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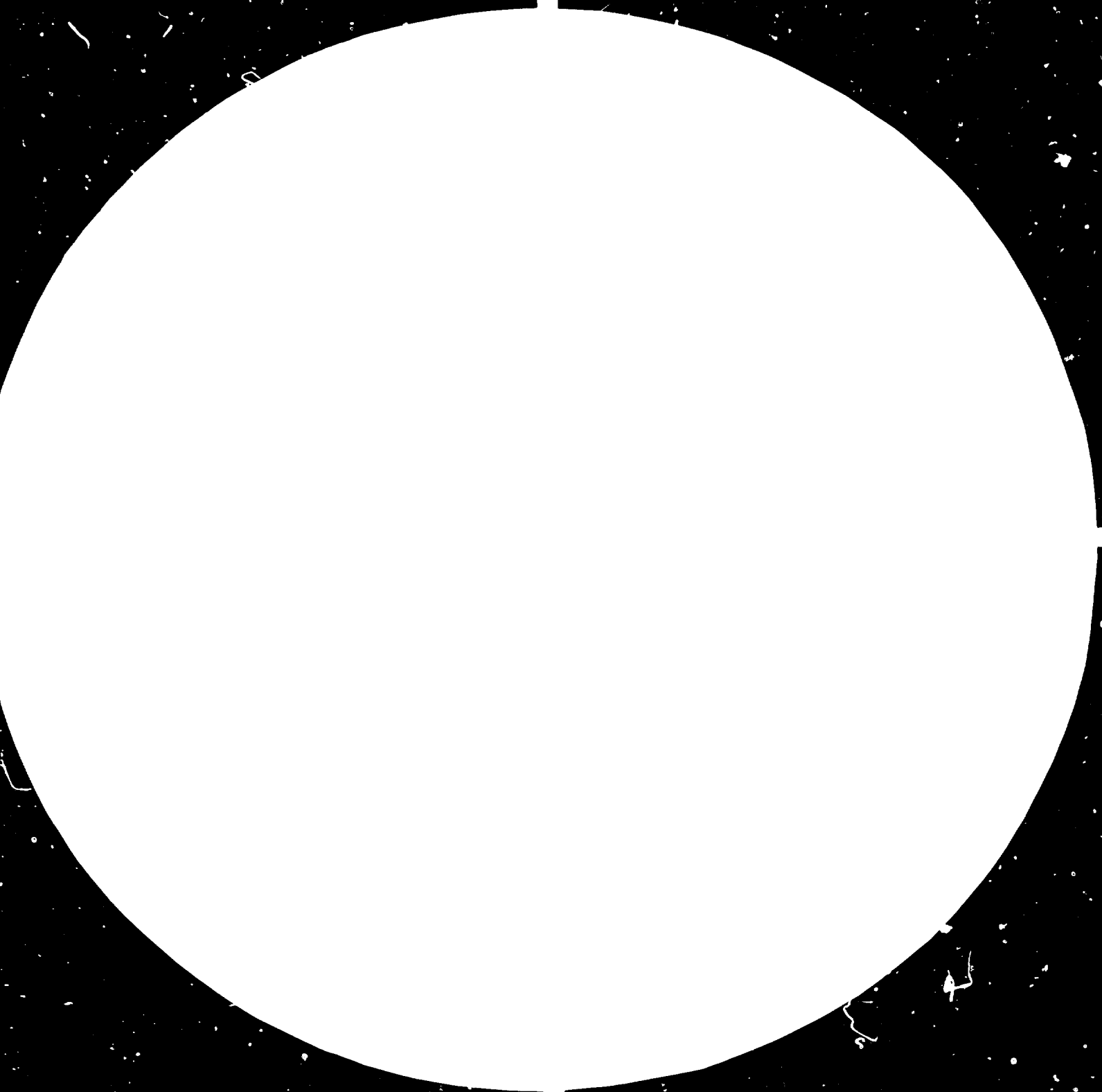
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THE USE OF PLASTICS IN TUNISIAN AGRICULTURE ^{1/}

by

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^{1/} The views expressed in this paper are those of the author and do not necessarily reflect the views of the UNIDO Secretariat. This document has been translated from an unedited original.

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Introduction

From only three in 1962, there are currently nearly one hundred production units in the country turning out plastics of all kinds. As in any other rapidly expanding industrial sector, this growth has not been without a number of difficulties.

One of these difficulties stems from the fact that Tunisia's petrochemical industry is still not sufficiently developed. As a consequence, the manufacturing plants are compelled to maintain large stocks of raw materials, most of which are imported.

The enterprises established during the early years all produced the same standard articles (for household use, packaging, etc.). In the last five years, however, we have witnessed a diversification into other articles, particularly for agricultural use (bags, films, irrigation piping, boxes, etc.).

The Tunisian plastics industries fall into three categories:

- The processing of plastic raw materials into finished products;
- The processing of raw materials into semi-finished products;
- The combined manufacture of semi-finished and finished products.

The total consumption of raw materials increased from 28,500 tonnes in 1979 to 30,800 tonnes in 1980 and is expected to reach 40,300 by 1985. Of this, the amount used for agricultural purposes is about 1,000 tonnes at the present time, a figure which it is estimated will rise to 1,600-2,000 tonnes in 1985.

Use of plastics in agriculture

Plastics are used in Tunisian agriculture, over an area of about 1,000 hectares, primarily as a means of protecting early crops.

The market-gardening of early crops under protective covering has a very long history in Tunisia. In the oldest market-gardening zones (Cap Bon, Sahel, etc.) growers formerly used, as protective coverings, such materials as the thick, fleshy joints of cactus plants, palms, reeds, straw, and coverings of vegetable matter. With the advent of plastics, agriculturalists quickly seized on this material, but failed to observe scientific principles in its use. Subsequently, the techniques in question were further refined and improved, until today plastics are used for the covering of large and small cultivation tunnels, as we shall be discussing below.

Consumption of raw materials for plastic articles
(in tonnes)

Product groups	1978	1979	1980	1985	Balance to be made up through imports (1985)
Household articles	3 565	2 850	3 000	4 200	200
Toilet articles	410	390	350	650	250
School/office supplies	385	400	420	550	300
Toys	390	380	400	600	100
Saddlery	200	200	200	350	-
School articles	4 080	3 800	4 000	5 100	-
Furniture, parts	4 500	2 500	2 800	3 000	100
Electrical parts	3 100	3 300	3 500	5 000	800
Building and water uses	6 060	3 600	4 000	5 000	100
Automotive industries	-	-	-	100	500
Ships and construction of a mechanical nature	220	200	330	450	50
Chemical industry	300	380	400	500	80
Agriculture and gardening	2 000	700	1 000	1 600	50
Miscellaneous	620	500	700	800	500
Semi-finished products	1 400	1 400	2 000	2 600	500
Subtotal	22 830	19 200	21 100	27 900	2 530
Packaging	9 290	9 300	9 700	12 400	200
Grand total	32 120	28 500	30 800	40 300	2 730

In recent years there has been rapid growth in the area of crops grown under plastic and particularly under large plastic shelters. The reasons for this development lie in:

- The climatic conditions which favour out-of-season growing in the agricultural production areas (along the coast);
- Government incentives through the granting of loans for the purchase of the necessary materials;
- Satisfactory sales of the produce grown in this way on the local market and the beginning of export;

- The awakening of public interest as a result of the higher returns on the major investments made possible by the introduction of irrigation to outlying areas;
- Interest on the part of the market-gardener in the increase in profits he can expect from the working of his land;
- The existence of information, extension and technical assistance services operating within the agricultural regions.

The plastics used

The total quantity of plastics used in crop-protection applications amounts to some 1,350 tonnes of transparent polyethylene in sheet form. When used as a greenhouse covering, this material is available in the form of films measuring as much as 6.5 metres in width and up to 180 microns in thickness. Under normal conditions, this film, which is treated with ultra-violet absorbing agents, may be expected to last two growing seasons. When used for the covering of small growing tunnels, widths vary from 1.5 to 3 metres and thicknesses from 100 to 150 microns, according to crop variety.

In their use of this material, growers have come to distinguish between two types of polyethylene (PE) film:

- Short-life PE, and
- Long-life PE.

In general, the short-life film (whose serviceability is limited to one year) is used to cover small tunnels, for the reason that handling, wind and other climatic factors have a serious deteriorating effect on long-life PE and render it nearly useless for a second year, particularly in the case of crops which, like melons, tomatoes, and water-melons, require a great deal of care.

At the present time, long-life polyethylene is favoured as a greenhouse covering, since the installation and removal of the film as well as the other delicate handling procedures associated with these structures are relatively costly.

1. Large shelters

Development and distribution

The first large greenhouses were erected in 1964/65 when three hectares of structures of "Argence" type were built in the Dahmani (Abida) region. After their relocation to the Utique area, these greenhouses were equipped with hot-air heaters and were used in the first demonstrations of crop-growing under protective plastic.

During the period 1973/74 the information and extension services conducted systematic testing involving the growing of a variety of crops in these large greenhouses. The results of these tests were quite positive.

Subsequently, a major effort was required on the part of these services to make growers aware of the advantages of plastics and to encourage them to learn the newly developed crop-growing techniques (use of the proper plastic variety, greenhouse ventilation, humidity and temperature control, etc.).

As a result of this work, from the period 1975/76 to 1979/80 the area occupied by large greenhouses has increased from 11 to 323 hectares, representing an average annual growth rate of 78 hectares.

During the first two growing seasons (1975/76 and 1976/77) during which greenhouses were used on a practical basis in Tunisia, the large greenhouses were concentrated along the coastal zones of Cap Bon and Sahel. Later, their use spread to a number of different governorates, remaining highly concentrated in the coastal areas.

The growth and distribution of greenhouse area is illustrated in the following table.

Crop varieties grown in large greenhouses

Many different kinds of crops have been cultivated in this way; however, occupying as they do 90 per cent of the total protected area, tomatoes, peppers and melons have pride of place. Other crops that are grown in these structures include cucumbers, eggplant, water-melons, marrows, French beans, strawberries, and gumbo.

Growth and distribution of greenhouse area (in m²)

Governorate	1975/76	1976/77	1977/78	1978/79	1979/80
Monastir	12 668	76 902	209 960	576 856	1 163 663
Nabeul	59 882	178 012	267 065	472 302	701 676
Sfax	728	114 163	162 307	328 002	391 138
Sousse	19 035	163 354	255 113	289 876	565 139
Bizerta	-	12 872	73 532	95 356	109 288
Mahdia	-	-	13 824	50 176	72 868
Zaghouan	9 982	13 487	22 402	49 423	64 854
Gabes	2 940	2 880	25 279	41 806	40 426
Jendouba	-	-	13 312	15 648	25 088
Tunis	-	-	9 600	22 437	19 064
Mednine	-	-	-	10 000	9 120
Beja	-	-	1 630	3 008	12 500
Gafsa	-	-	-	480	9 728
Siliana	-	512	952	952	952
Le Kef	-	-	512	512	512
<u>Total</u>	105 235	562 182	1 055 538	1 961 834	3 186 016

2. Small tunnels

Importance

Some 65 per cent of the area cultivated under plastic is used for the growing of early crops in small tunnels. The steadily increasing number of large greenhouses, far from checking the growth of small tunnels, seems on the contrary to have hastened their introduction on a wider scale. The fact is that for a variety of reasons, chief among them being the relatively high price of plastic greenhouses and the lack of experience in the raising of crops under plastic, many growers prefer to familiarize themselves with the new techniques by working with the small tunnels. Thus, from only 30 hectares or so in 1962/63 (at Cap Bon and in the Tébourba region), the area devoted to small tunnels rose to 730 hectares in 1979/80.

Crops grown

A very wide range of crops are grown in small tunnels, including, among others, peppers, tomatoes, melons, water-melons, cucumbers, and marrows. Tomato-growing is the least demanding and most widespread activity (some 40 per cent of the cultivated area).

Other uses

In addition to their use as a covering for large greenhouse structures and small cultivation tunnels, plastics are finding other agricultural applications as well. One of these is mulching, a technique which, on the basis of tests conducted under Tunisian climatic conditions, can be expected to grow in importance in the near future. Mulching provides a means of achieving at least three highly desirable objectives: major savings of water (as much as 35 per cent in melon-growing), earlier crops, and a slight increase in over-all yields.

Still other techniques have also been tested under Tunisian agricultural conditions. Some that might be mentioned are the use of plastics in windbreakers, the lining of irrigation channels and packaging, and the perforation of plastic sheeting for better ventilation.



