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Industry Council for Development

DEVELOPMENT of the TURKISH
NATIONAL SEED INDUSTRY

REPORT of the ICD MISSION to TURKEY
22 February - 5 March 1982

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ICD Mission to Turkey

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Industry Council for Development

I. INTRODUCTION

Terms of Reference

At the request of the government of Turkey and the International Finance Corporation, an Industry Council for Development (ICD) mission visited Turkey during the period of 22 February - 5 March 1982 to determine how the Turkish seed industry could better serve farmer needs, particularly through expanded private sector seed operations. This project was carried out through ICD's Commercial Seed Industry Development Project (CSIDP) which is funded by a grant from USAID.

The objectives of the mission, as outlined in the government request (Annex A), were as follows:

- "1. Identify the market for high quality seeds, particularly for corn, soybeans, vegetables, and forage.
2. Evaluate alternative strategies by which the prospective demands might be satisfied by private seed companies.
3. Outline the changes in government policies which may be necessary to promote the development of a private seed industry."

The ICD mission was composed of the following individuals (Annex B):

Dr. Alexander Grobman - Seed Industry Policy Adviser
Mr. Glen Allen - Seed Industry Marketing Adviser
Mr. Walter W. Simons - Executive Director, ICD
Dr. Nazmi Demir, Agricultural Attache, Embassy of
Turkey in Washington, D.C., accompanied the ICD
mission

Mission Program

The mission held 40 meetings in 5 cities and 6 research stations. Contacts (Annex C) included high-level government officials, national farm organizations and independent farmers, agricultural research stations, banks, and

local and foreign company representatives interested in the seed industry. Mission members also had contacts with representatives of several foreign seed companies interested in investment in Turkey. Several ICD member companies provided useful information and contacts.

Information Sources

In preparing for the mission, ICD received valuable information from the World Bank (IBRD and IFC), the Food and Agriculture Organization (FAO), the United Nations Development Programme (UNDP), Kuhn Loeb Lehman Brothers International, Inc., The American Seed Trade Association (ASTA), and the United States Agency for International Development (USAID). The mission's preliminary findings were also reviewed with some of these groups.

Documentation available to the mission included the FAO Investment Center Report #2/81 TUR. 26 of 16 January 1981 "Turkey Seed Project, Preparation Mission", as well as numerous reports made available by the World Bank Group and the Turkish Government (the State Planning Organization and the Ministry of Agriculture). In the field the mission obtained additional statistical and other reports related to specific crops, the activities of individual research stations, national development projects, etc.

ICD and CSIDP - Objectives and Activities

The Industry Council for Development is a non-profit, tax exempt, self-supporting membership corporation which assists economic and social advancement in developing countries according to their national goals and at the request of their governments. Members are corporations from market and centrally planned economies in developed and developing countries which support the objectives and principles of ICD and which are willing to make expertise available as a contribution to the development process.

ICD established the Commercial Seeds Industry Development Project (CSIDP) in 1979 to help improve the effectiveness of seed industries in developing countries. Assistance to seed enterprises includes management advisory services, market studies, training, and investment promotion. ICD is currently assisting seed industries in the Caribbean, Asia, Latin America, and Africa through CSIDP.

II. SUMMARY

A Dynamic Seed Industry Essential to Development

Turkey prides itself in being one of the world's seven countries which are self-sufficient in basic food production. The nation is fortunate in its rich natural endowment for agricultural production; it is a world genetic center for certain cereal and forage varieties; it has a wide range of excellent soils and growing conditions, and an industrious farming population.

As a land bridge between Asia and Europe, Turkey is also strategically placed to exploit potential export markets for agricultural products in Europe and the Middle East. Turkey thus has the need, as well as the potential, for a strong and profitable national seed industry responsive to the nation's farming and consumer needs and its development goals.

But Turkey, like many other countries, looked for years to heavy industry to provide the main "engine" for national economic and social growth. In so doing it neglected, relatively speaking, the tremendous potential for agriculture to fully contribute to the development effort. Fortunately, the primacy of agriculture for national development is now being given priority attention in Turkey as elsewhere.

The seed industry has a critical role to play in national development; but one that is not always well understood. Seeds are one of the least expensive inputs in the cost of production; but they have tremendous potential--depending on the quality of the seeds--to greatly increase both agricultural production and productivity.

However, as seedsmen like to emphasize, "the seed industry is different." It is different from other inputs because seeds are a living resource and very often the product of expensive long-term genetic engineering efforts. These efforts have, in fact, dramatically increased the international character of the seed industry in the past 20 years, building on the high-yielding grain varieties pioneered by the CGIAR system and the now rapidly expanding genetic achievements of private and public enterprises worldwide.

Redefining the Public/Private Sector
Seed Industry Partnership in Turkey

Individual countries have responded differently to these changing conditions. Because of its strategic importance and the need to protect the nation against seed-borne pests and diseases, the seed industry almost inevitably involves a partnership of public and private sector interests. The central question is how seed industry functions are allocated to each sector within the policy and operational context of the national seed system.

Some countries, including Turkey, have adhered to the old European model of a national seed system dominated by the public sector. The philosophy of such systems is state control and regulation of virtually all seed activities, including imports, local production, certification and marketing. Such a system is rationalized by the perceived need to protect the farmer. However, such systems are generally slow to accommodate to change and their rigidities inhibit private sector participation and limit the range of genetic material available to farmers. Technical independence is a logical objective of such systems with strong controls imposed on the introduction of foreign genetic material.

At the other end of the continuum of national seed systems is the more open model seen in the U.S.A. and Australia. Here, the private sector usually plays the dominant role in seed multiplication, production, marketing and research. This type of system is more oriented toward the farmer in the positive sense of allowing the market mechanism to provide a wide selection of varieties for farmer selection.

In this type of partnership the government performs its role as public guardian by ensuring quality in seed supplies first, through adherence of imports to national phytosanitary rules, and then through the official testing system which assures that the quality of commercial seed is consistent with the producer's claim, and through the certification process that deals with the genetic identity and variety name of seeds. Therefore, the public sector role is focused on promotional and quality control functions; otherwise the private sector is the main channel for seed activities.

In addition, both private and public sectors carry out parallel research and testing which facilitates the entry of new varieties into the official testing system. Such systems are generally open to the entry of foreign genetic material on the assumption that technology interdependence if properly monitored, eventually offers greater rewards for the farmer in terms of varietal choice. It also provides the basis for the national seed industry to develop its own genetic engineering capabilities utilizing indigenous, as well as foreign genetic material, and to participate in international markets.

As developing countries now increasingly give top priority to agriculture, they are also re-examining the mixture of public and private activities that characterize their national seed system. A number of countries, such as Peru, Kenya, Colombia, Greece, Brazil and Thailand have followed the more open, farmer-oriented model, with very positive results. Even countries in Eastern Europe, with well established centrally planned systems, are today aggressively seeking foreign partnership for their national seed industries.

Turkey today is also at this crossroads. The present national seed system does not adequately serve the needs of agricultural development nor does it hold any attraction for local or foreign private sector investment. Of all the countries that can today claim self-sufficiency in food, Turkey probably has one of the most restrictive national seed systems. The country is for all practical purposes technologically isolated and may be a decade or more behind in some crop variety developments.

An efficient and profitable national seed industry must be based on a dynamic public-private partnership oriented toward national development goals. The two critical prerequisites for a national seed industry are:

- a national seed system with legal, administrative and operational structures that support and promote commercial enterprise while also guaranteeing consumer protection through strong government quality control functions.
- an attractive long-term national market and, if possible, export opportunities.

The ICD mission analyzed these prerequisites with the following conclusions and recommendations:

Changes in the National Seed System

The Turkish national seed system should be transformed as quickly as possible from the present government-oriented system to a farmer-oriented system in which the private sector takes over primary responsibility for seed introduction, production and marketing. This will take time and careful phasing and should involve the following changes:

A. The Legal Structure

- . immediate elimination of price restrictions on non-strategic crop seeds.
- . permission to companies to import non-strategic crop seeds for private testing and test marketing.
- . revisions to the agricultural law, particularly to provide cheap credit for the seed industry.
- . a revised or totally new seed law that would establish the legislative basis for public-private partnership.
- . reduction of time for the official testing program for certain varieties and -
- . certification an optional procedure for private sector varieties.

B. The Administrative Structure

- . reallocation of public resources away from production and marketing to strengthen extension and education activities.
- . revision of the decision-making process to include private sector seed industry participation, especially through the National Seed Advisory Council.
- . better communication links with the farming population.

C. The Operational Structure

- . transfer, as quickly as possible, government responsibility for production of vegetable and hybrid seeds to the private sector. Gradually increase private sector participation in production of industrial and forage crop seeds toward the eventual goal of minimizing government certified seed production to strategic crop seeds and basic and foundation seed for other crops.
- . expand private sector testing to determine best varieties for inclusion in the official testing system.
- . permit immediate private marketing of imported seeds as "commercial" seeds.
- . test feasibility of using the government seed marketing system to handle private sector seeds.
- . promote local and foreign investment in the seed industry, particularly under the Framework Decree and through SPO/FID.

Exploiting Potential National and Export Markets

Although the data available to the mission posed problems of reliability, there is no question that attractive internal markets exist in all crop sectors studied. The estimated commercial seeds market for the 1982 season is approximately 11,000 tons with an estimated value of 17.3 billion Turkish lira at current controlled prices. Of this total, individual markets for 5,000 tons of maize seed, 4,000 tons of oil seed and 1,400 tons for vegetable seed are envisaged.

Turkish farmers have indicated their willingness to increase the seed cost per hectare as much as 30 times (in the "unofficial" black market) over the present government controlled price level in order to obtain the benefits of increased productivity. Several-fold increases in seed costs per kilo would not increase total costs per hectare for the seed input to more than 5% of the total cost of production (approximately 3 times the present price level) but would promote the use of improved seeds

and perhaps increase productivity per unit of land by 25 to 50% or more, depending upon the crop.

This market volume, combined with the potential for price increases and assuming a more liberal national seed system, is considered attractive for both domestic and foreign seed company investment.

While the mission did not directly assess export market potential, it is clear that excellent opportunities may exist in Turkey's natural markets in the Middle East and some parts of Europe. One private seed company currently produces and exports to Europe vegetable seed for its foreign partners.

Promoting Private Sector Participation in the Turkish Seed Industry

A significant potential exists for the development of a private sector seed industry in Turkey. The size and potential profitability of the Turkish seeds market present an attractive opportunity to both domestic and foreign investors. Similarly, the government's stated desire to create a more open and flexible seed system augurs well for the nation's private sector seed industry development.

A well functioning private sector seed industry will contain a series of financial incentives to entrepreneurs at all stages of the industry. These incentives include: low capital investment requirements, economies of scale and attractive profit potentials for prospective seed enterprises; attractive returns to contract growers for the production of seed relative to food crops; discounts to distributors for the distribution of privately produced seed; and ultimately higher incomes to farmers from the increased yields that result from improved seed use.

Experience in other countries indicates that these incentives will bring response from imaginative entrepreneurs in the domestic private sector. The mission estimates that within ten years twenty to forty seed companies could be operating in Turkey, some with partnership or licensing arrangements with foreign seed companies.

Discussions on policy options for attracting private investment in the Turkish seed industry with local and foreign private sector representatives revealed a number of important considerations:

Local Private Investment

- Promotional efforts should be made by the government to attract local private sector investment into the seed industry, particularly individuals and companies interested in full-time seed production. These efforts could be carried out through a "National Seed Enterprise Development Seminar", as recommended in this report, and outlined in Chapter VI.
- Existing Turkish seed companies are discouraged from further expansion, particularly by the difficulty of access to foreign technology and low-cost credit. The removal of these obstacles could provide an important incentive for existing national seed companies to increase their operations.
- Agroindustrialists in sectors affected by the quality of seeds (vegetable oil, food processing, livestock) should give consideration to vertical integration into seed production. The mission found that while such industrialists recognized the value of high quality seeds, few, other than a number of vegetable oil companies, had seriously considered supporting the national seed industry or entering into seed production themselves.

Foreign Investment

- Considerable potential exists for attracting foreign investment into the Turkish seed industry. Several foreign companies have indicated strong interest in entering the Turkish market, and have proposals before the government and/or varieties in the government testing system.
- While foreign companies are aware of Turkey's tremendous agricultural potential, they are wary of rigidities in the national seed system and of government controls that could inhibit profitable operations. In addition, Turkey's foreign investment regulations are not well known or understood by foreign seed companies. Therefore changes in the national seed system, and the

attractive incentives contained in the Framework Decree on Foreign Capital should be widely publicized abroad, particularly with seed trade associations in Europe and North America. There is an important role for the Foreign Investment Department of the State Planning Organization to play in these promotional efforts.

- There are also a number of areas that apply to the seed industry which will require further interpretation of the Framework Decree. These include partnership arrangements that would protect the proprietary rights of foreign companies over varieties introduced to Turkey, and qualifications for incentives under the decree of licensing arrangements, and joint marketing arrangements to test new varieties in the market prior to their production within the country.

National Seed Enterprise Development Program

In order to develop a consensus on national seed policy, and to attract domestic and foreign private sector resources, the mission recommends a special program of activities to stimulate seed enterprise development in Turkey. These include action to set up a national seed advisory council and a seminar series on the key policy and operational aspects for expanding the national seed industry. The series would examine lessons learned from the experiences of seed enterprise development programs in other developing countries, and could involve seed industry entrepreneurs from such countries.

Other activities to promote local private sector interest could include: special guarantees, incentives, and information for local private investment in the seed industry; an inventory of national seed industry human resources, training and development needs; and a national seed industry training program.

The mission also recommends that a series of efforts be made to publicize investment opportunities in Turkey through foreign seed industry associations, and the international press, to further stimulate the already growing interest of foreign seed companies in the Turkish seed industry.

III: THE NATIONAL SEED SYSTEM

A. General Overview

A national seed system has evolved in Turkey over the past 20 years based upon national legislation (Seed Law 308 of 1963), and a series of related regulations and decrees. While not officially called a national system, this structure has, in essence, developed around the guiding philosophy of government obligation to protect the farmer through a series of services that exercise almost complete control over the introduction, testing certification and sale of seeds.

In attempting to solve the problems of improved seed supply for the small grain crops, especially wheat and barley, a series of research, production and distribution organizations have been created by the government since the late 1950's. During this period, only three private seed firms have been established; they have been able to survive within the national seed system largely because of exceptional circumstances.

The system has been reasonably successful in providing a sufficient supply of high quality seeds to Turkish farmers in certain commodities, such as sugar beets and cotton. It has been somewhat less successful in supplying wheat seeds, and least successful, with a definite technological lag in both supply and yield potential, in maize, oil crops, forages and vegetables.

The national system is a complex, multiple agency system which attempts to coordinate seed industry activities at the top, through committee action, but with very weak links to the farmers. It operates fundamentally as a centrally-planned system in an increasingly open economy, and appears to have become outmoded for the present and future needs of Turkey's dynamically developing economy. This fact is further accentuated by the emphasis that the country places on the development of a strong and economically efficient agricultural sector.

The mission concluded that while seed prices in Turkey are among the lowest to be found anywhere, they have actually created serious supply shortages that, according to the available figures, total 99% of the demand in potatoes, 72% in wheat, 57% in corn, 78% in cucumbers, 92% in cauliflower, 50% in tomatoes and 97% in watermelons. It was confirmed to the mission from various sources that Turkish farmers recognize the value of improved high quality seed; they are willing to pay much higher prices than those prevailing under the internal government price controlled system. As a consequence of the seed shortage and the restrictions on seed imports, a black market with high prices now flourishes, especially for certain vegetable seeds where the high market value of final products, and yields, are linked to low seeding rates.

At the same time, other crop seeds which require large volumes of seed for planting, have fallen behind in their development, both genetically and in terms of market availability. In this category are maize, oil crop seeds such as rape, sunflower, soybean and other potential oil crops such as safflower and lupines.

The research activities of public institutions are up-to-date in methodology and quality of work. However, their ability to sample technology from other countries, in the form of new varieties and particularly the close-pedigree hybrid varieties is deficient, either by design or through lack of access to the sources for such new technology. At the same time, the operating systems of the official research establishment, plus the existing testing regulations and other negative incentives deter foreign enterprises from making available seed technology of potential interest to Turkish agriculture.

It is also a fact that in cases where foreign improved varieties and hybrids of certain crops have been tested and showed superior yields under Turkish agricultural conditions, follow-up, except until very recently, has not taken place.

The mission felt that Turkey is well endowed ecologically and in terms of human resources to develop a national seed industry which could supply a high percentage of farmers' needs for improved seeds and perhaps even support a dynamic seed export industry.

B. The National Seed Policy

A seed policy is an integral part of a nation's overall agricultural policy. The agricultural policy in turn supports a long-term development plan designed to attain priority objectives within the shortest possible time at the lowest social and economic cost to the country.

The current policy objectives in agriculture and economic development as described to the mission, and as related to seed policies, include:

1. Increase farmer income.
2. Reduce cost of production of food products.
3. Expand the supply of food products allowing the maintenance of food security.
4. Allow for export surpluses of original and added-value agricultural products.
5. Improve balance of payments through agricultural exports.
6. Stabilize rural populations by reducing the rate of migration to the cities, and increase capitalization, income and jobs in rural areas.

The national seed system, in its present framework, seeks to achieve a supply of high quality seeds, in accordance with the needs of the country, through the following policy principles:

- a) Government protection of farmers, under a system of restricted choice and government recommended varieties.
- b) A seed price control policy which attempts to provide farmers with seed at the lowest possible price commensurable with quality standards.

- c) Technology independence from foreign resources to the maximum extent possible.

Historically, when the system has come under pressure, it has adopted de facto open-system positions which have conveniently allowed potent injections of foreign technology. For example, imports have been allowed of improved varieties of wheat, cotton, sunflower and sugar beets. Unfortunately, these openings have been infrequent, reflecting ad hoc reactions to pressures rather than a consistent policy course.

The original seed industry policies were, undoubtedly, designed in relation to broader policies on food and agriculture and overall economic growth. However, the mission felt that three of the basic aspects of present seed policy, i.e., (a) low seed prices, (b) the restricted number of recommended varieties, and (c) production and distribution of seed through public institutions, may have had a counterproductive influence, offsetting in many cases, the gains that were achieved in the early stages of the improved seed supply program. These policies, which were established some 20 years ago, may no longer adequately serve the country's needs for providing the farmer with sufficient high quality seed supplies and should, therefore, be subjected to critical analysis.

As a starting point for such analysis, it should be emphasized that even though seeds are one of the lowest cost items in agricultural production (generally 3-5% of the cost of production), they are critical to increasing both production and productivity.

The key elements of a sound seed policy include government support for:

- . The availability of high-quality seed varieties with high yield characteristics and stability of performance to farmers who must be able to select the best varieties for location-specific conditions.
- . A stable seed industry with long-term growth potential, supported by government incentives and market opportunities.

- Strong permanent research and development programs in both the public and private sectors.
- Strong extension and educational efforts, particularly in the public sector, linked with the implementation of the seed policy.

C. The Administrative Structure

The administrative center of the Turkish national seed system is located in the Ministry of Agriculture. Although it was designed as a centrally-planned system, it actually operates with a mixture of economic characteristics (restricted, semi-restricted, open and black market), with both public and private decision-making centers. Production, distribution, pricing and credit is centrally planned and administered predominantly by government agencies throughout the system's production, distribution and extension phases. A three-man coordinating committee-- all government officials-- supervises programming and coordination. Decisions on action plans take place at the Under-Secretary and Director of Agriculture levels. There is apparently little, if any, participation of farmers or private seed producers in the decision-making process at higher government levels, although there are channels for liaison between farmers and the government through the Union of Turkish Chambers of Agriculture and other farm organizations.

D. The Legal Structure

The existing body of legislation relevant to seeds includes the Seed Law (308), the Agricultural Law, the Investment Laws, and a miscellaneous collection of decrees

The present Seed Law is based, in general, on normative and regulatory principles. There are absolutely no promotional elements in the law; it tends to follow earlier control-oriented seed law models from European countries. It comes as no surprise, therefore, that the law's built-in rigidities are not implemented in many cases; but the strict implementation of other aspects creates imbalances which inhibit development of a normal, private, healthy seed industry in Turkey.

The Seed Law places major emphasis on varietal purity of seeds, beginning in Article 1 and continuing through other articles. Although important, varietal purity is just one of the factors involved in agricultural production. It is as or more important to have sufficient good seed to satisfy farmer demand, even if this initially means less than optimum varietal purity.

This law and its complementing regulations lack the essential philosophical approach of promoting high quality seed supply through incentives and support for private sector seed activities in the introduction and testing stages. The adoption and enforcement of an exclusive testing and variety registration system by the Ministry of Agriculture, essentially transfers all responsibility and guarantees of performance from the originator of the variety-- either public or private-- to the government.

Such an approach reduces competitiveness and delays a dynamic change of varieties. This official control-oriented legal structure acts as a formidable barrier for any private organization interested in attempting to organize and participate in seed research, production and marketing. Authorities are clearly concerned with how this system has evolved over the years and the fact that today government controls virtually all areas of the seed industry. This situation is in contrast with the tendency toward open economic activity being encouraged in other major national industries.

E. The Operational Structure

1. Seed Testing

The mission found widespread concern among both local and foreign seedsmen interested in the Turkish seed market, as well as farming organizations, farmers, industrialists and a large number of agricultural research workers, that the current testing procedures for admission of varieties into the registered list are unduly lengthy and make no distinctions between commodities or types of seeds. The tests take a

minimum of three years, although in some cases a provisional permit may be given after two years of testing. This is, however, a very unclear situation since, after registration at the varietal list level, another registration and authorization for seed production is required, extending the testing period another three or more years.

The situation is further complicated by the added requirement, beyond meeting the phytosanitary laws (Annex F) that special permission is required for seed samples to be admitted to the country for testing. It has not been made specifically clear under what conditions interested parties may conduct preliminary tests on their own in Turkey, as a screening procedure, prior to selecting a small number of top varieties for submission to government-conducted tests. Government research workers widely believe that such screening tests may not be authorized, and that varieties developed or introduced from outside Turkey should only be screened and tested at government experiment stations or under their supervision. Obviously, the capacity of the government research institutions for testing and screening a large number of varieties, such as would be required if they were to be exclusive screeners of all varieties in Turkey, would be insufficient for such a task. One typical seed company with a breeding department might wish to screen 10 to 2,000 varieties of a given crop at anywhere between one and ten locations, on the average, before selecting the varieties for inclusion in the official testing program.

The Ministry of Agriculture's tests are conducted under standard, accepted methods and produce results reflecting the performance of varieties under small test-plot conditions.

These results are slow in being analyzed, tabulated and released. Cases were found by the mission in which even the government testing stations at some locations did not have crop performance reports which integrated the results of tests at their location with other locations throughout the country.

The three-year testing period, made in small sized plots is not paralleled by farmers' field size tests during that period. The latter tests if done at all, occur at a later time. This situation may delay complete field performance tests of a variety, where stress factors (drought, disease, etc.) are more likely to appear than in experiment station tests.

There appears to be an informal procedure for a two-year test before preliminary release of hybrids. While this point was discussed and accepted by technical officials, its legal validation under the present system has not been established. Officials seem to be aware that new genetic technology including high performance hybrid varieties may not be available in Turkey because of the lengthy testing procedure.

The testing system as conducted now at Ministry of Agriculture research institutes, does not specifically characterize the varieties according to stability performance parameters, but, rather emphasizes maximum yields. In practice, farmers are interested in more factors than maximum yield performance. As a security feature, they want varieties with the capacity to perform with reasonable yield expectations under adverse environmental conditions.

Once the variety is tested and found of interest its test records are presented by its breeder to a varietal registration committee.

It is said in favor of the current system that the varietal registration committees are well organized and do not include individuals who might be partial in their judgement. Also, the criteria for registration are broad, and include agronomic characteristics other than yield.

The system rests, nevertheless, on value judgments which are imposed by the government on farmers based on those few varieties, out of the vast selection existing in the world today, that have been exposed to the official testing

system in Turkey. No provisions exist, at least legally, for parallel testing initiatives outside of and complementary to the official system. Thus, the potentially great research resources that exist outside the government system cannot, under the present conditions, be mobilized to support varietal introduction, development, and testing in Turkey.

2. Certification

The present Turkish certification procedure actually combines two procedures --seed certification and seed quality control --which are usually separated in national seed systems. Certification should be restricted to matters of true genetic identity and its maintenance within recognized and specified tolerance for plant varieties through the development of seed from breeder to commercial categories. Quality control on the other hand is enforced by the government through a separate Truth in Labelling Act, which allows for regular testing of commercial seed against minimum quality standards claimed by the producer within established categories. In Chapter VI, the Mission Report suggests a way to separate these two functions.

In Turkey, there are no legal ways for voluntary certification of varieties of private origin, nor for allowing the use of preferential credit for the purchase of seed of high quality varieties or hybrids of private origin. In the U.S. and a number of Latin American countries, such mechanisms operate effectively.

3. Seed Production and Distribution

The mission identified the following seed production entities in both the public and private sectors:

- 1) State seed farms, engaged in commercial and certified seed production.
- 2) Agricultural experiment stations of the Ministry of Agriculture which are required

to produce basic seed but, in addition, produce commercial and certified seed in small quantities.

- 3) Specialized Government Corporations --the State Sugar Company contracts the production of sugar beet seeds with a specialized company which it partially owns.
- 4) Private cooperatives for cotton seed production.
- 5) Private companies engaged in vegetable, corn, sorghum, etc. seed production. Of these, three were identified (Beta, May, Tohum Islah).
- 6) Food processors, producing their own specialized seed varieties such as the TAT organization on tomato seed for industrial processing.
- 7) Farmers producing improved varieties on their own land, but outside government control.

The first three groups have been successful in promoting wide scale use of improved wheat and sugar beet varieties. There appears to be no immediate interest or economic potential for private seed companies to assume responsibilities for commercial or certified seed production in the above mentioned crops, or in feed barley. There might be potential for participation of the private sector in improving barley for malting purposes in regard to using varieties with better quality characteristics for beer making, but this idea has not yet been taken up by industry.

The agricultural research stations of the Ministry of Agriculture do not appear to be contributing significantly to the supply of commercial or certified seeds, and whatever small production effected by them may be made at relatively high cost. Their role in production of basic seed, on the other hand could be reinforced and specialized, and their participation in the production chain ought to be redefined in accordance with their original intended objectives.

The private seed companies supply an increasing percentage of the market for locally produced seed of various vegetable varieties. It is quite possible that existing and new companies, with appropriate incentives, could very well supply all of the vegetable crops.

There is a significant shortage of improved hybrid seed of commercial grain crops such as corn and sorghum, and of oil seed such as hybrid sunflower, in spite of the excellent results obtained in research trials. This would be a natural area for specialized seed companies to bring in their own technology for joint venture operations with Turkish capital and local expertise. They might undertake additional industrial seed production activities in crops such as soybeans, rapeseed, and in forage seeds such as alfalfa. Initially joint venture companies might contract the state farms to produce and process seed.

Seed marketing operations are undertaken in Turkey by the following government and private organizations:

- 1) TZDK - the government-operated agricultural supply stores are channels for most of the government-produced seed.
- 2) The agricultural bank's storage facilities facilitate the distribution of seed in various areas. Farmers can receive their credit directly in seeds through these bank outlets.
- 3) Some direct sales to farmers are carried out by state farms and by the agricultural experiment stations.
- 4) Private companies operate through their own network of retail agents.
- 5) Small country and market stores.
- 6) Farmer to farmer sales.

The government system has played an important role in the marketing structure for national seed supplies. It may continue to play such a role in the future for cereal seeds, possibly as a partner with the private sector in the sale and distribution of various other seeds.

However, the government system faces considerable limitations in terms of expanding and extending its influence among farmers. Its present structure, and its operation as essentially a non-profit system restricts its potential impact. In addition, the cost-accounting systems used by government units probably do not reflect the real cost of the operation, which is very likely to be uneconomic --if all real cost factors were to be included. Therefore, a modification of the public sector marketing system's operating practices toward more accurate cost accounting procedures, and the selling of private sector seed at reasonable profit levels would be essential if it were to serve as an effective channel for the distribution of privately produced seed to farmers. In addition, a private wholesale and retail distribution system, possibly linked to the sale of fertilizer, pesticides, and other farm inputs could be developed to increase sources of supply to the farmer, and cover areas not presently covered by the public sector system.

4. Credit

Credit for the purchase of seed is available primarily through the Agricultural Bank. Both specialized zero-interest credit for certified seed purchases, and general credit at 20% interest for the purchase of agricultural inputs (including seeds) are available. The latter compares with 60% and higher interest rates for regular commercial credit.

Classification of the seed industry for low cost credit is a "grey area" in Turkey, as in other countries. The mission recommends that the seed industry be considered within general agro-industry and as an agricultural production function in order to qualify for subsidized credit. Such a classification for

the seed industry would also avoid possible differential treatment of applicants and subjective judgements of applications for credit.

5. Extension

Agricultural extension efforts, and particularly those related to seeds, are considered by farmer organizations to be insufficient in both the coverage and quality of information supplied. If the private sector takes on a greater seed production and marketing role, more government resources ought to be channeled into extension and educational programs, including crop-based campaigns. In addition, the government could strengthen and improve the training of extension workers. A well designed and integrated seed promotion campaign-- including credit and marketing of improved seeds as an essential part of the input package-- should be organized by the government to assist farmers in their selection of improved varieties and the most effective production techniques.

IV. PROMOTING GREATER PRIVATE SECTOR PARTICIPATION
IN THE TURKISH SEED INDUSTRY

The government has indicated its interest in attracting far greater private sector participation in the national seed industry. A more open national seed system, as recommended in this report, is an essential prerequisite for attracting both domestic and foreign enterprises.

A second prerequisite is a long-term profitable market. The mission report's chapter on marketing documents the very attractive national market for production and distribution of seeds, particularly in non-strategic crops that could be open to private sector participation under the recommended new national seed system. There also appears to be good potential for export of high value seeds to countries in the Middle East and parts of Europe.

Experience in other developing countries has shown that these incentives will bring a response from imaginative entrepreneurs in the local private sector. Logically, the first individuals to be attracted are from that relatively small group of people who have some working knowledge of seeds. Often this includes government employees* as well as farmers and individuals in agro-industries with some relation to seeds.

The mission estimated that within ten years Turkey could have 20-40 seed companies, of which five would probably be large general seed houses with licenses or partnership arrangements with foreign seed companies. Most of the rest would be smaller specialized companies, particularly in the vegetable and forage seed sectors.

The mission discussed the question of policy options for attracting private investments with Turkish private seed companies; local and foreign agro-industrialists in the vegetable oil, livestock and food processing sectors; several potential foreign investors; local and foreign banks, IFC, ASTA, etc. While the results of these discussions can only be considered indicative, they reveal the following important considerations:

*In Peru the government offered a financial incentive, equal to eight months' salary, to employees entering the private sector seed industry.

A. Local Private Sector

- Under the current national seeds system, existing private seed companies are discouraged from further investment and expansion, particularly by the difficulty of access to foreign technology and to low cost credit.
- The other main category of entrepreneurs who might logically consider seed company operations under the present system are agro-industrialists in sectors affected by the quality of seeds (vegetable oil, food processing, livestock). The mission found that such industrialists understood the value of high quality seeds, but had only given superficial consideration to supporting the national seed industry, or to getting into the seed business themselves. Some food processors are de facto in the seed business; but other industrialists had not really seriously considered vertical integration into seeds.

The highly competitive vegetable oil industry, for example, recognizes the importance of higher quality seeds for oil crops. One company is working closely with the oil seed cooperative in Thrace to promote through demonstration programs the use of certified seeds by farmers. Three other companies have cooperated recently in importing soya bean seeds-- a move that was subsequently undercut by government imports-- and in other ways, to promote the use of improved seed varieties. This group expressed interest in the idea-- proposed by the mission-- of establishing a new, jointly supported seed production and marketing company that might include local banks and foreign seed companies as partners.

- Despite the present lack of local private investment in the seed industry, the potential profitability for seed production and marketing was widely recognized by industrialists, bankers and farmer organizations.

The mission believes that the recommended changes in the national seed system would help to trigger significant new domestic investments in this sector.

B. Foreign Investment

Only three foreign seed companies are presently involved in some form of partnership with Turkish companies. Several others have proposals before the government and/or varieties in the government testing system. The potential, therefore, is considerable for new foreign investment in this sector. In this regard, the mission had the following impressions:

- Foreign companies are aware of Turkey's tremendous agricultural potential, but they are cautious and even skeptical because of uncertainty about the direction and duration of political and economic change. They also have the impression that Turkey's national seeds system is a rigid structure of government controls which essentially inhibits profitable operations.

Therefore, changes in the national seeds system, if and when they are implemented, should be widely publicized abroad, and particularly with national seed trade associations in Europe and North America.

- The government must also keep in mind that Turkey is in competition with other countries for the limited foreign seed company resources. In Europe, Hungary and Yugoslavia are, in particular, making aggressive appeals for foreign seed company participation. Egypt and several other developing countries are also potential competitors.
- Turkey's foreign investment regulations are not well known or understood by foreign seed companies. The fact that Turkey has had a relatively liberal foreign investment law (Law 6224) since 1954, has been obscured by account of negative experiences in dealing with the required bureaucratic procedures.

On the other hand, there is increasing awareness among the more internationally minded seed companies of the Turkish government's new efforts to attract and speed foreign investment, in particular, the "one-stop" procedure for processing

investment proposals through the Foreign Investment Department of the State Planning Organization. Less well known are the attractive new incentives contained in the Framework Decree on Foreign Capital (No. 8/168) (Annex H). This decree specifically mentions "seed production" as a priority sector for foreign participation. Even so, seed companies will probably claim that "the seed industry is different", because it deals with a living resource, the proprietary rights for which are often difficult to protect. Because of this, and related factors, some foreign companies may logically prefer to test the local market with 100% imported seed before committing themselves to any form of economic partnership with a Turkish enterprise.

The mission explored ways in which this concept might be reconciled with the Framework Decree. One suggested approach would be to establish a joint foreign/Turkish marketing company in which the foreign partner's imported seeds could be considered equity "in kind". The mission was advised, however, that a company established strictly for distribution purposes would probably be considered a "commercial company", and not be eligible for incentives under the Decree. Interpretation of the Decree for such specific seed industry considerations will, therefore, be an important matter for government/industry cooperation in the immediate future.

C. Models for Investment in the Seed Industry

The mission analyzed various possible combinations of foreign and local, private and public sector partnerships in the seed industry. Following are several general models for such partnerships:

Totally or Majority Owned Foreign Subsidiary

This type of company is not encouraged under the Framework Decree (which applies to partnerships with a minimum of 10% and a maximum of 49% foreign ownership). However, exceptions to the Decree are possible if approved by a ministerial committee. The advantage to foreign investors would be protection of genetic technology which they might bring to Turkey, especially in the production of hybrid seeds.

Majority Owned Turkish Company

A joint venture with majority ownership by the Turkish partners is the model most favored by the government. A wide range of incentives is available through the Framework Decree. The foreign partner could consider seed supplies and know-how as equity "in kind".

This type of partnership could be initially established on a small scale, essentially as a marketing venture, to test the market for new seed ventures. However, as indicated earlier, pure distribution organizations are likely to be classified as "commercial companies" and not be eligible for incentives.

Turkish Company with a Foreign License

This is a simple form of partnership presently represented in the existing seed industry. However, unless some form of foreign investment were involved, the venture would not qualify for incentives under the Framework Decree.

Consortium or Vertically Integrated Agro-Industrial Operation

One or more agro-industrial companies in the same sector might create a seed company partnership with local banks and a foreign seed company.

Foreign companies already represented in Turkey might diversify into the seed industry, thereby qualifying for additional incentives.

Export Oriented Seed Company

Turkish export companies might consider diversification to include related seed exports. This could be particularly attractive to food processing and livestock oriented enterprises. Foreign partners might be interested in all or some of the company operations.

Farmers Cooperatives

Producer cooperatives are increasingly oriented toward seed marketing operations. It would be natural for some of them to be organized as regional seed production/marketing units, and to assume full seed industry activities. Another possibility would be to expand a specialized commodity operation, like a cotton seed cooperative, to include seed production and marketing. Such cooperatives exist in the U.S.A. for selected crops, such as peanuts, and Brazil for wheat.

Individual farmers with high potential for seed production and direct marketing under certified seed producers associations could be established for certain crops in Turkey. This was an early model in the U.S. and in Peru. In the latter country it still persists 26 years after its creation and accounts for one-third of the production and sales of hybrid seed corn there.

D. Incentives in a Private Sector Seed Industry

A well functioning private sector seed industry will contain a series of built-in incentives that encourage the production, distribution, and use of improved seed by the respective parties at all stages of the industry. While the magnitude of such incentives will vary according to local conditions, it is possible to present, for illustrative purposes, a general picture of how such incentives work, and their role in moving improved seed through the system.

Incentives to the Producer

Contract Grower:

Where a seed company's own facilities and planting area are insufficient to plant and grow the seed needed to fill demand, it will generally contract the growing of the seed to private farmers, who then sell the seed to the seed company at a pre-arranged price.

As a general rule of thumb for grain and maize crops, the seed company will pay the contract grower the grain price in the market for his harvest plus a

percentage above that price. This percentage will range from 10% for open-pollinated varieties, to 50% or higher for hybrid varieties. This percentage above the grain price provides the farmer with an incentive to produce crops for seed rather than for grain, and remunerates him for the extra care required to grow seed crops.

To the cost of purchasing seed from the contract grower (which implicitly includes the cost to the company of producing breeder and basic seed), the company must then add the costs of drying, processing, packaging, storing, and distributing the seed. As a general rule, the price paid by the final consumer for the seed will be five to seven times the market price of grain for hybrids, and 2.2 to 2.4 times the price of grain for non-hybrids.

Seed Enterprise

Unlike many agro-industrial activities, seed production is generally not a capital intensive activity. It is therefore an activity well suited to small or medium sized enterprises. Required capital investments for plant and equipment are relatively low. The main capital requirements are seed inventory and annual operating costs. As an example, a medium sized seed enterprise, producing 1,000 tons of hybrid corn and 500 tons of sorghum per annum, would generally require an average total investment of about US \$3 million. Of that investment, \$500,000. would go toward plant and equipment, while the remaining \$2.5 million would be required for inventory and operating costs. Seed companies often enjoy attractive economies of scale; existing plant and equipment can absorb considerable increase in production. The main expense incurred by increased production will be in labor and other operating costs.

Investors will be further attracted to the seed industry by the fact that they will require only a percentage of the total required capital investment on hand to enter the seed industry, the balance of required capital being provided by national credit sources. It can be expected that the percentage of total investment required from the investor would be in the neighborhood of 25%. Therefore, out of a total investment of \$3 million for the medium-sized enterprise described above, an investor would need approximately \$750,000. of his own risk capital as leverage for the remaining \$2,250,000. from national credit sources. For setting up a smaller-sized enterprise, producing a lower volume of seed,

on-hand risk capital requirements will obviously be lower.

Profit levels throughout the world seed industry indicate that on average, a healthy seed company could expect to receive 12 - 15% net profit on sales. The seed industry is not a high margin industry. Revenues are determined more by volume of sales than by high margins per unit of sales. Exceptions to this rule can generally be found in the vegetable seed sector which is characterized by lower sale volumes and higher profit margins.

Incentives to the Distributor

In cases where private seed companies do not set up their own retail outlets, they must rely either on the government marketing system, or alternatively, on private distributors who also engage in the selling of fertilizers, equipment, pesticides and other agricultural inputs. In order to market privately produced seed, private distributors (or public distributors selling at a profit) will charge a percentage of the sales price in return for marketing services. The percentage charged by the distributor will vary according to local conditions, the types of varieties sold, and the terms of its contract with the private seed company. If the contract with the seed company provides the distributor with an option to return unsold seed to the company, the distributor's margin will be lower, averaging in the U.S. and other countries around 5%. Where the distributor does not have the option to return unsold seed, he assumes the bulk of the risk for distributing the seed and will therefore charge a higher margin. This is necessary also from the company's standpoint since it induces the distributor to sell and store seed rather than other safer non-perishable commodities. Distributor margins for the sale of hybrid varieties will be higher than for self-pollinated varieties. In such countries as Kenya, where options to return unsold seed generally do not exist, distributor margins for hybrid corn seed range from 20 to 30%.

Incentives to the Farmer

The incentive to the farmer to use improved seed can best be measured by comparing the increased yields resulting from the use of improved seed with the additional cost the farmer must pay for the improved seed. A very

simplistic example will serve to illustrate the magnitude of the benefit resulting to a farmer from the use of improved seed. Say that a farmer using seed purchased from neighbors has been getting an average of 3,600 kilos of grain per hectare, and that his cost of seed per hectare averages \$6.; in addition, say that the use of purchased improved seed will increase his cost of seed per hectare fourfold to \$24. per hectare. Assuming that the price of grain is 22¢ per kilo, this added cost of \$18. per hectare equals the value of 81 kilos of grain. However, assuming an increased yield of 30%, the farmer would average 4,800 kilos of grain per hectare, an increase of 1,200 kilos per hectare. Therefore the farmer has spent 81 kilos of grain to get an added 1,200 kilos with the use of improved seed. This example, drawn from farm experience in a Latin American country, obviously does not take into account the costs of added inputs such as fertilizers and pesticides that often accompany the use of improved seed, and by arbitrarily assuming a 30% increase in yield does not take into account variable conditions that normally exist between farmers and crops. Yet even including these additional variables, the cost of the use of improved seed will more often than not be compensated by increased yields to the farmer, and by extension, increased income to the farming community.

E. National Seed Enterprise Development Program

In order to attract additional private sector resources--both local and foreign--the mission recommends a special program of activities outlined in Chapter VI. These include action to set up a national seed advisory council and a seminar series on the key policy and operational aspects for expanding the national seed industry. This series would take advantage of lessons learned from seed enterprise development programs in other developing programs and might involve seed entrepreneurs from such companies. A number of other promotional activities are also discussed in that chapter.

V. THE POTENTIAL COMMERCIAL MARKET
FOR SELECTED SEEDS IN TURKEY

A. Introduction

This chapter presents information on the potential commercial market for selected seeds in Turkey to be used in evaluating suggested changes in policies and regulations recommended in the main body of the report, and to provide marketing information of interest to potential seed industry investors. The groups of seeds analyzed are: (1) The oil seeds sector which includes sunflower, cottonseed, soybean, and rapeseed; (2) the corn sector; (3) the forage seed sector, including alfalfa, sainfoin, vetch, and sorghums; and (4) the vegetable crops sector, including the pulse family, but excluding dried lentils and chick-peas.

B. Definition of Commercial Seeds

Throughout this analysis the commercial seeds market would represent seeds commonly used by farmers without attempting to distinguish between the "registered", certified, and controlled" (classifications) of seed prevailing in official government regulations. Although these terms are used in Turkey, they do not reflect the international definitions common to the world seed industry. All three classification levels of seeds have therefore been treated as "commercial seeds" in this report with the recognition of existing differences in seed terminology between Turkey and other countries.

C. Information Sources

The information included in this report has been based on over 40 interviews with government officials, research institutes, private businesses, farm organizations, and farmers during a two-week visit to Turkey from February 22 to March 6, 1982. In addition, numerous documents were made available to the mission during the interviews. These have been reviewed and analyzed for information relevant to the commercial market potential for seeds in Turkey as well as for information on marketing channels and distributive discounts; pricing procedures; processing; packaging; storage; and geographical differences in market requirements.

An effort was made to reconcile the data variations between the many sources of information. The reader should be cautioned that discrepancies of data between sources were not unusual, and the level of accuracy of acreage and yield data contained in estimates by the Government of Turkey are not well established. The results presented in this report result from the mission's evaluations and assessments given the information available at the time. Thus, future surveys conducted by other investigators undoubtedly could result in differences in many of the factors presented herein.

The procedures used in preparing this analysis are consistent with the practices of the world seed industry, and the availability of any data deemed more accurate than those presented herein could be inserted easily into the methodology used in this chapter.

D. Market Overview

Currently, the four seed sectors included in this study experience frequent supply shortages. The system of government controlled production on state farms and research institutes has not been able to supply sufficient quantities of improved seeds to meet the needs of the Turkish farm community. Shortages of the higher yielding seeds are well recognized by farmer organizations and individual farmers. As a result, farmers must save a high proportion of their own seeds even though the government extension service has made detailed recommendations relative to the suggested frequency of change farmers should practice in the introduction of seeds from new sources.

The mission's analysis of the potential seed market in Turkey has been made on the basis of the frequencies of the introduction of new seeds by the farmer, which were reported during mission interviews, and which are beyond the time period suggested by the government extension service. Past studies on the potential Turkish seed market have generally relied on the frequencies recommended by government extension services in their analysis of the Turkish seed market. (See Tables 1 and 1a). Even with our assumptions of additional years between new introductions at the farm level, the available supply of selected improved seeds produced through the government's production program does not meet the needs of the reported

hectarage. Thus, it appears that the farmer is either saving a higher proportion of his own selections than was reported to the mission during the survey or was obtaining seeds from other sources, including unofficial marketing channels. During field interviews, for example, the mission repeatedly heard that some of the vegetable growers, particularly those operating greenhouses, were obtaining almost their entire seed needs through unofficial marketing channels at prices equivalent to 10 to 30 times the official price structure under government regulations.

The government varietal testing program makes it extremely difficult to introduce genetic advances in seed technology available elsewhere in the world, particularly from those few countries that produce food products or raw materials in excess of their own needs. For example, the benefits of hybridization and increased yields per hectare known throughout the world have been slowly and reluctantly introduced into the Turkish seed system. The time span for new variety introduction, including hybrids, and their approval by the key Variety Registration Committee, is a minimum of three years and requires the production of the parent lines of hybrids to be reproduced in Turkey. Seed companies operating outside Turkey have been very reluctant to undergo the lengthy time period required to obtain commercial introduction of hybrids in Turkey or to make available the local production of parent lines under the system of rigid price fixing and the minimum margin structure of the industry. Consequently, Turkish farmers have not been able to fully utilize the benefits of the worldwide genetic explosion in seeds technology to achieve increased productivity per unit of land area.

E. Geographic Markets

Offsetting the serious deterrents mentioned above to the introduction of modern seed technology into Turkey, is the potential size of the Turkish seed market.

Turkey has approximately 28.6 million hectares of cultivable land in farms out of a land area of 80.5 million hectares, according to government statistics. Approximately 8.4 million hectares of the land under cultivation are fallowed during the growing season because of local crop rotation practices or deficiencies in moisture. Some 3.0 million hectares of this land is irrigated, and one-half of the irrigated land appears suitable to double cropping under a more intensive agricultural program.

Fallowed acreage is found throughout the country, but the greatest proportion is on farms in the drier or higher elevations of the Anatolian and eastern highlands regions. These fallowed lands represent considerable unused potential if crop selections can be found which can utilize a short growing season under conditions of limited moisture or less productive soils. These limitations are severe, and not many alternative crops are available to meet these conditions. A possible course of action would be to carefully evaluate the possibilities for the production of hybrid sorghums, both grain and forage varieties, that could be utilized for the livestock feeding industry of Turkey.

Turkey is divided into some 47 provinces, which can be classified in six to nine geographic groupings. For the purposes of the seed industry, a geographic breakdown of the provinces into six principal producing areas will be helpful in understanding and describing some of the geographic variations among the selected seed sectors of this report. These six geographic areas are shown in Map 1, and Table 2 shows the percentage of total cultivable land appropriate to each area along with the relative share of acreage for each of the four crops evaluated in this report.

The climatic conditions of the four coastal areas, including the Black Sea, Marmara, Aegean, and the Mediterranean, are temperate. These areas are situated at lower elevations and experience higher annual rainfalls than the other regions listed in Table 2. Frost conditions occur in these areas between November 1 and April 1, ranging from an occasional frost in the Mediterranean area to regular frosting along the Black Sea.

The two other areas of the country, the Anatolian plateau and the eastern highlands, are generally at higher elevations with lower annual rainfall. Winters are more severe with temperatures ranging down to minus 15 degrees centigrade. Because these two regions of the country cover extensive areas of Turkey, they are broken frequently into three subregions for Anatolia and two subregions for the eastern highlands for analysis and studies. Since the climatic conditions in the two extensive regions generally are similar in regard to seed input requirements for the four seed crops of this study, they have been combined in Table 2.

The area of greatest potential for increased cultivated acreage in Turkey is the southern part of the eastern highlands where large areas could be placed under irrigation if and when decisions are made to construct additional dams within the Euphrates River Basin. However, construction of these dams is not expected to be completed in the current century. Therefore, the potential seed requirements for this potential added acreage have been excluded from this report.

F. Estimated Volume and Value of the Commercial Seeds Market

A summary of the estimated commercial seeds market for the selected crop groupings covered by this study is shown for the 1982 season in Table 3. This table shows that the estimated purchased (commercial) seed sales based on the assumptions used in this analysis totals approximately 12,400 tons with an estimated value of 9.4 billion Turkish lira at current controlled prices. The estimated commercial seed supply of these four sectors is

approximately 27,000 tons or well in excess of the estimated commercial seed sales. However, if we exclude the cottonseed seeds, which are easily obtained during ginning, then the estimated commercial seed supply is 9,623 tons compared with an estimated purchased seed market of 9,552 tons. At the same time, it is estimated that the amount of seeds saved by farmers for planting is approximately 53,000 tons, making a total seed requirement of about 66,000 tons for the acreage assumptions made for 1982 plantings for the four product groupings included in this study. The product details of Table 3 within each of the four sectors are shown in Tables 4 and 7.

It is noted that 95% of the estimated value of purchased seed sales is influenced by the value of the vegetable seeds sector, although the quantity is only about 12% of the volume. Vegetable seeds have a very high price per volume unit, but the cost of seeds per hectare planted (see Table 7) is not particularly different for vegetables than for the other three crops, as shown in Table 5.

In summary, a purchased seed sales volume of 5,400 tons for maize and 2,800 tons for oil seeds, excluding cottonseed, and 1,300 tons for vegetables should offer a market of significant potential interest to local investors and foreign seed companies, provided freedom of pricing and freedom of entry is assured. The availability of improved seeds, and particularly seeds of hybrid origin at appropriate price levels relative to market prices would provide considerable incentive for Turkish farmers to gradually use new seeds rather than to continue making their own selections as they are now doing.

Farmers in Turkey have shown a willingness to increase the seed cost per hectare to over 30 times the present government controlled price level in order to obtain the benefits of increased productivity. This is evidenced by prices for proven tomato seed products in the unofficial markets. Experience with farmers in other countries has shown that increases in seed costs per hectare up to 5% of the total cost of production (approximately

three times the present price levels, see Tables 5 and 8), will still make the introduction of improved seeds attractive, and can increase productivity per unit of land by a factor of 50% or more, depending upon the crop (see Table 6).

Because of the complexities inherent within the seed industry, no single seed company makes available an entire line of seeds covering every crop the Turkish farmer produces. Thus, establishment of seed monopolies have not become a factor in non-regulated seed markets. Market shares for a single product in excess of 35% for one company are seldom, if ever, found in countries where the marketing process is free of government regulations of a non-sanitary nature.

Because of the variable conditions affecting the four seed crops included in our study, the remainder of this report has been divided into discussions of each seed group or sector.

A. THE MAIZE (CORN) SECTOR

1. Current Situation

Turkey produces maize in several areas. The Black Sea area is the most important for maize production as shown in Table 2. Much of this corn is a white open-pollinated variety which is used for human foods, particularly bread, by the people of the region. Generally, these white corns are 125-day maturities, and it is estimated that at least 70% of the supply goes for human consumption. At the present time, the farmers of the Black Sea region depend upon their own selections although a few obtain seeds from the government seed supply program. Farms in this area are very small, usually less than one hectare, and most farmers prefer flat seeds which are hand planted with interplantings of beans, pumpkins, and melons being common.

The second most important corn growing area of the country is the Aegean region where corn is grown primarily for industrial use in rotation with other crops. Most of the corn grown there are open-pollinated, yellow varieties which are utilized primarily for animal foods or starch production. Varieties range from 105 to 135 days to maturity. Although a limited mixed feed industry is present in the region, much of the corn grown is consumed on or near the farm where it is raised. In this region the average size of the farm is larger than in the Black Sea region and the production and the harvesting of corn is more mechanized.

The third most important corn growing area is the Marmara region, and most of the corn grown there are yellow varieties of 120-day maturity for the starch industry of Turkey. Approximately 90% of the corn grown in this area is open-pollinated, even though this is the most important area for hybrid corn. Corn is frequently grown in rotation with wheat or as a second crop to an early or late season vegetable crop. Some 30% of the corn grown in this area is utilized for industrial purposes by the four local starch plants. The balance of production is divided about evenly between human and animal foods. Perhaps 40% of the animal feed is utilized by the mixed feed industry, particularly for poultry, while the

remainder is fed to the farmers' own livestock. Corn production in this region is partly mechanized even though the acreage per farm is small like the Aegean region.

2. Seed Volume - 1982

The estimated seed volume required for the hectareage of corn being grown in Turkey in 1982 is 22,000 tons as shown in Table 3. Commercial seed supply of composite varieties amounting to 3,200 tons is about 15% of the estimated purchased seed requirements based on average seeding rates and the frequency of change common to farmer practices for open-pollinated varieties. This shortage reflects either that seeding rates are lower than those reported during the survey or that a greater amount of farmers save seeds than estimated in the assumptions. It is the mission's opinion that the amount of farmer saved seed is more likely to be greater than the commonly reported practice which is several years longer than the recommendations of the extension advisors.

The estimated value of the purchased seed industry sales of maize in Turkey is 273 million lira using the official prices reported for various categories of maize seed. (See Table 3)

3. Seed Processing

The state farms that produce most of the open-pollinated corn varieties for seed are responsible for cleaning, processing, and packaging the corn seed. It is possible that they also may clean and process the hybrid seed produced by Tohum Islah but this was not confirmed during mission interviews.

4. Marketing Channels

All of the supplies of hybrid corn seed for 1982 (500 tons) were grown by Tohum Islah under license from Northrup King. In addition, Tohum Islah maintains the parent stock of the hybrids. Hybrid corn seeds are either sold through the dealers of Tohum Islah, which receive a discount of 20% from the official prices, or are made available through the 1,700 retail supply outlets of TDZK. Hybrid seeds were first tested starting in 1970 and introduced to Turkish farmers by Tohum Islah in 1974. All of the

government produced open-pollinated varieties are available through the TDZK dealer organization or through the special seed supply channel of the Agricultural Credit Bank under the special seed loan program.

5. Discount Structure

The discount structure for corn is about the same as for oilseeds except that all seeds are handled by Tohum Islah dealers or TDZK retail supply outlets and the cooperatives are not a factor in distributing corn seeds.

6. Breeding and Multiplication

Substantial research work is being done to improve open-pollinated varieties. Additional foreign hybrids were entered into the testing program in 1980 but the results of the two-year tests were not made available to the mission. However, there were reports that substantial increases in yields per hectare were obtained in both 1980 and 1981 from several of the corn hybrids in the testing program.

The mission found it difficult to understand the rationale behind the failure to make public research results of the two-year hybrid testing program conducted at the five research stations. Even the investigators at each of the five stations were not aware of how the results of their station compared with the results at the four other locations. This failure to communicate among the researchers is difficult to understand in view of the tremendous need for improved corn varieties among Turkish farmers. Since corn can have maturities ranging from 90 days to 135 days, it is important that corn tests show comparisons between hybrids with the same dates of maturity in the different areas of the country.

Also, certain areas of the country may have an opportunity for a 90-day corn such as the higher elevations of the Anatolian Plateau, which would not have any application in the coastal regions. On the other hand, some of the coastal areas with the long growing season may have the need for the high productivity of the 135-day corn as a main crop and a 95 to 105-day corn as a second crop.

Further complicating the corn testing program is the considerable demand for both white and yellow varieties to meet the various needs for human consumption, starch conversion, and the animal feed industry. There is no current demand for special corns with high oil, high sugar, or high lysine content; but this could change in the future.

It is recommended that the breeding program for maize be reviewed to consider some of the complexities of corn culture in different regions of Turkey as well as the genetic variations that are available in corn hybridization programs in other parts of the world.

Also, no mention was made to the mission as to the possible demand for forage type corns, which produce a large amount of high energy roughages for livestock production, a commodity that could conceivably be quite important to the Turkish livestock economy. The hybrid sweet corns might also be grown as a seasonal export crop; it is in considerable demand throughout the world, either as a processed frozen food or as a fresh product in the ear or kernel.

7. Potential Markets

The future potential of the maize seed industry in Turkey is limited primarily by the policy of introducing hybrid varieties. This is particularly true for those markets which depend upon yellow corn. Suitable white hybrids for human consumption are more limited in availability but there are a few varieties grown in other parts of the world that should be grown experimentally in Turkey to see how they would perform in meeting nutritional needs in those regions depending upon white corn for human consumption.

In projecting the future potential of hybrid corn, the acreage projections were limited to those areas presently served by yellow varieties, and the results of this analysis are shown in Table 6. From this table we see that we would expect hybrid yellow varieties to replace approximately 40% of the seed requirements for the existing acreage by 1987 and 100% by 1992. These percentages were based upon the rates of adaptation of hybrid varieties in other countries with farm conditions similar to those in Turkey and at assumed seed prices equivalent to less

than 25% of the estimated market price of maize per kilo. This would result in a commercial yellow corn seed market potential of 2,332 tons in 1987 and 5,800 tons in 1992. These quantities would be attractive to foreign investors capable of entering the Turkish corn seed market.

The key to the transfer of hybrid seed technology by most companies is the control of the parent breeding stock and the newer the variety the tighter the control exercised by the company. Since the newer varieties introduced into the world market usually represent the highest yield potential, control of the parents is highly secret and protected. Most of the companies initiate their parent breeding programs from inbred lines that are available from either university research programs or specialized foundation seed producers as well as their own research program. It is the combination of these inbreds into the parent lines where the technical expertise of the various commercial corn companies is inherent and it is this know-how that the companies make every effort to protect. Thus, any requirement that would cause the control of the parent stock of the seed companies to be lost, will be a deterrent to the successful introduction of the latest hybrid corn technology.

As shown in Table 6, the rates of hybridization assumed in this analysis would increase the productivity, per hectare, of the existing corn acreage by 246% in 1987 and 284% by 1992. This increased production of corn would substantially increase the supply of maize available for animal feed, industrial uses, or export during the next decade.

The future market potential for white corn, particularly hybrids, is more difficult to project. Since human acceptance and usage is a key factor and little is known about higher yielding white varieties or hybrids that would be acceptable to Turkish consumers, projections are subject to considerable errors in judgment. In Table 6 it is assumed that 15% of the present acreage of white corn could be planted to a white hybrid by 1987 and this would require 720 tons of seed and increase productivity per hectare by 75%. A further increase to 45% of the hectareage is projected by 1992.

B. THE OIL SEED SECTOR

1. Introduction

The oil seeds sector includes the seed of sunflowers, cotton, soybean, and rapeseed. The estimated seed tonnage requirements for oil seeds and the value of seeds industry at current prices are presented in Table 4. The estimates of acreage planted, percentage of farmer saved seeds, seeding rates per hectare, prices paid by farmers and available seed supplies were based on interviews and documents made available during the field investigation. Changes in any of the assumptions from any additional reliable sources that may be found can be incorporated into this analysis to increase the reliability of the estimates used. The data in Table 4 will be discussed further in this section of the report.

A comparison of the seed value per hectare to the estimated revenue per hectare for the oil seed sector is shown in Table 5. With the exception of soybeans, the seed value per hectare is less than 3% of the estimated revenue per hectare. Soybean seed appears relatively expensive per hectare compared with the average corn yields obtained during the first year introduction period and used to determine revenue per hectare in Table 4. As more knowledge of cultural practices necessary to obtain higher soybean yields per hectare becomes known and adopted, yields will increase and seed costs per hectare will reduce substantially to levels consistent with competitive oil seed crops.

2. Current Situation - Each Crop

An important oil seed crop in Turkey is cotton seed which is obtained as a by-product of producing raw cotton fiber for the textile industry. Also, the domestic usage of fiber and the export of cotton lint is an important income source for Turkish families. Cotton is grown in several areas of the country with the Mediterranean region being the most important producing region. Most of the seed used by farmers is obtained during the ginning process. Breeding

programs for improving cotton seed in Turkey have concentrated on the genetic factors affecting quantity and quality of fiber rather than the oil content of seeds.

Since most of the cotton seed supply comes from the local gins, particularly those operated by the cotton cooperatives, these seeds are marketed through either the cotton cooperatives or the TDZK retail supply marketing operation. The government of Turkey has agreed to import approximately 300 tons of improved cotton seed from one of the major U.S. cotton seed suppliers for planting during 1982. Because of the relatively good supply of cotton seeds available from the ginning process, this study recognized the cotton crop as an important oil source but did not give any significant attention to this crop because it was outside the scope of this mission and was receiving attention as an industrial raw material for textiles by other governmental agencies. However, it should be noted that there are improved cotton seeds for fiber and oil available in other areas of the world which probably could also increase the productivity of cotton hectareage in Turkey, particularly under irrigated conditions. This would require improved insect and herbicide control procedures in cotton culture before the availability of improved seed would significantly increase the revenue per hectare for the farmer.

Sunflowers are an important oil seed crop with acreage concentrated in the Marmara region and particularly in the Thrace area of Turkey, west of the Bosphorus Straits. The Marmara region grows approximately 68% of the sunflower crop in Turkey, as shown in Table 2, with over 90% of the region's total found in the Thrace area. All of the varieties now being planted in Turkey are open-pollinated and require insects for pollination. If insecticides are being used for other crops in the area, the insect population usually is reduced and pollination (and yield) is greatly affected. Furthermore, sunflowers are subject to certain soil-borne disease which carry over in the soil, and land rotation is therefore required.

Oil seed agronomists indicated to the mission that the government had made it mandatory for farmers to change sunflower seeds every four years. In an analysis, shown in Table 4, this factor of farmer

purchased seeds was used in the calculation of purchased seeds requirements estimated at 1,200 tons for 1982. When this requirement was compared to the 2,500 tons of seed available for 1982, it indicated that enough seed was available for farmers to change seeds every two years instead of every four years. About 900 tons of the available sunflower seed supplies were the results of contract growing by Tohum Islah, a private company, jointly owned 51% by Kleinwanslebner Saatgezucht (KWS) of West Germany and 49% by the state-owned Turkish Sugar Company.

Soybeans were introduced on a limited basis to the Mediterranean region in 1981, primarily on irrigated soils as a second crop following the wheat harvest in May. Four varieties of seeds were imported, and farmers who planted these seeds experienced a number of cultural problems frequently found during the first year of introduction of a new crop. In general, the average yield per hectare for most growers was below expectations. Further, farmers experienced difficulty in obtaining cash for the seeds which they produced, as crushing plants were reluctant to purchase the seeds for crushing because of the relative imbalance of prices between the raw seed and the oil and meal products resulting from the crushing process.

Thus, soybean results at the farmer and crusher levels were disappointing. Some reports available to the mission indicated that perhaps 40% of the seeds imported did not get planted for various reasons including farmer reluctance to experiment with a new crop. This inventory of unused seeds, plus additional quantities expected to be imported soon, will be available for the 1982 plantings. In general, the climatic environment and soil characteristics of several areas of Turkey should favor the successful cultivation of soybeans as farmers gain experience with the growth characteristics of the crop and markets can be provided for the oil and meal produced during the crushing process.

Rapeseed is grown primarily as a winter crop in the Thrace sector of the Marmara region of Turkey; but the acreage is quite limited because of difficulties in utilizing the meal resulting from the crushing of rapeseed. Further, the rapeseed oil probably is better utilized as an industrial oil in paints, soaps,

and lubricants, rather than as an edible oil. All of the varieties currently available to farmers in Turkey have a very high erucic acid, which passes through to the meal during the crushing process and offers a potential toxicity problem to either the single or multiple stomach animal if used excessively as a protein source ingredient in mixed animal and poultry feeds.

3. Seed Volume - 1982

The current estimated acreage for the oil seed products requires a seed supply of approximately 24,000 tons with some 17,500 tons represented by cotton seed. (Table 4). The seeds saved by the cotton cooperative through the ginning process or saved by farmers, or occasionally obtained by farmers from their neighbors, represents most of the supply of oil seeds used by farmers.

Excluding cotton seed, the estimated commercial oil seeds supply for 1982 is 6,142 tons compared to an estimated demand of commercial oil seeds of 4,421 tons based on seeding rates and the frequency of change in seed common to farmer practices, and 5,381 tons for total requirements. If all of the available soybean seed were planted in 1982 the area of soybeans would be increased by 30,000 hectares. The relatively high seeding rates per hectare used in this analysis probably is an accurate reflection of the quality of seeds available through the selection and home storage practices of the farmer.

4. Seed Processing

Generally, the cotton and sunflower seeds are cleaned, processed, packaged and stored by the cooperatives until released to farmers or the seed enters the TDZK retail supply outlet system.

5. Marketing Channels

The principal marketing channels used for oil seeds involve either the sunflower or cotton cooperatives or the TDZK farm supply organization. The cooperatives are probably the most important source in the more important growing areas such as the cotton area

in the Mediterranean region and the sunflower area in the Thrace sector of the Marmara region. In other parts of Turkey, the 1,700 retail outlets of TDZK provide oil seeds to farmers provided farmer requirements are made known to the local governmental agency well in advance of the planting season.

6. Discount Structure

It is reported that TDZK received a 17% discount from the official government prices for its services, including 10% for the services provided and 7% for the equalized freight procedures, to distribute throughout the producing areas. The cotton and sunflower cooperatives are permitted to retain the 17% discount fee for processing, storage, and handling the raw seed.

7. Farmer Customers

With the exception of cotton, the acreage of oil seeds planted per farmer is less than 3 hectares. Based on this average acreage per farm, some 125,000 to 200,000 farmers would appear to be growing sunflowers, rapeseed or soybeans. The acreage of cotton per farm reportedly is slightly larger than for other oil seed crops, so perhaps another 100,000 to 200,000 farmers produce cotton. Accordingly, a large number of retail outlets are necessary to reach all farmers growing oil seed crops and quantities handled per outlet are frequently quite small. Special seed storage facilities at the retail outlets apparently do not exist.

8. Breeding and Multiplication

Seed breeding is done at research institutions with two state institutions responsible for improvements in sunflower seed and three institutions for improvements in cotton seed. Some new open-pollinated varieties have been introduced in recent years, but only limited testing of the newer hybrid varieties of sunflower have been done. (The mission is not familiar with the current situation in cotton seed because of its lesser importance during this study.) The advantage of introducing hybrid sunflowers onto Turkish farms would be (i) the inherent self-compatibility effect which would eliminate the need for insect pollination as required by the open-pollinated

varieties and (ii) the higher yields commonly experienced by farmers growing hybrid sunflowers in other parts of the world.

- A further advantage of hybrid sunflowers, from the crushers' viewpoint, would be the higher oil content of the hybrid sunflower which typically is approximately 48% versus 42% for the open-pollinated varieties. Thus, the immediate introduction of the hybrid sunflowers into the Turkish seed industry is highly attractive in terms of the problems being experienced by farmers, as well as the need for increased oil yields to satisfy Turkey's demand for edible oil.

9. Potential Markets

Our calculations of the potential results from the introduction of hybrid sunflowers over the next decade are shown in Table 6. This table shows that if the present acreage expected for 1982 were to be maintained over the next decade and hybrid sunflower seeds were to be introduced immediately, it is estimated that the hybrid acreage would be approximately 25% in 1987 and 65% in 1992, resulting in yield increases from the present acreage of 91% and 141% as shown in the table. An additional benefit would be the increased oil content (6 percentage points) obtained during the crushing process. The hybrid seed requirements under these assumptions are estimated at 1,000 tons in 1987 and 2,600 tons in 1992.

The soybean situation is slightly different because it is not a crop familiar to Turkish farmers. Furthermore, the limited farmer experience in the first season was not too successful because of the lack of knowledge of practices necessary for soybean culture. Considering these limitations, it is estimated that soybean acreage would increase to 100,000 hectares in 1987 and 300,000 hectares in 1992, if improved soybean seeds varieties were made available promptly to Turkish farmers, and accompanied by a program of promotion and cultural advice through the extension service. The soybean seed requirements under these acreage assumptions are 7,000 tons for 1987 and 21,000 tons for 1992. Based

On a 40% oil content, this acreage at achievable average yields would increase the edible oil supply to 80,000 tons in 1987 and make available approximately 114,000 tons of soy meal, that is so important for poultry rations, to increase supplies of poultry meat and eggs for the Turkish market as well as possible export.

Seed prices and the genetic productive capacity of oil seeds are of central importance to the livestock and poultry producers, which depend upon the formulated feed industry for a significant proportion of animal feeds. Feed costs usually represent 50 - 70% of the cost of producing red and white meat under intensive or confined productive systems. Low prices prevailing in Turkey for poultry and livestock products presently make it very difficult for producers to pay prices for oil seed meal that would be profitable to the oil seed crushing industry. This, coupled with the low domestic price structure for edible oils, has reduced the oil seed crushing industry's demand for oil seeds produced by farmers, and particularly soybean. These factors could be a major obstacle to the expansion of oil seed production in Turkey. Therefore, any policy which seeks to expand oil seed production must take into account the interrelationships between prices for poultry and livestock products, edible oils, and the economics of the oil seed crushing industry. These factors in turn are the main determinants of the demand for oil seeds produced by farmers.

Each of the six regions of Turkey probably requires at least three or four different varieties of soybean, in order to meet the maturity dates and the climatic variations which are important in soybean culture. This crop is particularly sensitive to location-specific factors including the number of daylight hours. Varieties of soybeans are not particularly sensitive to soil factors provided they are well treated with inoculants with high bacterial activity. Inoculants are sometimes subject to storage and transit problems that decrease bacterial activity. When weakened products are applied, they do not provide the necessary stimulation to establish nitrogen fixation which is so important to superior yields.

C. THE VEGETABLE SEEDS SECTOR

1. Introduction

The vegetable seed sector of Turkey is probably the most complex due to the wide variety of vegetables grown in the country and the differences in the type of vegetables grown in different geographic regions. Also, vegetables are grown year-round in some regions; although winter production is limited primarily to the greenhouse establishments in the Mediterranean region, particularly near Antalya. The importance of the various regions in overall vegetable acreage is shown in Table 2. However, information about the importance of the different regions for each of the vegetable species was not as fully documented during the mission's field work as it could have been with more time.

It is estimated that Turkey grows approximately 600,000 hectares of vegetables with the Aegean, Mediterranean and Marmara regions, accounting for 56% of the acreage as shown in Table 2. Although most of the vegetables are grown under open field conditions, production in plastic and glass greenhouses is extremely important during the winter season. This is particularly the case for tomatoes and cucumbers.

2. Current Situation - Each Crop

Watermelons are the most important vegetable crop grown in Turkey, covering approximately 123,000 planted hectares in 1982 as shown in Table 7. They are grown in nearly every region of the country as they are an extremely popular summer vegetable among Turkish consumers. Some 308 tons of seed are required for this crop, with the popular "Sugar Baby" variety accounting for over 51% of the requirement.

The second most important vegetable crop grown in Turkey, as shown by the area planted, is tomatoes, which covered an estimated 110,000 hectares in 1982. Based on the information available to the mission, the field-grown areas represent 95% of the total, while the balance is acreage under covered production during the winter. Processing tomatoes are grown on only about 5,000 hectares; but the production

is significant to an estimated 18 plants making tomato concentrate for the domestic and export markets. Some 95 tons of seed are required for tomato production in Turkey. The relationship of seed value per hectare to revenue per hectare for the 1981 tomato crop is shown in Table 8. As seen in earlier sections of the report, seed costs are not a major input cost for field-grown production of open-pollinated varieties; but they are important for hybrid seeds.

Some of the large seeded vegetables such as peas, beans, and broad beans are grown widely throughout the country, covering an area of about 70,000 hectares. Since these seeds are large and self-pollinated, the amount of seed saved by the farmer is extremely high relative to the 6,000 tons of seed needs for these particular crops.

Another important vegetable crop is cucumbers, which cover an estimated 28,000 hectares, with open-field production totalling about 86% of the hectareage. The principal growing areas are Marmara and the Aegean regions for open-field production, and the Anatolia area of the Mediterranean region for covered production. The seed needs for current cucumber acreage are estimated at 70 tons.

3. Seed Volume - 1982

The estimated vegetable seed volume for the known acreages is 11,647 tons as shown in Table 3 and detailed in Table 7. The amount of farmer saved seeds accounts for approximately 10,327 tons, while the commercial vegetable seed volume represents the balance of 1,307 tons. Although seeding rates per hectare are extremely low for the vegetable seeds, the value of seeds per hectare ranges from a relatively low value of approximately 2,000 Turkish liras per hectare to a value of 120,000 Turkish liras per hectare for the crops grown under glass or plastic cover as shown in Table 9.

During the survey we did not obtain complete acreages for all of the vegetable crops, but we have shown the estimated seed value per hectare for those crops where acreage was not obtained (Table 9). Although the actual acreage is not known, the estimated seed requirements and the values shown in Table 7

represent over 90% of the total acreage, commercial seed sales, and available commercial supplies.

Seeding rates per hectare commonly used in Turkey are somewhat higher than used among farmers in other countries and higher than commonly recommended by the extension advisory services in Turkey. (See Table 1a). Again, this probably reflects the overall average quality of seed selections made by the farmer and the farmers' choice of overseeding of farmer saved seeds in an effort to achieve the desired plant population. Vegetable seed germination is generally extremely sensitive to storage conditions, particularly temperature and humidity, and thus germination of farmer saved seeds is undoubtedly lower than for seeds processed and carefully packaged by commercial seed companies.

Most of the vegetable seeds now available in Turkey are of an open-pollinated variety. There are a few hybrid tomato seeds produced in the country by the BETA Company, a private company, under license from Sluis and Groot, a Dutch seed division of The Sandoz Corporation. The BETA Company also grows some hybrid tomato seeds for export to other countries through the licensor.

4. Seed Processing

During our field interviews, we observed some of the seed packets used in Turkey at different outlets and made inquiries concerning processing and storage conditions available to the vegetable seed sector. These indicated that improper storage and inadequate packaging in plain paper bags could easily result in a seed with reduced germination when planted by the farmer.

We were able to visit a tomato seed processing facility operated by a tomato concentrate plant and it was a modern facility capable of producing quality tomato seed. It was reported to us that most of the other vegetable seed processing plants were small and older and in need of considerable modernization and possibly replacement. Also, storage facilities were inadequate to maintain quality from the producing season to the next planting season.

The TAT Company, a tomato concentrate processing plant, is permitted to import a small amount of tomato seeds of processing varieties every four years in order to produce their seeds for the production of transplants. These are furnished to the contract growers who supply processing tomatoes to the 18 tomato processing plants throughout Turkey. The TAT plant at Mustafakemal is equipped to save seeds using cold break processing for raising transplants. Some of these seeds are made available to other tomato processing companies for the growing of transplants to be supplied to contract growers supplying each of several of the processing plants.

5. Marketing Channels and Discounts

The marketing channels for vegetables are more complex than for the other seed sectors included in this study. Although we have discussed the importance of farmers' selections and the unofficial market, the balance of seeds are available through the government production programs as well as through two private companies, the BETA Seed Company and the May Seed Company. Most of the government produced seeds are processed, cleaned, and stored by the government owned seed processing facilities on the state farms and are packaged by TDZK retail supply cooperative in various size containers for distribution to the farmer. Distribution can be through either TDZK retail outlets or through the Agricultural Credit Bank's special seed distribution system under a special seed loan program.

The BETA Company produces seeds on their own lands (30 hectares), as well as contract growers (the latter are considerably more significant with 200 hectares). These locally grown seeds are cleaned, packaged, and distributed through approximately 150 retail dealers who are given a 20% commission for providing retail delivery services. The BETA Company is owned by approximately 420 stockholders and has been in business since 1961 when they initiated seed multiplication programs for sunflower and alfalfa seeds. In 1968 they started offering tomato seeds and have gradually expanded their vegetable seed line to where it now includes seeds for approximately 17 vegetable crops and represents an annual production of approximately 25 tons of seed of all types. Vegetable seeds became so important to their operations during a

two-year period between 1968 and 1970 that they decided to drop the sunflower and alfalfa seed programs. In 1974 they began producing two varieties of hybrid tomato seeds under license from Sluis and Groot for sale to Turkish farmers, as well as for export. Limitations on the availability of medium to long-term credit have discouraged greater growth by this company. BETA estimates that they have a 35% market share of the commercial vegetable seed business.

The May Company is another private company significant to the Turkish vegetable seeds sector. It is a family-owned operation that has been producing vegetable seeds since about 1940. Starting in 1967, the present management began to expand the seed production program through a more extensive contract growing program, and now produces approximately 125 tons of about 16 vegetable crops. In addition to sizable volume of bush tomato and pepper seeds produced, the company is an important producer of squash, spinach, green peas, and eggplant seeds. In June 1981 this company applied for a substantial loan to establish a seed processing plant to handle an increased volume of vegetable seeds, but the application was denied. This company is strong in the packet seeds business and also sells a substantial amount of bulk seeds to TDZK for repackaging and distribution. In addition to the TDZK outlets, the May Company has approximately 30 dealers which sell their products on a 20% discount structure. This company also is a very important grower of onion sets and is the only known source of commercially grown onion sets in Turkey. May's share of the Turkish vegetable seeds commercial market is about 51% based on volume and types of seeds. They are most competitive with BETA on tomato and pepper seeds but concentrate other production activities on larger type seeds and therefore tonnage is greater than BETA.

Although potatoes are usually excluded from the vegetable seeds sector, the Tohum Islah company produces approximately 1,800 tons of potato seed per year to supplement the quantity which is produced on the state farms.

A review of Table 7 will show that there is a substantial acreage of hybrid tomatoes, cucumbers,

eggplant and "sugar baby" watermelons grown in Turkey (80,000 hectares) where part or all of the seed is obtained by growers through unofficial channels of distribution. The total seed requirements for this acreage are estimated at 186 tons and the government and privately sponsored production and import programs for these seeds account for only 25% of the seed requirements. The balance of seed requirement therefore comes from the saving of hybrid seeds from one year to the next or from the unofficial market. It appears that approximately 24 tons of hybrid seeds of selected crops valued at about 7.8 million Turkish lira are obtained by farmers through the unofficial marketing channels. This unofficial channel undoubtedly takes many forms, but the price paid by farmers is a significant indicator that farmers are willing to pay very large amounts for high performance seeds as shown in Tables 8 and 9.

From the farmers' viewpoint, he can obtain his vegetable seeds from four different official sources--a dealer representing either BETA or May, the TDZK, retail supply cooperatives, or the seed outlet sponsored by the Agricultural Credit Bank under the special seed loan program. The market share of each of these outlets varies by the kind of vegetable seed, but the private company proportion of the commercial seed market for the items produced by each of the companies reportedly represents approximately 75% of the commercial seed business while the state proportion is an estimated 25%. However, the accumulated tonnage available through these four distributive channels is not adequate to meet the needs of the farmers for improved seeds. The farmer must therefore resort to his own selections, either from his garden or from the garden of his neighbors, or to the unofficial market.

6. Breeding and Multiplication

The world commercial vegetable seeds industry offers a hybrid for nearly every vegetable crop now grown in Turkey. The availability of this genetic pool to the Turkish farmer would substantially increase the productivity of the present hectareage of vegetables grown in Turkey. Admittedly, many of these hybrids may not have the characteristics desirable for local market consumption of the fresh product,

but the availability of these improved varieties would be essential to meet the needs of export markets available to Turkey. Most of the export markets for vegetables utilize hybrid varieties because of their ability to withstand packaging and transport. It is recognized that differences in the consumptive requirements do exist between the local demand and the export market. However, Turkish farmers would undoubtedly soon be able to determine which varieties available from the world genetic pool would meet their individual and collective requirements for increased production from their present acreage.

7. Farmer Customers

The average acreage of vegetables per farm is less than one hectare. Thus, there are about 700,000 to 1,000,000 farmers growing vegetables for commercial sale. In addition, a high proportion of the 5.0 million farmers in Turkey probably plant a few vegetables for home consumption. Thus, the availability of quality vegetable seeds is important to a large number of farmer customers and many distributive points or outlets are desirable to serve the commercial farmer. The farmer producing for his own needs must depend more on saving seeds from his own production or trading occasionally with his relatives or neighbors.

8. Potential Markets

Vegetable farmers in Turkey have shown a strong willingness to pay for higher yielding varieties of vegetable seeds as shown by the quantities of seeds obtained through unofficial marketing channels and the prices they are paying for these seeds. Opening the Turkish vegetable seeds market to foreign companies would make available seeds that may have a high price per kilo but the quantities needed per hectare are so small (and less than currently used) that a small increase in average yields would easily pay for the higher costs. Not only would this increased production benefit local consumers but it could open Middle East export markets for fresh and processed vegetables that are growing at a very rapid rate.

Turkey's environmental conditions are varied and quite desirable for fresh vegetable production and the

establishment of programs to assemble, grade, package and transport vegetables for export. This could provide substantially more foreign exchange than required for the increased cost of seed. Furthermore, Turkey could become a multiplier of selected vegetable seeds for sale in the world seed trade.

It is estimated that there is an annual demand for nearly 12,000 tons of vegetable seeds among Turkish farmers. However, the rate at which they will change to newer higher yielding hybrid varieties for each crop is difficult to project. It would undoubtedly move rapidly in tomatoes, watermelon, cucumbers, squash and eggplant where it is already known what hybrid seeds can do to increase productivity per hectare. In other vegetables it may develop slowly because of local taste preference and lack of knowledge about newer varieties. Undoubtedly, there are higher yielding hybrids available somewhere within the world vegetable seed trade that would prove desirable for local consumption. Also, in estimating the demand for hybrid seeds it is necessary to understand more about the potential export markets for fresh vegetables available to Turkey in order to quantify the seed requirements for various vegetable crops.

The vegetable seeds sector in Turkey may offer more promise to increasing food production from Turkish farmers than any other seed sector included in this report. The tonnages for specific crops will be small and the value large, but this is common in the vegetable seed trade as witnessed by The BETA and May companies now operating in Turkey. Foreign companies entering Turkey could be requested to provide assistance.

D. THE FORAGE SEEDS SECTOR

1. Seed Volume - 1982

The commercial seed market for forages is not well established in Turkey. Quantities of commercially supplied seeds are extremely limited, and the quantity (18 tons) available from the research institutes and government production farms is substantially below the farmers' needs for 8,155 tons, as shown in Table 3. Thus, farmers are essentially forced to develop their own selections from the open pollinated varieties available to them for most of their forage requirements. This group of seeds includes alfalfa, sainfoin (Onobrychis Viciaefolia), vetch, and sorghums. Cow peas and fodder beets also are frequently included as a forage crop in Turkey but these crops were outside the scope of our study and are excluded from this report.

2. Current Situation - Each Crop

Alfalfa is the most important forage grown in Turkey, and is found in two different geographic situations. The first is the low altitude, coastal regions (Marmara and Aegean), where the alfalfa crop can range from winter dormancy conditions to conditions of non-dormancy, depending upon the location. The other are the Anatolia and Highlands regions which are at higher elevations and contain primarily the winter dormancy type alfalfa seeds. From our viewpoint, these differences in dormancy requirements for the two different areas of production have not been adequately reflected in the genetic base of alfalfa seeds in Turkey. The major alfalfa cultivar is Kayseri, and this is probably best grown as a winter dormant variety. Alfalfa stands in Turkey typically last at least four years, and occasionally up to eight years or longer. Thus, the acreage planted each year would represent approximately one-fifth of the total acreage in cultivation. This substantially reduces seed requirements, and many farmers make available a small area of their field for seed production each year following the first cutting for green or dry forage.

Sainfoin is a crop that is very important to Turkey, but is not a crop found in very many countries around the world. This crop has extremely good characteristics for very shallow soils on hilly lands, and rocky soils where no other forage alternative generally is available. Normally, a stand will last only two years because it is subject to considerable insect infestation of the roots.

The seeds are commonly saved by the farmers and considerable acreage is found in the two provinces of Erzinacan in the Eastern Highlands and Gumushane in the Baltic region. However, it is grown in small amounts throughout eastern Anatolia and the Eastern Highlands.

Vetch is another important forage crop in Turkey that is grown primarily as a second crop during the winter or on the poorer and more hilly lands of the coastal regions. A few of the varieties grown in Turkey are winter hardy, but most are not. Most of the vetch seeds are produced by the state farms and available through the TDZK retail supply cooperative outlets.

Sorghum is a forage crop that is grown on a very limited basis (only 600 acres). Commercial seed supplies produced by Tohum Islah, the only supplier, represent only about 15 tons and this would be adequate to plant approximately 1,000 hectares. Although the quantities of sorghum seed available have remained relatively constant during each of the last three years, sorghums have not become a major factor to date in the forage situation of Turkey. All of the seeds available from Tohum Islah are hybrids, but so far as we could learn during our study, no significant research investigations were underway relative to hybrid sorghums for either forage, grain or both.

Reportedly there are some social problems associated with farmers becoming interested in sorghum production. However, it is our opinion that research on sorghums should be given careful attention in Turkey under a wide range of climatic conditions for both grain and forage because of their potential productivity per hectare as either grain or forage in comparison to the other forage products available. For example, sorghums as a first or second crop may have a use in areas where rainfall during the warm summer season is restricted, as sorghum is able to reproduce with relatively minimal amounts of moisture. The experience with both white and red sorghum varieties in other parts of the world would suggest that there would be adaptable varieties for the various climatic and growing conditions found in Turkey from some of the hybrid cultivars available from the world commercial sorghum seed industry. In addition, the sorghum/sudan and sudan/sudan crosses of low hydracyonic acid content probably have some potential as a forage for some of the cattle and sheep farmers of Turkey.

3. Potential Markets

Projections of the requirements for forage seeds from the commercial seed sector in Turkey have not been made during this study due to the general lack of information concerning the productivity benefits available from forage seeds available for transfer from the world commercial seed industry. It is the mission's opinion that there are non-dormant type alfalfas that would substantially increase productivity per hectare in the coastal regions of Turkey. There are also dormant varieties that would achieve similar productivity increases for the summer season in the higher elevations. However, until such results are proven through demonstration trials, it would be difficult to assess the speed with which farmers will adopt the improved alfalfa seeds.

International seed companies would not offer significant varietal contributions to Turkey in either sainfoin or vetch. Since these products have very special growing situations in Turkey, efforts to achieve varietal improvements should continue to be assigned to the Turkish research institutions.

Based on the mission's review and assessment of the commercial forage seed sector and on forage seeds available throughout the world, there is a high probability of substantial productivity increases resulting from the introduction of new cultivars of alfalfa and sorghums in Turkey. However, several field demonstrations over a period of two or three years would be required to properly assess and evaluate the true potential for these products in the commercial forage seed sector of Turkey.

KEY ASSUMPTIONS - SELECTED SEED SECTOR POTENTIALS IN TURKEY - 1982

	<u>Frequency of Change in Seeds by Farmers</u>			<u>Seeding Rates</u>		
	<u>Mission Interviews</u>	<u>Extension Recommendation</u> (Years)	<u>Available Supply</u>	<u>Mission Interview</u>	<u>Extension Recommendation</u> (Kilos/Ha)	<u>Countries Using Hybrids</u>
<u>Oil Seeds</u>						
Sunflower	4	4	2	12	10	6
Cottonseed	6	2	1	25	25	30*
Soybean	1	1	1	98	98	68
Rapeseed	6	1	8	21	21	--
<u>Maize</u>						
Standard - white	6	1	8	37	25	22**
- yellow	3	1	4	35	25	22**
Hybrids	1	1	1	30	20	22**
<u>Forages</u>						
Alfafa - Coastal	5	4	20	20	20	14***
- hill	5	4	20	20	6	14***
Sorghums - hybrid	1	1	1	25	--	8
Sainfoin	2	2	10	70	80	--
Vetch	8	2	20	96	80	--

* Spacing between rows and between plants is less - equals more plants per hectare.

** For plant populations per hectare grown in Turkey - up to 22 kilos per hectare are common for higher plant populations per hectare.

*** Rate is 25 kilo/Ha with sprinkler irrigation.

KEY ASSUMPTIONS - VEGETABLE SEED INDUSTRY POTENTIALS IN TURKEY - 1982

	<u>Frequency of Change in Seeds by Farmers</u>			<u>Seeding Rates</u>		
	<u>Mission Interviews</u>	<u>Extension Recommendation</u> ----- (Years) -----	<u>Available Supply</u>	<u>Mission Interviews</u>	<u>Extension Recommendation</u> ----- (kilos/Ha) -----	<u>Countries Using Hybrids</u>
<u>Solanums</u>						
Tomatoes						
Field - standard	6	1	10	1.0*	2.9**	2.3**
- Hybrid	2	1	2	0.5*	--	.15*
- Processing	1	1	2	0.5*	--	.15*
Greenhouse - Hybrid	1	1	1	0.4*	--	.15*
Peppers	2	1	4	0.5	.5	.4
Eggplant	4	1	8	2.5	.5	.4
<u>Cucurbits</u>						
Cucumbers						
Field - Standard	6	1	12	2.5	2.5	3.4
- Hybrid	2	1	--	2.5**	2.5**	.15*
Greenhouse -hybrid	1	--	--	--	--	.15*
Watermelon-Standard	6	1	--	2.5	4.0	2.4
-Sugar Baby	3	1	6	2.5	--	--
Melon	6	1	12	4.0	4.0	.8
Squash	6	1	8	5.0	--	2.8
<u>Other Vegetables</u>						
Cauliflower	3	1	1	2.5**	.25*	.4*
Spinach	10	1	12	19.4	19.0	17.0
Peas	6	5	9	150.0	120.0	114.0
Beans - Broad	10	5	--	150.0	100.0	91.0
- Green	10	5	--	150.0	100.0	91.0
Carrots	2	1	4	1.8	1.8	3.4

* Transplanted from seed

** Direct seeded

RELATIVE IMPORTANCE OF EACH GEOGRAPHIC AREA IN PRODUCING SELECTED CROPS ^{1/}

Percent of Acreage Grown in Turkey

	<u>Total</u> <u>Crop Land</u>	<u>Maize</u>	<u>Alfalfa</u>	<u>Sainfoin</u>	<u>Vegetables</u>	<u>Sunflowers</u>
Black Sea	7.5	56.6	4.5	14.7	6.1	2.9
Marmara	8.6	13.0	10.5	2.9	13.2	67.8
Aegean	11.5	18.6	13.2	6.7	20.7	12.2
Mediterranean	10.8	1.5	2.0	0.6	21.7	7.4
Anatolia	46.7	8.5	42.4	40.0	22.9	7.8
Eastern Highlands	<u>14.9</u>	<u>1.8</u>	<u>27.4</u>	<u>35.1</u>	<u>15.4</u>	<u>1.9</u>
Totals	<u>100.0%</u>	<u>100.0%</u>	<u>100.0%</u>	<u>100.0%</u>	<u>100.0%</u>	<u>100.0%</u>

^{1/} Excludes fallowed land of 8.5 million hectares.

Source: Government of Turkey Statistics

SUMMARY OF ESTIMATED COMMERCIAL SEEDS MARKET
FOR SELECTED CROP GROUPINGS - 1982 SEASON

	<u>Total Seed Requirements</u> (tons)	<u>Estimated Farmer Saved Seed¹</u> (tons)	<u>Estimated Purchased Seed Sales¹</u> (tons)	<u>Estimated Value of Purchased Seed²</u> (millions)	<u>Estimated Commercial Seed Supply³</u> (tons)
Oil Seeds*	24,577	18,460	5,597	TL 324.3	23,642
Maize	21,581	16,148	5,433	272.8	3,200
Forages	8,155	8,140	15	1.3	18
Vegetables ⁴	<u>11,647**</u>	<u>10,327</u>	<u>1,307</u>	<u>8,774.1</u>	<u>263</u>
TOTALS	<u>65,960</u>	<u>53,075</u>	<u>12,352</u>	<u>9,372.5</u>	<u>27,123</u>
TOTALS less Cottonseed	<u>48,460</u>	<u>38,375</u>	<u>9,552</u>	<u>9,265.5</u>	<u>9,623</u>

¹ Based on reported frequency of change common to farmer practices and seeding rates obtained from field interviews (see Tables 1 and 1A).

² Based on prices fixed by the price setting committee of the G.O.T. as taken from published reports or obtained during interviews.

³ Based on mission's calculation using information from interviews and reports obtained from the G.O.T.

⁴ Includes fresh and dried peas and beans - see Table 7 for details.

* Although cottonseed was not included in the scope of this study, data was developed to present a more complete oil seed sector analysis.

** Solanums	192.0
Cucurbits	605.0
Beans	9,980.0
Other Vegetables	870.0

ESTIMATED VALUE OF SEED INDUSTRY IN 1982 SELECTED CROPS AND AVAILABILITY OF SUPPLIES

Table 4

Crop	Estimated Total Acreage Planted (ha)	% Planted with Farmer Selections	Estimated Planted Acreage		Estimated Seeding Rate/ha (Kg/ha)	Estimated Seed Tonnage Requirements			Estimated Seed Price to Farmer (TL/Kg)	Estimated Value of Seeds Industry			Estimated Seeds Availability			% Local Availability of Purchased Seeds
			Farmer Selections (ha)	Purchased Seeds (ha)		Farmer Selections (Tons)	Purchased Seeds (Tons)	Total		Farmer Selections (000 TL)	Purchased Seeds (000 TL)	Total Seeds (000 TL)	Local Production (Tons)	Imported (Tons)	Total (Tons)	
Oil Seeds																
Sunflower	400,000	75	300,000	100,000	12	3,600	1,200	4,800	64	230,400	76,800	307,200	2,500 ¹	0.2	2,500.2	208
Cottonseed	700,000	84	588,000	112,000	25	14,700	2,800	17,500	38	558,600	106,400	665,000	17,200	300	17,500	100
Soybean	16,000	0	0	16,000	98	0	1,568	1,568	90	0	141,120	141,120	8.4	3,500	3,508.4	**
Rapeseed	9,000	84	7,600	1,400	21	160	29	189	NA	NA	NA	NA	133	0	133	70
TOTAL OIL SEEDS	1,125,000		895,600	229,400		18,460	5,597	24,057		789,000	324,320	1,113,320	19,841.4	3,800.2	23,641.6	
Maize																
Standard - white	320,000	84	269,000	51,000	37	9,953	1,887	11,840	48	477,744	90,576	568,320	2,700	0	2,700	55
Standard - yellow	264,000	67	177,000	87,000	35	6,195	3,045	9,240	48	297,360	146,160	443,520	0	0	0	100
Hybrids	16,700	0	0	16,700	30	0	501	501	72	0	36,072	36,072	300	200	500	15
TOTAL MAIZE	600,700		446,000	154,700		16,148	5,433	21,581		775,104	272,808	1,047,912	3,000	200	3,200	
Forages																
Alfalfa - coastal	30,000	100*	6,000	0	20	120	0	120	350	42,000	0	42,000	1.9	0	1.9	0.4
Alfalfa - hill	100,000	100*	20,000	0	20	400	0	400	350	140,000	0	140,000	0	0	0	100.0
	130,000		26,000	0		520	0	520		182,000	0	182,000	1.9	0	1.9	**
Sorghum - Hybrid	600	0	0	15,000	25	0	15	15	85	0	1,275	1,275	15.0	0	15.0	**
ainfoin	60,000	100*	30,000	0	70	2,100	0	2,100	70	147,000	0	147,000	NA	0	0	**
Vetch	115,000	88*	57,500	0	96	5,520	0	5,520	42	231,840	0	231,840	1.2	0	1.2	**
TOTAL FORAGES	305,600		113,500	15,000		8,140	15	8,155		560,840	1,275	562,115	18.1	0	18.1	

¹Tobum Islah produced 900 tons for 1982 planting
 NA - Not collected during study
 *Typically alfalfa plantings last 5 years, while vetch and sainfoin plantings last 2 years
 **Less than 0.1%

Table 5

ESTIMATED PERCENTAGE SEED VALUE OF REVENUE PER HECTARE FOR SELECTED CROPS - 1981

<u>Crop</u>	<u>Average Production Per Ha (Kilos/Ha)</u>	<u>Estimated Price Received Per Kilo (TL/Kg)</u>	<u>Estimated Revenue Per Ha (TL/Ha)</u>	<u>Oil Content</u>	<u>Seeding Rate Per Ha (Kilos)</u>	<u>Seed Value Per Kilo (TL/Kg)</u>	<u>Estimated Seed Value Per Ha (TL/Ha)</u>	<u>% Seed Value of Revenue Per Ha</u>
<u>Oil Seeds</u>								
Sunflower	1,200	40	48,000	41	12	64	768	1.6
Cottonseed	1,300	18	23,400	17	25	38	450	1.9
Soybean	1,000 ³	40	40,000	18	98	90	8,820	22.0 ³
Rapeseed	1,400	NA		36	21	NA		
<u>Maize</u>								
Standard - white	2,000	35	70,000		37	48	1,776	2.5
- yellow	2,600	35	91,000		35	48	1,680	1.8
Hybrids	7,500	25	187,500		30	72	2,160	1.2
<u>Forages</u>								
Alfalfa - coastal	8,000*	NA			20	350	7,750 ¹	
- hill	4,500*	NA			20	350	7,750 ¹	
Sorghums - hybrid	NA	NA			15	85	638 ²	
Sainfoin	3,000*	NA			34	70	2,380	
Vetch	3,000*	NA			96	42	4,032	

¹Averaged over 4 years

²Averaged over 2 years

³Approximately doubled due to low average yields obtained during first year production problem

NA - Not collected during study

*Air dried basis

ESTIMATED PRODUCTION EFFECT OF HYBRID PROGRAM FOR SELECTED CROPS

Crop	Current Estimated Acreage (ha)	1 Hybrid Acreage 1/		Estimated Hybrid Acreage		Estimated Average Yield of Hybrids		Estimated Production from Hybrid Acreage 1/		3 Yield Increase per Hectare over 1982 2/		Estimated Seed Requirements		
		1987	1982	1987 (ha)	1982 (ha)	1987 (Kilo/ha)	1982 (Kilo/ha)	1987 (Tons)	1982 (Tons)	1987	1982	Seeding Rate (Kg/ha)	1987 (Tons)	Total 1982 (Tons)
Oil Seeds														
Sunflower	400,000	254	654	100,000	260,000	2,300	2,900	230,000	754,000	+ 91	+141	10	1,000	2,000
Soybean	16,000	NA	NA	100,000	300,000	2,000	2,800	200,000	840,000	+100	+180	70	7,000	21,000
Maize														
Standard - white	320,000	15	45	48,000	144,000	3,500	5,000	168,000	720,000	+ 75	+150	15	720	2,160
- yellow	264,000	40	100	106,000	264,000	9,000	10,000	954,000	2,640,000	+246	+284	22 3/	2,312	5,808
													3,052	7,468

1/ Estimated rate of conversion of current acreage. Assumes seed prices will not exceed 5% of estimated revenue per hectare.

2/ Hybrid acreage only.

3/ Increased plant population to achieve higher average yields

NA - Not applicable

ESTIMATED PERCENTAGE SEED VALUE OF REVENUE PER HECTARE FOR THE TOMATO CROP - 1981

<u>Crop</u>	<u>Average Production Per Ha (Tons)</u>	<u>Estimated Farm Price Received Per Kilo (TL)</u>	<u>Estimated Revenue Per Ha (TL)</u>	<u>Seeding Rate Per Ha* (Kilos)</u>	<u>Seed Value Per Kilo (TL/K)</u>	<u>Estimated Seed Value Per Ha (TL)</u>	<u>% Seed Value of Revenue Per Ha</u>
<u>Solanums</u>							
Tomatoes							
Field - standard	50	9	450,000	1.0	2,700	2,700	0.6
- hybrid	65**	9	585,000	0.5*	240,000	120,000	20.5
- processing	75	4.5	337,500	0.5	3,000	1,500	0.4
Greenhouse - hybrid	125	15	1,875,000	0.4*	300,000	1,200,000	6.4

* Transplanting is a common practice in Turkey.

** Average yields may be as high as 85 to 90 tons.

COST OF SEED PER HECTARE
FOR SELECTED VEGETABLES IN TURKEY IN 1982 ^{1/}

	<u>Estimated Seeding Rate</u> (Kilos/Ha)	<u>Estimated Seed Price</u> <u>Per Kilo</u> (TL)	<u>Estimated Seed Cost for</u> <u>One Hectare</u> (TL/Ha)
<u>Cucurbits</u>			
Cucumbers			
Field - standard	1.0	2,300	2,300
- hybrid	0.5	240,000	120,000
Greenhouse - hybrid	0.4	300,000 ^{2/}	120,000
Watermelon - standard	2.5	1,000	2,500
- sugar baby	2.5	3,000	7,500
Melon	4.0	1,600	6,400
Squash	5.0	980	4,900
 <u>Other Vegetables</u>			
Cauliflower	2.5	10,000	25,000
Cabbage - white	2.5	2,100	5,250
" red	2.5	3,000	7,500
Lettuce	2.5	2,100	5,250
Spinach	19.4	330	6,402
Parsley	3.5	700	2,450
Radish	17.0	900	15,300
Carrots	1.8	1,000	1,800
Okra	9.0	450	4,050

^{1/} Based on interviews during February-March 1982.

^{2/} Some prices as high as TL 17/seed (600,000 TL/Kilo)

COMPARISON OF MARKET PRICES RECEIVED WITH AVERAGE
PRICE PAID FOR SEED BY U. S. FARMERS - 1981 SEASON

		<u>Seed Prices</u> (Spring 1981)	<u>Average</u> <u>Farm Gate</u> <u>price</u> (Oct. 1981)	<u>Times</u> <u>Seed Price</u> <u>Over Price</u> <u>Received</u>
Corn	(bu)	60.00	2.45	24.5
Sunflower	(lb)	1.81	1.03	1.7
Soybean	(bu)	14.00	6.06	2.3
Sorghum	(lb)	.57 <u>1/</u>	.39	1.5 <u>1/</u>
Wheat	(bu)	7.22	3.77	1.9
Barley	(bu)	5.95	2.38	2.5
Cottonseed	(lb)	4.80 <u>1/</u>	4.30 <u>2/</u>	1.1
Alfalfa - certified	(lb)	2.17	NA	
- commercial	(lb)	1.70	NA	

Source: U. S. Department of Agriculture - Price Bulletins

NA - Not applicable

1/ Hybrid varieties.

2/ Excludes value of cotton fiber.

VI: ACTION PROGRAM TO ESTABLISH A NEW NATIONAL SEED SYSTEM

There is an acknowledged need, and an expressed government desire to develop a national seed system for Turkey, based on the close collaboration of government institutions with a dynamic, privately-owned and operated seed industry. The latter should, according to this approach eventually take over a major portion of the responsibilities for providing high quality seed, in sufficient quantity and at just prices to Turkish agriculture and export markets.

To achieve this stated objective, an action program should be initiated simultaneously on several levels and carried out over the next two years with the following priorities:

A. Changes in Legal and Administrative Systems

Immediately, and presumably by decree:

- Government regulatory procedures for price fixing should be eliminated on seeds of all non-strategic crops, allowing market forces to determine prices. Just prices for both producers and consumers, without government-imposed distortions would result and become stable after some time.
- Free import of seeds should be allowed by private organizations for testing and marketing purposes, subject only to phytosanitary import regulations. Such seeds could be sold in the open market on a "commercial seeds" basis without required prior completion of government testing procedures.
- However, seeds placed in the local market would be submitted for government testing for relative field performance purposes.

The government has two alternatives regarding the length of time for testing:

- a) a short period of time, say one-two years, which would result in provisional approval of the seeds for marketing purposes after

which testing would continue toward final certification. This approach is used in Colombia.

- b) an indefinite testing period with approval and certification optional but not required. The objective of such testing would be to provide quality and performance information to consumers. This is the approach taken in the U.S.A. and Peru.

In such cases as hybrids of corn, sorghum and sunflowers, where the expected yields would be much greater than present varieties, the testing period could be minimized. Self-pollinated varieties of crops such as wheat, barley and soybeans could be retained for one-two years of testing. Vegetable seeds would probably only require a minimum testing period.

- The agricultural law would be revised or amended to allow seed companies to qualify as agricultural producers for low-cost credit for working capital, production and inventory costs.
- This action would provide immediate incentives for the local and foreign private sector to consider seed company operations. It would encourage foreign companies to test their hybrids and other varieties extensively in Turkey in order to select the best ones for the local market and for inclusion in the government testing program.

The Framework Decree would encourage foreign companies to enter the Turkish market in association with Turkish companies and farmers.

- The revised legal system would emphasize the government promotional, quality control and consumer protection roles. Within this context, the existing seed certification procedure would remain for varieties produced by the public sector, but could become optional for those produced by private companies. Seed certification in its true meaning

should be recognized as a procedure to allow the tracing of true genetic identity and its maintenance, within recognized and specified tolerance for plant varieties, through the lineage of breeder to basic to registered to commercial seed (Annex D). This would, therefore, continue to provide valuable information to farmers on truth-to-type seed varieties, especially those developed by government agencies.

A more important government quality control function would be exercised through the phytosanitary regulations for seed imports, and enforcement of a Truth in Labelling regulation, which should be established as soon as possible, presumably by decree.

Under the latter regulation, the government would be responsible for regular periodic testing of commercial seed against the minimum quality standards claimed by the producer within established categories of the Seed Law for each crop seed (germination, purity, noxious weeds, etc.) as stated on seed package labels. Seeds that did not meet minimum standards, as checked from time to time, would be banned from the market. To protect the seed producer, however, legal recourse for appeal through the court system should also be established.

Studies should also start immediately toward the longer term objective of defining a national seed policy and, within that context, a revised or totally new seed law. The policy would articulate the public/private sector partnership in precise terms. It could also take into account operational experience gained during the transitional phase, which would help to draw practical lines between the sectors in production, marketing, testing, research, etc. Eventually, therefore, the policy would reflect general development objectives within the context of the seed sector and specific Turkish conditions.

The experience of several developing countries, including the Dominican Republic and Peru, in revising seed laws should be taken into account. In those countries, the seed law is a basic legal framework which establishes

overall objectives and policies. Individual decrees become the instruments for implementing the law. Such a process allows the government to revise the legal and administrative systems by changing decrees, without changing the overall framework. Through this process, governments are able to react to evolutionary changes quickly and effectively.

B. Changes in the Organizational Structure

Variety Introduction

The private sector would immediately be allowed to introduce new varieties into Turkey by importing seeds, as long as they meet the phytosanitary requirements as administered by the Ministry of Agriculture.

Those varieties would be privately tested under Turkish conditions and introduced into the market at the discretion of the private companies. Most private companies would probably prefer to locate testing plots on their own. However, the Union of Turkish Chambers of Agriculture might be helpful in identifying farmers who could conduct field testing operations under contract.

As new private seed varieties entered the market, they would simultaneously enter the government testing system.

Production and Marketing

The most effective public/private sector partnership for these functions would also be redefined over a period of time based upon initial changes in the legislative and administrative systems, as well as market forces.

In this regard, the following adjustments should be considered as soon as possible:

- Elimination of all restrictions on production and marketing of non-strategic crop seeds by the private sector. The public sector would continue to control production and marketing of wheat, barley and rice seed.

Production of commercial seed of open-pollinated varieties should gradually be de-emphasized by government and transferred to the private sector over a five-year period.

- Therefore, public sector responsibilities for non-strategic seed varieties should ultimately be limited to the production of basic and foundation seeds which should be sold at a profit to the private sector for multiplication to commercial seed.
- State farms and research stations would be available to take on contract seed production for private firms. The commercial feasibility of this system would be clarified as the new marketing system evolved.
- Similarly, in the distribution of seeds, the existing public sector system would be available on a commercial basis for retail distribution of privately produced seeds. TZDK has an extensive retail network and is interested in such an arrangement. Promotion of individual branded varieties would be the responsibility of the private producer, since TZDK would conceivably handle competitive products. Parallel private distribution channels for seeds should be encouraged to develop throughout Turkey, mainly in connection with private distribution of other agricultural inputs.
- The market information function would be strengthened by improved public sector services for gathering accurate data on the internal and export markets. For the latter, Turkish commercial counsellors in key foreign countries would be asked to collect data on seed demand for selected commodities.
- Government participation in seed production and sales should be integrated into the overall system so as not to distort market relations; This has been a problem in some developing countries like Colombia and Mexico.

Extension and Research

- As these legal and administrative changes and market forces reduce the extent of public sector involvement in seed production and marketing, public resources should be freed-up for reallocation to expanded agricultural extension and education programs, particularly through crop-specific campaigns.
- The public-private sector partnership in research activities would also undergo significant change. Government research organizations would become much more user-oriented-- i.e. farmer oriented. They would gradually focus more on developing genetic resistance to diseases and pests; on other problems of widespread importance to the seed industry; and on creating use-specific gene pools.

The government would also continue to operate the national gene resource storage program, which should include breeding material as well as indigenous varieties. It would release material as might be needed by both public and private sector research programs that aim at developing new national hybrids or other varieties.

The private sector would expand its research on final development of new varieties.

The public sector would also take on increased responsibility for monitoring seed technology developments worldwide and for providing information, support and guidance to the local seed industry on such developments.

Varietal Protection

- An assessment should be made of the advantages and limitations to Turkey of establishing varietal protection measures to stimulate private breeding in self-pollinated crops in Turkey as a prelude to entering in a protected manner in the OECD market for seeds.

C. National Seed Enterprise Development Program

In order to achieve the new public-private sector seed industry partnership envisaged in this report the mission recommends a specific program of activities to stimulate seed enterprise development in Turkey.

The current institutional imbalance between private and public sectors is obvious. On the one hand there are strong, well-staffed government institutions in seed research, production, and marketing; on the other hand, there are only three private sector companies dedicated fully to commercial seed operations. Therefore, a program to achieve a balanced, efficient system, that would encourage the development of a vigorous Turkish seed industry, would give priority to the following:

1. Establishing a National Seed Advisory Council (NSAC) that would advise the government on national seed policy in all legal, administrative and operational aspects. Both government and private seed industry representatives would be involved. A likely model is the Argentine NSAC made up of 10 members: 5 representing government, 5 representing the private seed industry.
2. Promotion of local private sector interest in the seed industry and identification of local entrepreneurs, particularly those interested in full-time seed operations. Vertical integration and diversification by existing agro-industries into seed would, of course, also be promoted. However, the main weakness in the whole system is the lack of known entrepreneurs who would invest solely or primarily in the seed industry. From experience in other developing countries, it would be reasonable to expect that between 20-40 seed enterprises might be established in Turkey in the next 10 years if the recommendations in this report are implemented. Many of these would probably have linkages with foreign seed companies through investments, license arrangements, etc. Often the first

entrepreneurs drawn to a new seed industry are employees of government and other institutions and who have experience in the seed field. Agro-industries are another source of immediate potential interest, particularly those involved in seed related fields including livestock and food processing. Priority action to help promote local private sector interest would include:

- a) Specific guarantees, incentives and information on government support of local private investment in seeds. This might include decrees on pricing, agricultural credit, testing, etc. as well as better market information and possible public/private cooperation in production and marketing.
- b. A national seed enterprise development seminar series - The series would be designed to use case history material illustrating the experiences of various other countries, particularly developing countries, in establishing or restructuring national seed industries. Leading seed company entrepreneurs from such countries might participate in this seminar. Local participants would include top officials of public and private sector organizations currently involved or potentially interested in the seed industry. Subjects for such seminars could include:
 - the national seed system--an effective public-private sector partnership. This seminar would help develop the ground for a consensus on national seed policy, including proposals for new incentives or services and common long term expectations for the industry.
 - promoting investment in the national seed industry.

- research, production, financing, marketing and controlling seeds.
- a management philosophy for the national seed industry, including a cost accounting approach for both public and private sector operations.

Actually the first seminar could establish subjects for subsequent seminars. The results of the seminars would help to build a consensus among public and private sector organizations on the dynamics of the new system. The seminars could also help to attract both local and foreign seed entrepreneurs interested in the seed industry.

3. In the medium term establish a seed industry management and technology philosophy that would be based on commercial operations and apply to both public and private sector organizations. A first step in this regard would be:
 - a) An inventory of national seed industry human resources, training and management development needs - This inventory would cover the full range from basic skills development, through to post-graduate trained professionals in various seed industry technical functions as well as general management. This approach is currently being carried out with ICD assistance in the Caribbean and Thailand and is being considered in several other developing countries.
 - b) A national seed industry training program - With such an inventory, it would be possible to design a national training program over several years that would include activities at academic institutions and specialized institutions; internships with established seed companies, and on-site management seminars, workshops, etc.

4. Promotion of foreign industry participation in the national seed system - The interest of foreign seed companies in Turkey can be expected to expand considerably if the new national seed system is implemented. To stimulate such interest, a number of simple promotional efforts should be made, including:
- a) Cooperation should be established with national seed industry associations in developed countries. The interest already shown by ASTA is an example; and every effort should be made to exploit the visit of that group to Turkey in May, 1982. Opportunities for seed industry partnerships in Turkey should also be promoted through bi-lateral aid organizations such as the Overseas Private Investment Corporation (OPIC) of the U.S.A. and multilateral organizations such as IFC and UNDP's pre-investment program. The FAO Investment Centre may also be interested in providing assistance.
 - b) Turkish government and individual industry officials related to the seed industry should be available and well briefed to promote seed industry investment through speaking engagements, presentations and meetings in Europe and North America.
 - c) Opportunities for participation in the Turkish seed industry should be synthesized in one simple, compact document, available for widespread distribution.
 - d) Opportunities for investment should be publicized in the international trade and business press.
 - e) The State Planning Organization and its "one stop" investment service will be of critical importance to potential investors in seeds as in other agro-industries. SPO can also facilitate

the feasibility and marketing studies which such companies will often want to perform before concluding local arrangements, by helping with information sources, contacts, translations, etc.

A number of external organizations are available to assist with the implementation of the seed enterprise development program. ICD, through its Commercial Seed Industry Development Project could help the government plan, coordinate and implement the activities indicated above. ICD is already involved in several other countries along similar lines. IFC, with its strong interest in agro-industrial development in Turkey, also has a general promotional role to play. Similarly Kuhn Loeb Lehman, in its function as financial advisor to the government can assist the program.

A N N E X E S

ADMINISTRATIVE STRUCTURE

National Government (Ministry of Agriculture;
State Planning Organization)

LEGAL STRUCTURE

National Seed Policy (New)
National Seed Law (Revised or New)
- Phytosanitary Law

Agricultural Investment Law (Amended)
Foreign Investment Law (Interpreted)
Truth in Labelling Regulation (New)

OPERATIONAL STRUCTURE

PRIVATE SECTOR	New Variety Introduction	Control						Research
		Testing	Certification	Truth to Labelling	Production	Marketing	Extension	
	-Free import of foreign varieties	<p><u>What</u></p> <ul style="list-style-type: none"> -Experimental varieties -Advanced varieties -Released varieties <p><u>How</u></p> <ul style="list-style-type: none"> -Through own personnel -Through contract personnel <p><u>Where</u></p> <ul style="list-style-type: none"> -Leased or rented land (Plot) -Own land (Plot) -Farmer co-operators (Commercial) 	<ul style="list-style-type: none"> -Own varietal identity control -Publicly developed varieties subject to certification at registered and commercial levels -Privately developed self-pollinated varieties optional -Private hybrids non-certified 	<ul style="list-style-type: none"> -Own lab control of crop purity, noxious weeds, germination, foreign matter, humidity -Varietal name 	<ul style="list-style-type: none"> -Private varieties -Multiplication of commercial seed from government produced foundation seed -Production under contract with: <ul style="list-style-type: none"> a. Farmers b. Government Seed Farms 	<ul style="list-style-type: none"> -Retail marketing through own or government marketing organizations -Export marketing: <ul style="list-style-type: none"> direct or through foreign partner 	<ul style="list-style-type: none"> -Company program -Coordination with other input companies -Collaboration with Government agencies 	<ul style="list-style-type: none"> -New varieties developed using local and foreign genetic material

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PUBLIC SECTOR	New Variety Introduction	Testing	Control		Production	Marketing	Extension	Research
			Certification	Truth to Labelling				
	-Phytosanitary regulations	-Released varieties of private and public origin -Experimental public varieties -Information on results of tests on a yearly and cumulative basis	-Basic seed -First generation registered (occasional) -Commercial seed produced by Government institutions of varieties originating in Government institutions or otherwise submitted for certification	-Sampling of all marketed seed lots, at timely intervals -Control of truth to labelling and minimum standards on crop purity, noxious weeds, germination, foreign matter, humidity on all marketed seeds	Limited to: -basic and foundation seed of public variety -production of certified seed for strategic crop variety - phasing out Contract production for private sector	-Marketing of certified seed of strategic crop varieties, and of private sector seed through retail outlets	Ministry of Agriculture program including crop specific campaigns	-Research on industry wide problems (disease, pests, etc) -New varieties for strategic crop seeds -Administration national gene resource storage and utilization

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Ankara

October 23.1981

Mr. Walter Simon
Executive Director
Industry Council for Development
300E. 44th Street
New York, New York 10017

Dear Mr. Simon :

The Government of Turkey is interested in promoting the development of the private seeds industry. To this end, the Government requests the Industry Council for Development to commission a study that would accomplish the following objectives :

- (a) Identify the market for high quality seeds, particularly for corn, soybeans, vegetables and forage.
- (b) Evaluate alternative strategies by which the prospective demands might be satisfied by private seed companies.
- (c) Outline the changes in Government policies which may be necessary to promote the development of a private seed industry.

As the availability of high quality seeds is a critical factor in agricultural and general economic development, the Government requests that all possible steps be taken to initiate and complete this study expeditiously. In any event, we would hope that the study could be completed and delivered to the State Planning Organization by the end of February, 1982.

State Planning Organization

Yıldırım AKTÜRK



Industry Council for Development

25 November 1981

Mr. Yildirim Akturk
Republic of Turkey
Prime Ministry
State Planning Organization
Ankara, Turkey

Dear Mr. Akturk:

Thank you for your letter of October 23, 1981.

We are honored by your government's request and agree with the general terms of reference for ICD assistance to seed industry development in Turkey.

Based on initial discussions with Mr. Demir, your Agricultural Attache in Washington, as well as officials of IFC, IBRD, UNDP and the American Seed Trade Association, we believe the ICD mission should involve several individuals including seed industry executives, to cover both the market research and policy aspects of the project.

We agree this project should be implemented as soon as possible, and are presently seeking to identify appropriate experts who would be available early in 1982. In carrying out the terms of reference we would, of course, depend considerably on contacts with the Turkish government and private sector arranged by your Organization. In addition, we would look to the continuing cooperation of appropriate UN system organizations and USAID for information and advice.

I enclose a selection of documents which describe the work of ICD and its Commercial Seeds Industry Development Project (CSIDP). ICD's main objective is to assist governments with their development priorities, primarily by utilizing the expertise of commercial enterprises worldwide. Our activities are carried out at the request of governments and frequently in cooperation with the UN system under the "Guidelines for Cooperation Between UNDP and External Institutions", adopted by that organization's Governing Council in 1979.

Mr. Yildirim Akturk
Republic of Turkey
State Planning Organization
Ankara, Turkey

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25 November 1981

The Council's seeds industry activities are supported by a grant from USAID.

Consistent with our operating procedures, ICD would provide and finance the basic expertise necessary to implement the terms of reference you have specified. We would request that certain local costs for the ICD mission be for the government's account.

To facilitate this project, I would propose meeting with you and your associates in Ankara in mid January. By then we should be able to prepare a final plan, including proposed experts, for your approval. The purpose of my visit would be to conclude these arrangements and establish a schedule with you for project implementation as quickly as possible. I would appreciate your guidance on the most convenient time to meet with you.

We look forward to assisting the government of Turkey in the development of the nation's seed industry.

Sincerely,



Walter W. Simons
Executive Director

WWS:dlp

Enclosures: ICD & CSIDP Brochures, Membership List, Activities Report

CREDENTIALS of MISSION MEMBERS

Dr. Alexander Grobman - Seed Industry Policy Adviser

Dr. Grobman, a Peruvian citizen, is an agricultural adviser to the Peruvian government, and president of a private seed company in Peru. He is also an ICD senior associate, and has provided policy advice to several governments in Latin America and the Caribbean. Dr. Grobman has substantial experience in both the public and private sectors in developing countries, and with the U.S. seed industry. He was also Associate Director General of the Centro Internacional de Agricultura Tropical (CIAT) in Cali, Colombia for three years. Dr. Grobman holds a PhD. in Plant Genetics from Harvard University, has represented the Peruvian government at numerous international conferences, and is the author of several publications.

Mr. Glen Allen - Seed Industry Marketing Adviser

Mr. Allen is president of Allen Enterprises, of Topeka, Kansas, a privately owned company specializing in agro-business counseling, investment and management. Mr. Allen is an agro-business specialist, who concentrates in agricultural and agro-industrial marketing and the feasibility of agricultural investment projects, especially in developing countries. He has participated in numerous agro-studies related to food production and distribution systems throughout the world. Mr. Allen has assisted in the formation of several agro-industry companies and has worked in over 100 countries on agriculture-related projects. He has particular expertise in projects related to seed marketing, livestock and water resource development. Mr. Allen holds the degrees of B.S. and M.S. from Kansas State University.

Mr. Walter W. Simons - Executive Director, ICD

Before establishing ICD in 1979, Mr. Simons served as Deputy Executive Secretary of the Industry Cooperative Program, an official FAO Programme which acted as a major channel for cooperative activities between industry worldwide and the UN system. While with FAO, Mr. Simons organized and led various missions of senior industrialists to advise high-level developing country officials on agro-industrial policy and project matters. Prior to joining the Food and Agriculture Organization, Mr. Simons

held executive positions with several U.S. consulting and operating corporations active in developing countries. Mr. Simons holds a B.A. from Dartmouth and an M.A. from New York University

Dr. Nazmi Demir, Agricultural Attache, Embassy of Turkey in Washington, D.C., accompanied the ICD mission members during their stay in Turkey.

MISSION CONTACTS

22 Feb. 1982 Ankara

State Planning Organization

" "
Hüsnü Doğan, Head of Foreign Investment Department
Dr. Namik Kemal Kiliç, Advisor to State Planning Organization

Ministry of Agriculture and Forestry

" "
Tülin Dabakoglu, Director of Seed Testing and Certification
Prof. Dr. Osman Tekinel, Under-Secretary of the Ministry of
Agriculture and Forestry
Dr. Hayati Ölez, General Director of Agricultural Affairs (GDAA)

23 Feb. 1982 Ankara

Beta Corp.

Ismail Balci, General Manager (and Associates)

State Planning Organization

" "
Yildirim Aktürk, Under-Secretary
Arif Uğur, Agriculture Sector

The Union of Turkish Chambers of Agriculture

" "
Osman Özbek, President of the Executive Committee
Z. Yüçetürk, Executive Secretary (and Associates)

Ministry of Agriculture and Forestry

Dr. Necati Celik, Assistant General Director of Agricultural
Affairs
Yusuf Ergoun, Department Head of Field Crop Research (GDAA)
Yilmaz Akor, Forage Expert (GDAA)

24 Feb. 1982 Ankara

U.S. Embassy

Alfred Joseph-White, First Secretary
Yusuf Ziya Durusoy, Agricultural Specialist

Forage Crops Institute

" "
Dr. Ö. Kurt
N. Yunce

- 24 Feb. 1982 Adapazari Sakarya Agricultural Research Institute
"
Hüđai Arici, Director
Osman Arikođlu, Maize Specialist
- 25 Feb. 1982 Istanbul Anadolu Endustri Holding A.S.
"
Üstün Cevik, Investments and International Finance Coordinator
Unilever
U. F. Schroeder, Vice President
Abdullah Demirtola, Agronomist
Taskin Tuđlular, Production Manager
Ihsan Aysu, Head of Operations (Edible Fats)
Koc Holdings
Dr. M. Nusret Arsel
Dr. Veleddin Geigoun, Faculty of Agriculture
Department of Agricultural Microbiology
University of Ankara
Yesilkoy and Marmara Regional Agricultural Research Institutes
"
E. Enver Hüsamođlu, Director
Türker Cirit, Oilseeds Research Expert
- 26 Feb. 1982 Istanbul Consulting and Representation Co., Inc. (Hisar Bank)
Tolgay Cavuđođlu, Chairman
Korkmaz Ilkorur, General Manager
Enka
Fatih Tar, Assistant General Manager
Melih Halefođlu, Assistant General Manager

26 Feb. 1982 Istanbul

Sabancı Holding A.S.

Sakip Sabancı, Chairman and Managing Director
Dr. T. GÜNGÖR Uras, Director (Akbank T.A.S.)

Zihni

Metin Aral, Deputy General Manager
Atila Yoğurtçugil, Commerce Manager
Metin Sümer, Import-Export Manager
Semih Akyol, Export Manager

27 Feb. 1982 Yalova

Ataturk Horticultural Crops Research Institute

Refet Ergin, Director
Dr. Sozer Özelkök, Assistant Technical Director
Dr. Nesrim Turkes, Director, Vegetable Section
Dr. Tamer, Director, Vegetable Section
Basri Kaptan, Livestock Section
Ahmet Mengur, Landscape Development
Nurdal Ertan, Cut-flowers
Kamil Gursan, Cut-flowers
Güngör Simşek, Vegetable Crops Department
Nurten Sürmeli, Vegetable Crops Department
Dr. Mehmet Sencan, Representative (May Co.)
Dr. Umit Ertan, Post Harvest Section

Bursa

May Tohumculuk Ziraat ve tic.

Mehmet Ali Yormazoglu, President
Dr. Mehmet Sencan, Advisor

28 Feb. 1982 Mustafakemalpasa

Tat Konserve Sanayii A.S.

Ercan Bayramli, Production Manager
Necati Kuyumcu, Assistant Production Manager

28 Feb. 1982 Balikesir Vegetable Research Institute
Ihsan Doğan, Director

1 Mar. 1982 Izmir TZDK
"Güven Barutoğlu, Assistant Director for Izmir Region
Ibrahim Can, Seeds Specialist
Yasar Holding A.S.
Dr. Ali Nail Kubali (Ph.D.), Deputy Chairman
The Aegean Regional Agricultural Research Institute (Menemen)
Dr. Kaşif Temiz, Regional Director
Dr. Marciano Morales, Representative
Dr. Belgin Gomeç

2 March 1982 Adana Karatas Yag Sanayii
A. Gündüz Yaltir, General Manager
Paksoy Tic. ve San. A.S.
Uğur Paksoy
Ibrahim Paksoy
Marsa
Cahit Gürol, Assistant General Manager
Hayri Ertok, Division Manager for Foreign Trade Transactions

2 March 1982 Adana

GROUP MEETING at KARATAS

A. Gündüz Yaltır, General Manager, Karatas Yag Sanayii
ve Ticaret A.S.

Prof. Ibrahim Atakisi, University of Cukurova

Ahmet Atli, Agricultural Administrator of Regional
Farmers Association

Ismet Bakinli, Farmer

Cengiz Yaltır, Farmer

3 Mar. 1982 Ankara

Agricultural Bank

Mumtaz Pehlivanli, Assistant General Director
Reşat Sönmez, Agricultural Credit Manager

Tohum Islah

Ahmet Hizarci, Head Director

Muzaffer Adiyaman, Assistant Director

4 Mar. 1982 Ankara

State Planning Organization (including Dinner Meeting)

Yıldırım Aktürk, Under-Secretary

Husnu Doğan, Head of Foreign Investment Department

Dr. Namik Kemal Kiliç, Advisor to State Planning Organization

DEFINITIONS OF SEED INDUSTRY TERMINOLOGY
USED IN THIS REPORT

Breeders Seed

Seed originating in the process of developing a variety as the first generation seed from which all further seed of the variety is multiplied.

Basic or Foundation Seed

Seed of successive generations multiplied from initial or breeders seed under strict control of varietal family by the originator of the variety or by a delegated authority, for the purpose of being used by a seed producer for the production of either registered or commercial seed.

Registered Seed

A category of seed which sometimes is used between foundation and commercial seed in one or more generations of multiplication.

Commercial Seed

A category of seed produced by a seedsman, a farmer, a seed company or a government institute for final destination as farmers seed for commercial commodity production.

Commercial seed can be either certified commercial or common commercial seed or variety protected commercial (certified or uncertified) or hybrid commercial (certified or uncertified).

Certification Control

Seed certification is a procedure involving field and laboratory operations designed to allow the tracing of true genetic identity of a variety through the control of the multiplication of seed from generation to generation, within recognized and specified tolerances.

The category of certified commercial seed means that a Certifying Agency assures trueness to type of a given

variety. No other guarantees are given. Any additional considerations to seed quality are not implied, as they are covered by other controls, which should apply to all seed categories, both certified and uncertified.

Uncertified seed could be as good or better in over-all performance as certified seed, such as hybrid seed of private origin, which could not be certified unless parental lines are released, something which is not normally done in many countries.

Truth to Labelling Control

This control is based on government procedures designed to insure that a seed lot is never below minimum quality standards for a given crop, in respect to germination, purity, noxious weeds, mechanical mixtures, humidity, etc., as stated in the regulations to a Seed Act. In some regulations, a minimum standard for all seeds of a given species is mandated; in others variable standards for different seed categories could be decreed. Care should be exercised in legislating the name of common for uncertified seed, as some kinds of uncertified seed could have higher guaranteed quality at shipping than the minimum quality standards for all seeds of a species, including specific standards for certified seeds.