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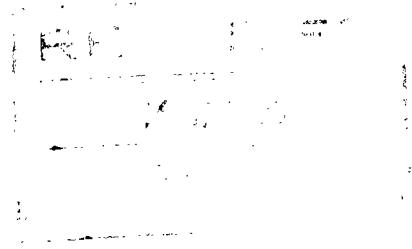
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PRODUCTION ECONOMICS OF OLIVES 1985-1988

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MINISTRY OF AGRICULTURE AND NATURAL RESOURCES**

NICOSIA



CYPRUS

JULY 1991

ISSN 0379-0827

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SUMMARY

The present study refers to the technical and economic analysis of olive production in two areas of Cyprus for the years 1985-1988. The data was obtained from 17 rainfed olive groves in Tseri and Mazotos area and 37 irrigated olive groves in Solea area. The average yield of rainfed olives was 2.0 t/ha compared to 5.3 t/ha of irrigated olives. About 53% of the rainfed and 60% of the irrigated olive production was processed into olive oil. Gross revenue was £1254/ha from rainfed and £3521/ha from irrigated olives. Variable production costs amounted to £272 and £656/ha for rainfed and irrigated olives, respectively. Hired labour and processing costs represented nearly 55% of the variable costs. Fixed costs were £852/ha for rainfed and £1937/ha for irrigated olives. The farm family provided 87% and 82% of the required labour for rainfed and irrigated olives, respectively. The mean net profit was £115/t from rainfed olives and £123.7/t from irrigated olives, and varied considerably between years.

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη αναφέρεται στην οικονομικότητα παραγωγής ξηρικών και αρδευσιμων ελιών στην Κύπρο. Τα τεχνικά και οικονομικά στοιχεία λήφθηκαν από 17 ξηρικούς ελαιώνες στις περιοχές Τσερίου και Μαζωτού και 37 αρδευσιμους στην περιοχή Σολέας κατά την περίοδο 1985-88. Η συνέχιση της έρευνας για τέσσερα χρόνια θεωρήθηκε απαραίτητη ώστε να απαμβλυνθούν κατά το δυνατό οι διακυμάνσεις που παρατηρούνται από χρόνο σε χρόνο λόγω της παρενιαυτοφορίας της ελιάς, και τα αποτελέσματα της εκφράζονται σαν μέσοι όροι τεσσάρων ετών. Η μέση απόδοση ξηρικών ελιών ήταν 2 τόνοι και των αρδευσιμων 5.3 τόνοι στο εκτάριο. Περίπου 53% της παραγωγής ξηρικών και 60% αρδευσιμων ελιών χρησιμοποιήθηκαν για παραγωγή ελαιολάδου. Το ακαθάριστο εισόδημα από ξηρικές καλλιέργειες ήταν £1254 και από αρδευσιμες £3521 στο εκτάριο. Οι μεταβλητές δαπάνες στις ξηρικές καλλιέργειες ανήλθαν σε £172 και στις αρδευσιμες £656 ανά εκτάριο. Σχεδόν 55% των μεταβλητών δαπανών απορρόφησε η μισθωτή εργασία και η μεταποίηση σε ελαιολάδο. Οι σταθερές δαπάνες ήταν £852 για τις ξηρικές και £1937 για τις αρδευσιμες ελιές ανά εκτάριο. Η οικογενειακή εργασία απετέλεσε το 87% και 82% της συνολικής εργασίας που απαιτήθηκε για τη διεξαγωγή των καλλιεργητικών φροντίδων των ξηρικών και αρδευσιμων ελιών, αντίστοιχα. Το μέσο καθαρό κέρδος ήταν £115 ανά τόνο ξηρικών και £123.7 ανά τόνο αρδευσιμων ελιών. Υπήρξαν όμως σημαντικές διαφορές από χρόνο σε χρόνο, ανάλογα με την αποδοτικότητα σε ελαιόκαρπο. Το συνολικό κόστος παραγωγής ανά μονάδα προϊόντος ήταν κατά 18% και 26% πιο χαμηλό από το ύψος των τιμών των ξηρικών και αρδευσιμων ελιών.

INTRODUCTION

Olive growing is an important farming activity in Cyprus. Olives are grown on about 6300 ha all over the country, representing 3.8% of the total cropped area. The volume of olive production in 1988 was 18000 t compared to 8000 t in 1987 and 12000 t in 1985 and 1986. The value of olive production between 1985 and 1988 averaged £8.3 million, and its contribution to the total agricultural output was 4%. During 1985-88 about 1200 t of olives and 1800 t of olive oil were imported to meet local demand. In the same period, 330 t of olives and 130 t of olive oil were exported. Olive growing is

also important as a farming activity, contributing with more than two thirds of the farm income in about 5% of the agricultural holdings and supplementing the income of 10000 farms that specialize in other agricultural activities.

The local olive variety dominates, although new table olive varieties have been recently introduced which are grown under irrigation. Olive growing rapidly expanded in the last few years. In view of the danger of surplus production and taking into consideration the limited export possibilities the Ministry of Agriculture and Natural Resources revised its olive policy and stopped promoting further expansion of the crop. It is

expected that Cyprus will soon become self sufficient in both olive and olive oil production, when new plantations reach the stage of full bearing.

The present study refers to a technical and economic survey that covers the crop years 1985-88. It also covers some socio-economic and marketing aspects of the production of olives and olive oil.

RESEARCH CONDITIONS

Technical and economic data was obtained from 17 rainfed olive groves at Tseri and Mazotos and 37 irrigated groves in Solea area from 1985 to 1988. The sampled growers were chosen on the basis of their willingness to provide detailed and accurate information on all aspects of olive growing. The size of the surveyed groves ranged from 0.13 ha to 1.0 ha, comprising 9 to 130 trees. Rainfed olives represented a total of 13.5 ha with 715 trees and irrigated olives 10.8 ha with 1296 trees. All data was collected by personal single-visit interviews. Data from 4 years were pooled in order to adjust for annual variation in yield and price.

RESULTS

Family structure and employment

The farm family in both surveyed areas was composed of the holder and 3 family members. The grower's age averaged 56 years in the rainfed (Tseri, Mazotos) and 62 years in the irrigated (Solea) area. Olive growers in the rainfed and irrigated area had received formal education of 7.3 and 7.9

Table 1. Family structure and employment of olive growers

	Rainfed groves	Irrigated groves
Grower's age	56	62
Grower's education	7.3	7.9
Family members	3.0	3.1
On-farm employment grower (wks)	30.0	16.4
On-farm employment family members (wks)	14.0	11.7
Off-farm employment grower (wks)	16.6	17.4
Off-farm income grower (£/year)	1214	801

years, respectively. The on-farm employment of the farm family in the rainfed area was 44 weeks/year compared to 26 weeks/year in the irrigated area. In order to supplement their income, farmers and their family members were also employed off-farm. Off-farm employment did not differ much in the two areas and averaged about 17 weeks/year. However, the off-farm income of growers in the rainfed areas was much higher (1214) than in the irrigated area (801), due to better job opportunities in the neighbouring towns (Table 1).

Land ownership and tenure

The average farm size in the rainfed areas was 7.18 ha of which 6.51 ha was owned land and 0.67 ha was rented at £48/ha. The area under olives was 0.86 ha or 12% of the total farm area. Irrigated olive groves were

Table 2. Land ownership and tenure

	Rainfed groves	Irrigated groves
Average farm size (ha)	7.18	2.40
Owned land (ha)	6.51	1.73
Rented-in land (ha)	0.67	0.67
Rent of land (£/ha)	48.00	66.00
Area of olives (ha)	0.86	0.54

of smaller size. Farm size was only 2.4 ha of which 1.73 ha was owned land and 0.67 ha was rented-in land at £66/ha. The area under olives was 0.54 ha, representing 22.5% of the farm area (Table 2). The average size of the sampled groves, the number of trees/ha and the age of trees are shown in (Table 3).

Table 3. Characteristics of sampled olive groves

	Rainfed groves	Irrigated groves
Area of olive grove (ha)	0.71	0.33
Number of trees per ha	53	120
Age trees (years)	43	47
Main variety	Local	Local

Output

Yields. The average yield of rainfed olives was 2 t/ha, but it varied considerably from year to year due to rainfall variation and the biennial bearing of the trees (Table 4). About 53% of the rainfed olive production was used for extraction of olive-oil and 47%

Table 4. Production and disposal of olive production 1985-88

	Rainfed olives					Irrigated olives				
	1985	1986	1987	1988	Mean	1985	1986	1987	1988	Mean
Total olive production (kg/ha)	2560	2878	878	1330	2000	8572	4858	7589	2350	5303
Olives used for olive oil production	1920	807	220	650	1064	6686	2772	4267	1246	3162
Olive oil production	462	183	52	142	250	1337	557	872	246	638
Olive oil/olives ratio	0.24	0.23	0.23	0.22	0.23	0.20	0.20	0.20	0.20	0.20
Olive oil sold to SEKEP	140	-	-	-	53	25	68	588	-	199
Olive oil sold directly to the market	287	148	26	112	165	1255	427	218	188	377
Olive oil consumed by family	35	35	26	30	32	57	62	66	58	62
Olives used for consumption	640	2071	658	680	936	1886	2086	3322	1104	2141
Olives sold to SEKEP	52	-	-	-	20	-	-	2056	-	615
Olives sold directly to the market	554	2032	621	640	880	1818	2010	1190	1063	1461
Olives consumed by family	34	39	37	40	36	68	76	76	41	65

for consumption as table olives. Almost all olive production and 66% of the olive-oil production was sold directly to the market. Only 20% of the olive oil and 2% of the table olives were marketed through the Cyprus Olive Marketing Board (SEKEP).

The yield of irrigated olives in Solea area was considerably higher than that of rainfed olives and averaged 5.3 t/ha. Yield variation from year to year was also high. Around 60% of olive production was used for the production of olive-oil and 40% for consumption. About 70% of the table olives and olive-oil produced was sold directly to the market by the producers and only 30% was sold to SEKEP. The low market share of SEKEP in the marketing of olives and olive oil is the result of the lower prices it offers. Consumers also are willing to pay higher prices for olive oil produced and sold by the producers, which is thought purer. The oil content of rainfed and irrigated olives was 23 and 20%, respectively. Rainfed olives were harvested mainly green in September and October. Irrigated olives were harvested in November and December.

Prices. The average (1985-88) farm-gate price was £627/t for rainfed and £664/t for irrigated olives. They were calculated by dividing the gross revenue by the mean yield irrespective of the form of the final product sold by the farmer. Differences in price between rainfed and irrigated olives were due to oil content and form of the final product sold (green olives, black olives, olive-oil).

The average annual growth rate of farm-gate prices was about 20% for the rainfed and 16% for the irrigated olives.

Gross revenue. Gross revenue depends on yield, prices received and the form of the final product sold by the grower. The average gross revenue was £1254/ha from rainfed olives and £3521/ha from irrigated olives. As a result of annual yield variation, gross revenue varied considerably from year to year (Table 5).

Production costs

Production costs were divided into variable and fixed. Variable costs refer to cash expenses for material inputs, hired labour, services and interest on operating capital. Fixed costs include imputed rent for the olive grove, family labour costs, interest on fixed capital and depreciation.

Variable costs

Fertilizers. Fertilizers accounted for about 10% of the total variable costs for both rainfed (17.9/ha) and irrigated olives (58.4/ha). The total quantity of nitrogen and phosphorus applied to irrigated olives was three times higher than that applied to rainfed olives. Sulphate of ammonia (21-0-0) was the main type of N fertilizer used in both rainfed and irrigated olives at an average rate of 63 kg/ha and 418 kg/ha, respectively. Other fertilizers used and their rates are given in Table 6. Minor differences were observed in the quantity of fertilizers used from year to year.

Table 5. Costs and returns (£/ha) of rainfed and irrigated olives

	Rainfed olives					Irrigated olives					
	1985	1986	1987	1988	Mean	1985	1986	1987	1988	Mean	
Number of olive groves	25	17	17	17		22	37	37	37		
Mean area (ha/grove)	0.75	0.69	0.69	0.69	0.71	0.20	0.35	0.35	0.35	0.33	
Number of trees/ha	53	53	53	53	53	120	120	120	120	120	
Yield (kg/ha)	2560	2878	878	1330	2000	8572	4858	7589	2350	5303	
Price (£/t)	500	700	750	785	627	470	660	720	730	664	
GROSS REVENUE	£	1280	2015	658	1044	1254	4029	3206	5464	1716	3521
Variable costs											
Fertilizers		15.1	19.7	18.0	20.5	17.9	46.1	60.4	59.5	59.6	58.4
Plant protection		8.3	12.6	13.8	16.7	12.3	18.8	27.1	31.8	36.7	30.5
Irrigation		-	-	-	-	-	55.5	53.0	52.0	53.0	53.0
Contract work		19.2	19.4	15.2	15.2	17.5	61.5	46.1	46.9	43.0	47.0
Machinery		2.7	4.2	4.5	5.5	4.0	-	6.5	13.4	6.2	7.8
Hired labour		37.1	88.5	48.0	18.7	46.5	270.0	155.3	355.0	38.5	191.8
Transportation		12.9	17.3	7.0	13.3	12.7	50.2	33.9	68.3	23.5	42.7
Industrial cost		73.0	40.3	13.2	39.0	45.6	254.0	138.6	256.0	74.6	166.3
Other (5%)		8.4	10.1	6.0	6.4	7.8	37.8	26.0	44.1	16.8	30.0
Interest on operating capital		8.0	9.5	5.7	6.1	7.4	35.7	24.6	41.7	15.8	28.3
TOTAL VARIABLE COST	£	184.7	221.6	131.4	141.4	171.7	829.6	571.5	968.8	367.6	655.8
GROSS PROFIT	£	1095.3	1793.4	526.6	902.6	1082.3	3199.4	2634.5	4495.2	1348.4	2865.2
Fixed costs											
Rent of olive grove		400.0	400.0	400.0	400.0	400.0	750.0	750.0	750.0	750.0	750.0
Family labour		264.0	411.0	255.0	396.0	322.3	860.0	719.0	1405.0	798.0	962.4
Interest and depreciation		130.0	130.0	130.0	130.0	130.0	225.0	225.0	225.0	225.0	225.0
TOTAL FIXED COSTS	£	794.0	941.0	785.0	926.0	852.3	1835.0	1694.0	2380.0	1773.0	1937.4
TOTAL COSTS	£	978.7	1162.6	916.4	1067.4	1024.0	2664.6	2265.5	3348.8	2140.6	2593.2
NET PROFIT	£	301.3	852.4	-258.4	-23.4	230.0	1364.4	940.5	2115.2	-424.4	927.8
Variable cost (£/t)		72.1	77.0	149.7	106.3	85.8	96.7	117.6	127.6	156.4	123.7
Total cost (£/t)		382.3	404.0	1043.7	802.5	512.0	310.8	466.4	441.3	910.9	489.0
Gross profit (£/t)		427.8	623.1	599.7	678.6	541.1	373.2	542.3	592.3	573.8	540.3
Net profit (£/t)		117.7	296.2	-294.3	-17.5	115.0	159.2	193.6	278.7	-180.6	175.0

Plant protection. Protection against the Olive fly (*Dacus oleae*) was effected by air sprays for both rainfed and irrigated olives. The cost amounted to £12.3/ha for rainfed and £30.5/ha for irrigated olives. Air sprays were charged to farmers on a per tree basis at the subsidized rate of £0.23-0.25/tree for 4 to 6 sprays (Table 7). Air spraying services are provided by the Ministry of Agriculture that acts in cooperation with the local farmers associations.

Irrigation. Irrigation cost, including fees paid to the local irrigation associations, amounted to £53/ha (Table 7) and varied little from year to year. The predominant method of irrigation was flooding and the exclusive source of irrigation was river water. The number of irrigations ranged between 5

and 9 depending on rainfall and water availability.

Contract work. Contract work refers to operations assigned by the growers to individuals on a contract basis, such as land cultivation and pruning. Contract work cost included rent of machinery and equipment used and operator's wages. It amounted to £17.5/ha for rainfed and £47/ha for irrigated olives, with little variation among years. Cost differences of contract work between rainfed and irrigated olives were mainly due to the greater number of rainfed olive growers using own machinery, and the increased charges for 2-wheeled tractors in Solea area.

Machinery. This cost refers to fuel and maintenance of machinery owned by the

farmer; it was £4.0/ha for rainfed and £7.8/ha for irrigated olives.

Table 6. Quantities (kg/ha) and types of fertilizers used

	1985	1986	1987	1988	Mean
Rainfed olives					
21-0-0	86	63	43	48	63
26-0-0	10	26	25	26	20
16-20-0	63	83	87	113	83
0-48-0	6	21	17	8	12
0-16-0	16	-	-	-	6
N	30.7	33.3	29.5	34.9	31.7
P	7.8	11.6	11.1	11.6	10.1
Fertilizers cost (£/ha)	15.11	9.7	18.0	20.5	17.9
Irrigated olives					
21-0-0	2913	47	453	497	418
26-0-0	73	33	29	35	36
16-20-0	76	54	55	38	52
0-48-0	89	185	128	102	133
N	92.2	90.1	111.5	120.0	105.7
P	25.0	43.3	31.5	24.6	32.3
Fertilizers cost (£/ha)	46.1	60.4	59.8	59.5	58.4

Hired labour. Cost of hired labour included wages for harvesting and, to a lesser extent, pruning. It was one of the major cash expenses and was directly related to the volume of production. Hired labour cost was £46.5/ha for rainfed and £191.8/ha for irrigated olives. In both cases only female labour was used at an hourly wage rate of £0.76 for rainfed and £0.85 for irrigated olives (Table 8).

Table 7. Spraying and irrigation cost (£/ha) of olive groves

	Rainfed groves	Irrigated groves
Spraying		
Number of sprays	4	6
Cost of spraying (/ha)	12.3	30.5
Cost of spraying (/tree)	0.23	0.25
Method of spraying	Air	Air
Irrigation		
Number of irrigations	-	5-9
Source of irrigation	-	River
Method of irrigation	-	Flooding
Cost of irrigation (£/ha)	-	53.0

Transportation cost. It included the cost of transporting the harvested produce from the olive grove to the oil mill; it amounted to £13.3/ha for rainfed and £42.4/ha for irrigated

olives. This cost is determined by the volume of production used for olive-oil extraction and the distance of the grove to the nearest oil-mill.

Industrial cost. It included the cost of processing olives into olive-oil. Oil mills charged £40/t of olives in 1985, £50/t in 1986 and £60/t in 1987 and 1988. The average industrial cost during the survey period was £45.6/ha for rainfed and £166.3/ha for irrigated olives.

Interest on operating capital. It represented interest on the total cash production expenses at the rate of 9% for 6 months and amounted to £7.4/ha for rainfed and £28.3/ha for irrigated olives.

Fixed costs

Rent of olive grove. Imputed rent was estimated at £400/ha for rainfed and £750/ha for irrigated olives. They represent average rent in each area and comprise the rent of land and interest on the value of trees.

Family labour. The major source of labour for both systems was farm family, which provided about 85% of the required labour. The family labour actually used was 407 h/ha for rainfed and 1071 h/ha for irrigated olives. Family labour cost amounted to £322 and £962/ha for rainfed and irrigated olives, respectively. The wage rates used for family labour averaged £0.79/h and £0.90/h, respectively. The higher wage rate in the case of irrigated olives resulted from the use of male labour, in pruning and transporting. The labour requirements by operation and the actual wage rates by year are given in Table 8.

Interest and depreciation. Interest on fixed capital was calculated at 8% on the value of all capital items such as tools and other implements. Their value was estimated at £720/ha for rainfed and £1250/ha for irrigated olives. Depreciation was calculated using the straight line method assuming a 10-year economic life for all capital items.

Economic results

Gross profit. Gross profit or margin represents returns of all productive resources employed for the production of output in the

Table 8. Labour requirements of olive trees by operation (h/ha)

	1985		1986		1987		1988		Mean	
	F	H	F	H	F	H	F	H	F	H
Rainfed olives										
Land cultivation	7	-	7	-	9	-	8	-	8	-
Pruning	42	-	56	-	63	-	40	-	49	-
Fertilizing	11	-	15	-	16	-	15	-	14	-
Hoeing	11	-	20	-	18	-	29	-	18	-
Harvesting	346	60	422	118	124	48	236	17	29	161
Other	24	-	28	-	25	-	32	-	27	-
Total	441	60	548	118	255	48	360	17	407	61
Wage rate (£/h)	0.60		0.75		1.00		1.10		0.79 0.76	
Labour cost (£/ha)	265	36	411	89	255	48	396	19	322	47
Harvesting labour (h/t)	158		188		196		190		176	
Irrigated olives										
Land cultivation	15	-	10	-	11	-	8	-	10	-
Pruning	114	30	47	15	49	15	58	8	58	15
Fertilizers	25	-	17	-	19	-	18	-	19	-
Irrigating	48	-	46	-	40	-	49	-	45	-
Harvesting	1164	420	793	192	1220	340	558	27	888	210
Other	68	-	46	-	66	-	35	-	51	-
Total	1434	450	959	207	1405	355	726	35	1071	225
Wage rate (£/h)	0.60		0.75		1.00		1.10		0.90 0.85	
Labour cost (£/ha)	860	270	719	155	1405	355	799	39	962	192
Harvesting labour (h/t)	185		203		206		249		207	

F=Family labour; H=hired labour.

olive growing farm enterprise. Gross profit from rainfed olives averaged £1082/ha and from irrigated olives £2865/ha. The gross margin to gross output ratio was 0.86:1 and 0.8:1 for the rainfed and irrigated olives, respectively. Unit gross profit from rainfed and irrigated olives was about the same and averaged £541/t. Net profit represents returns to management and amounted to £230 and £298/ha from rainfed and irrigated olives respectively. Unit net profit was £115/t for rainfed and £175/t for irrigated olives, and represented 18% and 26% of the average olive prices. The above economic analysis showed that the key factor determining profitability of olive growing is yield.

ACKNOWLEDGEMENTS

The author wishes to thank all growers

interviewed for their cooperation in collecting the data. Appreciation is also expressed to Mr. A. Demetriou and the staff of the Agricultural Economics Section for the collection and processing of the data.

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P.I.O. 43/91-600
Issued by the Press and Information Office, Nicosia

Printed by Konos Ltd, tel. 465910, Nicosia