- Less uptake of seed by farmers due to high prices

### **Seed Quality Control**

- Lack of lot numbering systems and post control tests to maintain seed quality

- Lack of facilities and expertise for testing seed-borne viruses
- Lack of up-to-date seed legislation conforming to international regulations

## **Recommendations for the Seed Sector**

In principle, all the basic components of a seed program exist in Iraq. However, some components are better developed than others and are contributing to the progress of the seed industry.

The following recommendations are useful to improve the ability of the seed sector to supply farmers with quality seed of improved varieties.

### **Variety Maintenance**

- Initiate proper variety maintenance procedures and joint inspection by SBSTC and breeders

### **Seed Production**

- Upgrade the knowledge of technical staff working in the seed companies
- Improve selection of contract growers and supervision during seed production and harvesting
- Encourage companies to enter vegetable seed production and, if possible, cooperate with international seed companies

### **Seed Processing**

- Ensure adequate maintenance of existing seed plants and establish new plants where necessary
- Upgrade the knowledge of technicians and introduce proper management to avoid variety mixtures during processing
- Enhance the internal quality control of

seed plants through the assistance of SBSTC

### Seed Marketing

- Allow seed companies to set seed price based on market forces and establish their own distribution network
- Establish enough sale points to bring seed within mobility zone of farmers
- Promote use of new varieties and quality

seed using the media

- Encourage use of certified seed for farmers to adopt higher seed renewal rates

### Informal Seed Sector

- Provide seed cleaning and treatment services by mobile cleaners for farmers using retained seed



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