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Agriculture

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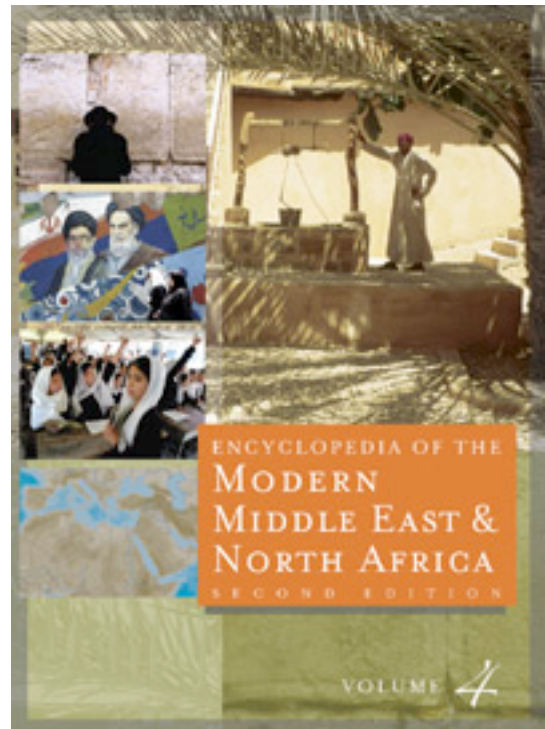
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AGRICULTURE

From the Latin *agricultura* (*ager*, field and *cultura*, cultivation), agriculture refers to the processes by which food is grown and harvested. It also pertains to the sector of the economy dedicated to harvested foods.

Soil cultivation for the production of crops began in the ancient Near East around 10,000 BCE (the Neolithic Revolution), and agriculture is the base of the past and current civilizations of the region. In 1996, 50 percent of the Middle East's population still lived in rural areas. Through the centuries, various rural cultures have developed, and they have balanced environmental and social factors and introduced for example various collective water-management systems. Nevertheless, in terms of food, the Middle East and North Africa (MENA) has become the least self-sufficient of the world's major populated regions.

Increasing Demand

In 2000, values for the agricultural exports for all the MENA region were about 11 billions \$ when values for the agricultural imports were about 33 billions \$. Although the differences among Middle Eastern countries are great (for example, Turkey is an occasional exporter of wheat, but Sudan repeatedly experienced famine during the 1980s and early 1990s), some regional generalizations can be made. Rapidly increasing demand for food has outpaced the domestic supply, because of (1) rapid population increase and (2) considerable expansion of per capita incomes during the period of the petroleum boom (roughly 1973-1985). Supply response has been significant, although it has been constrained by nature, history, and public policy, but the agricultural systems of the region have undergone considerable transformation as a result of recent efforts to increase domestic food supplies.

During the period from 1980 to 1990, population in the MENA grew at 3.1 percent each year (only sub-Saharan African populations are growing more swiftly) but then slowed in the period from 1990 to 1999 to 2.2 percent, reaching a population of 301 million in 2001. From 1965 to 1988, per capita income was also growing at about 3 percent each year, but in the decade from 1991 to 2001 economic growth was slower in MENA than in any region except Sub-Saharan Africa and the transition economies of Europe and Central Asia. From 2000 to 2001, the growth of output per capita was less than 1 percent.

Middle Easterners spend a substantial fraction of their additional income on food, especially on what are still considered luxury foods, such as meat and possibly fresh produce. Accordingly, the demand for all food rose at about 4 to 5 percent each year, and the demand for meat, milk, vegetables, and fruits rose at roughly 6 percent each year in the same period.

Few agricultural sectors could have met this increased demand from domestic supply alone; the countries of the MENA could not, and they became increasingly dependent on food imports. Most countries in the region now import at least 290 pounds (130 kg) of grain per person per year, and many import far more. In 2001, Libya imported 885 pounds (402 kg), Jordan, 764 pounds (347 kg), and United Arab Emirates, 1852 pounds (841 kg); these are similar to the amounts needed by the nonagricultural city-state of Singapore. Over the decades, this increasing food dependency has led many national planners in the region to try to accelerate agricultural growth, but they have had to deal with significant natural and social issues.

Water

The scarcity of fresh water is the main natural obstacle to greater food production in the region. With only 1.847 cubic yard (1.413 cubic meters) of fresh water available per capita in 2000, the MENA ranks well below the average of other regions. Drought, a recurrent phenomenon in the region, severely affects agricultural production. Many of the desert areas receive less than 20 inches (50 cm) of rain per year, making non-irrigated agriculture extremely risky or impossible. Seasonal rainfall patterns are highly variable; only the shores of the Caspian and Black seas receive rainfall year round. Elsewhere, precipitation follows one of two seasonal patterns: (1) a winter maximum along the Mediterranean shore, in the Fertile Crescent, and in central and southern Iran, or (2) a summer monsoonal maximum in Southern Arabia and Sudan. Precipitation within these areas often varies considerably, and rain may fall at the wrong time during the planting cycle.

The total irrigated land area increased from about 30 millions acres (12 million ha), some 15 percent of arable land, during the early 1960s to about 42 millions acres (17 million ha), some 17 percent of arable land, in 1985. Irrigation resources are unequally distributed across countries. Roughly 34 percent of all irrigated land in the region is in Iran; in descending order, the four countries with the largest amount of irrigated land are Iran, Egypt, Turkey, and Iraq. Likewise, irrigated land as a percentage of arable land varies widely by country. At one extreme, virtually all (97 %) of Egypt's farmland is irrigated, as is 65 percent of Israel's. By contrast, only 8 percent of Turkey's and 7 percent of Morocco's arable land is irrigated. Iran and Iraq irrigate roughly 33 to 40 percent of their arable land. Since irrigated land produces much more per acre than non-irrigated land, and produces crops of higher value, such as fruits and vegetables (as opposed to grains), these numbers understate the economic contribution of irrigated farming in

the Middle East. In the MENA, the proportion of irrigated land has increased from 25.8 percent of cropland in 1979 through 1981 to 35.5 percent in 1995 through 1997.

However, the development of irrigation has too often neglected long-run environmental issues, thereby jeopardizing the sustainability of the short-term gains from expanding irrigation. Two problems dominate: the neglect of drainage and the overexploitation of groundwater. Irrigation without drainage raises soil salinity, which reduces crop yields; because irrigation raises output immediately, while neglect of drainage reduces it only after ten to twenty years, governments short of cash have often sacrificed the future by underinvesting in drainage. This problem has plagued most of irrigation systems in the region as well as throughout the world. Overexploitation of groundwater is another example of heavily discounting the future: In many cases, this is fossil water, which is not renewable (Sahara, the Arabian Peninsula). In time, these ancient stores of water (similar to underground pools of petroleum) will be depleted and the farms and such ecosystems as oases that depend on such water will have to be abandoned.

It is often argued that since water is free to farmers they have no incentive to economize it. In fact, it is the giant irrigation projects, more than the farmers, that have overused this scarce resource. Two types of solutions were applied to this water problem: large-scale and small-scale infrastructure; both are technical solutions and underestimate the social dimension of the problem. The large-scale solution is exemplified by such state projects as the Aswan High Dam (Egypt) and the Great Man-Made River (Libya). Drip irrigation is typical of the small-scale solution. Pioneered in Israel, it delivers precisely calibrated amounts of water to individual fruit trees or vegetables but costs at least three times as much to install as conventional flow irrigation. Drip techniques also require literature and trained technical personnel to operate them effectively. Water-conservation imperatives also have an impact on the choice of crops and may reduce the allocation of land to water-intensive crops such as alfalfa, rice, sugar cane and cotton.

In the region, rain-fed farming systems are generally of the Mediterranean dry-farming system type, in which winter wheat or barley alternates with fallow and the grazing of sheep, goats, cattle, or camels. Those systems run up against the problems of desertification and the relationship between semi-migratory cattle herders and sedentary farmers.

Cereal grains are the dominant crop in the Middle East, occupying more than 40 percent of the arable land. Wheat (indigenous to the northern Fertile Crescent) is planted on about 25 percent of the farmed area in any year and constitutes more than 50 percent of all regional cereal production. It stabilized at 55 percent in the period between 1961 and 2001 in Middle East but grew from 55 percent to 73 percent during the same period in North Africa. Barley, which is also indigenous, is especially well suited to drier areas and is a distant second. About one-third of all the land planted in wheat in less developed countries is found in the Middle East. Because of natural and social constraints, grain production has grown less rapidly than population in the region. Increasingly, greater output of grains and all other foodstuffs will require a shift from bringing additional land into cultivation to raising the output per unit of land. The only country with significant unexploited or underexploited areas of land is Sudan. Such intensive agricultural growth, however, is constrained not merely by water resources but by social conditions and economic policies.

Land Ownership

The principal social constraints to agricultural development have been unequal access to land and other problems concerning property rights; unfavorable terms of trade facing farmers (local but also international trade with Western countries); low levels of investment; and technical difficulties, such as those involved with irrigation.

Despite considerable differences between countries and regions, the following generalizations on land tenure may be made: (1) Pre-reform land tenure was bimodal, with a small number of farmers owning large areas of land and a large number of others holding small parcels or working on the large ones as sharecroppers. (2) States were and are active in shaping land-tenure patterns. (3) Land reform has reduced but not eliminated unequal distributions of land. (4) Governments have usually intervened in land-tenure patterns largely for political reasons, specifically to ruin their enemies. However, (5) states often have had development strategies or programs that involved transferring resources from agriculture to industry and urban areas. Thus (6) states have tried to monopolize the distribution of farm inputs (such as fertilizers, equipment, etc.) and outputs (agricultural products). (7) Under injunctions from international organizations (the World Bank, the International Monetary Fund), states throughout the region have retreated from land reform as part of a general regional economic trend giving an expanded scope to the private sector.

Governments often created state marketing monopolies as part of land reform programs, eventually allowing them to tax farmers, by reducing the price of agricultural products below world market levels and raising those of inputs above world market levels. Such price policies, combined with macroeconomic and trade policies that distorted foreign exchange rates, weakened the incentives for farmers to produce the taxed crops. Not all crops were taxed, but grains and major export goods (e.g., cotton) usually were. These unfavorable pricing policies help explain the sluggish growth of grain output until the early 1980s. After that, governments increasingly recognized the need to offer farmers adequate incentives if the goal of food security was to be met. Taxes on farming have been reduced in many countries, and price policies have been improved. Less success has been achieved in improving life for small farmers (current policies bankrupt the family economy) and in improving macroeconomic policies that affect agriculture, such as inflation control and exchange-rate management.

Increased output per land unit is usually associated with greater use of higher yielding crop varieties (HYVs), which have been bred to be more responsive to fertilizer. The adoption rate for HYV wheat has been constrained by both limited water supplies and pricing policies. Only about 30 percent of Middle Eastern wheat fields are planted with HYVs, compared with nearly 80 percent in Latin America and Asia. By contrast, farm mechanization, especially tractor use, has spread rapidly, especially for such power-intensive tasks as land preparation. From 1979 through 1981, there were twelve tractors per thousand agricultural workers in the region, and from 1995 through 1997, 25 per thousand, which is higher than the world average. In 1960, there were some 2470 acres (1,000 ha) for every tractor in Iran, but only some 247 acres (100 ha) per tractor in 1985. The use of harvesting machinery, such as combines, has spread more slowly than the use of tractors. The pattern of mechanization indicates that machines were substituted for animal labor as opposed to being substituted for human labor; animals had become far more valuable as producers of meat and milk than as work animals, and governments in the region often subsidized fuel.

However, mechanized techniques are also important as a way to economize on human labor, since recent emigration from the countryside has negatively affected the agricultural sector in many MENA countries. Everywhere, the proportion of agricultural laborers has declined. From 1960 to 1985, the number of farm workers fell in Algeria, Jordan, and Syria, though it remained roughly stable in Egypt, Iraq, Tunisia, and Turkey. Labor migration, both from rural areas to cities and from non-oil to oil-exporting countries within the region, accounts for most of the decline of the rural population. Education in the countryside has raised skill levels and expectations, leading many young people to abandon farming. Only if the educated youth are given the technology and incentives to succeed in agriculture will the MENA be able to mitigate water scarcity and even partially meet the growing demand for food.

See also Food; Water.

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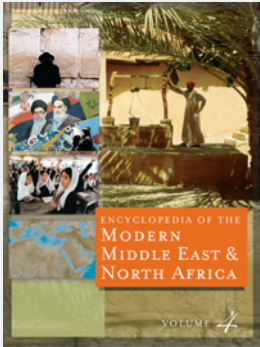
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