

**MEXICAN
WHEAT
COMES
TO
TURKEY**

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USAID/TURKEY**

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Corrigenda

Please make the following corrections

Page 11 line 8 - acknowledge should be acknowledged.
13 line 8 - mersin should be Mersin.
13 last line - draw should be drawn.
15 Picture caption - The date should be Sept. 4-6.
17 3rd line from bottom - it should be its.
20 line 9 - damaged should be damage.
27 line 7 - was should be were.
31 line 18 - axious should be anxious.
31 line 22 - mexican should be Mexican.
38 line 9 - leftist should be leftist.
44 line 8 - mediterranean shou'd be Mediterranean.
55 line 4 - Siete should be Ciete.
65 line 5 - number should be numbers.

FOREWORD

Being associated with the Mexican wheat program, presented herewith in narrative form, has been the highpoint in my experience as an agricultural worker in countries other than the United States. I was not in Turkey at its beginning nor will I be here when it reaches its goal, but I have been associated with it through its first full production year and well into its second. This has been an interesting and stimulating experience.

Many people contributed to the program's success, from the Government of Turkey, AID, Mexico and elsewhere. Each one played a significant part but perhaps most important were the 60,000 Turkish farmers without whom there could have been no program.

Any description of this effort in terms of lira, dollars or tons tells only a small part of the story. The vision and daring of those who planned and undertook it were really crucial to its ultimate success.

It is to be hoped that with this Mexican wheat program as an example of what can be done, Turkey will find itself not only self sufficient in food grains but also on the road to success in other major agricultural developments.

L. M. Humphrey

Mexican Wheat Comes To Turkey

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CHAPTER I

MEXICAN SEMI-DWARF WHEAT

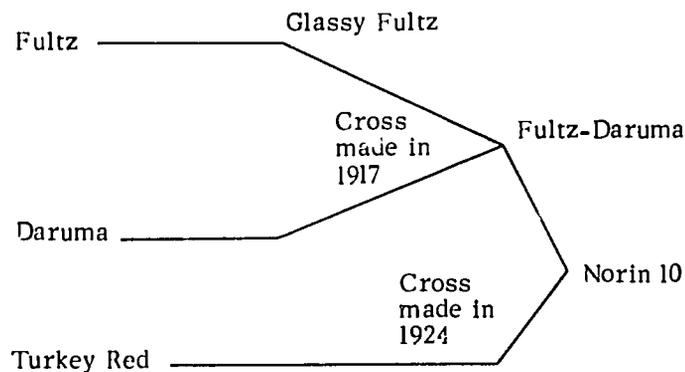
Mexican dwarf or semi-dwarf wheat varieties are being found adapted in many parts of the world, including the coastal areas of Turkey. These wheats are a relatively recent development, the first two varieties having been released in Mexico in 1961. Others have been released since that time. Both research and field trials have shown these semi-dwarf wheats to be adapted under a wide variety of conditions. The Rockefeller Foundation Progress Report for 1965-66 states as follows: "They (these varieties) are insensitive to day length: in the international yield nurseries they were among the highest yielders within latitudes ranging from 36° south of the equator to 50° north. Although developed especially for conditions in irrigated areas, they rank among the top yielders under rainfed conditions also, are relatively high yielders at low levels of fertility as well as at high levels, and have a broad spectrum of resistance to stem and stripe rust. They are truly cosmopolitan wheats that are ready to do their part in increasing wheat production in many countries far from their Mexican homeland."

The dwarf and semi-dwarf varieties are the most recent development in a wheat improvement program that started in 1943 when The Rockefeller Foundation and the Government of Mexico joined hands for the purpose of improving Mexico's then very poor level of production of wheat, corn, and beans. The wheat program had made very significant progress under the direction of Dr. Norman E. Borlaug even before the entrance of dwarf genes into the picture.

In 1946 Dr. S.C. Salmon, then Agriculture Advisor to the U.S. Occupation Forces in Japan, visited a wheat breeding station and discovered in the

breeding nursery there a semi-dwarf variety called Norin 10. The word "Norin" is an acronym made up of the first letter in each word in the Romanized title of this Japanese Agricultural Experiment Station. The story of the origin and history of Norin 10 was given in a short article by L.P. Reitz and S.C. Salmon in the November-December issue of Crop Science. Since Norin 10 has played such an important part in recent wheat developments in Mexico, Washington State and elsewhere, a summary of the article is included here.

The Japanese records showed that Norin 10 included two U.S. wheats and one Japanese in its lineage. The U.S. varieties were Fultz and Turkey Red. Fultz was exported to Japan some time before 1892. The Japanese variety was Daruma. The variety Fultz underwent selection and one of its derivatives called Glassy Fultz was crossed with Daruma in 1917. This eventually produced a strain called Fultz-Daruma which was then crossed with Turkey Red in 1924. This cross led to a number of different genetic types, one of which, while in the breeding nurseries, was known as Tohoku No. 34. This was later named Norin 10 and released to the farmers in 1935. The pedigree is as follows:



Norin 10 is characterized by very short stature: 24 inches (60 centimeters) under conditions of very high fertility and ample moisture. It also tillers very heavily, producing many heads from each plant. A further important characteristic is great resistance to lodging.

Dr. Salmon brought Norin 10 seed back with him to the U.S. Dr. O.A. Vogel, working at Washington State University, introduced this variety into his

breed'ng program. This led to the development of the high-yielding semi-dwarf winter wheat variety, Gaines, in 1961. At the same time, Dr. Borlaug introduced Norin 10 into the Mexican program and the Mexican dwarf and semi-dwarf varieties were evolved. These varieties, however, are all spring wheats adapted to somewhat warmer growing conditions than Gaines. The first two varieties to come from the Mexican program in 1961 were Pitic 62 and Penjamo 62.

In addition to being insensitive to changes in day length, these and other Mexican semi-dwarf varieties have a high genetic yielding capacity and can respond very well to high rates of nitrogen fertilization because the straw is short and does not lodge. The height to which the variety will grow is determined by the number of dwarf genes present. These genes are additive in their effect. Norin 10 has three and is very short, Sonora 64 has two and,



The local tall growing variety, Florensa on the left and Mexican semi dwarf wheat on the right. The short stiff straw makes the semi dwarf varieties able to use large amounts of fertilizer without lodging.

under favorable conditions, will grow to a maximum height of about 30 inches (76 centimeters). Penjamo, Lerma Rojo and others having only one dwarf gene may reach a height of 42-46 inches (107 to 117 centimeters).

These Mexican varieties were found, in Mexico and elsewhere, to have the capacity of yielding two to two-and-a-half times as much as the varieties they replaced. The following table illustrates their rapid acceptance into ten countries in South Asia, West Asia and Africa.

TABLE I

<u>Crop Year</u>	<u>Area Under Mexican Wheats</u>	
	<u>Acres</u>	<u>Hectares</u>
1964 - 1965	50	20
1965 - 1966	23,000	9,300
1966 - 1967	1,554,000	630,000
1967 - 1968	9,070,000	3,670,000
1968 - 1969 Est.	(14,554,000)	(5,900,000) ^{1/}

The most rapid increase so far in plantings of semi-dwarf wheats has been in India, Pakistan and Turkey, but they are spreading rapidly to other countries.

The Rockefeller report points out that as good as these new varieties are, their full potential will not be realized unless proper agronomic practices are followed in raising them. These include good preparation of the soil, use of relatively large amounts of fertilizer, correct rate and depth of seeding, correct use of and/or disposal of water and weed and pest control. The farmers who have the most satisfying results with Mexican wheat follow all of these practices exactly as recommended.

^{1/}

"Imports and Plantings of High Yielding Varieties of Wheat and Rice in Less Developed Nations," by International Agricultural Development Service, USDA.

CHAPTER II

EARLY HISTORY IN TURKEY

FIRST INTRODUCTION

Early history of Mexican wheat in Turkey started in 1959 when Sadettin Demiröz, Director of the Agricultural Research Station at Adapazarı, contacted The Rockefeller Foundation at its research center in Mexico. He obtained 17 samples from the Foundation's breeding stocks. These were planted in the 1960 season. More material including the released varieties was obtained in subsequent years. In the 1965-66 trials, the Mexican varieties made the highest yields.

In the meantime, a USAID technician obtained 40 kilograms of seed of Sonora 64 and Lerma Rojo from India. Mehmet Can Eliyeşil, a very progressive farmer, planted the seed in the fall of 1965 on his farm near Tarsus. The excellent performance of this wheat caught the interest of other farmers in the Tarsus-Adana area and 106 of them pooled their resources and obtained permission from the Government and the necessary foreign exchange to purchase 60 tons of Sonora 64 seed from Mexico. The seed cost them \$259 per ton delivered at İskenderun. This sum with customs and other costs represented a sizeable investment by these farmers. Planting was not completed until December because the seed arrived late. Results obtained from these plantings were somewhat variable because the farmers had not received instructions for raising the wheat. In meetings held after planting they were encouraged by USAID officials to use adequate quantities of nitrogen fertilizer. This most of them did and the results were generally highly satisfactory.

THE ELKINTON REPORT

The Minister of Agriculture, Bahri Dağdaş, became convinced that Turkey must do something about its lagging agricultural production. Increases in production were not keeping pace with the growing population. He, therefore, asked USAID to provide a team of agricultural specialists to study Turkey's agriculture and make recommendations for its improvement. A six-man team headed by Charles M. Elkinton, then Food and Agriculture Officer in AID/Pakistan, visited Turkey from November 14 to December 16, 1966. Dr. O.A. Vogel, USDA wheat breeder from the state of Washington, was a member of the team. Among Dr. Vogel's recommendations included in the report submitted to the Minister was the suggestion that a team of cereal specialists study the performance of the Mexican wheat being grown by the 106 farmers in Çukurova and make recommendations on the possible introduction of Mexican wheat varieties on a larger scale. Another general recommendation made in the Elkinton Report was that Turkey introduce, on an extensive scale, high-yielding wheat varieties from foreign sources and at the same time introduce the production techniques needed to maximize production.

The Minister accepted the recommendation that a team of wheat specialists come and study the Mexican wheat in Çukurova, but he realized that if he waited for their report it would be too late to do anything in 1967. Being a man of action he determined to go right ahead with a program of importing foreign high-yielding varieties as recommended in the Elkinton Report.

CHAPTER III

THE PREPARATORY STEPS

NEGOTIATIONS WITH USAID

On January 11, 1967 the Minister, Bahri Dağdaş, requested a meeting with two USAID representatives to inform them of his plans for Turkish agriculture and to ask the assistance of USAID in carrying out these plans. He had decided, on the basis of experience already gained experimentally and by that of the Çukurova farmers, to go ahead with a crash program of importing large quantities of Mexican wheat seed. He suggested 50 to 60 thousand tons and asked USAID to provide up to \$10 million long-term credit for the purchase of the seed.

Between January 11th, the time of the first meeting with Minister Dağdaş, and February 24th there were many meetings between USAID and the Ministry, The Rockefeller Foundation and others. The feasibility of such a crash program had first to be determined and then ways and means found to carry it out. There was serious opposition to the program. The Turkish research personnel strongly opposed it on the basis that not enough was known about the adaptation of the Mexican varieties and they wished to test them several more years before approving any large import of seed. Serious doubt was expressed by some officials of the USAID Mission, particularly by members of the Economic Planning Division concerning the wisdom of being involved in such a crash program. They questioned the proposed size of the program, the ability of the extension service, lack of machinery, danger of rust and pests, and the baking quality of Mexican wheat.

For a time it seemed that the whole program might die before it was born. However, the vigorous encouragement of the Agriculture Division, the Director of the Mission, and the determination of the Minister gave it

new life. This support and determination was further enhanced by the opinions of certain experts on the subject of wheat production; however they recommended a much smaller and more conservative program than that desired by the Minister. On February 1st, hardly three weeks after the Minister's first meeting with USAID, Mr. O.L. Mimms, Chief of the Agricultural Branch of the Near East and South Asia Bureau of USAID in Washington, came to Ankara to study the proposed program. He attended many Mission and Ministry discussions and after weighing all factors, both pro and con, and considering all objections and doubts, took a firm stand that the crash program was feasible and should be undertaken.

Further discussions between all agencies involved - the Ministry of Agriculture, Ministry of Finance, USAID, AID/W and The Rockefeller Foundation - led the Minister to reduce his request for Mexican seed from the original 60,000 tons to 20,000 tons. The next step was to perfect plans for carrying out the program fast enough so that the seed would be in Turkey in time for fall planting in 1967. USAID officials, particularly members of the Agriculture Division, with the solid backing of the Mission Director and his Deputy, helped the Ministry of Agriculture plan the grand strategy for carrying out the Mexican wheat program. This grand strategy involved some rather drastic changes in the organization and procedures of parts of the Government of Turkey. For this purpose, policy making and action groups were established.

POLICY DETERMINATION

To determine policies governing the over-all conduct of the Mexican wheat program, an Inter-Ministerial Wheat Council was established. Its purpose was to establish policy and assure coordination of effort in the program. Membership of this Council was as follows:

State Planning Organization - Under Secretary Turgut Özal, Chairman
Ministry of Agriculture:

General Director of Agriculture

General Director of State Farms

Director of Donatım (Agricultural Supply Organization)

Ministry of Finance - Head of the Department of Treasury

Ministry of Commerce and Industry:

Director of the Agricultural Bank

Director of TMO (Soil Products Office)

Ministry of Village Affairs, the Director of:

TOPRAKSU (Soil and Water Directorate)

Ministry of Energy and Natural Resources: the Director of

D.S.I. (State Hydraulic Works).

This Council was to meet at any time when major policy issues arose, but at least once a year. The establishment and operation of this Council was a considerable departure from Turkish custom. Cooperation and coordination at this level is a highly commendable development so this may be considered a significant and progressive by-product of the Mexican wheat program.

No less significant was the setting up of wheat committees, one in the Ministry of Agriculture and one in each of the three major Mexican wheat regions. The Ministry of Agriculture committee was charged with the implementation of the whole program, distribution of seed and fertilizer, extension training, provision of educational and publicity materials, farmer training, etc. This committee was chaired by Ekrem Günay, Assistant General Director of Agriculture, who was also named to head up the entire Mexican wheat program. The regional committees were headed by the Directors of the Agricultural Research Institutes in the three regions. These were Kaya Tosun of the Tarsus Research Station for the Mediterranean Region, Basri Devocioğlu, Plant Introduction Center at Menemen for the Aegean Region and Sadettin Demiröz, Adapazarı Research Institute at Adapazarı for the Marmara Region. These committees were charged with the conduct of the provincial and county programs in their respective regions. This involved local distribution of seed fertilizer and pesticides, extension training, farmer education, etc.

The driving force behind this entire effort was the energy, enthusiasm and determination of Minister Dağdaş. He is a man of action and once his mind was made up, he would let nothing stand in the way of the success of the program, at least as far as the actions of his Ministry and the men in it were concerned. He insisted on nothing less than 100 % cooperation.

The grand strategy for the Mexican wheat program involved certain major actions: financing the purchase of the seed, actual selection of varieties and shipping of the seed, a massive farmer education program, training of



The Minister of Agriculture for the Government of Turkey, Bahri Dağdaş participating in the harvest of Mexican Wheat. This was in the Cukurova near Adana in 1967. Minister Dağdaş supplied the interest, enthusiasm, determination and driving force that made the Mexican Wheat Program possible.

Turkish agricultural officials in the provinces, provision of required amounts of fertilizer and making credit available to thousands of farmers so that they could obtain the seed and fertilizer. How these major strategy steps were carried out will be considered in the next chapter.

CHAPTER IV

THE STRATEGY

FINANCING THE SEED PURCHASE

Financing the purchase of the Mexican wheat seed was a long, drawn-out affair. It started on February 24th when Minister Dağdaş officially requested the Ministry of Finance to grant a loan for the purchase of 20,000 tons of Mexican seed. In subsequent negotiations with USAID it was determined that the seed could not be procured under PL480 since they were being obtained from a source other than the U.S. The Ministry of Finance then applied for a \$5.5 million development loan for the purpose. The request was acknowledged, but since a loan would take several months to negotiate, the suggestion was made by USAID that the Government of Turkey make the required funds available from its own foreign exchange sources and negotiate an off-setting agricultural loan later. This was done and the amount of the loan finally approved after more than a year was \$3.45 million.

Once again the program faced a crisis. Between March 31st and April 19th a serious question was raised by AID/W about the advisability of undertaking the program. These doubts were the result of a rather lukewarm report by Kronstad and Jackson after their first trip to Turkey, during which time they had studied the plantings of Sonora 64 in Çukurova. There was also a question of whether Turkey could maintain sufficiently close control over at least one-fourth of the total planting. Assurance was given that the State Farm organization was fully capable and willing to maintain such control over the one-fourth of the seed which was proposed to be obtained from certified sources. While these discussions and reviews were still continuing, the letter of credit was received in Mexico on April 19th and purchase of the seed proceeded.

SELECTION OF THE SEED

In the meantime, on March 8th, acting on the assumption that the program was going to go ahead as planned, the Government of Turkey sent a team of three wheat research technicians to Mexico to join a fourth man who was in Mexico under training with The Rockefeller Foundation. This four-man team was joined by the Chief of the USAID Agriculture Division and Robert Horton from AID/W. Their assignment was to inspect fields from which seed was to be obtained and watch the harvesting, cleaning and bagging of the seed. Every bag of seed carried a tag signed by two members of the Turkish team certifying that it had been inspected and approved.

The original plan had been to obtain 15,000 tons of commercial grade seed for distribution to farmers and 5,000 tons of certified seed to be under control of the State Farms. As it developed, there were only 1,770 tons of certified seed available so 17,830 tons of commercial grade seed were purchased to make up the 20,000 tons total. The amount of commercial grade seed was later increased to 19,930 tons to fill out the second ship load, thus considerably reducing shipping costs. The price paid for commercial grade seed was \$120 per ton and for certified seed, \$148.40 per ton. All tons were metric.

The Ministry of Agriculture and USAID working together decided which varieties were to be imported. The decision was based on experience in other countries and performance records in trials in Mexico, India and Turkey. Thirteen varieties were selected to be included in the purchase. Large tonnages were to be obtained of six and smaller quantities of seven recently released varieties. The tonnages obtained are shown in the following table:

TABLE II

	Certified Seed	Commercial Grade Seed	Total
Penjano 62	600	6347	6947
Lerma Rojo 64	800	5390	6190
Super X	-	6856	6856
Mayo 64	270	915	1185
Nadadores 63	60	435	495
Sonora 63	20		20
Pitic 62	-	320	320
Inia 66	5	-	5
Noroeste 66	5	-	5
Tobari 66	5	-	5
Oviachic 66	0.3	-	0.3
Jaral 66	4.7	-	4.7
Ciete Cerros 66	1.0	-	1.0

There is a discrepancy between the total of these figures and the 22,100 tons which was supposed to have been purchased. The shortage is 66 tons. The figures presented here are, however, the best obtainable from the Ministry of Agriculture. Commercial grade seed was packed in plastic-lined, burlap bags of 74 kilograms net and the certified seed in white cotton, plastic-lined bags of 50 kilograms.

The seed was to be shipped to Turkey on two ships, 13,000 tons on one ship to be delivered to İzmir and mersin and 6,930 tons on a second ship to be delivered to İzmir and İskenderun. Harvesting, cleaning and bagging were handled so expeditiously that the ships were scheduled to arrive in July and August respectively.

THE FARMER EDUCATION PROGRAM

A vigorous and effective farmer education program was vital to the success of Mexican wheat production in Turkey. Very few Turkish farmers knew anything about this new wheat or what it took to raise a successful crop. The extension service had no experience in making personal contact with farmers. Their activities had been largely confined to various regulatory activities. The strategy for this part of the program was planned in meetings which included the Minister and other members of the Ministry of Agriculture, the Ministry of Finance, the State Planning Organization and USAID. The Government of Turkey agreed to assign 250 extension agents in the coastal provinces to work full-time on the Mexican wheat program and to pay them extra per diem as an incentive to spend more time in the villages. They also agreed to supply the provincial and county extension services with more vehicles to enable the agents to move freely and also to pay their drivers' salaries and per diem. USAID, at the request of Minister Dağdaş, agreed to provide a team of 12 extension agents from Washington and Oregon under a contract with Oregon State University. Nine of these men would remain in Turkey for three months and the remaining three for one year. The Ministry and USAID agreed jointly to produce the required educational and publicity materials.

LOCAL COST FINANCING

The first requirement to support the implementation of such a program was ample local currency financing. The matter was carefully considered by the Ministry and USAID and the following budget was draw up:

TABLE III

	Unit Cost (TL)	No.	Total (TL)
Trucks - new	80,000	50	4,000,000
Pickups - new	45,000	145	6,525,000
Drivers' salaries	9,000	100	900,000
Drivers' per diem	15 x 140 days	130	273,000
Technicians' per diem	30 x 150 days	200	900,000
Operation and maintenance of vehicles	41 x 100 days	195	800,000
Training materials			223,000
TOTAL			13,621,000

The Ministry was able to obtain only 7,621,000 TL. from the regular Ministry budget by shifting funds from different directorates and departments. Turkish law prohibited the Ministry from paying more than a limited amount of per diem to extension workers and vehicle drivers. After much discussion, the Mission approved a sum of 6,000,000 TL. from Trust Funds to round out the 13,621,000 TL. budget. As shown above, this total budget provided for the purchase of 50 trucks and 145 pickups, drivers' salaries and per diem, extension agents' per diem including extra incentive amounts, operation and maintenance of vehicles, and the development and publication of educational training and publicity materials.

EXTENSION TRAINING MATERIALS

Both the Government of Turkey and the Mission recognized the fact that if the extension service was to conduct a successful campaign they must have materials with which to work. The Ministry and USAID jointly developed a list of materials that would be required. The actual production of these materials including art work and printing was done by the Communications Media Division of USAID. The materials deemed necessary and the numbers finally produced were as follows:

1. Why Mexican Wheat - a several page leaflet,	25,000
2. Instructions to agricultural extension agents,	400
3. How to Grow Mexican Wheat - a high grade bulletin,	45,000
4. Flip chart showing the major steps	300
5. Slide sets - 40 slides in each set,	40
6. Record cards for farmers and county agents,	60,600
7. Poster emphasizing need for drainage,	5,000

8. Poster emphasizing spring fertilizer applications,	15,000
9. Folder urging correct fertilizer use,	50,000
10. Poster urging preparation for the second year,	5,000
11. Reprint of How to Grow Mexican Wheat	110,000

This last item was a revision of the original and after help from the USAID art department, was published by the Ministry. All of these materials played a very important part in the instruction of both extension personnel and farmers.

REGIONAL SEMINARS

The Ministry recognized the fact that before the extension agents could be effective in farmer education they had to know as much as possible about



Nazım Durlu, at the seminar held in Adana, August 24-26, 1967, discussing cultural methods required to raise a successful crop of Mexican Wheat.

Mexican wheat and how to raise it. To give them this training, three 3-day seminars were planned, one in each region. Locations and dates of these seminars were as follows:

Marmara Region, at Yeşilköy near İstanbul	August 16-18
Aegean Region, at Ege University, İzmir	August 24-26
Mediterranean Region, at Adana	September 4-6

These seminars were well planned, well handled and well attended. USAID played a relatively minor role in the programs. They were attended by all

Extension personnel in the respective regions, State Farm Directors, research personnel and farmers who wished to attend.

THE AMERICAN EXTENSION TEAM

Minister Dağdaş asked USAID to provide a team of 12 American extension specialists to work in the provinces with the local extension services. Nine members of the team were to be in Turkey before and during the planting season for a period of three months. The other three would remain for a year and follow the program through to harvest.

The original suggestion that such a team come to Turkey was made by Kronstad and Jackson on April 17 at the end of their first trip. The Minister concurred in this suggestion and formally requested the team. The contract with Oregon State University was signed on June 30. This contract and all other funding requirements were handled under the Mission Technical Assistance Project since no formal Cereals Project existed at the time.

Eight members of the American Team were Oregon and Washington County Agents and four were leading farmers from these states. The Team arrived in Ankara on August 20. They were given a five day briefing on Turkish agriculture and customs, the Mexican wheat program including the implementation plan and the role of American technicians. Following this briefing they were assigned to their posts. The composition of the team and their posts of assignment were as follows:

TABLE IV

Name	Profession	Source	Post
John K. Frizzell	County Agent	Oregon	Adana
V.W. Johnson	County Agent	Oregon	Adana
E.A. Minnick	County Agent	Washington	Antakya
James D. Moore	Farmer	Washington	Mersin
R. E. Morrow	Farmer	Oregon	Antalya
C. A. Hindes	County Agent	Oregon	İzmir
R. E. James	Farmer	Oregon	Aydın
Gus W. Hokanson	County Agent	Washington	Manisa
R. G. McCarty	County Agent	Oregon	Istanbul
Dudley I. Sitton	Farmer	Oregon	Bursa
Hollis Ottaway	County Agent	Oregon	Balıkesir
Dan Verhagen	A.S.C.S.	Oregon	Çanakkale

Dr. John Frizzell was group leader for the entire team and actively supervised the Mediterranean region which included the warmer parts of Maraş, Gaziantep, Hatay, Adana, İçel and Antalya provinces. Charles Hinde was supervisor for the Aegean Region which included Muğla, Aydın, İzmir and Manisa provinces. R.G. McCarty supervised the Marmara Region including Balıkesir, Çanakkale, Bursa, Kocaeli, Istanbul, Bolu and Sakarya provinces.

THE PARTICIPANT TEAM

Another important segment of the strategy was the proposal to send fifteen Extension, State Farm and Ministry of Agriculture leaders to the United States to study wheat production in the Pacific Northwest. All of this team spent most of the allotted time - 22 days studying wheat production methods in Oregon, Washington and Mexico. Five members were scheduled to visit the John Deere Factory at Moline for a few days of the tour. The participant team included six provincial Extension Directors, five State Farm Directors, the Chairman of the Ministry wheat committee, the wheat Research Coordinator, a representative of seed certification and a news and radio writer. Drs. Vogel, Jackson and Kronstad were scheduled to guide this team on different parts of their observation tour.

PROVISION OF FERTILIZER AND CREDIT

Based on experience in other countries and on advice of USAID officials the Government of Turkey accepted the fact that two more strategic inputs would be required for the final success of the program. These were an ample supply of nitrogen and phosphate fertilizer and readily available credit with which to purchase seed, fertilizer and, in some cases, machinery. The fertilizer was to be assured through imports and would be distributed by Donatım (the Agricultural Supply Agency) and credit cooperatives. The required credit would be made available through the Agricultural Bank (Ziraat Bankası) after certain significant modifications in the methods of handling agricultural credit.

The success or failure of the whole Mexican Wheat Program would depend upon how successfully each segment of the strategy was carried out. No strategy will accomplish its purpose no matter how well planned or what its objectives, unless it has behind it a sound motivating force. In this case motivation was supplied by the interest, drive, enthusiasm and absolute

determination of Bahri Dağdaş, Minister of Agriculture. Without this there would, literally, have been no Mexican wheat program. Supporting this motivating force supplied by the Minister was the strong and continuing support of USAID in helping plan and implement the program.

CHAPTER V

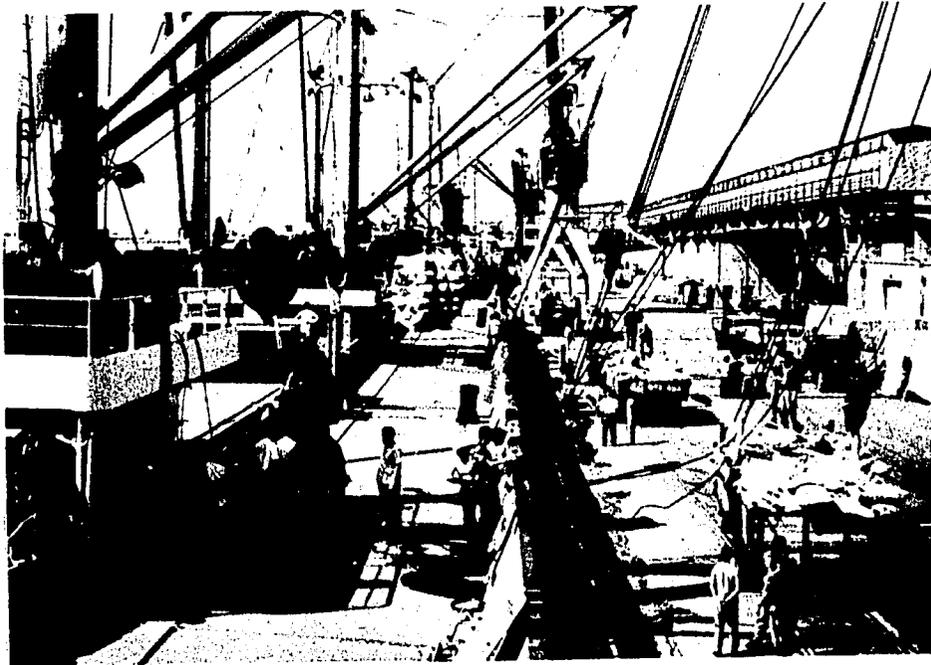
IMPLEMENTING THE PROGRAM

All parts of the grand strategy were carried out, despite a desperate shortage of available time and, at times, seemingly insurmountable obstacles. In retrospect, much of the program would appear to verge upon the miraculous in view of the momentous decisions that had to be made and the magnitude of the tasks to be accomplished. Decisions were made, money was provided the seed was selected, bought and shipped all within a very tight time schedule.

ARRIVAL OF THE SEED

On July 15th the S.S. Pireaus docked at İzmir with 13,000 tons of the Mexican seed, part of which was unloaded at İzmir and the rest at Mersin. This arrival was right on schedule. Arrangements had been made so that

The first shipload of seed arrives in İzmir on July 15 and unloading starts. The seed arrived in good condition and was taken by truck to local storage in İzmir.



there would be no customs delay. At 0800, hatches were opened and 30 trucks were lined up alongside the ship, waiting for wheat. The ship was filled right up to the hatch covers with bagged seed. Unloading started at once and the trucks began moving the seed to prearranged storage in İzmir.

Most of the seed was in excellent condition. However, there had been some leakage through two of the hatches and some bags; perhaps 200 or more had been damaged by water. Further, examination revealed that, while the burlap bags were wet and in many cases rotted, the plastic liners had protected the seed and no real damaged was suffered. Such seed was subsequently rebagged and relabeled with no loss.

In loading the ship in Mexico, no attempt had been made to segregate the seed by variety. This meant that following the unloading and temporary storage there remained a tremendous job of sorting out varieties. This



The first ton of seed leaves the ship. The ship was full of bagged seed up to the hatch covers.

problem was immediately faced by the Ministry personnel. In a very short time the seed was separated as to variety and designation, both the commercial and certified. Then it was quickly moved out to the various provincial destinations for storage before being sent on to counties and villages.

The second shipload of seed reached İzmir on August 15th where the same procedures as those used previously were followed. After offloading part of the seed here, the rest was delivered to İskenderun for onward movement to its provincial county and village destinations in ample time for planting.

Experience from India and Pakistan indicated that seed should not be treated for disease where it was to be stored for long periods in airtight containers for shipment or storage. Since all of this seed was being packed in plastic-lined bags, treatment with Ceresan was postponed until shortly before planting. Communication with the Dupont Company (manufacturers



Certified seed was packed in new printed cotton bags of 50 kilograms (left), and the commercial grade seed was in new stenciled burlap bags of 75 kilograms.

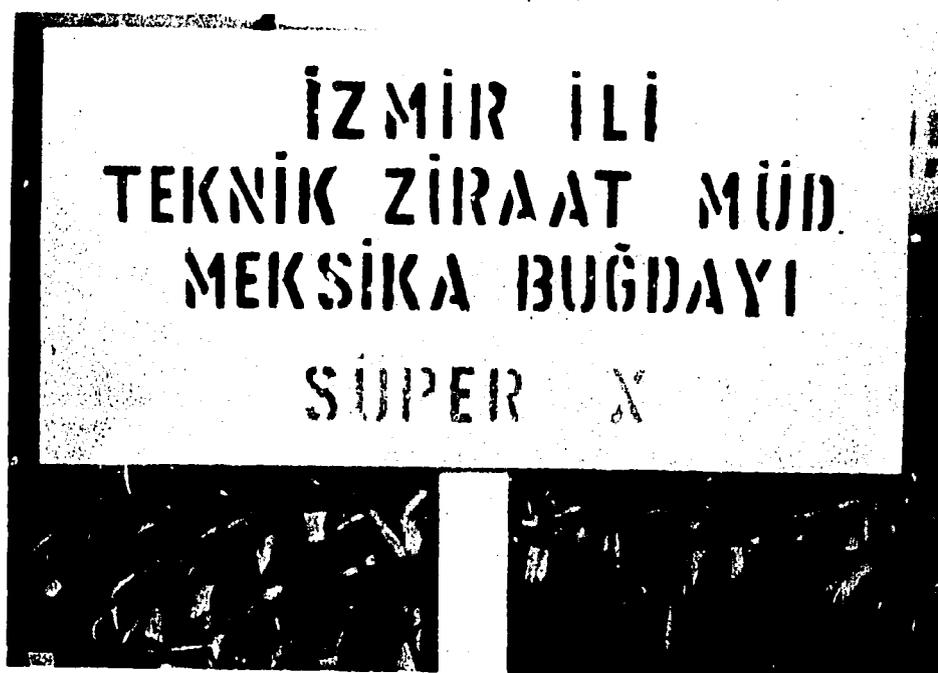
of Ceresan) verified that treated seed should not be kept in plastic containers except for short periods of time or germination would suffer. Therefore, the general practice was followed of treating the seed in the villages or on the farms shortly before planting. This proved to be satisfactory and effective.

EXTENSION ACTIVITIES – THE AMERICAN TEAM

All 12 members of the team arrived on August 20th. As stated earlier, they were given a five day briefing which included a review of the USAID agricultural program in Turkey, a look at Turkish customs and agriculture, and a review of the Mexican wheat program and their proposed part in it. Shortly after the briefing, the team members moved out to their respective posts as indicated in an earlier section.

Two problems quickly became evident. The Government of Turkey intended to provide transportation and interpreters. The provincial extension services, already desperately short of vehicles, were unable to provide anything like adequate transportation. Furthermore, the Ministry had intended to provide interpreters from their own English speaking personnel. This very soon proved highly unsatisfactory. In some cases, knowledge of English was very limited and in all cases, first responsibility was to the Ministry. This meant split loyalties and very uncertain availability. The Administrative Section of USAID quickly solved these problems by employing the interpreters and renting cars for the team. These very important contributions to the program were paid for from USAID trust funds.

Several provinces erected signs in the edges of fields so that those driving by would know that this was Mexican wheat. In many instances the variety name appeared on the sign. Izmir province used some of the clearest and simplest signs. Translated this one says "Izmir province – Agricultural Extension Director – Mexican wheat – Super X." The variety name, Super X, was stencilled in red.



The official counterparts for the team members were the extension directors in the provinces covered by the various members. However, they worked freely with all extension personnel, including county agents and their assistants. In almost all cases, relationships were excellent. A very small number of Directors were indifferent in their attitude toward the program. In a few cases this led to slightly strained relations at the Director level. However, at lower levels - specialists, county agents and assistant agents - relationships were excellent because this was the level at which the most of the major work was done.

FARMER EDUCATION

Local extension workers were not accustomed to working with farmers, probably for three chief reasons: (1) they were generally overloaded with regulatory or other extraneous duties which took most of their time; (2) they had little instruction in the methods required for farmer training and (3) they were so poorly trained in subject matter that they could not approach the farmers with any degree of confidence. This last worked both ways and the farmers had little reason for confidence in the extension workers.

This situation changed rapidly. The 250 workers assigned to the Mexican wheat program were relieved of their extraneous duties. Moreover, they had received detailed instructions at the regional seminars. This instruction included a very thorough study of Mexican wheat including all aspects in great detail on how to raise it. The discussions were supported by adequate



M. Harrison Taylor, USAID Training Specialist explains to the seminar the most effective methods for farmer training and education. Akdoğan Seran interprets for Mr. Taylor.

printed materials. There was also an excellent discussion by a USAID training technician on how to approach and instruct farmers. Thus, for perhaps the first time, the extension agents could approach the farmers with confidence, with a subject they knew and understood, and with some knowledge of how to make the approach.

In this they were backed up and further instructed by their American counterparts. These men had long experience at this sort of thing, either at the giving (county agents) or receiving (farmers) end. They understood the techniques and immediately put them to work.



A group of farmers at a "tea house" village meeting hear about Mexican Wheat. Interest at these meetings was always keen.

Turkey lends itself almost ideally to the farmers contact approach. This is because farmers tend to congregate at "tea houses" during periods when there is no field work. In good weather the "tea house," except where the tea is prepared, usually comprises a number of small tables and plenty of chairs haphazardly arranged under a sycamore or other trees. Visits may be either announced in advance or not with about equal effectiveness. The author took part in a few unannounced meetings of this sort. A few minutes after arriving at the "tea house" and being served tea, the farmers would begin to congregate. In a matter of minutes, 50 or 60 would be present and

for the next hour or two would ask intelligent and pertinent questions.

In this manner, many hundreds of villages were visited in each region. Often several such visits were made in a single day, frequently extending far into the night. Although such activities were far beyond the call of normal duty for either the Turks or Americans, they were carried out with enthusiasm



These Turkish farmers and 60,000 of their brothers learned about Mexican wheat from the county and other extension agents.

and a devotion to a cause probably never before experienced by the Turkish extension workers. The farmers responded to such an extent that more than 60,000 took part in the program. Every one of these farmers was personally contacted at least once and most of them several times. More than 90 per cent faithfully followed the instructions given them by the extension agents.

The extension agents' job was not easy. The story they were telling was so new and in most respects so contrary to long established traditional procedure. First, they had to explain what Mexican wheat was, what it had done elsewhere in the world and what it could do for Turkey and its farmers. The second part of the story was more difficult. This had to do with the agronomic practices required to grow this new wheat. In two important respects these practices were very different from those prescribed by tradition. These had to do with seeding rates and methods and the use of fertilizer. The customary seeding rate was 20 kilograms or more per decare (175 lbs.

per acre). They were now being asked to seed no more than half this amount and were being urged to sow the seed with grain drills instead of the usual hand broadcasting. Furthermore, these farmers were being asked to use high rates of fertilizer where they had used none before, or at most a little phosphate. They were asked to apply 6 kilograms of P_2O_5 and 12 kilograms of N nutrient per decare (53 lbs. P_2O_5 and 106/lbs. N per acre). Moreover, the fertilizer was to be applied in a certain manner. At planting time the P_2O_5 and 4 kilograms of N were to be applied and the remaining N was to be applied in two equal top dressings in the spring. All of this was an entirely new concept to most of these farmers.

In addition to these major departures from custom, the farmers were given instruction in better methods of seed bed preparation, weed control and drainage. They were told that if they followed all of the recommended practices they could expect yields 2-4 times what they had obtained with the local varieties and traditional cultural methods. The Government did not provide any subsidy for the program except to assure the farmers that the price for the grain produced would be supported at the same level as that in effect before the introduction of Mexican wheat. This price was 75 kuruş per kilogram (\$2.30 per bu.).

The farmers were required to pay all costs of seed, fertilizer and drills, if they bought them. As explained earlier, credit through the Agricultural Bank and credit cooperatives was made more readily available than in the past. The credit was in kind and required that both the seed and recommended fertilizer go together as a package. The effectiveness of the extension job may be judged by the fact that more than 60,000 farmers took part in the program and most of them went into debt to do it.

In addition to farmer meetings, the extension service used frequent pre-arranged demonstrations to illustrate such procedures as drill calibration and operation, fertilizer application and, if necessary, hand seeding. Such demonstrations, if well conducted, are valuable because there is no substitute for seeing a thing done.

DISTRIBUTION OF SEED

In spite of the magnificent job done by extension, only about 17,000 tons of the seed was planted. There were several reasons for the shortfall. Excessively heavy fall rains interfered, first with cotton picking and later with planting operations in Çukurova and in Antalya province. This prevented

the planting of a substantial amount of seed. Sugarbeet harvest was delayed in the Marmara region because the sugar factory in Adapazarı was damaged by an earthquake. In a few provinces seed requirements were overestimated. Lastly, a few of the extension Directors were lukewarm toward the program. Their lack of enthusiasm was reflected in the relatively poorer farmer response. Actual amounts of seed allotted to, and planted, in the various provinces was reported as follows by the Ministry of Agriculture:

TABLE V
Allocation and Distributuon of Mexican Wheat Seed (Tons) and Hectares
Planted

<u>Region</u>	<u>Province</u>	<u>Allocation</u>	<u>Distribution</u>	<u>Hectares Planted</u>
Mediterranean	Adana	5692	3960	39,602
	Antalya	792	299	2,992
	Gaziantep	362	314	3,154
	Hatay	1769	1153	11,524
	İçel	1336	708	7,076
	Maraş	475	434	4,341
Aegean	Aydın	965	812	8,118
	Denizli	370	370	3,698
	İzmir	1140	1009	10,084
	Manisa	2060	1089	10,890
	Muğla	300	226	2,263
Marmara	Balıkesir	2299	1113	11,130
	Bilecik	20	20	200
	Bolu	195	78	776
	Bursa	1128	836	8,364
	Çanakkale	954	501	5,885
	Istanbul	510	433	4,330
	Kocaeli	125	124	1,249
	Sakarya	954	717	7,176
	Tekirdağ	10	10	100
	State Farms		1770	17,700 *
	Spring and Exp.	460	460	4,600 *
TOTAL		21,916	16,436	165,252

* No figures available. Author's estimates.

LIAISON WITH THE FIELD

As the program developed and the situation in the provinces became clear, i.e. assignment of extension workers, allotments of seed and fertilizer, etc., it became apparent that an effective method of liaison between American field workers and the Mission was going to be necessary. Such liaison could be maintained either by frequent visits of Agriculture Division personnel or by frequent written reports or both. It was decided to use both methods.

In June the Mission was able to secure the services, on a safe-haven basis, of four technicians who had been evacuated from Middle East countries because of the June, 1967 Six-Day War. One of these refugees, the author, was assigned as Chief of the Cereals Branch, in charge of the USAID aspects of the project. The other three were assigned liaison duty in the three regions. One of these men was later assigned to the project on a permanent basis and the other two subsequently went to other posts, but made valuable contributions to the project while in Turkey.

REPORTING

A system of reporting was devised which would require a minimum of time on the part of the team members in the field and yet yield a maximum of information. A two-page mimeographed form was filled out weekly and mailed in time to reach the Division about the middle of the week. Following receipt of the field reports, a weekly summary was prepared for distribution to AID/W and all others interested in the program. This enabled the Mission and all other interested parties to keep a running account of project progress. Because this method of reporting was relatively easy, but very effective, one of the weekly team reports is included to show the type of form used and the way the information was reported. Also included is a sample of the weekly summary. This summary is for the same week as the sample team report.

The distribution list for the summary reports included the Ministry of Agriculture, FAO, AID/W, The Rockefeller Foundation, Oregon State University, the Agricultural Attache and interested personnel in the mission.

WEEKLY REPORT * WHEAT PRODUCTION TEAM

NAME Charles Hinds PROVINCE Izmir WEEK ENDING SATURDAY 11/18/67

SEED: (Availability) (Distribution) (Quality) (Status of seeding) (Germination where known) (Emergence)

Seeding continuing but at a slower rate. Moisture present only in heavier non irrigated claysoils. Farmers and agents reluctant to seed in the dust. Approximately 50% of tonnage seeded. Earlier planting looks excellent.

FERTILIZER: (Requirement) (Availability) (Distribution) (Use) (Manner in which applied)

No problem.

LAND PREPARATION: (Implements used) (Soil moisture status) (Timeliness)

Soil moisture fair to poor in most areas. Some farmers are contemplating irrigation where possible. I have discouraged this to date but may have to relent unless rain is forthcoming this week.

SEEDING: (Broadcast) (How covered) (Depth) (Availability and use of drills)

Larger acreages being seeded with drill, small lands being hand broadcast. 50% of the tonnage allocated is seeded (est. 90% with drill 10% by hand).

CREDIT: (Availability) (Use) (Problems involved)

No problem.

STATUS OF FARMER TRAINING

Held three training sessions for county agents past week. Land preparation, soil moisture, fertilizer application, seeding techniques and drill usage were covered. Agents seemed more sure of themselves after these sessions.

TRANSPORTATION: (Adequacy) (Problems involved) (Rental cost)

No problem.

ATTITUDES TOWARD THE PROGRAM: (Agricultural workers) (Farmers)
(News Papers) (Others)

Good on all counts.

ADEQUACY OF SUPPORT: (From AID) (From GOT) (Other)

Adequate

SPECIAL PROBLEMS:

None after the vouchers have been straightened out.

OVERALL PROGRAM STATUS - Satisfactory xx .Unsatisfactory _____.

SUGGESTIONS, QUESTIONS, REQUESTS, GENERAL OBSERVATIONS:

I am still convinced the Ministry of Agriculture is missing a good bet if they fail to look into the subsoiling I suggested for the Salihli area in Manisa province. Several thousand acres could be brought into annual production. As the situation now stands some of this land raises one crop in three years.

WEEKLY REPORT NO. 12 WHEAT PRODUCTION TEAM
SUMMARY FOR WEEK ENDING NOV. 18, 1967
L.M. Humphrey

MARMARA REGION: BURSA, BALIKESİR, ÇANAKKALE, SAKARYA,
ISTANBUL.

SEED: Carryover situation unchanged from last week. Planting progressing rapidly.

FERTILIZER: Ample supplies available. It is being applied as recommended.

LAND PREPARATION: Farmers following recommendations as far as they can with available equipment. Moisture conditions good except dry in parts of Bursa Province.

SEEDING: A large part being broadcast, especially in Balıkesir Province but covering is mostly as per recommendations.

CREDIT: Problems solved now. Earlier credit problems in Balıkesir were responsible for reduction in area planted to Mexican Wheat.

FARMER TRAINING: Largely completed. Visits now to observe stands.

TRANSPORTATION: No problems reported.

ATTITUDES TOWARD PROGRAM: Good. Farmers are interested and anxious to learn.

SPECIAL PROBLEMS: None.

SUGGESTIONS OBSERVATIONS QUESTIONS. Bursa has all seed out but 50 tons. Stands are good. 4-H Club at Yenişehir interested in the Mexican Wheat Program.

EGE REGION: İZMİR, AYDIN, MANİSA, MUĞLA, DENİZLİ.

SEED: Aydın reports 918 tons of seed distributed with a few tons remaining to be distributed. Seeding progressing well. In other provinces seed is still moving to the farmers and planting is proceeding. Emergence of early plantings is good.

FERTILIZER: No problems on availability. It is being applied as recommended.

LAND PREPARATION: Most land prepared by plowing and disking. Moisture conditions reported good everywhere except Manisa where soil is becoming dry.

SEEDING: Aydın reports 42 drills in the province 25 new and 17 old. 8 are owned by State Farms, 1 by Ziraat Odası, 11 by Credit Cooperatives

and 22 by farmers. Farmers reported lined up two deep waiting to use drills instead of broadcasting. Muğla has three drills. İzmir has 69, 45 new and 24 old owned as follows: 40 by cooperatives, 6 by farmers, 1 by the Chamber of Agriculture, 20 by Teknik Ziraat and 2 by Foça Prison.

CREDIT: No problems.

FARMER TRAINING: Largely completed except in Muğla and Manisa where it is still being pushed.

TRANSPORTATION: No problems reported.

ATTITUDE TOWARD THE PROGRAM: Reported good to very good in all provinces.

ADEQUACY OF SUPPORT: Adequate.

SPECIAL PROBLEMS: Difficulty in working out drill schedules in Denizli.
MEDITERRANEAN REGION: ADANA, ANTALYA, HATAY, İÇEL, MARAŞ, GAZİANTEP:

SEED: Distribution moving slowly because of delay in cotton harvest. Emergence of early plantings is good.

FERTILIZER: Supplies adequate and the farmers are using it in the amounts recommended. Considerable di-ammonium phosphate being used in Mersin area.

LAND PREPARATION: Moisture conditions improved since recent heavy rains. Preparation is picking up.

SEEDING: Most seed in Antalya broadcast and covered with a disk. Only 6 or 7 drills available. Adana has 140 drills, 50 new and 90 old. İçel reports only 14 drills available but being used night and day. Much seed is being broadcast and covered with disks.

CREDIT: No problems in Antalya since visit by Ekrem Günay. Difficulties still exist in İçel and Adana where lesser bank officials refuse to follow Central Bank directives. This is causing delay in distribution of seed.

FARMER TRAINING. Village meetings and field demonstrations continuing very actively.

TRANSPORTATION: Situation reasonably satisfactory. İçel, with 14 groups working the villages could use more vehicles and Aydın still needs a Jeep Station Wagon.

ATTITUDE TOWARD THE PROGRAM: Reported good.

ADEQUACY OF SUPPORT: Satisfactory except AID processing of expense vouchers is still too slow.

SPECIAL PROBLEMS: Çetinel Manufacturing company unable to get No. 15 size chains for 10 drills. Credit in İçel. Some seed damaged by water in the warehouse at Antalya. Evidently some flooding of the area during recent storms.

SUGGESTIONS, QUESTIONS, OBSERVATIONS. Greatest need in the region is to get cotton out and the land prepared. Also instruction in drill operation and maintenance is a serious need.



The entire team came to Ankara three times during their 4-month stay, on October 9th, November 12th and just before leaving Turkey on December 12th. The purpose of these visits was to report personally to USAID and to the Ministry on program progress. These meetings presented an opportunity for a frank discussion of problems that hampered progress and were very helpful, especially to the Ministry, in finding solutions to problems.

At the December 12th meeting, the Ministry of Agriculture expressed appreciation for the team's contribution by presenting each member with a certificate of appreciation signed by Bahri Dağdaş, Minister of Agriculture. On the following day nine members of the team departed for home.

CHAPTER VI

FORMAL PROJECT DEVELOPMENT

This project developed in a manner quite different from normal procedure. The approach used undoubtedly contributed much to its initial success. Normal procedure would involve a proposal that a project be undertaken, followed by preparation of required program documents which would first be considered at AID Mission level and then in AID/W. At any one of these levels the documents might or might not be modified with perhaps eventual approval. All of this might take a year or more before the action could get under way.

In this case the Minister wanted things to start right now. Normal procedures would cause too much delay. The Mission considered the proposal posed by the Minister and, considering the immediacy of the need and the great ultimate potential, decided to go ahead on an interim basis and carry the project under the Mission Technical Support Project. The wisdom of this decision was borne out by subsequent events. All initial phases, including the Oregon State contract under which the extension team came to Turkey, the 15-man participant team going to the States in July, local financing during the first year, and financing extra technicians (evacuated from Egypt and Jordan), were handled in this manner.

On August 27, 1967 the author, then on safe-haven status, was designated Chief of the Cereals Project which, however, still had no official status. A second such technician was assigned to the "project" to assist with adaptive research and maintain liaison with the extension team in the field. Work was immediately started on a project proposal (PROP). This document went through many revisions before it was finally approved by the Mission

and sent to AID/W on March 22, 1968. Further delays were encountered there and it was not until June 15, 1968 that the project was finally approved and made official. From that point on, project affairs moved in the customary way. A Project Implementation Proposal (PIP) had been completed and sent to Washington on February 20, 1969.

In the meantime, a third direct hire technician was transferred from the "On Farm Water Project" to work on agricultural equipment aspects pertaining particularly to the Plateau program. Also, in December of 1968, a revision of the Oregon State Contract was signed, under which OSU would supply three men, a stubble mulch specialist, a weed control specialist and an extension specialist. These men would work primarily in guiding the moisture conservation program on the Anatolian Plateau although the weed control technician would be available for Mexican wheat areas as well.

CHAPTER VII

PROBLEMS ENCOUNTERED AND SOLUTIONS

A program of such magnitude as this, and undertaken on a crash basis, could not be expected to escape some problems. Some were minor and quickly disposed of while others were more serious and presented more difficulty in their solution. Minor problems, such things as transportation and interpreters for the production team, problems of seed sorting, etc., and their solutions have been discussed before. Only major problems will be considered here. The weekly reporting system was very helpful in pinpointing these problems and in getting Ministry action before they became too serious.

TRANSPORTATION FOR EXTENSION WORKERS

The fact quickly became evident that transportation, especially for county agents, was woefully inadequate. This was critical because without adequate transportation the vital job of farmer education could not be carried out effectively. The Ministry of Agriculture, the State Planning Office, and the Mission all took prompt action. The Ministry speeded up purchase of new vehicles as fast as they became available while, through the action of the Wheat Council and SPO, 50 vehicles were transferred on a temporary basis from other governmental agencies. This partially relieved the situation, but the Ministry and the Mission took quick action to secure 145 vehicles from U.S. military surplus property sources. The Ministry and the Mission each sent a man to England and Germany to select vehicles and supervise their shipment. These vehicles arrived and were put into operation in time to play an important part in the program.

Although this transportation problem was never completely solved, and probably never will be, its importance was recognized and the actions that were taken made the job done by the county agents far more effective than it would otherwise have been. Good transportation is now recognized as a prime requirement for effective extension work.

ADVERSE PUBLICITY

Opposition to the Mexican wheat program began to appear in the press even before planting got underway. Most of this opposition came from far leftist sources which oppose the success of any good program. The first stories to appear made the claim that the quality of Mexican wheat was poor and could not compare with Turkish wheat. Others said that the Mexican wheat program was a scheme on the part of the U.S. to have this wheat take over cotton land, thus reducing Turkish production and thereby improving the American foreign cotton market.

These stories had no visible effect on the progress of the program so the leftists became more vicious in their attacks. Two events played into their hands. First, a few weevils were discovered in some of the seed at İzmir. The following translation is quoted from an Istanbul newspaper: "A great part of the wheat seed imported from the USA is infested with a pest-rhizopertha. It was discovered by the Bornova Agricultural Anti-Pest Institute (İzmir). The utilization of the seed has been stopped until further notice. This insect is detrimental to human health besides lowering production. Agricultural experts are touring the region to establish the infested wheat and destroy it." Of course, the story is full of fallacious statements including that to the effect that the seed came from the USA. It came from Mexico. The Government of Turkey took immediate action to ascertain the true facts and get them published in more reputable newspapers. (A minute quantity of the seed was lightly infested with weevils and this was very quickly fumigated by the Plant Protection Directorate and then distributed for planting.)

The second event used by the leftists was a newspaper story from Mexico describing the death of several children caused by eating bread made from flour that had become contaminated with parathion. (Parathion is a deadly insecticide highly toxic to humans.) The Mexican stories were accompanied by pictures showing all the gory details. The leftists seized upon this material to put out a whole series of stories to the effect that Mexican wheat would make poisonous flour and would be highly detrimental to human health.

Such propaganda, while obviously untrue, is difficult to counteract, and it had its effect, in spite of continued and vigorous Ministry action. However in the end, and with the help of the American team, the efforts of the leftists were largely overcome.

PERSONNEL PROBLEMS

As would be expected with 20 provincial directors and more than 250 other extension personnel assigned to the Mexican wheat program, there were many degrees of ability and enthusiasm. The lack of enthusiasm on the part of a few directors posed the most serious problem, but fortunately these were few and, in most cases, were taken care of by the Ministry. Offsetting these situations was the enthusiasm and desire to "make the program go" on the part of the vast majority of those working on it. It is difficult adequately to describe the effort put forth by the Turkish extension workers. The word "phenomenal" perhaps comes closest.

PROBLEMS OF NATURE

Probably most difficult to contend with were the problems posed by nature: weather, earthquake and plant disease. By far the most serious of these problems was that caused by weather with unseasonably heavy rains at and after planting time, floods, freezes and drought. The weather was described by long-time residents as the worst in 30 years. These were problems man could do little about after they became extant. Flooded fields could be drained in most instances but little could be done about freeze damage and drought after these disasters had struck. However, an important fact was learned and the farmers recognized it. This was that where all recommended practices had been followed, damage from freezing, even at critical times, was much reduced or non-existent. Also observed was the fact that well fertilized fields were able to withstand protracted periods of drought far better than those with insufficient amounts of fertilizer. Thus, while little



Where soils are too thin, shallow or gravelly water is soon exhausted. The light colored areas are "hot spots" where the wheat in this field of Penjamo is drying up. Such fields should be avoided.

can be done to overcome these problems after they happen, much can be done ahead of time to make their effects less severe.

Earthquake is mentioned because there was a fairly severe one in the Adapazarı area which damaged the sugar factory there. Harvest of sugarbeets in the Marmara region was seriously delayed and this prevented the planting of rather extensive areas to Mexican wheat in a normal rotation with sugarbeets.

DISEASE PROBLEMS

Plant disease posed no really serious problem during the 1967-68 season, but significant amounts of stripe (yellow) rust were found at a few locations in Super X and Mayo. Sonora 64 and Sonora 63 had shown heavy infestation



*Dr. Vogel, left,
and Dr. Kronstad discuss disease problems.
Dr. Vogel is wheat breeder at
Washington State University and
Dr. Kronstad holds a similar position
at Oregon State University.*

of this disease in some of the trials. On the basis of these observations the decision was made to discontinue production of all four of these varieties. This action was recommended by Dr. Kronstad after his observations made during a study trip in April, 1968.

The only other diseases observed were downy mildew and Septoria on Lerma Rojo at a few locations. However these are not considered serious and the effects usually disappear as the weather becomes dry. No other diseases of any consequence were observed.

CREDIT PROBLEMS

The fact that most of the farmers would require credit for the purchase of seed and fertilizer and, in many instances, drills, was recognized in the planning stages of the program. The Government of Turkey took the decision to make certain changes in the rules governing the granting of loans. The principal changes were: (1) Wheat loans were granted on a note with two signatures instead of requiring a mortgage on the land as in the past, (2) Wheat loans were approved even though a previous crop loan, cotton for example, had not been repaid, (3) Credit at 7% for the purchase of drills or other equipment was made available on the basis of two, three or sometimes four signatures, (4) In case of a disaster, causing loss of a crop, loans were extended for a year and a second wheat loan was granted, (5) The Agriculture Bank branches sent their personnel to distant villages to help farmers expedite applications for their loans, (6) All loans were "in kind" and to get credit for seed the farmers were required to include the recommended amount of fertilizer.

Problems arose because some of the branch bank personnel did not know how to apply the new regulations or, for one reason or another, simply refused to do it. Either through the direct efforts of the American team members or as a result of their weekly reports of such problems, they were quickly solved in most cases. When problem situations were called to the attention of the Ministry, they sent individuals of authority to the scene of the trouble and straightened it out. In the end, the ready availability of credit played a very important part in the success of the program.

FARMER DOUBTS

The key practices involved in raising Mexican wheat were so different from the traditional that the farmers found them difficult to accept. The old method required little or no preparation of a seed bed, the use of a small amount of phosphate part of the time but no nitrogen, and hand broadcasting 20 kilograms per decare (175 lbs. per acre) or more of seed. The seed was then covered either by disking or with a turning plow. Little or no effort was made to control weeds. Now the farmers were being told to use a kind of wheat about which most of them knew nothing, to prepare a seed bed as well as for cotton, to use heavy applications of fertilizer (53 lbs. of P_2O_5 and 106 lbs. of N per acre), to drill the seed if possible but in no case plant more than 10 kilograms of seed per decare (88 lbs. per acre).

The fertilizer recommendations called for an initial application of all the $P_2 O_5$ and 4 kilograms per decare of N followed by two spring applications of 4 kilograms each of N. The wheat usually looked so good after the first application that many of the farmers found it hard to accept the fact that more N could be needed.



Moisture stress was frequently encountered, especially in the Aegean region where a prolonged drought occurred. The curled leaves on this Super X indicate the beginning of a stress condition. Fortunately this farmer, on the left, was able to irrigate. Second from the right is Ahmet Alp, the very able and effective extension director in Izmir Province.

It was the job of the extension service to dispel the doubts and to convince the farmers to follow the recommendations. The fact that they were backed up by foreign experts (the American team) did much to convince them. Posters and leaflets were also used in the villages urging and illustrating drainage and spring applications of nitrogen fertilizer. All of this had its effect and approximately 90 per cent of participating farmers followed all or most of the recommendations.

CHAPTER VIII

RESEARCH

The foundation upon which any productive agricultural program stands and grows is research. The fact was clearly recognized that such a program must be undertaken and plans were laid accordingly. The program would consist of two parts, basic research including breeding of new varieties and adaptive research consisting of agronomic trials to determine varietal adaptation, fertilizer use, rates and dates of seeding, etc.

There is some basic research currently underway involving the introduction of Mexican material into the breeding programs. This work is good but is not coordinated and a sense of urgency is lacking. Negotiations are underway between the Rockefeller Foundation and the Government of Turkey, and have reached an advanced stage, to permit the Foundation to establish a Mideast Wheat Research Center in Turkey. Under this center all basic wheat research in Turkey would be coordinated and vast quantities of new breeding material would be introduced from other parts of the World. Experience gained from other such programs - Mexico, India, Pakistan and others - indicate that new improved varieties can be developed on a regular basis in this way.

A large program of adaptive research was planned to learn which varieties were adapted to the different regions, which rates of fertilizer usage produced the greatest economic returns and to investigate other important agronomic factors affecting yields and returns to the farmers. This was to be a program of uniform trials conducted in every Mexican wheat region

and province and including as many different ecological conditions as possible. In order that the program might be carried out on a uniform and coordinated basis, Dr. Ahmet Demirliçakmak, Deputy Director of the Ankara Agricultural Research Institute was appointed Research Coordinator. This aspect of the overall research program will be continuing year after year, complementing the breeding program.



Kaya Tosun, Director of the Research Station at Tarsus on the right and one of his assistants. They are standing in the uniform variety trial, March 1967.

Trials were conducted on or from the three coastal regional agricultural research institutes at Tarsus in the mediterranean region, Menemen in the Aegean region and Adapazarı in the Marmara region. The trials controlled by these institutes were the direct responsibility of their directors. Trials were also conducted in the Black Sea region near Samsun to determine adaptability of Mexican wheat in that region. All trials were uniform in all regions in that they contained the same varieties and/or treatments and followed uniform planting arrangements. The following trials were planted:

UNIFORM TRIALS

1. The variety trials contained 14 Mexican and 6 local and other varieties and were distributed as follows: Black Sea 5, Marmara 5, Aegean 11 and Mediterranean 16. All trials were uniformly fertilized with 6kg/dec. P_2O_5 and 15 kg/dec. N.



*Necdet Yenigün,
a research worker at the
Tarsus Research Station and
the Super X plot in the
variety trial.*

2. The date of planting trials included three varieties; Ciete Cerros, Lerma Rojo and Florensa (local) and were planted on the following dates: Oct. 15, Nov. 1, Nov. 15, Dec. 1, Dec. 15, Jan. 1, Feb. 15 and March 1. They were distributed regionally as follows: Black Sea 3, Marmara 4, Aegean 4 and Mediterranean 4. Each of these trials received 6 kg/dec. P_2O_5 and 15 kg/dec. N.
3. One uniform rate of seeding and rate of N trial was conducted in each region. They included two varieties, Lerma Rojo and Ciete Cerros, four seeding rates, 150, 200, 250 and 300 seeds per square meter and four rates of N, 8, 12, 16 and 20 kilograms per decare.

4. One trial to test rates and sources of N was conducted in each of the four regions. These trials included the rates 8, 12, 16 and 20 kilograms of N per decare obtained from the following materials: ammonium nitrate, urea, di-ammonium phosphate and ammonium sulfate.
5. One trial was planted in each region to determine the effect of rates of N and times of application. The rates were 8, 12, 16 and 20 kilograms per decare and the following times of application were included: (1) all at seeding; (2) one-half at seeding, one-half at tillering; (3) one-third at seeding, one-third at beginning of tillering and one-third at the end of tillering; and (4) one-third at seeding, one-third at tillering and one-third at heading.
6. There were also uniform fertilizer trials which included Lerma Rojo and Ciete Cerros. Each trial included all combinations of N - 0, 8, 12, 16, and 20 kg/dec.; P_2O_5 - 0, 6, and 12 kg/dec.; and K_2O - 0 and 8 kg/dec. Regional distribution of these trials was: Black Sea 1, Marmara 3, Aegean 6 and Mediterranean 5.

This made a total 75 adaptive trials involving Mexican wheat covering the most important factors governing its production. For one reason or another, some of the trials were not harvested. Very serious drought or



The need for nitrogen fertilizer is very evident. In the foreground the left hand plot received only 6 Kg/dec. of P_2O_5 and no N. The right hand plot had no fertilizer. In the background both plots received complete fertilizer including adequate nitrogen.

poor and uneven soil conditions made a number so unreliable as not to be worth harvesting. There were, however, some good ones in every region.

OBSERVATIONS

Trials at Tarsus, Aydın, Menemen and Adapazarı were visited several times during the growing season. The condition of these trials as regards planning, handling and marking can be described as excellent. General observations were made on the varieties and height measurements and stripe rust notes were taken. These observations are summarized in Table VI.

TABLE IV

Variety	Appearance	Beards	Rust *	Height		Remarks
				Ins.	Cm.	
Sonora 63	Good	Yes	S	44	112	
Sonora 64	Fair	Yes	S	35	89	Bird damage, early, smut.
Pitic 62	Good	Yes	R	45	114	
Super X	Excellent	Yes	S	42	106	
Lerma Rojo	Very good	Yes	R	46	117	Septoria, bronze color
Penjamo	Very good	Yes	MR	42	106	
Nadadores	Very good	Yes	MS	44	112	Late, semi-winter habit
Mayo	Good	No	MS	45	114	
Inia	Good	Yes	R	43	109	
Noroeste	Good	Yes	MR	40	102	
Tobari	Fair	Yes	R	42	106	
Oviachic	Good	Yes	R	35	89	Durum
Jeral	Poor	Yes	R	40	102	Bird damage, very early
Ciete Cerros	Excellent	Yes	MS	44	112	
Tevere	Fairly good	Yes	R	41	104	
Mara	Good	No	R	38	96	Blue
Guaderna	Good	Yes	R	65	165	
093/44	Fair	Yes	R	62	157	
406	Fair	Yes	R	58	147	
Florensa	Fair	No	MS	66	168	Sterile florets

* S - susceptible, MS - moderately susceptible, MR - moderately resistant, R - resistant.

RESULTS

The complete results of the 1967-68 adaptive trials have not as yet become generally available. Those discussed below in general rather than specific terms have been made available to U S A I D on an unofficial basis.

1. The uniform variety trials. Results examined from 14 of these trials which were considered to have yielded the most reliable statistics gave the following useful information:
 - a. Mexican varieties consistently produced higher yields than the three widely used local varieties included in the trials.
 - b. Average yields from the 14 locations showed the following ranking of the seven principal Mexican and three local varieties:
 1. Super X, 2. Pitic 62, 3. Ciete Cerros, 4. Penjamo 62, 5. Lerma Rojo 64, 6. Nadadores 63, 7. Inia 66, 8. 406 (local), 9. Floransa (local), 10. 093-44 (local).
 - c. The average yields ranged from a high of 429/kg/dec. (63.7 bu/a) to a low of 261 kg/dec. (38.8 bu/a).
 - d. Since Super X and Cieto Cerros have been removed from the recommended list because they showed susceptibility to stripe rust, this leaves Penjamo, Lerma Rojo and Nadadores available for very wide production at the present time, with Pitic, Inia and perhaps others to follow when seed supplies are increased.
2. Other trials. The following general results were obtained from the fertilizer and other trials:

Both plots received 6 Kg/dec. of P_2O_5 . The left hand plot had no nitrogen while that on the right had 12 Kg/dec., the recommended amount.



- a. In the fertilizer trials both Lerma Rojo and Cieto Cerros made the highest yields with 20 kg/dec. of N and 6 kg/dec. of $P_2 O_5$ (176 lbs. of N and 53 lbs. of $P_2 O_5$ per acre). Yields were very low without any fertilizer.



This illustrates the importance of $P_2 O_5$. All of the wheat received the recommended amount of N but on the left $P_2 O_5$ was accidentally omitted. Holding the plants are Dr. Tom Jackson from O.S.U. and Nahi Bey from Adana.

- b. In the sources and rates of N the 20 kg/dec. rate proved best and the source made no appreciable difference.
- c. In the rates of seeding and rates of N all of the seeding rates tried yielded essentially the same, and the 20 kg/dec. rate of N again proved best.
- d. In the dates of application of N the best results were obtained with two applications, half at planting time and half at tillering.

CHAPTER IX

THE PAY—OFF

Reports from the field were consistently good except for minor isolated instances. The Minister asked that Kronstad, Jackson and Vogel return to Turkey to visit the Mexican wheat regions and make an evaluation of the first year's program based on field observations. Kronstad and Jackson arrived in Ankara on April 18th and Vogel reached İzmir on the 29th.

THE SPRING FIELD TRIP

A trip to all Mexican wheat regions was planned which included, in addition to the three above mentioned consultants and USAID representatives, the following Ministry of Agriculture personnel:

Nazım Durlu - Assistant to Ekrem Günay
Selâhattin Ecikoğlu - Director, Ankara Agriculture Research Institute
Mesut Özüygür - Director, Soil Fertility Institute
Vasıf İyiol - Eskişehir TOPRAKSU
Ayhan Anteplioğlu - Donatım Machinery representative
Dr. Mehmet Yüksel - Plant Protection.

This group departed from Ankara on April 20 and remained together for the entire trip of 3,802 miles.

Many research plots and hundreds of farmers' fields were visited and observations were made on the principal varieties growing under a wide variety of conditions. These included different soil types, climatic conditions and many degrees of farmer adherence to recommended practices.

All of the Mexican varieties had certain things in common. The following general observations were made:

Seed bed. All varieties responded poorly to poorly prepared seed beds. A seed bed of the quality made for cotton gave the best results.

Seeding rate. High rates, above 10 kilograms per decare, reduced tillering, reduced cold tolerance and produced weaker plants and generally lower yields.

Soil. Shallow soils, especially if they were sandy or gravelly, have low water holding capacity and were most subject to damage from drought. Soils with a very high clay content or where a hard pan was present were also found undesirable. Deep clay or sandy loam soils with good moisture holding capacity were found to be most satisfactory.

Fertilizer. The soils of Turkey are generally deficient in nitrogen and phosphorus. Wheat needs both. Without phosphorus the nitrogen response is very poor. When there is a correct balance of these elements the results were excellent. Adequate amounts of fertilizer contributed much to resistance to damage from cold and drought.



This Penjamo wheat was given the full recommended amount of fertilizer but the second row from the left did not receive any P_2O_5 . Two things stand out: Nitrogen response is very poor without P_2O_5 and there is little if any lateral movement of the P_2O_5 in the soil.

Crop rotation. Mexican wheat performed better in rotation with other crops, especially cotton and sugarbeets.

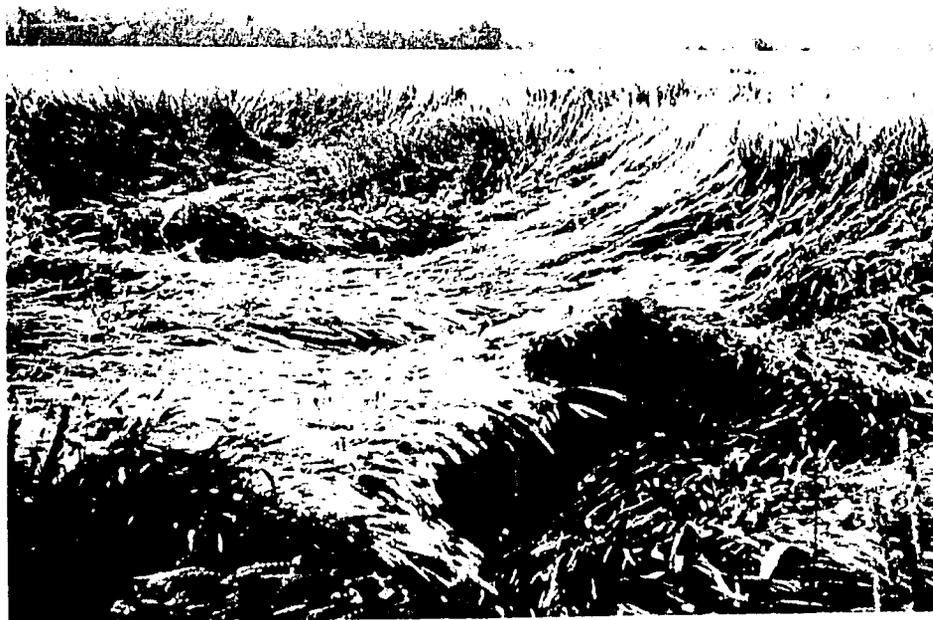
Diseases. Except as noted under the chapter on research, the only diseases observed were loose smut in Sonora 64 and downy mildew and septoria on Lerma Rojo. These latter were not considered to be serious.

VARIETAL DESCRIPTIONS

Based on observations made in research plots and many farmers' fields, the following varietal descriptions are given:

Super X. Height 42 inches (106 cm.). Heads large, bearded. Medium maturity. Plants bluish green. Wide smooth leaves. Susceptible to stripe rust. Some lodging under very heavy fertilization and ample moisture. Appearance excellent.

Lerma Rojo 64. Height 46 inches (117 cm.). Heads medium large, bearded. Medium early maturity. Head color bronze as maturity approaches. Lodging characteristics similar to those of Super X. Moderately resistant to stripe rust. Moderately susceptible to downy mildew and septoria. Appearance very good. Widely adapted.



Even Semi-dwarf Lerma Rojo can lodge if too much fertilizer is used under irrigated conditions. Lodging here was not serious and indicated that close to maximum production had been reached.

Penjamo 62. Height 42 inches (106 cm.). Heads large, bearded. Medium early maturity. Lodging characteristics similar to those of Super X. Moderately resistant to stripe rust, mildew and septoria. Drought resistant. Appearance very good. Widely adapted.



Semi Dwarf Penjamo headed out and only waist high. This is one of the most widely adapted of the semi-dwarf varieties.

Mayo 64. Height 45 inches (114 cm.). Heads medium size, beardless, bluish green before maturity. Medium early maturity. Moderately susceptible to stripe rust. Appearance good.



Nadadores at maturity. The light, bright color of this wheat gives it a very fine appearance at harvest time.

Nadadores 63. Height 44 inches (112 cm.) Heads large, bearded. Moderately susceptible to stripe rust. Semi-winter growth habit. Maturity medium late. Appearance excellent.

Siete Cerros. Same as Super X, but less susceptible to stripe rust.

Sonora 63. Height 44 inches (112 cm.). Heads medium large, bearded. Maturity medium early. Susceptible to stripe rust. Appearance good.

Sonora 64. Height 35 inches (89 cm.). Heads medium size, bearded. Very susceptible to stripe rust. Always has smutted heads. Appearance only fair.



Dr. Hixson illustrates the relative heights of Sonora 64 on the left and local 406 on the right.

Pitic 62. Height 45 inches (114 cm.). Heads medium large, bearded. Maturity medium early. Moderately resistant to stripe rust. Appearance good.

Inia 66. Height 43 inches (109 cm.). Heads large, bearded. Maturity medium early. Moderately resistant to stripe rust. Appearance very good.

Tobari 66. Height 42 inches (106 cm.). Heads medium size, bearded. Maturity medium early. Resistant to stripe rust. Appearance good.

Jaral 66. Height 40 inches (102 cm.). Heads medium size, bearded. Lower leaves fire under stress. Resistant to stripe rust. Early maturity. Appearance fair.

Noroeste 66. Height 40 inches (102 cm.). Heads large, bearded. Maturity medium early. Resistant to stripe rust. Appearance good.

Oviachic 65. Height 35 inches (89 cm.). Durum type. Heads medium large, bearded. Bluish heads and stems before maturity. Maturity late. Wide leaves. Resistant to stripe rust. Appearance good.

YIELDS

As might be expected with some 60,000 farmers participating in the program, a wide range of yields was reported by the Oregon State wheat team, both in their weekly reports and in their end of tour report. ^{1/}Really low yields were relatively rare and, when they did occur, were the result of failure on the part of the farmer to follow recommendations or, in a few instances, due to natural causes. The highest authenticated yield reported was 1128 kg/dec. (167 bu/a). This was made by a field of Super X in Adana province. The reports indicate an average over the entire Mexican wheat region of between 350 and 400 kg/dec. (52-60 bu/a). In the same region the yields of native varieties were reported between 100 and 150 kg/dec. (15-22 bu/a).

Some interesting observations were made of the effects on yields as influenced by method of planting and degree of fertilization. A study of 154 farms showed that drilled wheat averaged 421 kg/dec. (62.5 bu/a), while that broadcast by hand yielded 342 kg/dec. (51 bu/a) or 7.9 kg/dec. (11.8 bu/a), in favor of drilling. A second study made on these same farms compared the



A very fine large field of Penjamo. Left to right Dr. Kronstad, a County agent and Dr. Frizzell.

^{1/}
Introduction of Mexican Wheat in Turkey 1967 - 1968. End of Tour Report of OSU Wheat Production Team. Compiled by John K. Frizzell, August, 1968.

results of complete and incomplete fertilization of the wheat. Yields on 126 farms where complete fertilizer recommendations were followed averaged 428 kg/dec. (63.5 bu/a) while on 32 farms where fertilization was incomplete (one or more applications omitted) the average yield was 232 kg/dec. (34.4 bu/a). This is 196 kg/dec. (29 bu/a) in favor of following complete fertilizer recommendations.

There were numerous instances of farmers doing some experimenting on their own with different rates of fertilizer use and changes in seed rate. One of the most interesting of these cases, and one worth recording, occurred near Gazi Paşa on the Mediterranean coast. The farmer in this case planted an extensive acreage of Lerma Rojo and he decided to compare it with the local variety both fertilized and unfertilized. At harvest he was thoroughly convinced on all counts when he realized the following results:

<u>Variety</u>	<u>Yield in kg/dec. (bu/a)</u>	
	<u>No fertilizer</u>	<u>With recommended fertilizer</u>
Lerma Rojo	120 (18)	450 (67)
Native	40 (6)	150 (22)

It is interesting to note here that with or without fertilizer, Lerma Rojo yielded three times as much as the native variety. This corroborates the statement made in the Rockefeller report quoted earlier. The extension director in Antalya province made good use of this information.

TOTAL PRODUCTION OF MEXICAN WHEAT

The amount of Mexican wheat that was finally planted for the 1967-68 crop is not known exactly. The OSU team report indicated that at least 16,875 tons of seed was planted. A small additional amount was planted in the



Women hand harvesting Nadadores in Thrace. They said that this wheat was hard to cut because the stems were so thick and there was so much of it.

spring on the Plateau. It is probable that the final amount planted was very close to 17,000 tons. The average planting rate shown by the OSU report was slightly less than 100 kilograms per hectare, giving approximately 170,000 hectares as the total that was planted.

Indicated average yields for the three regions were between 350 and 400 kilograms per decare. The accurate average for the whole Mexican wheat area was probably closer to 350 than 400 kilograms per decare. In making estimates of total wheat produced by this program, the conservative average yield of 350 kilograms per decare, (52.1 bu/a) is used. This would indicate about 595,000 tons of total production.

Yield figures for native varieties of wheat in the coastal regions were reported all the way from 100 to 150 kg/dec. (15-22 bu/a). In order to make a conservative estimate of the extra grain produced by the Mexican varieties the higher figure is used. Thus each hectare of Mexican wheat produced at least two tons more grain than had it been planted to native varieties. This means that a minimum of 340,000 tons of extra wheat was produced. At the world price at the time of harvest in 1968 this grain was worth more than \$23



These harvesters are cutting a very fine field of Natadores with sickles. This is the old traditional way but is rapidly being superseded by combine thrashers.

million. All costs of the first year's program to AID, the Ministry of Agriculture and the farmers is roughly estimated at not more than \$15 million, leaving a net profit of \$8 million (TL 72 million) or more.

BONUSES

This is a substantial monetary return but there were also some bonuses. These were the "spin offs" or side effects and have already been described in detail at several points in the text. In order to make this crash program work, it was necessary to make some rather drastic changes in some of the institutions of the Government of Turkey. Most important of these were: (1) The Government itself, coordination and cooperation between Ministries and Departments; (2) Drastic changes in the rules and regulations governing granting of agricultural credit by the Agriculture Bank and the credit co-operatives, (3) The development of an active and effective extension service from one which heretofore had been largely ineffective as far as educating or otherwise helping the farmers was concerned; (4) The rapid expansion of agricultural machinery manufacture, not only grain drills but also combine thrashers, tractors, and other equipment. This expansion was almost entirely in the private sector; (5) Perhaps more significant and far reaching than any of these is the effect on the human resources involved. High government officials have learned something of the value of working together, credit and extension personnel have learned the deep satisfaction that comes from helping people and the feeling of confidence that comes from doing a good job, and the many thousands of farmers who have discovered the fact that their government is interested in them and has officials willing and able to help them.

These bonuses are pretty big and over the "long haul" may be equally as important as the introduction of the new wheats. Time and the persistence of the farmers and the agricultural workers of Government of Turkey will tell the story.

CHAPTER X

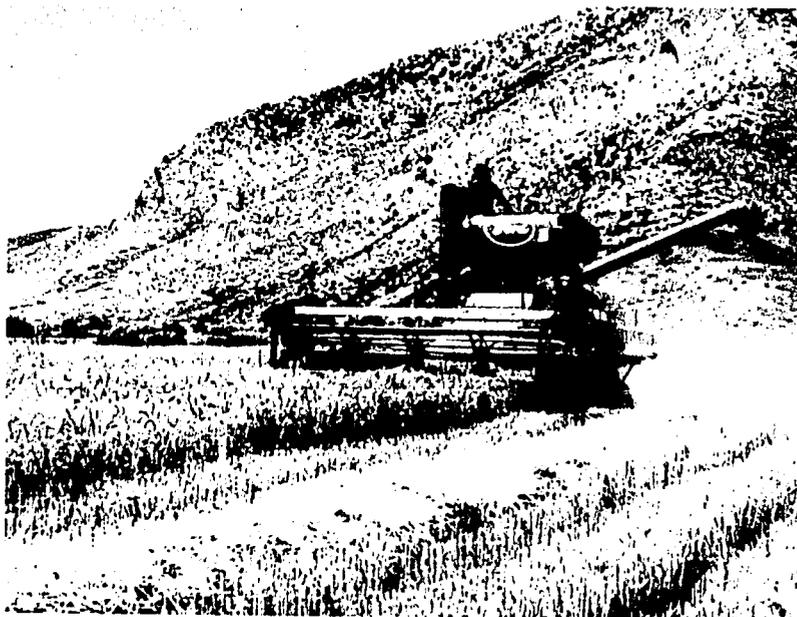
A LOOK AT THE FUTURE

At the time of this writing the 1968-69 crop is well underway, but since it still has at least four months to go, it will be considered as part of the future. The tremendous farmer interest in the 1967-68 Mexican wheat program is reflected in what has happened in the current season. The supply of government seed - that produced on State Seed Farms from certified seed - was less than had been anticipated. This was partly because production did not quite come up to expectations and partly because the Government of Turkey let Iran have 1,500 tons of Penjamo 62. This left a total of about 40,000 tons. It is not known how much seed was held by farmers but this is probably not less than 30,000 tons, giving a total of about 70,000. Anticipating a slightly higher seed rate than last year, this amount of seed would give an indicated total planting of at least 650,000 hectares (1,605,500 acres).

The first year saw Mexican wheat planted in 20 coastal provinces with small amounts sown in the spring in a few of the Plateau provinces. This year major plantings have been made in the three additional southeast Anatolian provinces of Urfa, Diyarbakır and Mardin, and the Black Sea province of Samsun. Also, 767 tons will be distributed to 21 Plateau provinces for limited spring plantings under irrigation. Thus Mexican wheat has spread from the original 20 provinces to 45 and the area from about 170,000 hectares to more than 650,000. There has been a similar increase in the number of farmers involved in the program from about 60,000 to more than 200,000.

Provincial extension headquarters throughout the 24 principal Mexican wheat growing provinces have been visited from time to time and information obtained from these visits indicates that the area actually planted is very

Harvesting Super X the modern way. The owner said that this field was yielding above 400 Kg/dec. (60 bu./A.).



close to that expected. Final figures may never be known exactly and the area could be somewhat larger than expected. The reason for the uncertainty is that no one knows just how much seed was saved by the farmers and this may have exceeded original estimates.

FUTURE YEARS

The very rapid and widespread acceptance of Mexican wheat by the farmers is expected to continue until, by no later than 1975, it is expected that 1.3 million hectares (3.2 million acres) will be planted in Mexican wheat in the 24 provinces best suited to its production. This represents more than 90 per cent of the land in these provinces suitable for such production.

The average yield of Mexican wheat is likely to be lower during the 1968-69 season because of the very large increase in the number of farmers and the general shortage of nitrogen fertilizer. The extension service will be unable to do the effective educational job they did in the first season because their numbers and facilities have not been increased to keep pace with the rapidly expanding numbers of farmers. An average yield of about 280 kg/dec. (41.5 bu/A) is expected, down from 350 kg/dec. (52.1 bu/A) in the 1967-68 season. This is expected to improve until in 1975 it will reach about 320 kg/dec. (47.5 bu/A).

Total production of Mexican wheat will very likely increase rather rapidly from the 595,000 tons in 1967-68. There should be about 1,820,000 tons in 1968-69 and probably 4,160,000 tons by 1975. This production is expected to contribute to rather substantial surpluses and will certainly contribute much toward making Turkey self-sufficient in food grains.

These production figures have not taken into consideration what may happen with Mexican wheat in the 21 Plateau provinces where it is being tried under irrigation. If this proves practical as seems probable from demonstration in 1968, there may be very substantial quantities produced in this area.

The experience referred to in the previous paragraph concerned the planting of 15 tons of Lerma Rojo which was distributed to five villages in Burdur province in southwest Anatolia. Elevation was 1025 meters (3360 feet). The enterprising extension director offered five prizes for the highest yields. The five high yields ranged from 680 to 524 kg/dec. (101.1 to 77.8 bu/A), and the entire 150 hectares averaged 443 kg/dec. (65.8 bu/A). This wheat was planted in March and harvested in July and received the full recommended amount of fertilizer and irrigation as required.

Another thing that could lead to a change in the whole production picture is the possibility of producing spring planted Mexican wheat every year in some parts of Anatolia under rainfed conditions. Planting in March or early April would follow moisture conservation practices the preceding fall and winter. Plantings of this type are being made at a number of locations on the Plateau to determine its feasibility.

Thus endeth the story of how Mexican wheat came to Turkey. It has been a story of vision, great enthusiasm and determination and of almost unbelievable dedication and hard work on the part of a lot of people, both Turkish and American. The results have exceeded even the most optimistic expectations and the outlook for the future is bright indeed.

Super X is characterized by large full heads. It is not uncommon to find more than 80 grains in such heads.



BIBLIOGRAPHY

1. End of Tour Report, Ephraim Hixson
Ankara TOAID A-1706 - 12/17/68.
2. End of Tour Report, Harvey Johnson
Ankara TOAID A-1658 - 11/29/68.
3. Imports and Plantings of High Yielding Varieties of Wheat and Rice in
Less Developed Nations International Agriculture Development Service,
USDA, 1968.
4. Introduction of Mexican Wheat into Turkish Agriculture
Ankara TOAID A-141 - 3/21/69.
5. Introduction of Mexican Wheat in Turkey
End of Tour Report, Oregon State Wheat Production Team
Team Leader, John K. Frizzell - July, 1968.
6. Origin, History and Use of Norin 10 Wheat
L.P. Reitz and S.C. Salmon
Crop Science 8, Nov.-Dec. 1968, pp. 686-689.
7. Prospects for Turkish Agriculture
A Report by Study Team to the Minister of Agriculture
Team Leader, Charles M. Elkinton - December, 1966.
8. Prospects for Wheat Production and Possible Surpluses in Turkey
Leonard H. Rhodes, Food and Agriculture Division - March, 1969.
9. The Rockefeller Foundation Program in Agricultural Sciences
Program Report: Toward the Conquest of Hunger - 1965-1966.
10. Wheat Production Team December Meetings
L.M. Humphrey, Food and Agriculture Division - 1/5/68.

ADDENDUM ^(*)

The figures presented in Table VII show the amount of seed planted for the 1968-1969 season, and the number of hectares planted in each of 61 provinces. The tonnages of seed are presented in three columns: seed supplied by the government, that held by farmers from the previous crop and the total amount planted. The number of hectares planted are given in three columns showing the number planted in the fall, spring and the total for each province.

The 31 provinces marked with an asterisk are considered to be in the normal Mexican wheat area and planting is normally done in the fall. In the other 30 provinces, which are located on the Anatolian Plateau planting is normally done in the spring. It will be noted that in five provinces some planting was done in the fall and some in the spring.

The figures presented in Table VII differ in some respects from those given in Chapter 10. This is especially true of the total hectares planted on the plateau in the spring. This area was increased from the originally planned approximately 7,670 to 82,730. Also the total number of provinces planting Mexican wheat increased from an expected 45 to 61. Only six provinces are not planting Mexican wheat this year.

The accompanying provincial map of Turkey shows the distribution of Mexican wheat in Turkey for the 1968-1969 season. The figures represent the number of hectares planted.

Those uncircled were planted in the fall and those circled were planted in the spring. This presents the Mexican wheat picture as of May 20, 1969.

(*)

Since the preparation of the manuscript for this booklet and its submission to the printer, additional information has been obtained giving complete figures for plantings of Mexican wheat for the 1968-1969 season. This information was obtained by contacting every director of extension in Turkey, either by a personal visit or by telephone.

TABLE VII. Tonnages of Mexican Wheat Seed, Both that Supplied from Government Sources and Held by Farmers and Hectarages Planted in 61 Provinces in Turkey During the 1968-1969 season.

Province	Seed Planted 1968-1969			Hectares Reported Planted		
	Gov't	Farmer	Total	Fall	Spring	Total
Adana *	10,000	4,500	14,500	145,000	-	145,000
Adiyaman *	52	120	172	1,800	-	1,800
Afyon	98	25	123		1,600	1,600
Ağrı	300	-	300		3,000	3,000
Amasya	102	300	402		4,020	4,020
Ankara	853		853		7,000	7,000
Antalya *	636	869	1,505	15,000		15,000
Artvin	20		20		200	200
Aydın *	2,205	588	2,793	27,244		27,244
Balıkesir *	626	2,500	3,126	30,000		30,000
Bilecik *	125	389	514	6,000		6,000
Bingöl	100	-	100		840	840
Bitlis	40		40		400	400
Bolu *	150	290	440	4,400		4,400
Burdur	75	30	105	300	750	1,050
Bursa *	853	2,751	3,604	36,050		36,050
Çanakkale *	300	1,000	1,300	13,000		13,000
Çankırı	67		67		670	670
Çorum	100	100	200		2,000	2,000
Denizli *	884	342	1,226	12,260		12,260
Diyarbakır *	1,590	6	1,596	18,200		18,200
Elazığ	20		20		150	150
Erzincan	35	40	75		750	750
Erzurum	400	100	500		5,000	5,000
Eskişehir	500	400	900		9,000	9,000
Gaziantep *	1,254	418	1,672	18,000		18,000
Giresun *	73		73	700		700
Gümüşhane	655		655		6,500	6,500
Hatay *	1,600	4,400	6,000	60,000		60,000
İçel *	1,345	2,700	4,045	40,450		40,450
İsparta	4	10	14		140	140
İstanbul *	223	848	1,071	11,700		11,700
İzmir *	1,761	900	2,661	26,610		26,610
Kars	400		400		3,000	3,000
Kastamonu *	16		16	160		160
Kayseri	300	200	500		5,000	5,000
Kırşehir	17	1	18		180	180
Kocaeli *	100	435	535	5,328		5,328
Konya	550	-	550	500	5,000	5,500
Kütahya	89	-	89		890	890
Malatya	130	200	330		3,300	3,300
Manisa *	2,400	4,000	6,400	64,000		64,000
Maraş *	626	1,008	1,634	14,367	1,000	15,367
Mardin *	2,000	100	2,100	21,000		21,000
Muğla *	653	70	723	7,230		7,230
Muş	40	4	44		440	440
Nevşehir	11	50	61		610	610
Niğde	70	6	76		760	760
Ordu *	20		20	50	150	200
Sakarya *	543	285	828	8,280		8,280
Samsun *	450		450	4,000		4,000
Sirt	815		815	4,000	4,150	8,150
Sinop *	220		220	2,200		2,200
Sivas	650	20	670		6,700	6,700
Tekirdağ *	18	38	56	579		579
Tokat	325	85	410		4,000	4,000
Trabzon *	2		2	20		20
Tunceli	8		8		80	80
Urfa *	2,844	1,000	3,844	35,000		35,000
Yozgat	345	200	545		5,450	5,450
Zonguldak *	20		20	200		200
Totals	40,708	31,328	72,036	633,628	83,730	716,358

