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An Assessment of Possible Alternative Price Policies for Cotton in Syria

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Foreword

The Working Paper series aims at supporting the Syrian development and modernisation process by enriching public availability of documentation on agricultural economics and policy studies conducted at the National Agricultural Policy Center (NAPC).

In addition to full-fledged reports, the studies carried out at the NAPC involve the preparation of papers to consolidate the outcomes of on-going researches that provide a reference for future follow-up. The collection of such documents in the NAPC Working Paper series allows sharing with a wider public research results susceptible of further analysis and elaboration.

This working paper describes the conditions of the Syrian cotton sector and of the relevant policy, also introducing an analytical model that can be used to assess the incidence of the current and possible alternative price policies for cotton.

Cotton industry has traditionally been the subject of direct policy intervention in Syria, including setting a fixed price for seedcotton and cotton fibre while attempting to control the total cultivated area by a regime of production licenses. Nowadays, Syria is living through a period of relatively rapid change in the set of policies that affect the cotton industry, change that seems to tend towards increased reliance on market forces to determine production incentives, but which raises concerns for increasing pressure on the budget deficit and on water consumption.

The paper builds up on the results of a research effort carried out by a team of NAPC trainee during the final phase of their specialized training (from January to July, 2003), under the patronage of the FAO Project GCP/SYR/006/ITA-Phase II, funded by the Italian Government. The team, led by Mr Carlo Cafiero, FAO International Consultant, was composed by Mr. Basem Al-Joumani, Mr. Mahmoud Al-Shareef, Mr. Ahmad Sadiddin, Mr. Loay Al-Shakouhi and Ms. Raghad Shweikh. The team worked under the supervision of the Project CTA, Mr Ciro Fiorillo, and the NAPC Director, Mr Atieh Al-Hindi., and benefited from the support on-the-job of the Project Agricultural Economist, Mr Pirro-Tomaso Perri, and the Project Translator, Ms Asma Matar.

The research results have been finalized by Mr A. Sadiddin, during his stay as visiting researcher at the University of Naples, Italy, in spring 2004, under the supervision of Mr Carlo Cafiero, and then arranged in this working paper under the direct supervision of the NAPC Director, Mr Atieh Al-Hindi.

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Abbreviations

ACB	the Agricultural Cooperative Bank
CBD	the Cotton Bureau Directorate
CMO	the Cotton Ginning and Marketing Organization
GESM	the General Establishment for Seed Multiplication
GOAR	the General Organisation for Agricultural Research
GOTI	the General Organization for Textile Industry
MAAR	the Ministry of Agriculture and Agrarian Reform
MEET	the Ministry of Economy and External Trade
MSIT	the Ministry of Supply and Internal Trade
PMC	the Presidency of the Ministers Council
PU	the Peasant Union
SAC	the Supreme Agricultural Council
SP	the Syrian Pound (the Syrian currency)

Introduction

The importance of cotton production

Cotton is the most important among all natural fibres, accounting for half of all the fibres used by the world's textile industry. Its importance is due to its high productivity and the high quality of its fibre, which is widely used to produce textile goods at a competitive cost. In addition, cotton is a major source of employment at both the production and the processing level.

Today, cotton is cultivated around the world in 75 countries, covering a total area of 32 million hectares.

The cultivation period varies from 175 days to 225 days depending on the varieties used. For a good crop of cotton, a long sunny growing season with at least 160 frost-free days and ample water are required. Well-drained and crumply soils that can keep moisture are the best. In most regions extra water must be supplied by irrigation. In fact, cotton is a water-intensive crop (Salloum, SCS -2001). About 55% of world cotton production comes from irrigated land. The remaining 45% is either partially irrigated or entirely rainfed. Because of its long growing season, cotton should be early planted but not before the sun has warmed the soil enough. Besides, a good drainage system has to be applied. The best temperature is 33 degrees, and the average rainfall must be more than 300 mm annually. Areas which are more than 800 meters above sea level are suitable for cotton (Salloum, SCS -2001).

The importance of cotton production in Syria

Syria currently occupies the tenth place in the world in terms of annual average production, with a share of 1.6% of the total (see **Table i.1**) and the second place in terms yield per hectare (refer to **Table i.2**) (Al-Jamal, 2003).

Some economic sources say that more than 20% of Syria's 17.5 million population depends partially or totally on cotton; cultivation, manufacturing, marketing, and other related services (MAAR, XXXII Cotton Conference, 2002). At the end of the 1990s, the value of cotton production was SP29 billions. By then, the value of produced cotton was almost equal to 2.5% of GDP and about 10.7% of the agricultural production value.

It is the first among agro-industrial crop in terms of production value, the second exported item in overall exports (following oil) and the third most important contributor to GDP, after petroleum and wheat (Muna, 2001). Therefore, cotton is probably the most important strategic crop for Syrian agriculture.

Table i.1 - World cotton production (Unit-million of 480-lb.bales)

Country	97/98	share %	98/99	share %	99/00	share %	00/01	share%	01/02	Share %
China	21.1	23.0	20.7	24.4	17.6	20.2	20.3	22.9	24.4	24.9
USA	18.8	20.5	13.9	16.4	1.7	19.5	17.2	19.4	20.3	20.7
India	12.3	13.4	12.9	15.2	12.2	14.0	10.9	12.3	11.8	12.0
Pakistan	7.2	7.8	6.3	7.4	8.6	9.9	8.2	9.2	8.2	8.4
Uzbekistan	5.2	5.7	4.6	5.4	5.2	6.0	4.4	5.0	4.9	5.0
Africa F.zone	4.3	4.7	4.0	4.7	3.9	4.5	3.2	3.6	4.6	4.7
Turkey	3.7	4.0	3.9	4.6	3.6	4.1	3.6	4.1	3.9	4.0
Brazil	1.7	1.9	2.1	2.5	3.1	3.6	4.3	4.8	3.6	3.7
Australia	3.2	3.5	3.3	3.9	3.5	4.0	3.7	4.2	3.1	3.2
Greece	1.7	1.9	1.8	2.1	2.0	2.3	2.0	2.3	2.1	2.1
Syria	**1.6**	**1.7**	**1.6**	**1.9**	**1.5**	**1.7**	**1.7**	**1.9**	**1.6**	**1.6**
Egypt	1.5	1.6	1.1	1.3	1.1	1.3	0.9	1.0	1.4	1.4
Turkmenistan	0.9	1.0	0.9	1.1	1.1	1.3	0.9	1.0	0.9	0.9
Argentina	1.4	1.5	0.9	1.1	0.6	0.7	0.7	0.8	0.3	0.3
Iran	0.6	0.7	0.6	0.7	0.6	0.7	0.7	0.8	0.6	0.6
Paraguay	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.3	0.3
Others	6.2	6.8	6.1	7.2	5.6	6.4	5.5	6.2	6.1	6.2
world total	91.8		85.0		87.3		88.7		98.0	

Source: US cotton market monthly economic letter. 10 May 2002. http:/email.bharattextile.com/texstat6.php

Table i.2 - The order of cotton yield of the producing countries.

Country	Yield of ginned cotton per hectare
Australia	1,528
Syria	**1,414**
Turkey	1,319
China	1,096
Brazil	1,049
Spain	1,039
Greece	1,037
Mexico	1,008
Egypt	926
Kazakhstan	781
U.S.A	708
Uzbekistan	668

Source: (Al-Jamaal-2003)

Chapter 1 – The Cotton Industry

1.1. Farming

Cotton cultivation in Syria has been known for a long time. Idelby variety had been cultivated, especially in Aleppo and Idleb governorates, in rainfed farms since 1923. Due to the low profitability and low yield of the rainfed cultivation, Syrian Government has been promoting irrigated cotton mode since 1983[1] (Helaly, 2001).

About 98% of total Syrian cotton is produced by private farms; the remainder is grown in low-yield state-owned farms whose area is some 5000 hectares. The majority of the private production takes place on farms owned by the farmers that mainly depend on family labour, the rest of the production occurs on rented or share-cropped land (Westlake, 2001).

1.1.1. Planting

Farmers begin planting cotton in the second half of March, but the greater part of cultivated area is planted in April. Planting dates differ according to the governorate and the mantika. It starts on March 23 and lasts until April 10 in Homs and Hama governorates (including Al-Ghab) in addition to Euphrates area (*Sareer*) in Al-Raqqa and Al-tebni and Al-jathrat in Der-Ezzoor. However, it occurs between April 1 and April 20 in the rest of the country except Almedakh in Aleppo where it lasts until April 25.

Cotton, in Syria, is generally planted on rows separated by a distance of about 60-65 cm between each two rows[2].

Patching and spacing follow planting. They occur 15 and 30 respectively days after planting. Spacing is always accompanied by hoeing and weeding. Furthermore, the last two operations are performed usually twice. The second time occurs about three weeks after the first one.

Planting is usually done depending completely on family labour. However, patching and spacing are demanding operations and they are difficult to be managed only using family labour. Therefore, farmers usually hire additional labour to achieve these operations in time.

1.1.2. Fertilisation

Cotton, in Syria, needs two kinds of fertilizer. The first is phosphor and it is added (as super-phosphate) before planting and covered with soil. The second is Nitrogen and it is usually added (as urea) at four dates. The first dose (20%) comes right before planting, the second (40%) occurs about 30 days after planting (right after spacing), while the third and the forth (20% each) occurs approximately 60 to 75 days after planting. Fertilization is usually followed by a small irrigation dose.

[1] Refer to **Table 1.1** in the appendices, which indicates the area, the production, and the yield of irrigated and rainfed farms, before the adoption of irrigated cotton mode in 1983.
[2] Farmers are not allowed to plant cotton by spreading the seeds.

The performance of fertilisation is mostly done by family labour; it is only done by hired labour in some of the very large farms. However, the share of such farms to the total in terms of area is too small to be relevant in our study.

1.1.3. Irrigation

Syrian cotton is a summer irrigated crop that occupies about 20% of the country irrigated area[3], consuming some 3-4 billions of cubic meters of water which corresponds to about 25% of domestic annual available water (Somi, 2001).

Most of farms have been applying the flood irrigation system. Whereas, the Government through the Ministry of Agriculture and Agrarian Reform (MAAR) encourages farmers to apply new efficient technology like drip irrigation mode through the provision of extension advice and loans that reach an amount approximately equal to about SP75, 000 /ha (Westlake-2001).

Irrigation is considered one of the most important factors that affect quantity and quality of cotton production. Therefore, it is important for the farmers to follow the scientific principles of irrigation by delivering sufficient quantities of water at the corresponding dates, since organizing the irrigation operations during the first growing period and avoiding the thirstiness of plants increase the yield by 50% (Somi, 2001).

Cotton water needs vary according to the differentiation in the ecological conditions (humidity, rainfall, soil quality, etc) of the different areas in which cotton is cultivated. In **Table 1.1**, it is shown that water need of cotton varies between 7771 cm/ha in Al-Ghab and 12408 cm/he in Al-Hassakeh, taking into consideration that these quantities differ inside each governorate according to the differences in growing period and the soil quality.

Table 1.1 - water needs in cotton cultivation governorates

Governorate	Homs	Hama	Al-Ghab	Idleb	Aleppo	Al-Raqqa	Der-Ezzoor	Al-Hassakeh
Water need cm/he	8556	9561	7771	9744	9887	10289	12408	11075

Source: (Somi, 2001)

If the soil has a medium quality and underground water level is not high, the first irrigation dose should be given right after spacing cotton plants; the second occurs two weeks after the first and so on, the last dose happens two weeks before the beginning of the harvest season. Nevertheless, if the soil is enough fertilized or underground water level is high, it is advisable to reduce the irrigation dose number and so the irrigation water quantity.

Furthermore, it is known that water needs are affected by the irrigation efficiency which is, in turn, affected by the used irrigation technology.

Cotton cultivated area has been substantially expanded in the 1990s from 156,000 hectares, in 1990, to a peak of 275,000, in 1998. This has basically been the result of increasing the total area of irrigated land in Syria resulting from increased use of water from the Euphrates Dam (commissioned in 1974) and from dams commissioned in the early 1990s in Al-Hassakeh.

However, the recent drought and the associated shortage of irrigation water, has forced reductions in the area devoted to cotton in the annual agricultural plan that MAAR sets. This area fell to 256,000 hectares, in 2000, and to 199773 hectares, in 2002[4].

After adopting irrigated cotton mode only in 1983, yield per hectare has risen substantially, from 2,979kg/ha, in 1983, to 4,100kg/ha, in 2001, and the production has risen from 384,000ton, in 1970 to, more than one million tons, in 2001[5].

[3] There are roughly 1.3 million hectares of irrigated land in Syria (Westlake-2001).
[4] About 2910 ha faced a big flood, and about 3484 ha faced thirstiness and drought as a result of Zeyzoun Dam collapse which took place on Jun4, 2002.

This yield increase has resulted from the following factors:

1. The development and adoption of new, environmentally adapted varieties as Raqqa 5, Aleppo 90, Der-Ezzoor 22, etc. which increased cotton production by 40%
2. Adoption of furrow planting (that gives a 20% higher yield than flood planting) and improved irrigation techniques[6]
3. Improved agricultural extension
4. Increasing of farmer's agricultural knowledge (Westlake, 2001)

1.1.4. Harvesting

Syrian cotton is picked up by hands. Harvest season starts when 60-70% of the bolls open, then farmers pluck the first harvest (this harvest is the best one in terms of quality). When most of the remaining bolls open farmers pluck the second harvest. Sometimes, there is a third harvest if the weather remains warm without any rain; however, quantity of the last harvest is very small, and the major part of the farmers does not submit it into the Cotton Marketing Organisation (CMO)[7].

The beginning of the harvest differs according to the soil character, cotton variety, planting date, irrigation mode, and other agricultural operations. In general, harvesting season lasts until the end of October (sometimes until the middle of November). Cotton bolls do not open at the same time, and it takes about two months from the opening of the first and the last boll.

Cotton harvesting is the costliest operation, and it needs very much labour compared to the other operations. Due to its high labour requirements, most farmers depend at least partly on hired labour to achieve this operation in time in order to obtain the highest price for their production, since cotton price in Syria depends partly on the delivery date[8].

Farmers fill the seedcotton in clothsacks with capacity equal to about 160 kg each, and Agricultural Cooperative Bank (ACB) insures the sacks for farmers and early determines their price[9].

There is always a difference between the quantity delivered to the CMO ginneries and the estimated quantity measured from a random sample by the MAAR[10]. This difference is attributed to the sneak of some quantities into the domestic market. The majority of this sneak is used for mattresses and pillows manufacturing, or it is sold to illegal small-scale ambulant ginneries. The latter, if identified, are destroyed by the government. This is principally done to prevent farmers from using cottonseeds to plant unlicensed area, and to avoid mixing different species of the seeds[11]. In fact, the difference can be also attributed partly at least to some losses created during the harvest seasons. The latter usually occurs due to some early rainfall or because some farmers do not pick up the last harvest, since it is sometimes economically inefficient.

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[5] Refer to **Table 1.2** in the appendices.

6 In spite of the big importance of watering sources and the limitation of these sources, the efficiency of its use, in agricultural sector, are stile poor, and the losses at field level are the biggest ones, at which flood irrigation mode has been used in most irrigated land, without taking into account economic water requirements, and the fit relation between water and soil (Westlake-2001).

[7] This may partly explain the difference between the estimated production of MAAR and the real quantities delivered into the CMO.

[8] For more details, refer to *current policy* section.

[9] Refer to *current policy* section.

[10] Refer to *current policy* section.

[11] Refer to **Table 1.3** in the appendices, which show cotton quantity that should have been delivered from planed and unplanned areas, in addition to actual received and sneaked quantity.

The official price of cotton is divided into three grades according to the delivery time[12]. In addition, the price depends on the quality of cotton. This price policy aimed at encouraging farmers to early planting and then early harvest to avoid the early rainfall during the harvest season. In fact, the occurrence of such early rainfall might negatively affect the quality of the product; moreover, might cause some quantitative losses.

As a result, of this categorization, farmers overcrowd in a short period to deliver their production and this may cause some bottle necks, which could be summarized in the following:

- Rise of transportations cost
- Rise on harvest labour wages
- Harvesting the crop at premature ness time

1.1.5. Agrarian Rotations

The MAAR is encouraging cotton farmers to adopt standard rotations of wheat/cotton that lead to a typical cultivation of cotton once in every three years on suitable irrigated land. However, If there were sufficient water, the maximum that cotton could be cultivated without causing serious disease and soil fertility problems would be once every two years (Westlake-2001).

Cotton is cultivated in Syria in the following governorates: Al-Hassakeh, Al-Raqqa, Dair-Ezzour, Aleppo, Hama, Idleb, and Homs. The other crops cultivated beside cotton differ in their variation, their planting harvesting dates, and their areas according to the different governorates and mantikas. Wheat is cultivated beside cotton in all governorates, however, since it is a winter crop while cotton is a summer crop, wheat cannot be, in principle, considered a competing crop to cotton in the agrarian rotation. Nevertheless, the overlap of the two crops' seasons (cotton planting is in March while wheat harvesting is in June) makes the cultivation of cotton after wheat harvest unfeasible within the same season. Therefore, cotton can only be planted once every two years on the same land plot. Thus, technically speaking, cotton can occupy 50% of the land plot every year, while wheat can occupy the remaining 50%.

Some summer crops, such as sugarbeet and potato, are cultivated in other parts of the country and compete with cotton. These two crops are cultivated in February and harvested in July, so they cannot be cultivated as intensive crops after wheat harvest in the same plot; consequently, they are competing crops to cotton. Sugarbeet plays a significant role in this context due to the large Government intervention in its cultivation through setting pricing and licensing systems similar to those of cotton. In addition, the big involvement of the parastatals in its marketing makes it preferred by farmers because this involvement reduces the risk of price fluctuations, from which the unregulated crops like vegetables suffer.

To determine the agrarian rotations prevailing in cotton farms, precise field survey should be conducted, but the available data from the statistical abstract of the MAAR are useful to present a general picture. In Al-Hassakeh, cotton is the only important summer crop in terms of area cultivated, but sugarbeet is also important in both Al-Raqqa and Dair-Ezzour Governorates. In the remaining governorates (Aleppo, Idleb, Homs, Hama, and Al-Ghab), potato is also an important crop in the rotations practiced by farmers.

The cultivation of these three crops (cotton, sugarbeet and potato) is constrained by several factors, among which: total area of the farm, agrarian rotation requirements, water availability, licensing system for each crop. The latter is considered a big constraint that limits the expansion of cotton and sugarbeet cultivation since the marketing of these two crops is confined to parastatals. Nevertheless, the statistics of the MAAR clarifies that many farmers expand the cultivation of cotton beyond the licensed areas. This is explained by the existence of an informal market for cotton. However, water scarcity in several areas makes the expansion of the cultivation of these three crops very difficult especially considering that they are water-intensive

[12] Refer *to "the current policy"* section.

crops. In addition, the agrarian rotation requirements limit the area of the three crops in total to only 50% of the farm area since these crops are soil-exhausting and should be followed by less exploiting crop (wheat) in the subsequent season or left fallow.

1.1.6. Services Given by the Agricultural Departments

The agricultural directorates supervise cotton crop at governorate level by periodical reports delivered to the agriculture department by extension units in relevant villages.

The agricultural department gives farmers enlightenments, advice at the farm level, offers free soil analysis and free insect control, if the damage, caused by pests or epidemic, exceeds the economic threshold. Also there are extension fields to induce farmers to retreat using insecticides.

Agricultural departments have been advising to use safe alternatives to pesticides, such as organic-genesis and biotic control. In 1988, a laboratory at Aleppo University was established to breed biotic enemies such as *Trichogramma Parositoide*. Also, another laboratory was established in Der-Ezzoor to multiply parasites such as *Habrobrakon hebtor*. As a result of that, the area controlled by the chemicals dropped from18.9% in 1987 to 0.30% in 2002 of the total cotton cultivated area.

The Cotton Bureau Directorate (CBD) issues monthly extensive programs for cotton and delivers them into extension departments at the governorate levels to generalize them to cotton farmers. Besides, it issues scientific materials announced in informative programs on TV or Radio.

1.2. Ginning

Cotton fibre is obtained by removing the seeds in a ginning machine. Cotton fibre is then spun into yarn, which is woven or knitted into a fabric. Cotton fibre is then pressed into Bales for delivery to Spinning Mills.

Cotton is Roller Ginned or Saw Ginned depending on cotton varieties and ginning characteristics.

Syrian cotton is of medium staple length, which is the most common staple length produced worldwide. The CMO, which was established in 1964, has the responsibility of ginning and marketing the domestically produced cotton by:

- Purchasing the seedcotton from farmers
- Ginning the purchased seedcotton
- Controlling and developing the ginning mills in the whole country
- Providing cotton to the private and public spinning mills
- Exporting the surplus to the international markets

The CMO organizes this process through three stages:

- Cotton delivering
- Cotton ginning
- Cotton selling and marketing

1.2.1. Cotton Delivering

Farmers should submit their seedcotton into the ginneries or the closest purchasing centre of the CMO, which has one in Al Hassakeh and two centres in Al-Raqqa. In the purchasing centres and the ginneries of the CMO, there are delegates of agricultural department. These delegates are the responsible of giving the certificates of origin, including the number of clothsacks and the percentage of licensed and unlicensed area.

Cotton is delivered into the CMO purchasing centres and ginneries according to the certificate of origin, issued by the extension engineers to cotton farmers. Since the laboratories of cotton quality are not available, fibre length and class are determined by experienced classers, and these operations are achieved by hand according to the percentage of dirt, spots, colour, ripeness, etc. as it is done in most of the world. All the information is entered into a computer card and sent to the CMO centres to be checked.

The CMO normally pays farmers approximately 15-20 days after the delivery date. During this period, the quality of their cotton and their credits with the ACB.

1.2.2. Cotton Ginning

The CMO has 15 saw ginneries, located in Aleppo (7), Homs (4), and one in each of Dair-Ezzour, Al-Hassakeh, Hama and Idleb, in addition to one that was opened in 2003 in Al-Raqqa.

Ginning commences in late September and is completed by July or August, depending on the size of the national crop. The capacity of the existing ginneries has been increased over the past years.

Typical ginning out-turns are as follows:

- Cotton fibre: 33%
- Seed: 63%
- Losses: 4%

Cotton fibre is compressed into bales (200 kg each). The CMO needs almost three to four months from purchasing the seedcotton from farmers and receiving payments for sales of cotton fibber and seeds. During this period, the CMO finances its working stocks and other costs through loans borrowed at an interest rate of 7.5% per annum.

Some constrains in ginning are:

- The old mills have been still working so far.
- Ginning mills are not equally distributed according to the production areas.
- There is no enough professional labour.
- There is a big problem since spare parts of machines are unavailable.

1.2.3. The Sale of Cotton Fibre

The CMO sells the production of cotton fibre in local and world markets. The priority is for public sector in terms of quantity and quality, and then to the domestic privet sector, it exports the rest. In 2002, the CMO sold 145296 tons to the domestic market and export 259873 tons.

Cottonseed for agricultural uses is grown and ginned separately from commercial cottonseed. The CMO sells seed for planting to the General Establishment for Seed Multiplication (GESM) at the same price that it sells seed to oil mills, private and public.

Chapter 2 - Competitiveness and International Trade of Cotton Fibre

In principle, cotton fibre is a tradable good. It is thus of interests to analyse and study the possible comparative advantage and the potential for international trade of this good.

Domestic prices for cotton fibre in Syria are higher than those in world market[13]. Nevertheless, import of cotton fibre and seedcotton is prevented by the presence of high tariffs, which maintain isolation of domestic production from the world market. To understand the reasons of the difference between these two prices, and the directions of comparative advantage, we will first study and analyze the cost for the CMO to gin 1 kg of seedcotton; second, we will calculate the Export Parity Price to get an idea on comparative advantage.

Table 2.1 (in the appendices section) is taken from the budget of the CMO and shows the cost for the CMO to produce 1 kg of cotton fibre from seedcotton, as calculated in the season 2002/2003.

Given the conversion rate of the CMO (each 1 kg of seedcotton gives 330 grams of raw cotton, 630 grams of seeds, and 40 grams of wastes), the cost of 1 kg of cotton fibre is equal to SP 82.13 (table 19).

Referring to **Table 2.1** (and **Table 2.2** in the appendices)

We notice that:

- The table shows that the bank interest on the current account and overdrawn account paid by the CMO was 2.23 SP for each 1 kg of seedcotton and 6.69 SP for 1 kg ginned cotton (fibre);
- Each 1 kg of seedcotton gives (according to the CMO rate) about 330 grams of ginned cotton. Since the world conversion rate is above 350 grams, on average, the cost of 1 kg cotton fibre is SP 79.5 (**Table 2.1**). Being the Syrian cost at SP 82.128 (due to the country conversion rate), we notice an extra cost of SP 2.6 compared to the world situation (on average).

Table 2.1 - Cost of ginned cotton in the CMO

cost of purchasing marketing and ginning 1kg of seedcotton	31.42 SP
Charging for ginned cotton	86.25 SP
Conversion rate to price	0.33 %
Cost of producing 1kg of cotton fibre from seedcotton	82.128 SP

Source: (CMO, Internal document-2003)

As a result, each kilogram of cotton fibre charges an additional cost due to the inefficient conversion rate and the existence of a bank interest that result in an extra cost equal to SP 9.29 (or about 11.3% of raw cotton cost and 35% seedcotton cost).

[13] See table V in the appendices.

Table 2.2 (in the appendices) shows that the actual price at farm gate is higher than the export parity price. This means that raw cotton does not have a comparative advantage in Syria at current world prices. However, what is mentioned in this chapter does not completely explain all relevant issues related to the fact that domestic cotton price is higher than world price since the story has another aspect related to the support provided by developed countries, especially the USA and some EU countries. This results in encouraging farmers of these countries to increase cotton production causing downward pressure on the world cotton price.

Chapter 3– The Current Cotton Price Policy

Since 1960, the Syrian Government intervention in agriculture has been based on the implementation of medium term plans (five years), supplemented by annual executive plans. The stated aim of the annual plans is to steer farmers towards the pattern of land use that the government perceives the best one to meet national objectives. Given its importance, cotton has always been at the core of Syrian agricultural planning.

There are many instruments through which the Government aims at enforcing the plan. The main instruments used for the agricultural cotton sub-sector are the setting of a controlled price and the control of total production by means of a licensing system.

For some time, thanks to the favourable conditions on the world market for cotton, the controlled price could be raised up to levels that permitted good profit margins for farmers while allowing the Government to earn a surplus by exporting the excess supply. In the 1990s, the cotton basic price was raised gradually from the level of SP18.25 (in 1992), to SP30.75 (in 1996). At the same time, the Government could still earn high revenues from exports given that the intervention price was still set at a level below the world price.

This policy, combined with the adoption of new cotton varieties and the expansion of water availability, has caused a dramatic increase of the cotton cultivated area [14](Westlake, 2001).

Recently, the conditions on the world market have radically changed making the policy increasingly costly for the Government. The domestic official prices of cotton are now much higher than the world price, and to maintain the policy in place would have caused large deficits with negative effects spilling over the domestic manufacturing sector which was, until recently, forced to pay cotton at the official price plus a margin.

Another problem caused by the expansion of cotton production relates to the fact that cotton is a water intensive crop, giving the growing concerns about water availability in Syria.

The combination of these effects has generated a lively debate on the sustainability of the policy and has led to some changes (see below), while more reform is expected in the future. To allow for a better understanding of the structure of the Syrian policy for cotton, its objectives and of the tools used to achieve them, a detailed description of the Syrian cotton policy is discussed right below. The description is coupled with a special focus on the most recent changes in the policy and the tools of its implementations.

3.1 A Historical Background about Cotton Policy

Since 1965, Syria has faced two stages in the evolution of its price policy of agricultural products. From 1965 to 1986, the responsibility for administering the price planning policy was distributed among several ministries. In 1969, Law No.158 gave the Ministry of Supply and

[14] Refer to table 1.2 in the appendix.

Internal Trade (MSIT) the mission of setting the price levels on the basis of analysing the production costs carried out by the MAAR. Up to 1986, the study of production costs was not very precise and there was not a precise policy to determine the profit margins to be added to the cost.

From 1987 onward things have changed: in 1988, the decree No.16 stated that the prices' determination of crops should have been done based on an estimate of the production costs obtained by surveys conducted at the farm levels. Furthermore, the price included a profit margin that ensures good incomes for farmers. Therefore, the profit margins increased by 30-60% compared to the previous price level. To implement such mechanism, the Supreme Agricultural Council (SAC) forms a Cost Calculation Committee embedded in the MAAR. This Committee, based on periodic estimates of farm costs and annual estimates of cost changes, determines every year the expected average unit cost of production for each regulated crop at the Country level. The Committee consists of members from the MAAR, the MSIT, the Peasant Union (PU), the National Bureau of Peasants, the Agricultural Engineering Syndicate, and the ACB.

3.2 Description of the Current Policy

3.2.1 Planning and Licensing Policy

The dispositions on planting cotton depend on production plans, according to the decree No.222/1958, known as the "*law of cotton planting management*".

Before the agricultural season and according to the general indication of the agricultural plan and the shares of strategic crops set in the plan, committees from the directorates of agriculture of each governorate discuss the previous production plan and identify the new irrigated areas in coordination with the extension units of the relevant villages. The extension unit in each village sends the names of the farmers that can (and are willing to) plant cotton to the agricultural maslahas in the mantikas, which calculate the total areas and send them to the directorate of agriculture.

According to them, the directorates of agriculture propose a new production plan and send the tables of the irrigated areas with the expected production and yield to the MAAR, which in turn, discusses it in the Presidency of the Ministers Council (PMC). The final approval to the plan is made by the PMC, which adjusts it if needed before giving the final approval. Then the MAAR sends the plan to the directorates of agriculture in the different governorates, which distribute it to the agricultural maslahas to be diffused to the extension units and the peasant cooperatives to be finally performed.

The directorate of agriculture in each governorate has flexibility in allocating the plan among its different mantikas taking into consideration water availability[15]. At the mantika level, the plan is distributed to the villages according to a percentage, which is calculated by dividing the area of the cotton plan in the mantika over the total agricultural area (excluding the trees area). At the village level, the extension unit of the village is responsible for supervising the implementation of the plan. Usually, the allocation of cotton plan is defined in the agricultural licenses that the farmers obtain from the extension units to be used for obtaining the annual short-term credit from the ACB (see below). Furthermore, the share of cotton area relative to the total at the farm level is generally consistent with that of the village level. In other words, if the share of cotton area in a specific village were 25%, the area that each farmer can cultivate with cotton should not exceed 25% of his farm area.

[15] The most important criterion used at the national level to distribute the cotton cultivation plan among the different governorates is the available water recourses. However, other criteria are also important such as the feasibility of cotton cultivation due to the ecological conditions.

Each farmer has a fixed percentage to plant cotton, according to the area he has and the resources of water he uses for irrigation. Any farmer that has at least one hectare can get a license, provided the existence of a formal document stating that he has access to the land. However, if irrigation water source is a well (underground water), a farmer should also provide a document stating that the land he has access to includes a licensed well.

In case of farmers who have unlicensed wells, the MAAR nominates special committees to ensure that the well is appropriate to cotton planting. If so, the farmer can obtain the license even if the well is unlicensed.

To get it, the farmer has to fill a request for the license and give it to the relevant agricultural maslahas or extension unit**.** The license document is produced in two copies, one for the farmer and the other to be sent to the ACB for credit.

3.2.2 Credit Policy

The ACB is the only formal source of credit for Syrian farmers. In addition, the Government depends on it for the performance of some of its agricultural policies especially those related to the strategic crops from which cotton is of special importance.

Based on the license issued to the farmer, the ACB issues loans in money and in kind at two different times of payments. The **first payment**, which starts at the beginning of February and lasts until April 30, (according to the planting dates) is granted to the farmer as an in-kind loan and monetary ones. The in-kind loans are usually in the form of seeds and fertilizers. The maximum amount of seed a farmer is entitled is determined in light of the Cotton Conference recommendations. Usually, a farmer obtains either 70 kg/ha for planting plus 20 kg/ha for patching of normal seeds (unshaved), or 50 kg/ha for planting plus 10 kg/ha for patching of shaved seed.

The bank buys seeds from the GESM, which annually sets the price of these seeds. Since 1999, the price of one kilo gram of normal seeds is set at SP10 while that of the shaved seeds is sold at SP11.9.

All seeds of all varieties have the same price, except for the Aleppo 33 variety, which is slightly more expensive. The bank determines a profit margin about 20%, and takes a commission of SP100 per ton from the farmers for each sold tons, as agreed with the GESM.

The amount of chemical fertilizers is also determined on the base of the Cotton Conference recommendations. The bank is the only institution specialized in receiving and differentiating the chemical fertilizers. These fertilizers are either imported by the General Establishment for Foreign Trade that belongs to the Ministry of Economy and External Trade (MEET), or bought from the relevant public factories, which belong to the Ministry of Industry.

The decision No. 24, on April 30, 2001, issued from the SAC, stated that the chemical fertilizers should be sold at the real cost price of each season that, annually, is reconsidered if there is any change in its cost. The monetary part of this payment is equal to about SP1000 per dunum[16].All financing operations are stopped five days before the end of planting dates.

The **second payment**, which occurs between August 1 and November 30, is also granted to farmers as in-kind loans and monetary loans. The in-kind loans are in form of jute bags. the ACB provides farmers the jute bags whose number is determined in the Cotton Conference recommendations (usually it is about 2.5 bags per dunum). In fact, the ACB offers farmers two kinds of jute bags: used bags that the bank buys from the CMO, and new bags that the General Organization for Textile Industry (GOTI) ensures (either by manufacturing or by importing) for the bank. Annually, the ACB issued an administrative generalization indicating the prices of used and new jute bags, depending on the decisions of the CMO and the MEET, that respectively refer to new and used jute bags. It is important to stress that the used bags are sold with a

[16] One hectare is equal approximately to ten dunums.

commission for the CMO of about 3.5% of the sale price. In 2001, the price of used bags was SP40, while the new ones were SP85. In 2002, the price of used bags was SP40, while the new ones were SP87. The monetary part of this payment is about SP500 per dunum.

The interest rate that farmers have to pay is 4% for public and cooperative sector, 5.5% for private sector. Whereas for loans over 50,000 SP related to just one crop, the interest rate increases to 6% for public and cooperative sector and 7.5% for private sector.

Since farmers face many risks (drought, deceases, frost, etc) the bank ascertains these events and estimates the percentage of injuries. If the farmer is not able to pay his debt, the bank agrees on delaying it to the next year and divides it into instalments. On April 3, 2000, the legislative decree No. 2 came into force to exempt damaged people from repaying interests and fines; while the loan itself is divided into instalments for five years. Furthermore, ACB offers loans to farmers that want to use new irrigation methods, according to its decision No.2404/6 on March 5, 2000. This decision allows loans to implement modern irrigation, which are enough to install modern irrigation schemes sufficient to irrigate up to 50% of irrigated area by both sprinkler and drip irrigation modes. In light of the decree No.1016 on December 9, 2001, the previous decision was adjusted by a new one No.2172/2 on February 17, 2002. As a result of this decision, the loans are given according to the production plan and the percentages of crops in agricultural rotation. Therefore, new irrigation modes are financed according to the planned areas for cotton with drip irrigation groups, as the Central Bank of Syria published in the announcement No.10/308 on July 16, 2001. **Table 3.1** summarises the credit system for drip irrigation used for cotton.

Table 3.1 - The credit system for drip irrigation for cotton

Area (Dunum)	Financing rate SP/ (Dunum)	The roof of credit
1-20	10,000	180,000 sp
21-50	9,000	425,000 sp
50 and above	8,500	1,000,000 sp

Source: the ACB

The period of a loan is 10 years for collective irrigation projects (3 wells or more) but only 5 years for individual irrigation projects.

3.2.3 The Supervision of the Plan Performance

The directorates of agriculture supervise the performance of the production plan through the agricultural maslahas and extension units. Two months after planting, an engineer from the extension unit and a member from PU define, for each farmer, the planted areas (licensed and unlicensed). In addition, they check if the farmer plants unaccredited variety (the MAAR decides for each governorate the variety that the farmers should plant). At the end of August, the same committee identifies the expected production (by taking a random sample). Then they send tables to the cotton departments with this information, to be used by the CMO to pay for farmers when they delivered their production. The agricultural department forms another committee that refines the work of the previous one. This committee consists of: an engineer from PU, an engineer from the agricultural maslaha in the relevant mantika, and a person from the Ruling Party. This work is supervised by a committee from the directorate of agriculture in the relevant governorate. Sometimes, a further supervision is given by a committee directly appointed by the MAAR. All these committees assure if the farmers comply with the production plan for the area. To determine the expected production for all the country a Random Sample Method is used.

The random sample method

Several committees are formed in every governorate (the committees' number differs according to each governorate' size); each committee consists of an engineer from the agricultural economy maslaha and an engineer from the cotton maslaha in the relevant directorate of agriculture. These committees choose two villages in each mantika depending on the distributed licenses to the farmers. The villages should be representatives of the mantika. Then they select two farms in each village to be representatives of the village. The selected farms' area should account to 8% of the total licensed area of cotton. Next, the committees estimate the expected production and the cultivated areas (licensed and unlicensed), by doing two field visits.

The **first one** is at the end of May, after the planting processes. In this visit, the engineers estimate all the cultivated areas (licensed and unlicensed) in the selected farms, then they calculate the average of licensed and unlicensed areas for the two representative farms and generalize the results at village level. The average of the two villages is generalized at the mantika level and so on for governorate and national levels. In the same visit, the engineers select small pieces of land, each of them about 1 m^2, summing up to about 1% of the farm size and border them with ropes.

The **second visit** is in August, two weeks before harvesting. The same committee harvests the pieces of land bordered in the first visit, weigh all the balls, and estimate the yield. They apply the yield at the farm level, and the average yield of the two farms is applied at mantika level. At this stage they calculate the expected production for the mantika by multiplying the estimated area with the estimated yield. The results apply also at governorate and national levels.

A central committee supervises the work of the five committees and reports to the MAAR. The central committee is composed by the Director of Statistics and Planning of the MAAR, the Head of Cotton Maslaha of the MAAR, the Director of the statistics bureau of the PU, and the director of agricultural statistics of the Central Bureau for Statistics.

This method was omitted on the basis of the recommendations of the Cotton Conference of March 2003, the justification for the omission was that the selection method of the sample depended mainly on the administrative units which cannot be representatives of cotton producing areas.

Now the extension units do have the responsibility of estimating cotton area and yield by constructing tables including the names of all cotton farmers in addition to their cotton area, licensed and unlicensed, then they estimate the actual yields of farmers by performing field visits[17].

The expected production for agricultural season 2002, on the base of the random sample, was 802,178 tons, resulting from 199,773 hectare. This area is 22.29% less than the cultivated area in 2001. This led to a reduction of production of about 207,648 tons.

3.2.4 The Pricing Policy

The setting of cotton price was of the authorities assigned to the SAC on the light of studying the costs of production. This study is done by a committee from the MAAR, the MEET, and the PU. Since 2001, the setting of cotton price has been assigned to the Council of Ministers after dissolving the SAC. However, cotton prices have not changed since 1996.

Before 1992, the setting of cotton prices was according to the costs of production plus a profit margin but regardless of the delivery date of the production to the CMO. In September 1992 a decision issued from the SAC decides that cotton price should also depend on the delivery date as follows:

[17] The workers of the extension units face several difficulties during the estimation of the areas and the yields due to the lack of sufficient trained staff in addition to the lack of the suitable equipment.

- SP21.00 /kg for a delivery date between the beginning of the season and 31 October;
- SP18.50 /kg for the delivery date from 1 November to 30 November;
- SP15.00 /kg for the delivery date after 30 November.

Thorough the time, the reference dates have been repeatedly adjusted and the prices increased to take into account the increases of the costs. In 1995, on the base of decision No.23 of the SAC issued on August 10, the prices and the dates have been set as follows:

- SP30.75 /kg for the delivery date from the beginning of the season to 15 November;
- SP26.25 /kg for the delivery date from 16 November to 30 November;
- SP19.75 /kg for the delivery date after 30 November.

Since then, the prices have not changed.

The law No.14 issued in 1975 that relates to the organization of the agricultural plan states the possibility of destroying any unlicensed cultivated area. In 2001, the Government decreased the cotton plan compared to the situation before due to water scarcity. In addition, the decision No. 60 issued from the Council of Ministers set the price of cotton produced in unlicensed area at the prevailing world price.

Cotton farmers deliver most of their production during the first period in order to obtain the highest price, so the delivered quantities at the first grade are always much larger than the others. In the agricultural season 2002, for example, the percentage of delivered cotton in the first grade was 96.36%, in the second was 3.56%, and in the third was 0.08%.

In order to apply the price policy, the officials of the extension units of the MAAR write down the number of jute bags, the planted area and the percentage of unlicensed area for each farmer in a paper called the *certificate of origin*. This certificate entitles the CMO to pay for farmer at official price or world price according to the percentage of licensed and unlicensed area recorded in the certificate. Furthermore, the officials of the extension units also annotate on the certificate if the farmer has planted unaccredited variety. The CMO cuts off SP1000 every cotton bag including mixed varieties of cotton. The farmer takes this certificate to the CMO, to have the price determined for him.

As mentioned before, the CMO is the only buyer of seedcotton in the country. It operates according to a delivery date system. However, not all the seedcotton delivered in the same grade gets the same price. In fact, seedcotton has different specifications to meet and set the basic price for each grade. These specifications are:

Moisture: 8%
Fibre length: 1 3/32
Cotton fibre extraction rate: 63-39%
Class: 0 to 0 minus ¼

The class is determined over the degree of cleanness and imperfections in one unit of seedcotton. Therefore, whenever the specifications differ from those mentioned above, the price of seedcotton changes accordingly, and the values range as shown in **Table 3.2**, which reflects the highest and the lowest prices that the CMO paid the farmers in 2002.

Table 3.2 - the price of cotton in the three grades in 2002

The grades	Legal cotton	Base price	The highest price	The lowest price
First grade	Licensed	30.75	31.24	24.60
	Unlicensed	14.40	14.63	11.25
Second grade	Licensed	26.25	26.65	20.99
	Unlicensed	12.29	12.48	9.83
Third grade	Licensed	19.75	20.05	15.80
	Unlicensed	9.25	9.39	7.40

Source: CMO, internal document, 2003

Farmers sometimes have to deliver their seedcotton to distant ginneries, this implies additional costs compensated by the CMO, as a transport subsidy, for distances over 200 Km. these subsidies differ as following:

- From Al Hassakeh to Aleppo ginners SP153 per ton.
- From Al Hassakeh to Der-Ezzoor ginners SP51 per ton.
- From Al Hassakeh to Hama ginners SP209 per ton.
- From Al Hassakeh to Homs ginners SP178 per ton.
- From Al Hassakeh to Idleb ginners SP197 per ton.
- From Al Raqqa to Aleppo ginners SP102 per ton.
- From Al Raqqa to Hama ginners SP172 per ton.
- From Al Raqqa to Idleb ginners SP128 per ton.
- From Ain Al Arab to Aleppo ginners SP39 per ton.

The decision No.3 of the Council of Ministers of 2001 states that the CMO has to pay the farmers for their delivered seedcotton just at the equivalent world price[18], and the difference between the world price and the official price (only for licensed cotton) will be paid by the ACB.

3.2.5 The Trade Policy

The CMO currently sells about 30% of its products of cotton fibre to domestic spinners and exports the remaining 70%.

The prices for domestic markets were determined on the base of the costs, plus a profit margin of 2%. Exports have been traded at the world price. This price policy prevented the cotton fibre of Syrian yarn and textile companies from being profitably exportable. For example, in the marketing year 1999/2000 the average price for cotton fibre for the domestic market was 85.56 SP/Kg, while the average price for exports was 56.18 SP/Kg. This price policy also reduced the profitability that Syria can get from exports of garments and other textile products.

As a response to the request of the domestic manufacturers and to encourage the domestic industry to compete in the international market, the Government allows the CMO to sell the cotton fibre to domestic spinners at the world price plus the costs of international transportation and insurance, in light of the decree No.3 mentioned above. However, import tax decree is still in place and the world price determined by Government for the domestic market is still higher than the world price for export.

The CMO sells about 86 types of cotton fibre, and the characteristics of the base fibre cotton are:

- Fibre length: 1 1/16
- Class: 0

Cotton seeds are sold to the GESM, for multiplying the seeds (to sell them to the ACB to be sold to cotton farmers in the following year), sold to oil mills, and on the international market at the world price.

The domestic market of cotton is protected by import taxes on cotton fibre (30%), yarn (15%), textile (15-59%), and clothes and garments (75%) (Westlake, 2002).

[18] The equivalent world price was 14.4 in 2002.

Chapter 4 – A Model for Policy Evaluation

In order to assess the impact of possible alternative price policies for cotton, we need a model that represents the aggregate behaviour of the cotton producing sector in Syria. First, we should model the behaviour of individual farms, then we should aggregate the supply and demands of individual farms to estimate the aggregate supply of cotton, and the derived aggregate demands for labour and water to be used to assess the incidence of possible alternative policies.

To estimate individual demands and supplies, we need to make an assumption on the technology at the farm level. The simplest assumption is to assume fixed coefficients, which implies constant marginal costs. Given this assumption, the production plan of any individual farm can be modelled trough a linear programming model. Consider a farmer who can cultivate several crops given certain availability of water and other fixed resources, operating under a licensing system that imposes a constraint on the maximum amount that can be cultivated of a given crop. The following linear programming model, where the farmer decides on the areas to be cultivated with different crops, describes the profit maximization decision:

$\text{Max } \Pi = \Sigma_i (p_i y_i - c_i) h_i \quad \text{for } i = 1, 2, \ldots, m$

Subject to:

$\Sigma_i h_i \leq H$		total area less or equal to the farm size
$h_j \leq l_j$	for $j = 1, \ldots, n$	licensed area
$\Sigma_i a_{i,j} h_i \leq b_j$		total availability of fixed resources (e.g., water)
$\mathbf{f}(h_1, h_2, \ldots, h_n) \leq \mathbf{o}$		agronomic rotation requirements

where:

H is the farm size;

p_i is the price of the product of the i-th crop;

y_i is the yield of the i-th crop;

C_i is the production costs of the i-th crop;

h_i is the area cultivated with the i-th crop;

l_i is the amount of land licensed to the i-th crop;

b_j is the availability of the j-th resource (such as water);

$a_{i,j}$ is the requirement of the j-th resource for one unit of land cultivated with the i-th crop;

the function **f**(.) defines a set of constraint on the relative dimension of the various crop areas to obey agronomic requirements (such as, for example, to define the rotations among crops).

Individual farming model set up

The application of the model described above requires taking into consideration the conditions of Syrian cotton farms and recognizing the possibility for farmers to cultivate cotton in excess of the officially licensed area.

In principle, the price farmers receive for unlicensed cotton production should be equal to the prevailing world price, although this is rarely true. There are many ways in which a farmer can get a higher price, for example by selling cotton to farmers who had the license but did not produce it, or by selling on the informal market, or by cheating on the actual yield, and so on. If a farmer decides to produce cotton in excess to the licensed area, it means that there exists an expected *effective* price for cotton somewhere in between the world reference price and the official price paid for the licensed production.

In 2002, there has been production of cotton on unlicensed areas, and our attempt is that of exploiting such fact, to try and estimate the actual incentive price that Syrian farmers face. Unlicensed cotton, in fact, competes with wheat and other crops, and the only constraint seems to be that of water availability in addition to land constraint.

We tried to apply the methodology by setting up individual farm types as representative samples of the cotton-producing areas in each mantika, distinguishing them according to the water source and the irrigation method aiming at solving the linear programming to derive the reaction functions (supply and derived demands of inputs) of each farm type.. By aggregating over all different farm types, we will then be able to obtain a measure of the total impact of any simulated policy on the actually cultivated land. By recognizing that the amount of labour and the amount of water used, given a certain technology, are functions of the cultivated area, we will also be able to measure the impact on farm employment and water consumption of the simulated policy.

We depended in our research on secondary data that has been gathered by the MAAR directorates in the relevant governorates[19]. Since the data of the MAAR are weighted at the mantika level we could not define the differences among the cotton farms in each administrative mantika especially in the large ones such as in Al-Hassakeh, Al-Raqqa and Aleppo. These differences are very important to solve the linear programming model and are related to the following parameters: yields, water needs, labour needs, the and variable costs for all crops that enter in the agrarian rotation with cotton and considered competing crops to it. In addition, we could not obtain reliable information about water availability at the farm level especially taking into account the different water sources (public nets, wells and rivers) and the irrigation schemes (flood, sprinkler, and drip).

To apply the methodology precisely we need to achieve the following:

1. selecting in each administrative mantika a set of cotton farms that are representative of the mantika taking into consideration the differences in the irrigation schemes (flood, sprinkler, and drip) and water sources (nets, wells, rivers). In addition, the differences in terms of wells' depths should be taken into account due to their effects on the irrigation cost and so the production costs. Regarding the irrigation from nets and rivers, it must be noted whether the irrigation is performed with or without pumping since this also affects the production cost.

2. conducting field survey on the representative farms to collect the following data:
   - yields of cotton and all competing crops to it
   - water needs to cotton and the other crops
   - family and hired labour needs of all crops
   - variable costs of all crops

[19] We have obtained data from the Agricultural Directorates of Aleppo, Hama, Homs, Der-Ezzoor, Al Ghab, Al-Raqqa, Al Hassakeh and Idleb. Therefore, the data obtained covers all Syria excluding Al-Hassakeh.

- total area of each representative farm
- water availability at the farm level
- the agrarian rotations of each representative farm
- the area of each crop
- the licensed area for the crops that are cultivated under licensing systems (cotton and sugarbeet).

3. Estimation of the prices of all relevant crops

After collecting all the previous data, we will apply the linear programming and the following is an example about how the model can be applied on the special conditions of our study. In addition to cotton, the other crops that have been taken into consideration are: wheat, sugarbeet and potato, and they have been chosen according to the relative importance of each one of them in the studied mantikas. The objective function of our model becomes

Max $(r_{11}-c_1)\, h_{11}+(r_{12}-c_1)\, h_{12}+(r_2-c_2)\, h_{2+}(r_3-c_3)\, h_3+(r_4-c_4)\, h_4$

Subject to:

$h_1+h_2+h_3+h_4 \le h_o$

$a_1\, h_1+a_2\, h_2+a_3 h_3+a_4 h_4 \le a_o$

$h_{11} \le h_{L1}$

$h_3 \le h_{L3}$

$h_1 = h_{11}+h_{12}$

$r_{11} = p_{lc} y_1$

$r_{12} = p^w y_1$

$r_2 = p_2 y_2$

$r_3 = p_3 y_3$

$r_4 = p_4 y_4$

where:

p_{lc} = unit price of licensed cotton (SP/kg)

p^w = unit price of unlicensed cotton (SP/kg)

p_2 = unit price of wheat (SP/kg)

p_3 = unit price of sugarbeet (SP/kg)

p_4 = unit price of potato (SP/kg)

y_1 = yield of cotton (kg/dun)

y_2 = yield of wheat (kg/dun)

y_3 = yield of sugarbeet (kg/dun)

y_4 = yield of potato (kg/dun)

h_{11} = area cultivated by licensed cotton (dun)

h_{12} = area cultivated by unlicensed cotton (dun)

h_{L1} = cotton licensed area (dun)

h_1 = total area of cotton (dun)

h_2 = area cultivated by wheat (dun)

h_3 = area cultivated by sugarbeet (dun)

h_{L3} = sugarbeet licensed area (dun)

h_4 = area cultivated by potato (dun)

h_o = total farm size (dun)

a_1 = water consumption for cotton production (cm/dun)

a_2 = water consumption for wheat production (cm/dun)

a_3 = water consumption for sugarbeet production (cm/dun)

a_4 = water consumption for potato production (cm/dun)

a_o = water availability (cm)

c_1 = average cost of cotton production (excluding land, water) (SP/dun)

c_2 = average cost of wheat production (excluding land, water) (SP/dun)

c_3 = average cost of sugarbeet production (excluding land, water) (SP/dun)

c_4 = average cost of potato production (excluding land, water) (SP/dun)

Now we have to adjust our model to take into account the rotation requirement of the different crops.

$h_4 + h_1 + h_3 \leq h_2$

After solving the linear programming model, we will be able to forecast the effects that result from changes in the following policy variables:

- change in the levels of controlled prices of cotton, wheat and sugarbeet;
- changes in the administration of area control, by giving farmers more flexibility in choosing the area to be cultivated;

these changes in the policy variables will have effects on:

- the total area of cotton,
- total production of cotton,
- farmers' incomes,
- water demand by cotton farms,
- labour demand by cotton farms,
- the expected changes in the Government expenditure, and it is possible here to select two scenarios:

1. while keeping the licensing system in place;
1. with erasing licensing system.

Chapter 5 – Conclusions and Policy Implications

With reference to Chapter 3 of this volume, it is noticeable that the Government bears big losses since it has to export ginned cotton at the world prices, which are considered, distorted due to the big supports that the developed countries (especially the USA and some of the EU countries) provide to cotton farmers. Consequently, it is important to focus on the processing activities of the crop and exporting it in the form of cotton yarn or garments in order to limit the losses, enhance the industrial development and increase employment. Therefore, it is advisable to:

1. decrease the cotton cultivated areas gradually to save the scarce water resources;
2. focus on the processing activities and exporting the cotton as semi-manufactured in the short-run and totally manufactured in the long-run;
3. find alternative crops to cotton that are economically profitable and less water-exhausting than cotton
4. adopt a supporting system to cotton similar to the systems adopted internationally, where the crop is paid for at the world price, while the support is transferred to the farmer independently through establishing some funds specific for this purpose. This would help saving the farmers' incomes at a reasonable level without coupling them with the prices of the crops which distort the market performance.

However, we cannot draw precise recommendations on the cotton sector depending on the available information. In fact, it is still necessary to perform a more complete analysis of the sector, which will be the next undertaking of the National Agricultural Policy Center.

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Appendices

A map of Syrian Cotton producing regions

Table 1.1 – time series of cotton area, production, yield from 1974-75 to 1983-84

Season	Area in hectares			Production in tones			Yield in kg	
	irrigated	rainfed farm	Sum	Irrigated	rainfed farm	Sum	Irrigated	rainfed farm
1974/1975	180,649	25,212	205,861	379,474	7,060	386,534	2,100	280
1975/1976	185,089	23,037	208,126	405,795	8,544	414,339	2,192	371
1976/1977	172,660	9,096	181,756	404,474	4,379	408,853	2,343	481
1977/1978	176,284	10,223	186,507	390,747	4,146	394,893	2,216	405
1978/1979	164,232	4,913	169,145	377,964	1,958	379,922	2,301	399
1979/1980	150,078	3,933	154,011	341,605	1,354	342,959	2,276	344
1980/1981	134,218	4,592	138,810	320,622	2,197	322,819	2,389	478
1981/1982	139,714	3,719	143,433	352,298	3,573	355,871	2,494	961
1982/1983	156,431	2,348	158,779	419,874	2,348	422,222	2,684	1,000
1983/1984	175,697	--------	175,697	523,419	------	523,419	2,979	------

Source: (Khoury,)-yahoo, cotton in Syria.

Table 1.2 – cotton area, production, yield in specific years

Season	Area/ha	Production/ton	Yield kg/ha
1969-1970	136,133	383,687	2,818
1979-1980	136,353	322,898	2,368
1989-1990	156,358	441,171	2,822
1999-2000	256,212	1,081,898	4,223
2001-2002	199,773	802,178	4,015
2002-2003	190,271	765,637	4,024

Source: Cotton Bureau, Khoury

Table 1.3 – cotton production in 2002-03 by governorate

Governorate	Production from licensed areas (ton)	Production from unlicensed areas (ton)	Total production (ton)
Homs	843	6	849
Hama	11,241	300	11,541
Al-Ghab	43,535	1,000	44,535
Idleb	9,579	177	9,756
Aleppo	136,457	1,363	137,820
Al-Raqqa	173,014	1,012	174,026
Der-Ezzoor	75,822	744	76,566
Al-Hassakeh	244,601	14,173	258,744
Total Syria	695,092	18,775	713,867

This information is about 2002

Source: MAAR statistics-2003

Table 2.1 - Cost of 1 kg of seedcotton /SP

Average actual purchasing price were paid by CMO to farmer	27.71
Average premium paid for cooperative marketing	0.02
Bank Interest on the current account and overdrawn account paid from CMO to Banks	2.23
Cost of loading from delivering centres to ginning factory	1
Workers wages in COM	0.49
Commodity equipments	0.44
Services equipments	0.02
Current converting expenditure	0.15
Production centre expenditure	0.18
Total	32.24

(CMO, Internal document-2003)

Table 2.2 – cotton parity Price in 2002

Exchange Rate (SP/US$)=51SP	Parity	Actual	Difference between parity &actual	% Difference between parity &actual
Cotton fibre(ginned) FOB Latakia (US$/ton)	**1000.00**			
Exchange rate (SP/US$)	51.00			
Cotton fibre(ginned) FOB Latakia (SP/ton)	**51000.00**			
Exporting agents commission (0.2%)	102.00			
FOB Latakia price of ginned cotton net of commission (SP/ton)	**50898.00**			
Handling cost in the port (SP/ton)	146.00			
arranging cost (SP/ton)	27.15			
Storage cost (14days) (SP/ton)	19.60			
Lifting cost (SP/ton)	3.00			
bills of lading value (SP/ton)	75.00			
Stamps (SP/ton)	16.00			
Lead for closing container (SP/ton)	5.00			
Harbour agency fee (SP/ton)	29.60			
Total costs in Latakia (SP/ton)	321.35			
Distance between Al Hassakeh and Latakia (km)	1698.00			
Average cost of transport per km (SP/ton)	0.57			
Transport from cotton ginnery in Al Hassakeh to Latakia (SP/ton)	967.86			
Ex-ginnery, price of ginned cotton (SP/ton)	**49608.79**	**82128.30**	**32519.51**	**1.7**
Ginning cost per 1 ton of ginned cotton in ginnery (SP/ton)	12493.94			
Realization from sale of cottonseed (SP/ton)	15368.18			
Into-ginnery, price of 3.03 ton of cottonseed bagged(raw cotton) (SP/ton)	52483.03			
Into-ginnery, price of 1.0 ton of cottonseed bagged(raw cotton) (SP/ton)	**17321.13**			
Average distance from farm to ginnery (Km)	50.00			
Average cost of transport per km (SP/ton)	0.64			
Transport from ginnery to farm gate (SP/ton)	32.00			
Farm gate price of cottonseed(raw cotton) (SP/ton)	17289.13	**27300.00**		1.58

(CMO, Internal documeny-2003)