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*Cotton ranks as the number one foreign currency earner among agricultural crops in Syria. It occupies about 33% of the total irrigated area. Practically all Syrian cotton is grown under irrigation. Currently, about 65% of the production is exported to different countries of the world. Thus, cotton plays a significant role in providing the foreign exchange necessary for developing various economic activities. The cotton industry employees about 1.7 million people out of a total of 9.5 million people in Syria.*

## I - Cotton production policy

Since 1965, cotton production policy has been very successful. It is summarized as follows :

1. Cotton growers must attain a licence from the Ministry of Agriculture and Agrarian Reform if they wish to grow cotton.

2. A staple price for seed cotton is garanted throughout the whole season. This price is announced for the basic quality grade before preparing the land for cotton growing, and all seed cotton must be sold to the Cotton Marketing Organization.

3. Limits on the last date for planting cotton in region, this is about mid-May.

4. Limits on the area for every extension unit which is responsible for pest control, advice concerning good growing methods, and estimating yield for every field.

5. Granting better loan facilities to cotton growers by the Agricultural Cooperative Bank of Syria. The loans comprise cash and material loans for the purchase of seeds, fertilizers, pesticides, and sacks.

## II - Cotton production - Area - Yields

The area planted to cotton and seed cotton yields in 1983/84 was 175,697 hectares and 523,419 tons compared to 158,779 hectares and 422,222 tons in 1982/83.

Yields in irrigated land reached 2,979 kg per hectare of seed cotton in 1983/84 compared to 2,684 kg per hectare in 1982/83.

Table I shows cotton area, yield and production in last 10 years 1974/75 - 1983/84.

## III - Breeding program

The Cotton Bureau is a directorate in the Ministry of Agriculture and Agrarian Reform which is responsible for the supervision of cotton growing controlling cotton exports and for conducting research. It plays an effective role in solving the problems facing cotton. The main objectives of the Breeding Programs are :

1. High yielding cultivars producing 4,000 kilograms per hectare under the different agro-climatic conditions of the country.

2. *Verticillium* wilt tolerance with high yields.

3. Heat resistance - being able to produce cotton under high temperature conditions, especially in Deir Al-Zor Province which is considered the hottest in Syria.

4. Subsequent to an extensive hybridation program involving Acala, Tashkand and short season varieties, use hybrids to combine fibre quality with yield, early maturity, and high bloom retention.

5. Production of long-stapled lines from *Gossypium hirsutum* with high productivity and wide adaptibility more suited to Syrian environmental conditions.

6. Release plants with growth habits suitable for machine harvest.

7. Maintenance of the purity and the quality standards of local varieties at isolated stations by applying pedigree and mass selection methods.

8. To retain an optimum balance between productivity and fibre quality, especially increased uniformity of strength and length.

The most important varieties that have been developed through this program are :

**a) Cotton variety Aleppo - 4°**

This is the most prevalent variety planted in Syria which covers almost 97% of the total area. It was obtained by crossing the cotton variety Aleppo - 1 with Alaca SJ-1. The first nucleus of this variety was given in 1977 to the General Organisation of Seed Multiplication for increasing and distributing it to farmers. It has replaced the previous variety Aleppo - 1 as it has more tolerance to Verticillium wilt, it has a 1/32 inch longer staple, and its strength is about 90,000 PSI, compared with 80,000 PSI for Aleppo - 1.

**b) Other cotton varieties Aleppo - 33/1 and Tashkant - 3**

There are other secondary cotton varieties such as Aleppo - 33/1 and Tashkant - 3 grown in limited areas in some regions to meet certain requirements such as wilt tolerance. Aleppo - 33/1 is a strain selected as an off-type from the American variety Acala SJ-4.

It is more tolerant to *Verticillium* wilt than Aleppo 40 and has good properties.

Tashkant - 3 is a strain selected as an-off type from the Russian variety Tashkant - 3. It is earlier in maturity and more tolerant to *Verticillium* wilt than Aleppo - 40. Thus it is suitable in areas highly infested by wilt.

During the last few years, several varieties were introduced to serve the objectives of the breeding program. Those varieties are: Tamoot - Camd-E., McMair 220, Mcnair 235, and Delcot 311, as short season varieties ; Deltapine 70, Deltapine 41, Deltapine 55, CIM 70, and NIAP as early mature varieties tolerant to heat ; Stoneville 731 N, Stoneville 825 N, Stoneville 506 N as nectarville varieties, and Coker 3131 and Coker 208 as varieties with good lint properties ; Tashkant 6, Summerkand 2, and 3, Ozpakistan 3, and 175 F as sources for tolerance to wilt.

Table 2 shows the performance of some varieties that have been tested for three years.

## IV - Problem-oriented research program

**1. Giant Cotton** : in the past few years, we have faced a problem of "Giant Cotton" or the appearance of very tall cotton plants with excessive square shedding which is inflicting high losses in production and yield. To detect the reasons for "Giant Cotton", many experts from abroad visited Syria and reported that there are many factors together which may lead to giant cotton. These include, high rate of nitrogen, excessive irrigation, high plant density, high temperature, and lygus insects.

The combined factors under studies are :

1. Nitrogen fertilizer rates
2. Frequency of irrigation
3. Dates of planting
4. Plant densities
5. Minimum and maximum temperature.

**2. Earliness** : the use of early and rapid maturing types of cotton. These plants escape damage from insect injury and are harvested before unfavourable weather begins.

**3. Stress tolerance** : it is necessary to breed new varieties more tolerant to heat and drought, especially in the North East of Syria where about 60% of the total area is planted. The average maximum temperature raises to more than 400° during the hotest months (July and August), and the average minimum temperature reached in some years 25-27°C.

In 1982 and 1983, we started to introduce and develop varieties more suitable for growing under high temperature, drought stress conditions.

**4. Mechanization** : the serious attempts towards mechanization, especially planting, hoeing, and ploughing machinery, application of chemical and organic fertilizers, have all been among the aspects of the agronomic research being conducted by the Cotton Bureau. In the current season (1985), about 22% of the total area was sown by mechanical planter. Mechanical harvesting is still being studied under experimental conditions. Thus hand picking is still the sole method used to harvest cotton.

**5. Plant protection** :

a - **Diseases** : the main diseases that cause some damage and decrease cotton production are :

| | |
|---|---|
| Wilt disease | *Verticillium albo atrum* |
| Damping-off | *Rhizoctonia Solani - Fusarium* sp. |

Planting tolerant varieties such as Aleppo 40, Aleppo 33/1 and Tashkant 3, and following crop rotation with cereals had reduced the incidence and severity of *Verticillium* wilt. Double seed treatments with BCNP plus mercurial fungicides or thiram or the use of Vitavax are recommended to control damping-off under Syrian conditions.

b - **Insects** : the main insects arranged according to their appearance in cotton are :

| | |
|---|---|
| Cut-worm | *Agrotis ypsilon* |
| Thrips | *Thrips tabaci* |
| Aphid | *Aphis Gossypii* |
| Green worm | *Laphigma exigua* |
| Jassids | *Empoasca lybica* |
| Red Spider | *Tetranychus telerius* |
| Spiny boll-worm | *Earias insulana* |
| American boll-worm | *Heliothis armigera* |

The quality losses in cotton resulting from insects attack are very low in Syria, even though the amount of insecticides used are small. However a research program on integrated pest control has started. This program includes early mature varieties, cultural practices, predators and parasites. The use of sex phenomenon for *Earias insulana* and *Heliothis armigera*, and the use of pesticides.

c - **Weeds** : the main weeds in cotton fields in Syria are :

| | |
|---|---|
| - Bermuda grass | *Cynodon dactylon* |
| - Rabbit grass | *Panicum colannum* |
| - Red pigweed | *Amaranthus retreflexus* |
| - Cooklebur | *Xanthium brasilicum* |
| - Field hindweed | *Convolvulus arvensis* |
| - Foxtcul millet | *Setavia italica* |
| - Johnson grass | *Sorghum helapense* |
| - Goose foot | *Chenopodium album* |
| - Purslane | *Portulaca oleracea* |
| - Night shade | *Solanum alatum* |

Weeds in cotton fields are kept to a minimum, mostly because the Syrian farmer is very active and tends to keep his fields clean by cultivation. Pre-planting incorporated herbicides are used widely : almost 90% of the cotton area is treated annually with Treflan. Research work is going on for the control of perennial weeds using Lancer, Ronstar, and Fusilade.

## References

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| Season | Area in hectares | | | Production in tons | | | Yield in kg / |
|---|---|---|---|---|---|---|---|
| | Irrigated | Dry Farm. | Sum | Irrigated | Dry Farm. | Sum | Irrigated Dry 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 – |

**Table 1: Shows area in hectares. Production of seed - cotton in tons and yield i kg / ha for irrigated and dry farming in Syria during 10 seasons - 1975 / 1984**

| Varieties | Yield (cotton seed kg / dounum) | | | Degree of wilt resistance | Gin turn out % | Earliness 1st. picking % | Fibre properties | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Average 6 stations | Non-infested 3 stations | Wilt infested 3 stations | | | | Fibrograph 2,50% ( inch ) | Pressley index | Stelometer GM / Tex | Micronaire reading |
| Aleppo 1 (Pengetcy Chineese) | 357 | 409 | 305 | 1,84 | 39,14 | 70,00% | 1,111 | 8,22 | 19,22 | 4,50 |
| Aleppo 40 (Aleppo 1xAcala SJ1) | 407 | 423 | 389 | 1,61 | 39,13 | 72,00% | 1,117 | 8,48 | 50,03 | 4,52 |
| Aleppo 33 / 1 (Acala SJ4) | 357 | 376 | 331 | 1,45 | 38,74 | 71,00% | 1,169 | 8,75 | 21,85 | 4,34 |
| Tashkand 3 (Russian) | 433 | 411 | 449 | 0,93 | 38,35 | 76,00% | 1,127 | 8,06 | 19,38 | 4,33 |
| Aleppo 33 (Acala SJ1) | 362 | 391 | 338 | 1,38 | 38,94 | 68,00% | 1,154 | 8,64 | 21,80 | 4,61 |
| Strain 178 (Aleppo 40 x Tashkand 3) | 338 | 306 | 384 | 0,61 | 37,93 | 64,00% | 1,148 | 8,16 | 20,17 | 4,44 |
| Deltapine 41 | 371 | 422 | 307 | 1,90 | 41,20 | 67,00% | 1,18 | 8,34 | 19,88 | 4,15 |
| Deltapine 55 | 326 | 393 | 307 | 2,10 | 40,40 | 68,00% | 1,167 | 8,05 | 18,51 | 4,01 |
| Deltapine 70 | 246 | 284 | 208 | 2,03 | 38,95 | 67,00% | 1,14 | 8,39 | 19,86 | 4,21 |
| Acala SJ5 | 362 | 357 | 368 | 1,65 | 39,54 | 71,00% | 1,195 | 8,87 | 22,93 | 4,46 |
| Average | 356 | 377 | 338 | 1,55 | 39,23 | 69% | 1,151 | 8,4 | 20,36 | 4,36 |
| C.V. % | 18% | 12% | 18% | – | 4% | 4% | 44% | 3% | 6% | 3% |
| ( SE ) | 21,00 | 15,00 | 20,00 | – | 1,05 | 0,60% | 0,013 | 0,09 | 0,44 | 0,05 |

**Table 2: Three years performance summary: 10 varieties in 6 stations (1982 - 1984 )**