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Mechanization of Cotton Harvesting in Greece: Necessity – Difficulties – Means

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I – Historical Background

Cotton has been grown in Greece since ancient times. During the 2nd century B.C., it was known in Peloponnese as "Vissos" while in the Byzantine era it was found in Macedonia and Thessaly.

The area covered by cotton in Greece was relatively small (800,000 ha) until the period before World War II. Thereafter, cotton growing has expanded rapidly as a result of an agricultural development program and reached a record of 231,200 ha in 1963, which amounted to over 6,5% of the country's cultivated land.

It was then that cotton growing faced the problem of shortage of labour, especially during the peak harvesting period, due to the increasing area under cotton on one hand and the large exodus of the agricultural population from the rural areas on the other hand. Thus, in 1964, the cotton area dropped dramatically to 140,300 ha, i.e., by 43% compared to the previous year and continued to decline.

II – The Necessity of Mechanization

In 1965, the Hellenic Cotton Board and the Ministry of Agriculture, in an attempt to overcome labour shortage and reduce cotton harvesting costs, decided to mechanize cotton harvesting by introducing the first 17 cotton pickers from the United States. Up to 1970, the number of cotton harvesters all over the country reached 44, as shown in *Table 1*. The Ministry of Agriculture, in an effort to spread the use of harvesting machines, granted a 70% subsidy for the first machines in 1965 and continues the subsidies since then.

However, the introduction of cotton pickers did not have the desired effect. Three main obstacles stood in the way of farmers' efforts to acquire cotton harvesting machines. The fact that holdings were small and fragmented, the initial cost of cotton pickers and their high capacity, made their use uneconomic or impossible for small- or medium-size farms.

All these factors, but mainly the small size of the holdings, resulted in a slow movement of machine purchasing and the small area of mechanically picked cotton, as *Table 1* shows. Thus, the problem remained and the Greek cotton industry was left facing the most serious crisis at that time. There was a widespread belief among those concerned with cotton: that the future of cotton growing, and the cotton industry as a whole, was dependent upon an effective means of mechanizing cotton harvesting. New more dynamic schemes had to be tried in order to overcome the crisis.

III – Mechanizing Cotton through Group Action

A second movement by the Hellenic Cotton Board gave a way out to the problem. The idea was to promote mechanization of cotton harvesting through the joint action of cotton producers: the so-called "Cotton Group Farming" or "Common Cultivation Groups". On the basis of producers grouping, the Hel-

lenic Cotton Board implemented a 10-year program aiming at the formation of informal cotton groups, gathering various numbers of farmers. After a long time spent by Cotton Board Agronomists travelling from village to village persuading the farmers to co-operate for their own benefit, these groups proceeded in materializing the above program. Farmers' reactions was not encouraging, at least at the beginning.

However, the agronomists' insistence on one hand and their ability to win over the farmers' confidence on the other, resulted in the formation of the first cotton group made up by farmer leaders who always had good relations with the agronomists. Henceforward, the situation was easier both for farmers and agronomists.

To facilitate the new institution and cotton mechanization, the Cotton Board purchased annually the necessary machines and leased then to the groups for a period of one or two years. At the end of this period, the groups realizing the benefits they had through this joint action decided to buy the machines and continue their function. In this way and after three years of experimentation (1970–1972), the new institution started to become more and more successful. Thus, within a period of nine years (1973–1981), 487 groups were formed and operated covering an area of 37,500 ha or 30% of the country's cotton area (*Table 2*).

The positive results they obtained through this co-operation in harvesting led cotton producers to proceed a step forward in ginning and disposing their product as ginned cotton, aiming at higher profits. So through co-operation with the Hellenic Cotton Board and the Unions of Agricultural Co-operatives, a number of groups proceeded in the common ginning and selling of cotton for two continuing years, at satisfactory prices, obtaining better economic results. However, adverse weather conditions prevailing during the second year made difficult the joint conduct of the product.

Nevertheless, regardless of this failure, the institution of cotton groups had shown very important economic as well as social results, such as:

- reduction in labour requirements from about 70 man-days per hectare to approximately 20 man-days;
- reduction in production costs and increase of net returns;
- creation of a collaboration spirit among the farmers;
- securing cotton harvesting and creating quite good conditions for developing social relations;
- promotion of structural improvements.

But the most important achievement of the institution was the large number of cotton harvesters bought by groups at that period. Thus, while in 1970 only 44 machines were in use, by 1981 that number increased to 1,060 machines serving an area of 75,000 ha representing about 60% of the total cotton area, as shown in *Table 3*.

The institution of those informal cotton groups gave an impulse to cotton growing up to 1977, but this did not last and the cotton acreage gradually decreased and dropped to 125,500 ha in 1981, which was lower than in 1970 when the experimentation started. This was mainly due to the decline of the traditionally farmed area, as shown in *Table 4*, and especially of small- and medium-size holdings which did not take advantage of the new institution and were forced either to restrict their cotton area to the extent they could harvest it by hands or to abandon it. Thus, while at the beginning the number of group members ranged from 6 to 26, it became as restricted as possible later on, the average being of 4 to 5 members related among them either by friendship or by kinship, according to a survey carried out in 1984.

In addition to that, the informal character of cotton groups did not provide the level of security required for a more permanent and stable organization among the farmers. It was necessary, therefore, for cotton groups to have the formality and legality to perform as district entities, with recognized rights and obligations.

That legal foundation was given to the groups by the special Protocol 4 and Regulation 389/82 of the EEC concerning "Cotton Producer Groups and Associations thereof in the Cotton Sector", after Greece's accession to the EEC, since January 1981.

IV – Cotton producer groups within the EEC

With the Protocol 4, the Community that has always promoted collective or joint activities gave a new dimension to cotton groups while Regulation 389/82 provided not only the necessary legality and publicity but also the preconditions for lasting and steady collaboration among the members as well as the conditions of formation and operation of the groups.

Within the framework of this Regulation, the Hellenic Cotton Board had to draw up a five-year special program of development and rationalization of cotton production and marketing.

The goals of the program were:

- a) The expansion of the cotton area, up to 190,000 ha within a period of five years (1982–1986) from 126,000 ha in 1982.
- b) The formation and operation of 500 cotton groups at the same period.
- c) The provision of these groups with an equal number of cotton harvesting machines subsidized by 50% of the purchasing cost.

After this program had been approved, a new period for cotton groups, and cotton grouping in general, had started. At the same time the local agronomists started a fight, informing the cotton producers about the new potentialities of collective activities, the advantage of this new form of grouping, etc.

However, the formality that this Regulation required for the new groups—there had to be articles and recognition by the member State, the minimal number of 10 members, the limit of cotton production to 175 tons of seed cotton annually, as well as other preconditions of the Regulation—caused the growers to be hesitant and to confront the new situation by scepticism, at least at the beginning of the new institution. A new effort had to be made to inform the growers so as to overcome their hesitation and take advantage of the new changes. Yet, in spite of the 'trying hard', the first year's results were not satisfactory as only 10 groups were formed and functioned at that time.

During the second year, a new activity by the Hellenic Cotton Board gave another dimension to the subject of cotton groups. Aiming at taking advantage of the Regulation's potentialities, agricultural co-operatives were able to be recognized as cotton groups by brief procedures. After this movement, the effort was turned to inform the cooperatives about the new situation.

Almost every night, groups of agronomists from the Cotton Board were in villages where meetings were called informing co-operative members about the relevant regulation of the function of co-operatives as groups, the advantages of the grouping, the prospects, etc.

There followed hours of discussion and, in the end, the growers voted for or against the EEC's regulation for the recognition of their co-operative as a group. Most of the time, recrimination and arguments among the producers followed the discussions. Nearly all the arguments referred to how the groups would function, to the management, the property and handling of the harvesters, the order of priority for the members' service, the operation and payment of the harvesters, etc. At other times, the attacks of some producers, luckily a few ones, were turned on us and we were accused by some of them of introducing EEC standards and western type elements in general; others said that we promote eastern systems and others reached to the point to doubt our good intention to serve them.

Despite all these problems, the briefing of the growers and of the co-operatives by the agronomists of our Service all over the country was constant and persistent. So, after the first hesitations, cotton growers realized what the benefit of the new institution would be, and proceeded in recognizing the first co-operatives as cotton groups. The result was 79 co-operatives to be recognized—the second year already—and that in nine years (1982–1990) there existed 427 co-operative groups and 69 non co-operative groups, making a total of 496 groups as shown in *Table 5*.

These groups, according to the Special Cotton Program, were provided with cotton harvesters to service their members, as well as other machinery, subsidized up to 50% of the cost of purchase. So, as the groups increased each year, the number of cotton pickers increased too, faster than the groups, as well as the area under cotton. The cotton production increased too as *Table 6* shows.

On observing *Table 6*, we realize the great sensation that the institution of the groups had on the cotton growers. The new formal groups, together with the informal ones, raised the total number of the groups up to 946 (450 of the old groups and 496 new ones). In the meantime the harvesters belonging to the groups reached to 1,483 in all while the total number of harvesters in the country amounted to 2,025. The great number of cotton harvesters, especially those belonging to the co-operative groups, formed the basis on which the big increase of the cotton acreage has leaned these last years.

The result of this amazing mechanization was the drastic increase of the machine-harvested cotton that, on a country level, exceeded 85% of the cotton acreage compared to 60% in 1981, whereas in some areas it reached 100%. Today 80% of the cotton is machine-picked (with harvesters belonging to groups) and only 20% of the cotton is picked by hand.

Conclusions

The institution of Cotton Producers Groups, as described above, had a huge meaning and effect on cotton growing, the growers' income and the country's economy in general.

Cotton growing indicated a drastic increase: from 137,300 ha in 1982 to 280,000 ha in 1989, i.e., an increase of 104%. The rise in seed cotton production at the same time was much bigger. From 313,700 tons in 1982, it reached to 828,000 tons in 1989, representing 164% which is a record of production in the country's history. This vast success is mainly due to the large number of cotton harvesters belonging to the groups and to the relatively higher prices, which raised cotton to a more favourable position against other groups such as wheat, sugarbeet, maize, etc.

The institution of the Cotton Producer Groups has been rapidly adopted by the Greek cotton producers, who joined together under the group scheme (co-operative or private) to achieve collectively higher incomes, while retaining their family farms and independence. The cotton groups, and particularly those of the co-operatives, have shown that co-operation among farmers is a one-way street for the crop and themselves. It is possible for small growers to survive and continue growing cotton with positive economic results only through co-operative groups. The large number of the group members and the co-operatives recognized as groups (427) prove the importance of the system and the enthusiasm with which cotton producers accepted the new institution.

Using the groups' harvesters, the cost of harvesting is the lowest possible because it covers only the expenses for harvesting. In some cases, the harvesting and transporting of the product are done by the members of the group without any charge (on the product). In a survey we carried out, based on 13-years data, we found that the cost of mechanized harvesting which was, in 1977, 20% of the selling price of seed cotton, fell down to 7% in 1991. There was a similar reduction in the cost of hand-picked cotton which, in 1977, was 39% of the selling price against 20% in 1991. According to the cotton growers' estimations, the cost of harvesting would be at least double than today's if the cotton groups were not in existence.

In the meantime, the total cost of cotton production of the groups was reduced by 15–20% compared to to the cost of production of hand-picked cotton, making cotton growing more profitable.

From the above, it is obvious that the institution of cotton groups was very important. It could be more important if this collaboration of the cotton growers covered the stages both before and after the harvesting (e.g., production, ginning, standardisation, marketing, etc). To achieve these results, a great effort has been made by the Hellenic Cotton Board which is the responsible organization for the materialization of the cotton program, and by Greek cotton producers who have the first and more important word in materializing this program.

Of course it was not all so easy. There were and still are many and various problems about group functioning and especially co-operative groups, such as the frailty of many councils to carry on their new duties, the lack of efficient staff, the indifference of some councillors and members of the groups regarding groups, the lack of accommodation in many co-operatives.

Today the serious problem encountered by cotton growing farming in Greece, especially in some areas as in the Karditsa county, is the lack of irrigation water which becomes each year more intense due to the drastic reduction of the rainfall as it can be seen in *Figure 1*.

Finding irrigation water is not only necessary to increase the production but is a matter of survival for the Karditsa county and other counties. The big dams (of the Aheloos river, of Smokovo, etc.) must be of top priority if we want to solve the problems of water and protection of the environment, **today**, before it is too late.

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Table 1. Cotton harvesters and acreage mechanically harvested from 1965 to 1970

Year	Number of cotton harvesters		Acreage mechanically harvested (ha)	% of mechanically harvested area
	Annual	Total		
1965	12	12	450	0.3
1966	21	33	1,700	1.2
1967	5	38	2,700	2.0
1968	2	40	500	0.4
1969	3	43	300	0.2
1970	1	44	1,000	0.7

Table 2. The common cultivation groups of cotton from 1973 to 1981

Year	Common cultivation groups		Area of the groups (ha)	%
	Annual	Total		
1973	23	23	1,800	1.2
1974	22	45	3,000	2.0
1975	8	53	3,500	2.5
1976	50	103	6,900	4.6
1977	114	217	14,700	8.0
1978	90	307	20,200	12.0
1979	95	402	25,400	18.6
1980	45	447	28,700	20.3
1981	40	487	37,500	35.0

Table 3. Evolution of cotton mechanizing from 1970 to 1981

Year	Number of cotton harvesters		Acreage mechanically harvested (ha)	% of mechanically harvesting area	Total cotton area (ha)
	Annual	Total			
1970	1	44	1,000	0.7	
1971	8	52	?	?	
1972	68	120	?	?	166,900
1973	126	246	14,700	10.0	146,700
1974	69	315	?	?	154,000
1975	36	351	16,300	12.0	136,300
1976	141	492	26,700	18.0	148,600
1977	199	691	46,700	26.0	183,000
1978	151	842	68,700	41.0	168,200
1979	120	970	71,000	48.0	136,400
1980	50	1020	74,700	56.0	141,100
1981	40	1060	75,100	60.0	126,300

Table 4. Evolution of cotton acreage from 1977 to 1981

Year	Total cotton area (ha)	Traditionally cultivated cotton (ha)	%	Area of cotton groups (ha)	%
1977	183,000	168,000	92	14,800	8
1978	168,200	148,000	88	20,100	12
1979	136,400	110,000	81	25,500	19
1980	141,100	112,500	80	28,600	20
1981	126,300	91,000	71	35,300	28

Table 5. Evolution of cotton groups from 1982 to 1990

Year	Number of non cooperative groups	Number of cooperative groups	Total annual number of groups	Cumulative number of groups
1982	10	—	10	10
1983	44	79	123	133
1984	6	145	151	284
1985	—	52	52	336
1986	—	16	16	352
1987	—	1	1	353
1988	1	82	83	436
1989	—	34	34	470
1990	8	18	26	496
Total	69	427	496	

Table 6. Number of cotton producers groups, acreage and production for 1981–1990

Year	Number of groups	Number of group members	Number of group harvesters	Area of the cotton producer groups (ha)	(%)	Total cotton area (ha)	Production of cotton producer groups (tons)	(%)	Total cotton production (tons)
1981	—	—	—	—	—	126,329	—	—	352,603
1982	10	137	10	696	0.5	137,300	1,725	0.5	313,700
1983	133	11,222	193	31,047	19.2	161,779	76,966	19.1	402,545
1984	284	24,844	474	79,468	41.4	192,042	201,110	44.3	453,370
1985	336	30,110	604	92,671	44.3	209,000	213,385	44.5	520,045
1986	352	31,510	677	97,744	46.5	210,000	245,035	33.3	623,592
1987	353	31,595	677	98,144	48.6	202,000	246,035	43.1	571,052
1988	436	37,989	822	113,189	44.2	256,000	276,952	36.9	750,000
1989	470	39,699	952	118,589	42.3	280,000	293,866	35.5	828,500
1990	496	40,709	1,029	121,737	45.4	268,000	300,668	45.3	663,008

Figure 1. Rainfall distribution in Karditsa, prefecture of Greece for the period 1962–1991

