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Agricultural development strategies in a small economy : the case of Tunisia

In recent years there has been increased emphasis on agricultural development and its contribution to economic growth in developing countries. Development economists have referred to this as a shift away from an earlier « industrial fundamentalism » to an emphasis on growth in agricultural production and productivity in the overall development process (1). In fact, we may be witnessing today a shift toward « agricultural fundamentalism » as evidenced by a recent study which points out that « few nations achieve high per capita income without first achieving substantial gains in agricultural productivity » (2).

(1) HAYAMI, YUJIRO, and RUTTAN, VERNON (W.). — *Induced Innovation and Agricultural Development*, University of Minnesota, Department of Agricultural and Applied Economics, Staff Paper P71-1, January 1971.

(2) *Economic Progress of Agriculture in Developing Nations, 1950-68*, Economic Research Service, U. S. Department of Agriculture, Foreign Agricultural Economic Report N° 59, May 1970.

This could be the case of Tunisia, a country that is poorly endowed with all agricultural production factors except labor. Even in the case of the latter, the quality has been low because of limited levels of education and training of the rural population. Improving the quality of its most abundant resource, human capital, through public support of education has been the principal overall strategy of the Government of Tunisia for total economic development.

While much of Tunisia's agricultural resources must be considered marginal relative to other countries endowed with a more favorable climate, agriculture has figured high in Tunisia's development plans because much of its limited resources are in this sector.

TUNISIA AGRICULTURAL ECONOMY

Tunisia's attempts to achieve economic development have met with some success. Between 1960 and 1968,

Gross Domestic Product grew in real terms at a compound annual rate of 4,2 per cent. Average per capita GDP was \$ 187 in 1968, although in the rural sector it is much lower. Much of Tunisia's economic growth is attributable to the extractive industries such as phosphate rock mining and processing and petroleum. Tourism and related service industries have grown at a very rapid rate because of Tunisia's favorable location on the Mediterranean.

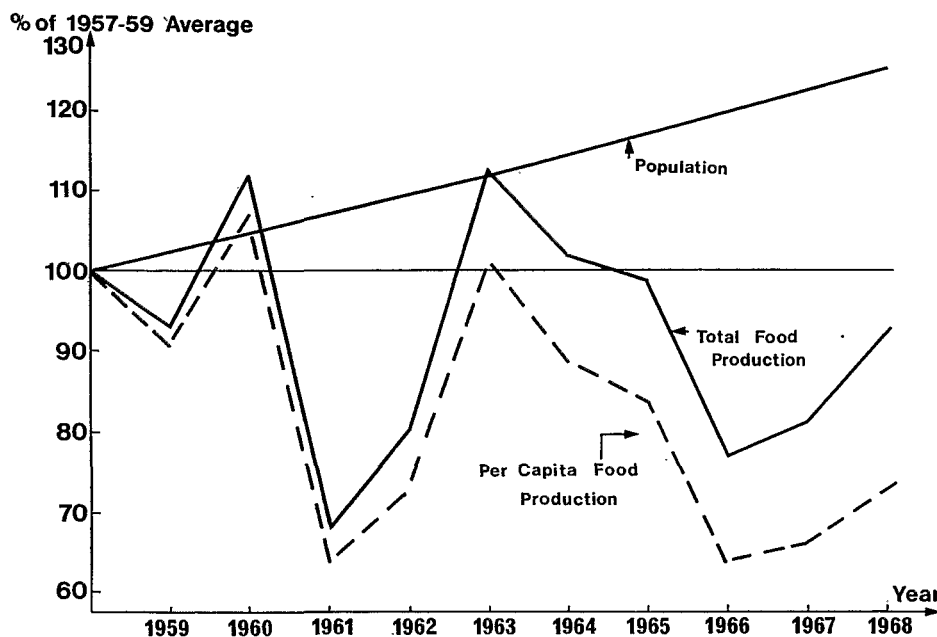
Economic growth in the total economy would have occurred at a faster rate had agriculture, the largest single sector of the economy, been able to contribute to that growth. As shown in Table I agriculture and food industries accounted for one-third of the GDP in 1961. Value added by the agricultural sector reached a high of 131 million dinars in 1965 but declined to 88 million dinars in 1967. During the latter year, agriculture and food industries contributed only 20 per cent toward the total GDP.

The poor performance of the agricul-

TABLE I
Gross Domestic Product at Factor Cost from Agriculture,
Agricultural and Food Industries, and Total, at 1966 Prices, 1960-68
(million of dinars)

Year	Agriculture	Agricultural and Food Industries	Total Agriculture and Food Industries	GDP Total	Percent Agriculture and Food Industries of Total
1960.	85	23	95	337	28,1
1961.	92	31	123	368	33,6
1962.	89	27	116	381	30,5
1963.	95	26	122	396	30,7
1964.	99	27	126	418	20,3
1965.	102	28	131	441	29,7
1966.	74	26	100	429	23,4
1967.	63	24	88	434	20,3
1968.	76	27	104	470	22,2

Source : République Tunisienne, Secrétariat d'État au Plan et à l'Économie Nationale, *Plan de Développement Économique et Social, 1969-1972*, Annexe Statistique.



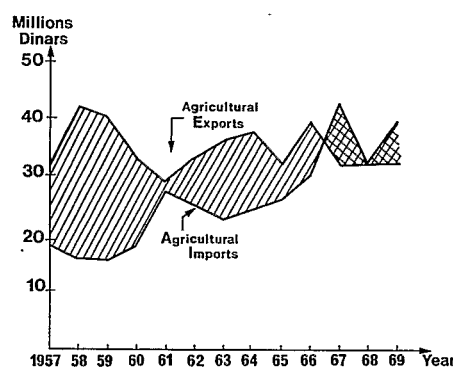
Sources : *Indices of Agricultural Production, 1959-1968*, U.S. Department of Agriculture, Economic Research Service, Foreign Regional Analysis Division, ERS, Foreign 265.

FIG. 1. — *Indices of Total and Per Capita Food Production and Population, Tunisia, (1957-59 = 100).*

tural sector during the years 1966 through 1968 is due in no small part to droughts that occurred during this period. There can be little doubt that climate is a limiting factor in agricultural production in Tunisia. Rainfall is extremely variable both within and between crop years which results in substantial variability in crop and livestock output from year to year.

Trends and variabilities in total food production in Tunisia relative to population changes are shown in Figure 1. Average total food production and population during the three years 1957-59 is the base period. In only three years of the following decade did total food production rise above that in the base period. While trends are difficult to delineate when food production varies so much from year to year, one cannot conclude from this chart that Tunisian food production has shown a rising trend over the past decade. Population, on the other hand, in 1968 was 26 per cent higher than in the base period 1957-59. As a result, food production per capita in Tunisia has fallen. Domestic food production per capita in 1968 was only 68 per cent of its level in 1957-59.

The stagnant nature of domestic food production in Tunisia coupled with a steady increase in population is reflected in rising imports of food and agricultural products. As shown in Figure 2, agricultural imports increased from 18.3 million dinars in 1957 to an all-time high of 43.7 million dinars in 1967. While Tunisia's agricultural exports have



Sources of Data : See Tables 1 and 2.

FIG. 2. — *Food and Agricultural Exports and Imports, Tunisia, 1957-1968.*

ve varied substantially from year to year, they have not trended up as have imports. The total value of agricultural exports in 1969 was 32 million dinars or about the same as in 1957.

Since agricultural exports have not increased to offset the higher imports of food and agricultural products, the commercial balance of trade in the agricultural sector has shifted from a positive trade balance in the period 1957-66 to a negative balance in 1967 and 1969. Tunisia, like many other developing countries, is confronted with the problem of a shortage of foreign exchange and a deficit in its overall balance of payments. It has been disappointing to Tu-

nisian economic planners that the agricultural sector has not been able to contribute to the solution of the payments deficit problem.

Food Imports

As shown in Table II, cereals comprise the largest category of Tunisia's food imports. It is also evident from the table that growth in cereals imports in recent years has accounted for a substantial share of the increase in total food imports. In 1969, imports of cereals, most of which is wheat, accounted for nearly half of the total food imports shown in the table.

Since cereals loom so large in Tunisia's total food imports, it is evident that imports could be substantially reduced if productivity in the domestic cereals sector is improved. The Government of Tunisia recognizes this and has undertaken a major effort to increase cereals output through its accelerated cereals production program that was adopted in 1967. Although the best prospects for substituting domestic food production for imports are probably in cereals, limited additional opportunities for import substitution are found in milk and dairy products. A small domestic sugar industry has developed in the country and sugar beets have figured in Tunisia's agricultural production plans. It is questionable, however, whether Tunisia can produce sugar domestically as cheaply as this commodity can be purchased in international markets.

Although not included among the imports of principal food products in Table II, Tunisia has imported sizeable quantities of soybean oil. These imports have enabled Tunisia to increase its consumption of vegetable oils during a period when domestic production of olive oil has been at low levels, and its total consumption of vegetable oils by 15 per cent over this same period.

Food Exports

As shown in Table III, olive oil is Tunisia's most important agricultural export. Tunisia often has ranked second only to Spain in world olive oil exports. However, olive oil exports declined slightly from 1957 to 1969. A larger decline in olive oil exports would have occurred had not concessional soybean oil imports been substituted for domestic olive oil consumption.

During the early part of the decade 1957-1969, exports of wine were often as large or larger than those of olive oil. Wine exports, however, fell off sharply after 1964 when Tunisia lost its trade preference in the French market. To date it has not been able to find other export markets for wine to replace the lost French sales.

Exports of citrus, fruits and vegetables have increased slightly during the past decade, but these increases have been offset by declines in durum wheat and wine exports.

TABLE II
Imports of Principal Food Products, Tunisia (1957-1969)
(millions of dinars)

Year	Cereals	Dairy Products	Coffee and Tea	Sugar	Others	Total
1957 . .	3,5	1,3	2,6	3,8	4,9	16,1
1958 . .	1,6	1,2	2,1	3,6	4,4	12,3
1959 . .	2,3	1,2	2,4	3,2	3,4	12,5
1960 . .	5,1	1,2	2,2	3,1	3,7	15,2
1961 . .	1,3	1,3	3,4	2,7	17,0	23,8
1962 . .	1,1	1,5	2,4	2,8	13,2	20,9
1963 . .	5,0	1,3	2,7	3,1	3,5	15,5
1964 . .	2,8	1,3	2,8	7,4	2,8	17,1
1965 . .	8,6	1,3	2,3	3,2	2,4*	17,9
1966 . .	8,3	1,9	3,1	2,8	3,6	19,5
1967 . .	17,4*	2,1	3,9	3,1	2,8	29,4
1968 . .	11,4	2,5	2,1	2,9	3,6	22,4
1969 . .	13,4	3,5	2,6	3,5	4,3	27,3

* Estimated

Source : *Évolution du Commerce Extérieur de la Tunisie, 1956 à 1965*, République Tunisienne, Secrétariat d'État au Plan et à l'Économie Nationale, Service des Statistiques du Commerce, Mars 1966.
RAPPORT ANNUEL, 1968, 1969, Banque Centrale de Tunisie.



TABLE III
Exports of Principal Food Products, Tunisia, 1967-1969
(million of dinars)

Year	Live Animals	Vegetables	Fish	Citrus	Fruits and Nuts	Olive oil	Canned Fruits and Vegetables	Wine	Cereals	Other	Total
1957. . .	1,6	*	0,9	1,6	0,9	7,9	0,7	7,6	4,0	2,7	27,7
1958. . .	1,8	*	0,8	1,9	1,2	9,2	0,9	12,9	6,4	1,7	36,7
1959. . .	1,0	*	0,7	1,8	0,8	14,4	0,8	7,4	6,3	2,1	35,3
1960. . .	1,3	*	0,8	1,6	1,2	5,8	0,9	7,3	7,0	1,8	27,6
1961. . .	1,1	*	0,6	1,9	0,8	9,6	1,0	7,9	1,6	1,3	25,7
1962. . .	1,2	*	0,7	1,8	1,3	12,8	1,5	7,6	1,4	1,5	29,8
1963. . .	1,4	*	0,6	1,8	0,7	9,9	1,6	10,0	4,0	1,4	31,4
1964. . .	1,5	*	0,6	2,2	1,8	11,9	2,2	8,6	3,3	1,5	33,6
1965. . .	2,5	*	0,3	2,6	1,5	13,5	2,0	2,6	0,3	1,0	26,4
1966. . .	2,2	*	1,4	2,9	2,5	13,4	2,8	5,0	4,3	1,0	33,3
1967. . .	1,5	1,1	0,8	3,3	1,1	8,0	2,3	5,0	0,1	2,2	25,3
1968. . .	1,4	0,8	0,6	1,6	1,7	11,9	1,8	3,0	0,0	2,3	25,1
1969. . .	0,9	0,8	0,7	3,6	0,7	10,0	1,3	2,9	0,0	4,1	25,0

* Included with canned fruits and vegetables and other exports.

Source : *Évolution du Commerce Extérieur de la Tunisie, 1956 à 1965*, République Tunisienne, Secrétariat d'État au Plan et à l'Économie Nationale, Service des Statistiques du Commerce, Mars 1966.
RAPPORT ANNUEL, 1968, 1969, Banque Centrale de Tunisie.

Agriculture has figured prominently in Tunisia's economic development plans. The broad framework for Tunisia's agricultural development was first established in the *Perspectives Décennales* for the period 1962-1972. Within this generalized framework, a *Plan Triennal* (1962-64) and two *Plans Quadriennaux* (1965-68) and (1969-72) were designed and implemented.

Objectives of Agricultural Development

The principal objectives of agricultural development were outlined in the *Perspectives Décennales*, 1962-72 and have remained the same throughout the three detailed plans that followed. To achieve these development objectives, the Plans have emphasized three principal

policies for development : 1) Agricultural diversification and intensification, 2) Structural reform (shifts in systems of land tenure), and 3) Development of water resources.

The remainder of this paper will be devoted to a discussion of these agricultural development policies. The extent and means through which they have been implemented and their results as

reflected by changes in production will be emphasized. Policy, planning, and changes in the cereals sector will be analyzed in more depth since this is the largest sector of the Tunisian agricultural economy. Data used in the analysis have been obtained in large part from official Tunisian sources such as the *Annuaire Statistique de la Tunisie* (3).

AGRICULTURAL DIVERSIFICATION AND INTENSIFICATION

Tunisian agriculture has been heavily dependent upon cereals for many years. As shown in Table IV, nearly two-thirds of the cultivated land in Tunisia was devoted to cereals in 1960.

The importance of cereals in the North, where a substantial share of the more productive land in the country is located, was even greater than for Tunisia as a whole. In fact, the agriculture of the North could almost have been classified as monoculture because of the predominance of cereals. Studies have shown that the one-crop cereal production of the North was not practiced by only one type of farmer, but by all types of farmers: large and small, modern and traditional, Tunisian and foreign colons.

The *Perspectives Décennales* 1962-1971) emphasized the importance of crop diversification to reduce the dependence on cereals:

1. Reduction in the land area devoted to cereals and lands with « more specific » agricultural uses were to be shifted to other crops.

2. Crop rotations were to be changed to obtain a higher yield from the land. Modifications in crop rotations would permit the modern sector to produce more intensively, control erosion and preserve and develop soil fertility. These changes were to result in cereal production sufficient for domestic consumption.

Two new triennial crop rotations were recommended for Northern Tunisia in accordance with average rainfall in a particular area. First, in areas that receive more than 400 mm of rainfall per year, the recommended crop rotation was as follows:

First year: durum wheat,

Second year: bread wheat or barley,

Third year: forage crops and legumes (oats-vetch, horsebeans or green manure).

In areas that received less than an average of 400 mm of rainfall per year, the recommended rotation was as follows:

First year: durum wheat,

(3) As is true of many developing countries, the reliability of statistics is open to question and may be subject to a wide margin of error. Consequently, they must be interpreted with caution.

TABLE IV

Distribution of Agricultural Land in Tunisia in 1960 and Planned Changes to 1971

Use	1960		Planned 1971	
	Hectares (1000 ha)	Per Cent	Hectares	Per Cent
Cereals	2 000	63,5	1 600	44,7
Industrial Crops	5	0,1	15	0,4
Grain Legumes	75	2,4	210	5,9
Vegetable Crops	26	0,8	50	1,4
Forage Crops	49	1,6	280	7,8
Tree Crops	995	31,6	1 428	39,8
Total Cultivated	3 150	100,0	3 583	100,0
Non-Cultivated Land	1 300		742	
Permanent Pasture	50		175	
Alpha Grass	3 600		3 400	
Forest	900		1 100	
Total Agricultural Land	9 000		9 000	

Source: *Perspectives Tunisiennes*, Publication du Secrétariat d'État aux Affaires Culturelles et à l'Information, Tunis, 1962 p. 154.

Second year: bread wheat, barley or oats-vetch,

Third year: fallow-legumes.

Part of the land was to be fallowed in the third year for moisture conservation.

It is significant to note, however, that little information is available in Tunisia on the costs and returns from farm operations under new crop rotations with forage and livestock as compared with

traditional biennial cereal rotations and extensive livestock grazing on weed fallow. Farm management research involving the budgeting of various types of farms at a given point in time and over time is needed.

Since agricultural diversification and intensification were to be implemented through changes in the cereals sector, a more detailed examination of this important sector of Tunisian agriculture is warranted.

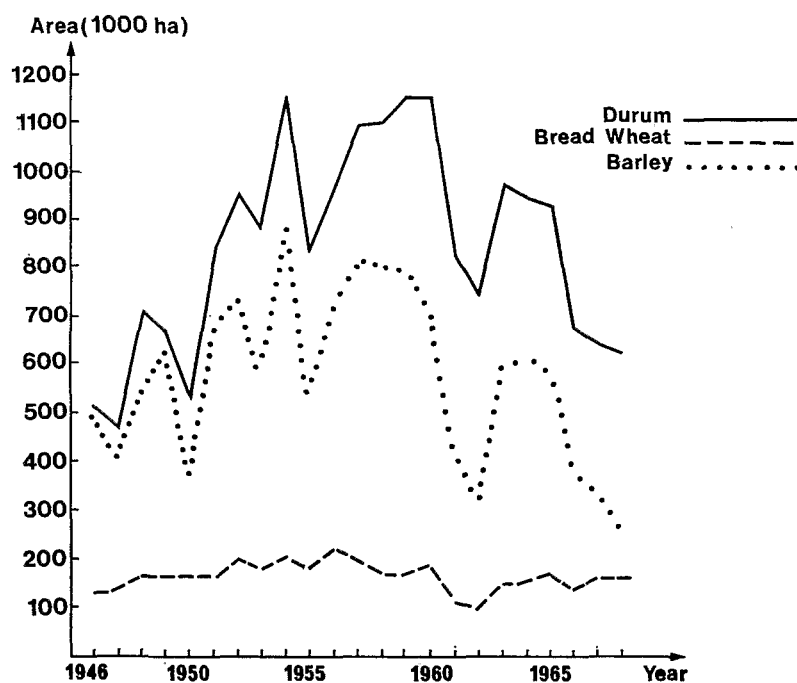


FIG. 3. — Area of Three Cereal Grains: Durum, Bread Wheat, and Barley in Tunisia, 1946-68.

The Cereals Sector

The three principal cereal grains produced in Tunisia are durum wheat, bread wheat, and barley.

The average area devoted to cereals declined from a high of 1 981 thousand hectares in 1954-1958 to 1 296 thousand in 1964-1968. This indicates that Tunisia has made some progress in implementing its policy of agricultural diversification in accordance with the Plans by transferring some of the poorer cereal land into tree crops such as apricots, almonds, and olives as well as into permanent pasture. As shown in Figure 3, most of the reduction of cereal area has come out the areas in durum and barley since 1960. Bread wheat area has remained relatively constant over the period, but the expansion of bread wheat had not been accomplished through 1968.

Tunisia's hopes of increasing cereal production on a reduced area through intensification of production and the application of modern technology to farming have not been realized. Figure 4 shows that yields of all three cereals have been extremely variable from year to year and have not exhibited a rising trend. In fact, bread wheat yields have registered a secular decline since the early 1950's.

The area planted to Mexican bread wheat varieties has expanded from 450 hectares in 1967/68 to 12 000 hectares in 1968/69, 53 000 hectares in 1969/70 and just over 100 000 hectares in 1970/71. The yields of the new varieties have averaged considerably higher than the indigenous Tunisian varieties such as *Florence-Aurore* in each of the above years according to annual reports of the Accelerated Cereals Production Project, but a comprehensive analysis of yield comparisons over the entire period is not yet available. But their relative performance depended on the amount of rainfall. Consequently, they are best suited to the better cereal lands in Northern Tunisia where average yearly rainfall is higher and less variable both between and within crop years. This has been recognized and the new varieties have been planted mainly on the large state-owned and private farms in the North under mechanized farming where the required cultural practices are more easily applied.

The data in Table V also indicate that private farmers in Northern Tunisia continue to rely heavily on cereals. Forty-five per cent of their land was planted to durum, bread wheat, and other cereals (mainly barley). Nearly one-third of the land was in fallow which is usually part of a rotation with cereals, and, consequently should be considered in cereals usage. When fallowed land is added to land in cereals, 78 per cent of the total agricultural land of these farmers was devoted to cereals production. It is also of interest to note that only 3,6 and 3,8 per cent of the land was devoted to forage crops and grain legumes, respectively. This would indicate, as far as the private sector is con-

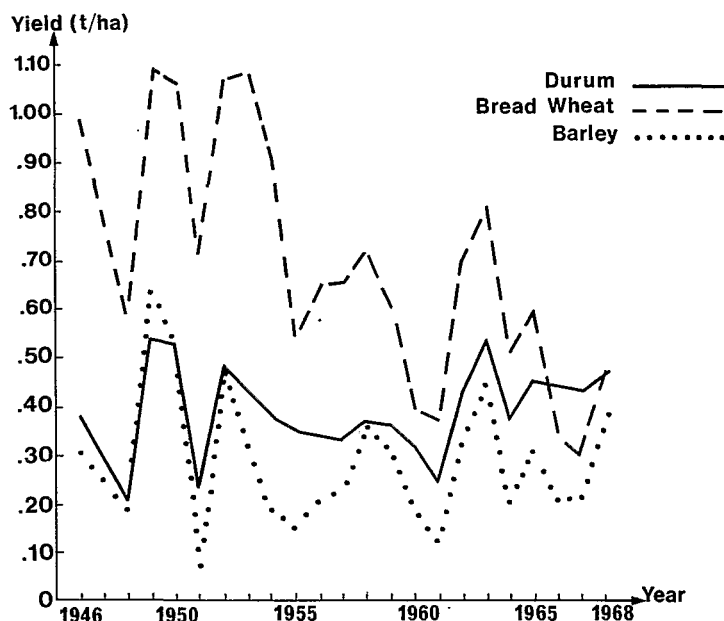


FIG. 4. — Yield of Three Cereals : Durum, Bread Wheat, and Barley in Tunisia, 1946-68.

cerned in Northern Tunisia, that very little change has occurred in crop rotations which would induce more diversification in production and a shift in emphasis on cereals.

Comparable data concerning land usage in the public sector such as that discussed above for the private sector are not available. However, indications are that such data would probably show some decline in land used for cereals. As previously discussed, data for the country as a whole show a decline in area planted to both durum and barley since 1960.

While Tunisia's development plans ha-

ve emphasized the shifting of some cereals land into other uses, cereals will probably continue to be very important in Tunisia for the following reasons. First, the bulk of Tunisian agriculture will remain dry land agriculture. Of the approximately 3,2 million hectares of cultivable land in the country, only about 100 000 hectares are now irrigated. Prospects for expanding further irrigation are limited. In dry land agriculture, cropping alternatives are also limited. Cereals may produce the largest net returns per hectare on much of the better arable land in the North under dry land farming. Second, considering the low incomes of most of the population, cereals will continue to occupy an important place in the diets of the people. Currently, cereals provide more than one-half the calories for the average Tunisian diet and account for about one-third of the total consumer expenditures on food. The income elasticity of demand for cereals in Tunisia is estimated to be 0,35 which means that if we assume per capita consumer income will increase 3 per cent per year, cereal consumption per capita can be expected to increase about 1 per cent. Adding this to the current annual population growth of 2,8 per cent, results in a growth in total domestic demand for cereals of 3,8 per cent per year.

However, the Accelerated Cereals Production Program has been applied only to bread wheat. Durum and barley are more important than bread wheat in terms of both quality and area, and small farmers using traditional methods rely heavily on them.

It is important too to develop complementary relationships between cereal production and forage production. Such efforts, however, must be simultaneously accompanied by improved livestock feeding, and upgradation of the genetic potentials of indigenous cattle.

TABLE V

Agricultural Land Use in 1968 on Private Farms in Northern Tunisia

Use	Hectares	Per Cent
Durum Wheat . .	119 200	29,8
Bread Wheat. . .	37 200	9,3
Other Cereals . .	25 200	6,3
Fallow	130 000	32,5
Forage Crops . .	14 400	3,6
Grain Legumes . .	15 200	3,8
Dry Plantations. .	31 200	7,8
Natural Pastures .	24 800	6,2
Irrigated		
Vegetables	2 000	0,5
Plantations	800	0,2
Total	400 000	100,0

Source : Crédits pour l'Intensification de la Grande Culture privée du Nord (1^{re} Tranche) République Tunisienne, Ministère de l'Agriculture, Bureau du Plan et du Développement Agricole.

STRUCTURAL REFORM

The transformation of Tunisian agriculture was to occur through structural reform or changes in systems of land tenure and farm organization. Production cooperatives were to become the principal means of « modernizing » small traditional farms and achieving the benefits of scale economies associated with large farms.

Structural reform has overshadowed other agricultural development policies in Tunisia during the decade of the 1960's. The Government's attempts to induce « modernization » of the agricultural sector through shifts in systems of land tenure and farm organization created a climate of uncertainty and confusion that seriously interfered with incentives. Nevertheless, an attempt will be made to outline some of the principal reforms that have occurred since independence. « Les Reformes des Structures » were really the heart of Tunisia's agricultural development strategy.

The first agrarian legislation of the new Government involved land reform and transferred the public and private habous lands to the Government. Habous was an ancient system of land tenure under Moslem Law in which title of land was not registered. These lands were subsequently sold or given to small peasants or other private individuals by the Government which, at that time, encouraged private property. The period from independence until 1961 was also marked by the Government's encouragement of agricultural cooperation through assistance in the formation of service cooperatives through which small farmers, with individually owned farms, could voluntarily participate in service cooperatives to purchase farm supplies and market their produce.

In 1961 the Government adopted a policy of economic planning in which the emphasis was to shift from social problems in the poorer regions to increasing production in the North which possessed better agricultural resources. Subsequently, a greater distinction was to be made between the modern and traditional sectors in agriculture and less on differences between poor and rich farming regions.

The shift in emphasis to the agriculture of the North was undoubtedly influenced by the gradual takeover of the lands of European colon farmers from independence to 1961. More than one-half of these lands, which totaled 850 000 hectares, were appropriated in some form by the Tunisian government by 1961. The remaining colon-owned lands were nationalized in 1964 (4).

The chosen means of achieving diversification an intensification of agricultural production, to increase agricultural output was a structural reform through a program of cooperative farming. The Three Year Plan, effective January

1962, which was to implement the objectives set forth in the Ten Year Plan provided for the Cooperative Producing Units (CPU's). Their advantages over service cooperatives were said to be, 1) easier application of new cropping systems and new techniques, 2) the formation of large farms to take advantage of economies of scale, and 3) greater facility for achieving a higher savings level.

The new cooperatives were to be formed only after a socio-economic survey of the area had been completed and future members were consulted. Small farmers within the boundaries of a proposed cooperatives were to have the option of becoming members or exchanging their land for a plot outside the cooperative. Larger landowners could rent or sell their land to the cooperative or join. The basic principal was that of transferring individual ownership into share ownership and that the individual characteristic of a holding disappears as it becomes a part of an overall cultivation plan.

Moore and Lewis report that the formation of new production cooperations received another push in May 1964 when the remaining colon-owned lands were nationalized and the state found itself in the possession of an additional 460 000 hectares of land. This, together with other lands previously acquired, involved total holdings of some 700 000 hectares of the best land in the country. On September 30, 1964, the Office des Terres Domaniales (OTD) was established with its functions being to assume the management of all state lands; to maintain current output levels on these lands; to direct their cultivation; to establish experimental farms and testing stations; and to administer over an eight year period, the distribution of the state lands, primarily to agricultural cooperatives.

It was soon evident that the new cooperatives were not achieving the operating results that planners had hoped for. One of the problems was that they were obligated to take on more poor peasants and workers than could be supported from their gross income. The cooperatives could offer only 150 to 180 work days annually to each cooperator and often times less. In addition, there were a number of other problems such as : 1) Lack of trained personnel for managerial positions. Often times the manager was a high school graduate or had even less formal education with little practical farm experience, particularly on large mechanized farms. 2) A cumbersome bureaucratic system through which production decisions came from above with final authority often resting in the Ministry of Agriculture in Tunis. This often resulted in costly delays. 3) Lack of experience of the members in operating and maintaining farm machines that had come, in large part, from the farmer colon-owned farms. Often times tractors and other farm machinery were inoperable because of an incapacity to make repairs or a lack of spare parts. 4) Absence

of production incentives of the members who were paid entirely on the basis of hourly wages. Consequently, the members did not associate their work efforts with the output of the cooperative. 5) Heavy short term debt structures and a lack of long term capital to implement intensified production programs such as livestock enterprises.

Despite the problems and relatively poor operating results of the production cooperatives, the Government was undaunted in its efforts to form more cooperatives. It was felt that their problems could be resolved and enthusiasm among technicians remained high. It has also been argued that the financial assistance of the World Bank to the cooperatives may have contributed to that enthusiasm (5).

A U. N. Report indicated that on June 30, 1968 the distribution of land in Tunisia was as follows (6) :

1) Cooperatives had been extended to 1,5 million hectares of which more than half (880,000 hectares) were in producers cooperatives and the remainder in pre-cooperatives. Of the 880 000 hectares, the great majority of the land (665 000 hectares) and 40 000 cooperators were concentrated in the North. Most of this was former colon-owned land that had been combined into production cooperatives with small, neighboring peasant properties, often of poor quality.

2) About 3 000 private Tunisian landowners with an average holding of a little more than 200 hectares each owned an equivalent amount of land to the production cooperatives in the North. The U.N. Report points out « Many of these landowners were absentee farmers who leased away their land, and who lived more or less comfortably from the rents often combined with incomes from other activities ». It is of interest to note that at the time of independence, 5 000 Tunisian farmers in the modern sector owned farms averaging 70 hectares each. This indicates total land ownership of the private, modern Tunisian sector had expanded from about 350 000 hectares to over 600 000 hectares and concentration of ownership has increased substantially since 1956.

3) In addition to the 40 000 members of production cooperatives, and 3 000 larger private farmers, there were 64 000 peasants on an equal amount of land in the North, but of much inferior quality.

4) A few production cooperatives, and the majority of pre-cooperatives were in the semi-arid and southern parts of the country where efforts had been made to introduce irrigation combined with extensive dry-land farming and cattle breeding on the previously collectively owned tribal lands.

5) Small and medium private sized

(5) « Guilt by Association », Barrons, June 1, 1970.

(6) LINER, STURE — *Background Notes on Some Developments in Tunisia, September 1969 — February 1970*, United Nations Development Program, Tunis, March 5, 1970.

(4) MOORE (M. P.) and LEWIS (M. S.), *Agricultural Cooperation in Tunisia*, (Unpublished Manuscript), 1968.



Photo UNESCO, G. Schmidt.

Tunisie : Centre d'irrigation de Sbiba.

farms in the Sahel, the 300 miles of coast running from Bizerte to Gabes including the Sfax olive orchards.

Difficulties mounted in pushing the cooperative movement, however, as efforts were directed to the small, independent farmers in the Sahel who resisted. Opposition also came from the larger private farmers in the North and their political allies who had a vested interest in a « moderate » approach to social change. Faced with these difficulties, Mr. Ben Salah, Minister of Plan and National Economy, prepared a draft bill for submission to the Party Congress in the Fall of 1969 which called for cooperatives as being the only way of cultivating the soil. This bill received strong opposition from other influential members of the party and was never adopted. Subsequently, there was a sweeping administrative reshuffling in the Government which was to be followed by an abrupt change in « Les Reformes des Structures ».

On September 22, 1969, the Tunisian Parliament passed a law which outlined the Government's commitment to promote the coexistence of three sectors in agriculture-state owned, cooperative, and private. Subsequently, farmers who had joined production cooperatives against their will were given the option of leaving the cooperative to farm their land as they had in the past. Most chose this option. Many cooperatives were completely liquidated and indications are that those that are still operating are the early ones that were formed out of the former colon-owned farms in the North.

As experience has shown in other countries that have initiated sweeping land tenure reforms, agricultural production often declines during and immediately after such reform is undertaken. Unquestionably, the uncertainties and confusion associated with « Les Réformes des Structures » in Tunisia, have been important contributing factors to the poor performance of Tunisian agriculture during the past decade.

DEVELOPMENT OF WATER RESOURCES

Since its independence in 1956, Tunisia has placed a heavy emphasis on investment in water resources, both surface and underground, to expand the amount of irrigated agricultural land. The importance of irrigation investments in total agricultural investment is illustrated by the Four Year Plan 1969-1972. During this four year period, the planned total agricultural investment was 128 million dinars. Of this amount, 48 million dinars or 38 per cent was to be devoted to irrigation projects in agriculture.

The relative importance of investments in irrigation to those in dry land agriculture can be gauged by the planned investment on the cooperative producing units. The new Four Year Plan visualized an investment totalling 37,4 million dinars for dry land agriculture on the production cooperatives from 1969-1972. It was previously pointed

out that by June 30, 1968, cooperative producing units had been extended to 1,5 million hectares of which 665 000 hectares was in the most productive dry land areas of the North. The amount of irrigated land that would result from previous and new irrigation projects is estimated at about 100 000 hectares. Consequently, the 1969-72 Plan provided an investment of 48 million dinars on 100 000 hectares for irrigation and 37,4 million dinars on 1,5 million hectares in production cooperatives under dry land farming. This would indicate that while Tunisia's agricultural development strategy of agricultural diversification and intensification was to be implemented largely through the installation of modern farming methods on the production cooperatives, the cooperatives were to receive a small amount of investment funds relative to irrigation projects which covered a much smaller area.

A comprehensive analysis of returns to investments in irrigated agriculture in Tunisia has not been made. The University of Minnesota Team in Tunisia is currently making a study of water resource development in Tunisia to determine the technical, economic, and social factors involved in the success or failure of irrigation projects. Until the results of this study are available, one must rely primarily on qualitative information in making preliminary appraisals. Such information indicated that to date the returns to investments in Tunisia's water resources have been disappointing. The expansion in irrigated land was to facilitate primarily an increase in production of high value fruit and vegetable crops for both domestic and foreign markets.

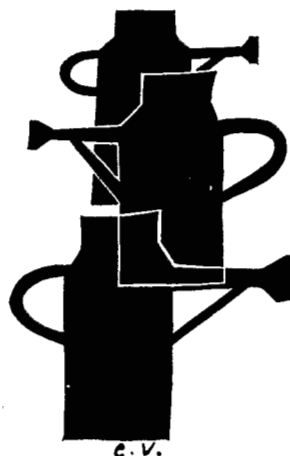
While many of Tunisia's irrigation projects are relatively new and sufficient time has not lapsed to realize full productivity, Tunisia's largest project, the *Office de Mise en Valeur de la Vallée de la Medjerda* (OMVVM) has been in operation for more than a decade. This irrigation project on the Lower Medjerda River was started by the French after World War II. The two major dams on the Medjerda that were planned by French technicians were completed by late 1957.

Moore and Lewis point out in their excellent analysis of the development of this project and its operations, that French technicians had originally envisaged a transfer from dry land cereal and wine cultivation to more intensive, irrigated farming with high-yielding, labor-intensive fruit, vegetable, forage, and industrial crops on newly irrigated land in the Medjerda Valley.

Much of the land in the OMVVM irrigation area was subdivided and distributed to carefully chosen landless peasants who were judged to be the most capable. Subsequently, the OMVVM established service cooperatives in which these farmers were required to become members. Through these cooperatives the farmer members were to receive technical advice and marketing services both for farm supplies and the commodities grown.

In summary, investment in water resources has figured high in Tunisia's agricultural development strategy with about 40 per cent of total government agricultural investment going to water projects. These investments have been concentrated on a relatively small area, but returns to date have been low according to certain gross measures and several studies that are available. Economic studies to analyze the potential returns to further investments in water resources relative to investments in dry land farming would be valuable to government planners and policy makers. Tunisia's water resources are limited relative to the total land base. Further, their development is expensive and the quality of the water is low because of a high saline content. With present available technology, the bulk of Tunisian agriculture will probably remain under dry land farming.

As the Government of Tunisia enters a new decade after the tumultuous 1960's, an important question confronting it is how to divide its investments between water resource development and dry land agriculture. Substantive research and analysis of the rates of return to further investments in water resources relative to investments in dry land farming are essential.



C. V.