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Grape - Cost of Prod.

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THE ECONOMICS OF GRAPE PRODUCTION

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WASHER 1-4

ECONOMICS OF GRAPE PRODUCTION

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INTRODUCTION***

Grape production, covering the 0.5% of the total (3.5 million hectares) area cultivated in Greece, represents the 1.3% of our total gross value of the crop production. Grapes are growing in various regions. Among these regions Kavala occupies an important position, not mainly for the area cultivated, but for the quality of the grapes produced and for the exports achieved.

Indeed, grapes are a relatively new crop in this region, but the yields achieved, the quality of grapes and mainly the great quantities exported in good prices have contributed to the rapid expansion of this crop. Now, grapes continue to be expanded in this region, because this crop has contributed to the improvement of the farmer's income and to the increase of the imported exchange.

The importance of this farm enterprise for the agricultural economic both of this region and of the whole country there was the main reason for which a special investigation was undertaken by the Department of Agricultural Economics Research. Indeed, this investigation was included in the research programme of 1973 of our Department and its purpose was to present the economics of grape production at present and in the future.

The methodology used and the quality of the collected and analyzed physical and economic data, of a great number of grape enterprises by using records and accounts, indicate that the results achieved and the conclusions drawn can be directly applied in actual practice at present and in the future, not only in this region, but also in any other region in Greece.

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***This paper was published in the annual scientific report of the School of Agriculture and Forestry of the University of Thessaloniki. Regression, Correlation and Marginal value products were estimated by using electronic computer. The paper was efficiently typed by Mrs. Parashou, who is a technician in this Department.

RESEARCH CONDITIONS AND METHOD OF WORK

The whole investigation includes on the one hand 169 grape growers for keeping detailed and accurate physical and economic data of their grape farms or grape enterprises during the year 1973 by using records and accounts, and on the other 372 grape growers for keeping only yield achieved according to age and size of their grape enterprise. In other words, the whole research includes 541 grape growers.

It is known that grapes are a perennial crop and for this reason the production factors required and the yield achieved vary according to age. In order to have representative physical and economic data of each age, the 541 grape growers were chosen by that way, so that a large number of growers correspond to each age (table 1). This method was followed in this investigation because it was the only way to have in one year a complete analysis of the grapes for their whole life. The age of 26 years was taken as the last one, because in this region there were not found grape vineyards of greater age.

From an economic analysis point of view the grape enterprise is divided into two periods, e.g. the period from planting until normal production begins and the period from this year until 26 years.

In the first period, the costs of the production factors used are invested as grape vineyard from planting until the annual input is covered by the annual output. This year is the third one for the grape vineyard. The total costs of the production factors used in the first period are distributed on the years of the second period according to yield.

In the second period, the yield achieved and the labour and capital required are progressively increased from third until tenth year, while during the second decade (11-20 years) these remain rather unchanged. Finally, from 21 until 26 years, yield achieved and labour and capital required are progressively decreased.

Although the main parts of this analysis refer to the fluctuation of the yield achieved and of the costs of the production factors used according to age or classes of ages, however the most important point of this analysis is the presentation of the economics of grape production for the average of its whole economical life. On the other hand, the average financial results of this crop it is necessary to be compared with the corresponding results of the various annual crops if we want to have the actual economic position of grape production in a region.

Analysing the physical and economic data of this farm enterprise we met the following difficulties :

a) certain growers they used own farm machinery, while many of them they used hired machinery. In order to avoid differences between annual expenses of the own machinery and the payments of the hired machinery for the same farm operations it was considered that all farm operations were performed by hired machinery.

b)The rent of land covered by the grape vines it was difficult to be estimated because there is not land used by annual crops in this region. For this reason, the estimation of land rent was based on the rent paid for the land used by the same profitability annual crops near this region and on the market value of the land in this region.

c)Another difficulty it was the distribution of the total costs of the production factors used from planting until third year to the mainly productive period of the grape vines. This distribution was based on the yield achieved by each year from thourth until twenty sixth. The same method it was followed for the distribution of the total costs of the capital invested as posts and wire supporting grape vines.

In this paper the text is ommited and only tables are given. This was done on the one hand, because the money available in the Department is very limited, and on the other, because all tables and charts are simple and almost self-explanatory.

ANALYSIS OF PHYSICAL AND ECONOMIC DATA
OF GRAPE ENTERPRISE

Table 1
Number of grape vineyards according to age

Age Number	Age in years											
	A. First period					B. Second period						Total
	Establishment	1	2	3	4	5	6	7	8-10	11-20	21-26	
No. of grape vineyard	14	13	10	15	29	24	48	44	134	172	38	541

First period: covers the period from planting until normal production begins (3th year)

Second period: covers the mainly productive period of grape vineyards e.g. from 4 until 26 years.

Table 2
Number of pure grape farms according to size

Size Number	Classes of size in hectares					Total
	up-0.5	0.51-1.0	1.10-2.0	2.01-3.0	3.01-over	
No. of farms	5	14	36	10	5	70

A. ANALYSIS OF PHYSICAL AND ECONOMIC DATA
OF FIRST PERIOD

Table 3
Total and per farm operation man equivalent labour required from planting until normal production of grape vineyard begins

Farm operations	Labour in hours per hectare according to age			
	Establishment	Year 1 (0-1)	Year 2 (1-2)	Year (2-3)
Soil cultivations-Planting	246	-	-	-
Grafting	-	-	317	-
Inter-row cultivations	-	180	175	165
Winter pruning	-	-	-	137
Fertilizing	-	2	11	11
Spraying	-	-	61	86
Summer pruning and training	-	-	-	17.5
Picking and transportation	-	-	-	306
Total	246	182	564	880

Table 4

Costs of production factors used from planting until normal production of grape vineyards begins

Production factors invested	<i>Capital invested in dollars per hectare according to age</i>			
	Establishment	Year 1 (0-1)	Year 2 (1-2)	Year 3 (2-3)
1. Costs of production factors used				
a) Land (rent)	-	333.3	333.3	333.3
b) Labour (wages)	132.0	91.0	335.0	462.7
c) Capital (expenses)				
Machinery	151.7	107.3	219.0	297.3
Fertilizers-Pesticides	-	8.3	152.7	266.3
Value of rooted cuttings	119.7	-	-	-
Twine, packing, paper etc.	-	-	16.7	56.0
Interest of capital invested	-	28.3	68.3	148.7
Interest of variable capital	-	5.7	19.3	31.0
Total	403.4	573.9	1,144.3	1,595.3
2. Costs added	403.4	573.9	1,144.3	379.3
3. Costs of production factors as grape-vines	403.4	977.3	2,121.6	2,500.9

Table 5

Costs of production factors used per farm operation normal production of grape vineyard begins

Farm operations	<i>Participation of each operation in dollars per hectare according to age</i>			
	Establishment	Year 1 (0-1)	Year 2 (1-2)	Year 3 (2-3)
Soil cultivations-Planting	403.4	-	-	-
Grafting	-	-	228.0	-
Inter-row cultivations	-	196.7	195.0	179.3
Winter pruning	-	-	-	106.3
Fertilizing	-	10.0	32.3	49.3
Spraying	-	-	268.0	399.0
Summer pruning and training	-	-	-	109.7
Picking and transportation	-	-	-	238.7
Total	403.4	206.7	723.3	1,082.3

B. ANALYSIS OF PHYSICAL AND ECONOMIC DATA
OF SECOND PERIOD

T a b l e 6

Total and per farm operation man equivalent labour required according
to age

Farm operations	<i>Labour required in hours per hectare according to age in years</i>						
	4	5	6	7	8-10	11-20	21-26
Inter-row cultivations	166	170	172	178	181	184	185
Wire tying on the posts	6	15	26	33	34	36	28
Winter pruning	174	219	285	324	359	360	330
Fertilizing	11	12	15	22	27	31	31
Spraying	109	158	210	253	272	283	326
Summer pruning and training	232	314	427	563	679	683	689
Picking and transportation	345	364	546	651	724	732	670
Total	1043	1252	1681	2024	2276	2309	2259

T a b l e 7

Monthly fluctuations of man equivalent labour required

Months	<i>Monthly labour required in hours per hectare according to age in years</i>							
	4	5	6	7	8-10	11-20	21-26	Average of 26 years
January	168	184	218	226	236	241	254	202
February	159	199	234	241	241	248	212	233
March	59	65	68	73	72	74	76	61
April	41	66	93	98	105	108	84	92
May	148	155	175	227	247	256	219	214
June	169	193	225	243	275	286	319	251
July	61	86	126	158	164	164	207	145
August	37	41	69	75	91	103	151	82
September	119	150	225	238	239	244	279	217
October	72	95	201	314	455	458	315	392
November	9	17	46	98	108	116	113	71
December	1	1	1	33	43	11	30	15
Year	1,043	1,252	1,681	2,024	2,276	2,309	2,259	1,975

T a b l e 8

Capital needed in dollars per hectare and per year according to age

Kinds of capital	<i>Capital needed in dollars per hectare according to age</i>							
	4	5	6	7	8-10	11-20	21-26	Average of 26 years
Machinery	307.7	314.7	322.7	335.0	343.3	351.7	344.7	333.3
Fertilizers	45.3	48.3	50.0	66.3	68.7	75.3	95.7	70.0
Pesticides	229.7	245.3	285.3	288.3	293.0	323.0	339.3	290.3
Twine, packing paper etc.	45.7	51.3	57.0	77.3	92.0	95.0	88.7	84.0
Total	628.4	659.6	715.0	766.9	797.0	845.0	868.4	777.6

T a b l e 9
Yield and gross output

Age in years	Gross output		
	Yield (tons/hect.)	Price (\$/ton)	Total
Year 4	9.83	200	1,966
Year 5	13.63	200	2,726
Year 6	18.99	200	3,798
Year 7	23.93	200	4,786
Year 8-10	26.61	200	5,322
Year 11-20	27.66	200	5,532
Year 21-26	24.38	200	4,876
Average (26 years)	22.12	200	4,424

T a b l e 10
Costs of productions

Age in years	Production costs	
	\$/hect.	\$/ton
Year 4	1,799.7	183.0
Year 5	2,006.3	147.3
Year 6	2,378.3	125.3
Year 7	2,691.3	112.3
Year 8-10	2,900.7	109.0
Year 11-20	2,985.0	108.0
Year 21-26	2,929.7	120.3

T a b l e 11
Participation of the cost of each production factor to the total production costs

Production factors	Costs of using production factors in dollars per hectare according to age in years						
	4	5	6	7	8-10	11-20	21-26
A. Land (rent)	333.3	333.3	333.3	333.3	333.3	333.3	333.3
B. Labour (wages)	550.7	662.7	888.0	1,066.0	1,198.0	1,214.7	1,184.7
C. Capital (expenses)	915.7	1,010.3	1,157.0	1,292.0	1,369.3	1,437.0	1,411.7
C ₁ Machinery	307.7	314.7	322.7	335.0	343.3	351.7	344.7
C ₂ Materials	320.7	345.0	392.3	432.0	453.7	493.3	523.7
C ₃ Depr., insur. and interest of capital invested as grape-vines	83.7	116.7	162.0	203.7	227.3	235.7	207.3
C ₄ Depr. insur. and interest of capital invested as posts	70.6	70.6	70.6	70.6	70.6	70.6	70.6
C ₅ General expenses	42.7	48.7	59.7	68.7	74.7	77.3	75.7
C ₆ Interest of variable capital	31.3	33.0	35.7	38.3	40.0	42.4	43.3
C ₇ Taxes	59.0	81.6	114.0	143.7	159.7	166.0	146.4
Total	1,799.7	2,006.3	2,378.3	2,691.3	2,900.6	2,985.0	2,929.7

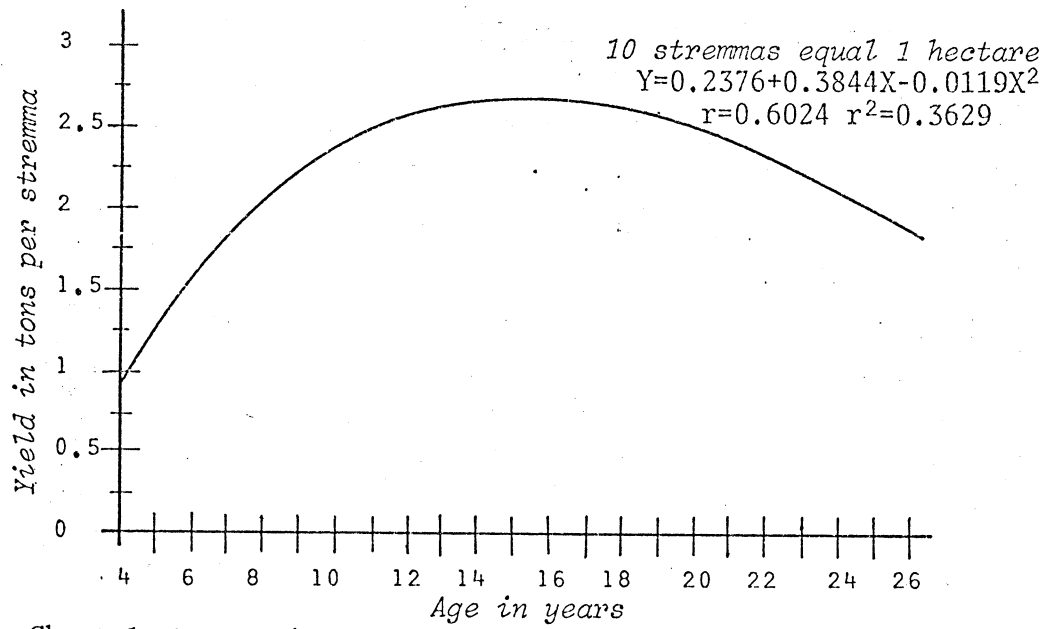


Chart 1. Regression and Correlation analysis between age and yield

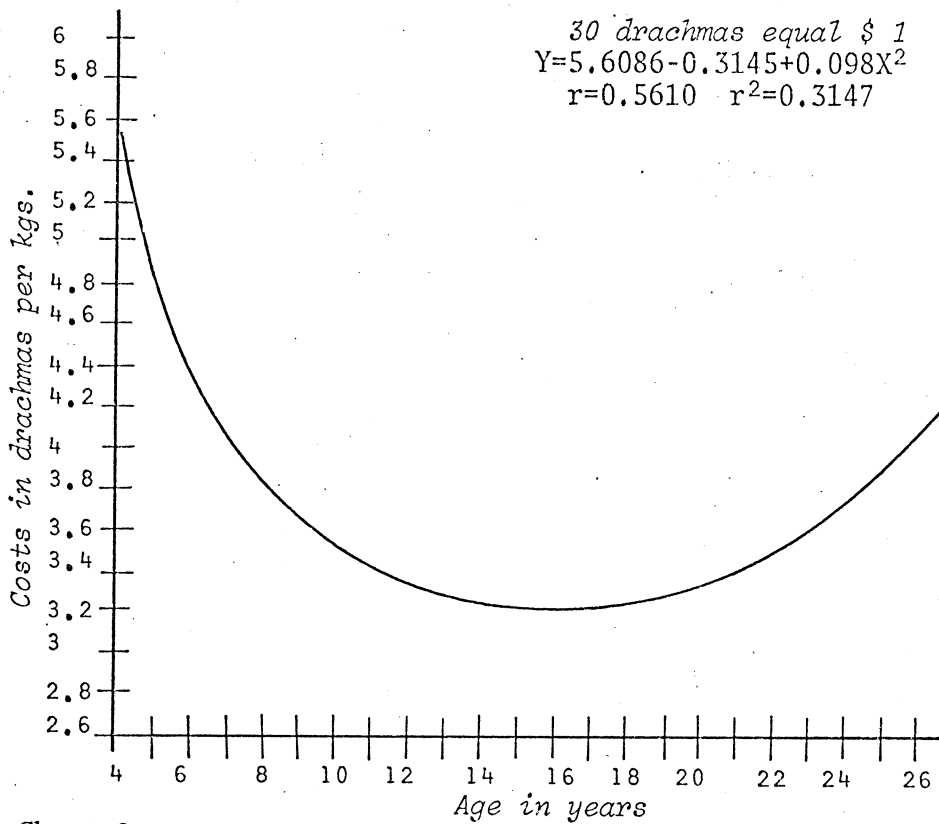


Chart 2. Regression and Correlation analysis between age and costs of production

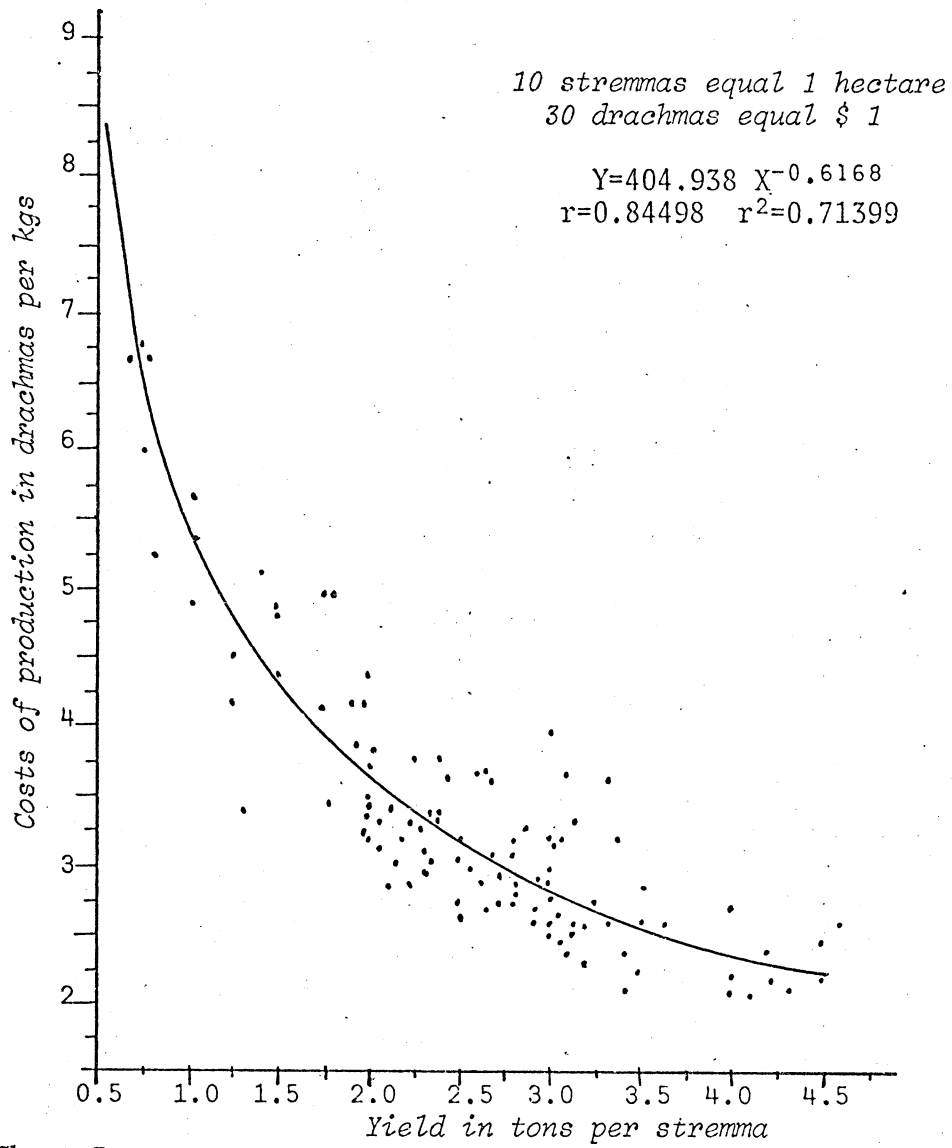


Chart 3. Regression and Correlation analysis between yield and costs of production

Table 12

Participation of the cost of each farm operation to the total production costs

Farm operations	<i>Costs of each farm operation in dollars per hectare according to age in years</i>						
	4	5	6	7	8-10	11-20	21-26
Inter-row cultivations	181.0	186.3	208.3	214.0	218.7	221.3	219.7
Wire tying on the posts	3.0	7.7	13.0	16.7	17.0	18.0	14.0
Winter pruning	127.0	166.0	199.3	231.7	251.3	257.0	231.7
Fertilizing	55.7	59.3	70.0	86.0	95.3	100.3	122.3
Spraying	425.3	422.0	512.3	566.3	589.7	603.7	672.0
Summer pruning and training	135.7	175.3	237.0	312.7	347.7	358.3	359.7
Picking and transportation	251.3	275.7	363.0	405.7	475.3	501.0	433.7
Land rent	333.3	333.3	333.3	333.3	333.3	333.3	333.3
Depr. insur., and interest of capital invested as grape-vines	83.7	116.7	162.0	203.7	227.3	235.7	207.3
Depr. insur., and interest of capital invested as posts	70.6	70.6	70.6	70.6	70.6	70.6	70.6
General expenses	42.7	48.7	59.7	68.7	74.7	77.3	75.7
Interest of variable capital	31.3	33.0	35.7	38.3	40.0	42.4	43.3
Taxes	59.0	81.6	114.0	143.7	159.7	166.0	146.4
Total	1,799.6	1,976.2	2,378.2	2,691.4	2,900.6	2,984.9	5,914.6

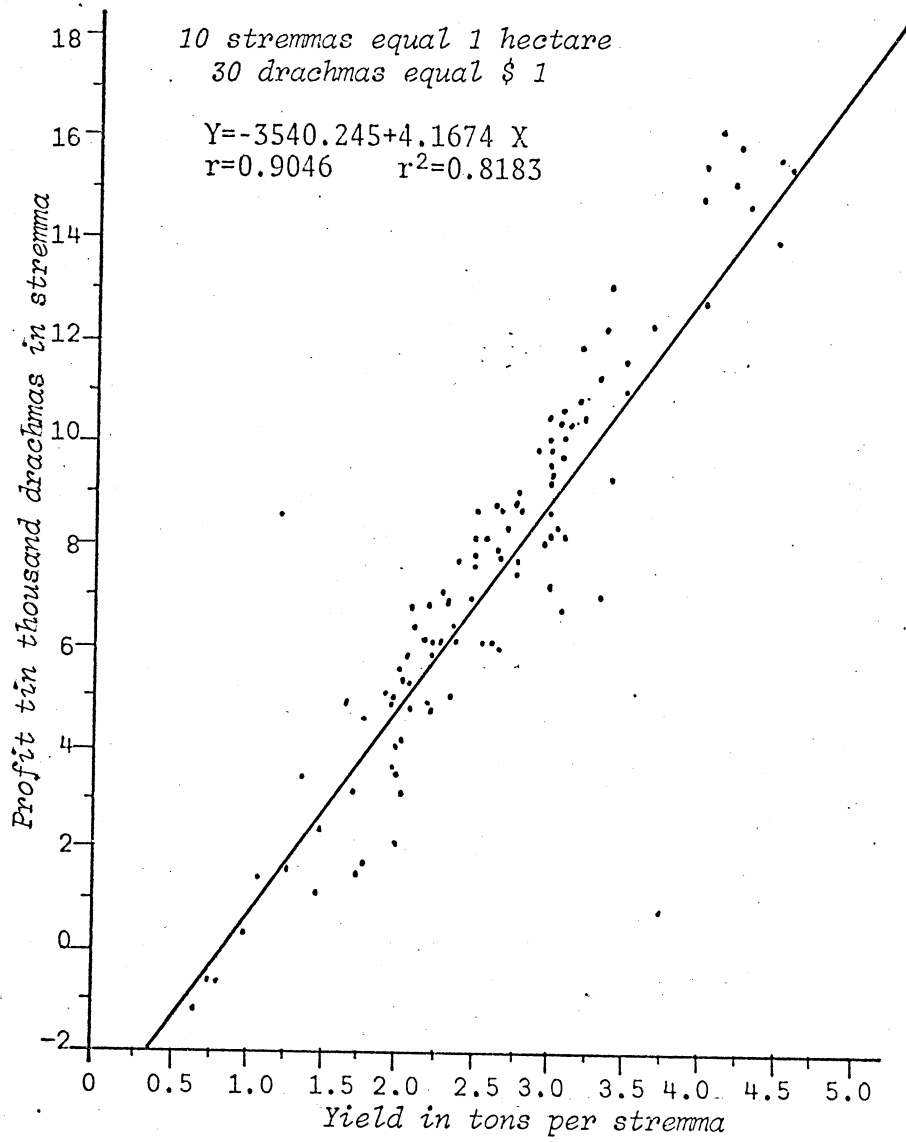


Chart 4. Regression and Correlation analysis between yield and profit

Table 13

Profits, returns and incomes according to age in years and for the average of 26 years

Profits, returns, incomes	Financial results in dollars per hectare according age and for the average of 26 years							
	4	5	6	7	8-10	11-20	21-26	Average (1-26)
1. Profits								
a) \$ per hectare	166.3	719.7	1,419.7	2,094.7	2,421.3	2,547.0	1,946.3	1,752.0
b) \$ per ton	17.0	53.0	74.7	87.7	91.0	92.0	80.0	79.0
c) % of production costs	9.2	35.9	59.7	77.8	83.5	85.3	66.4	65.6
2. Return to labour								
a) \$ per 10 man hour day (1)	6.9	11.0	13.7	15.6	15.9	16.3	14.6	14.1
b) \$ per 10 man hour day taking into account the profit belonging to labour only (2)	6.5	9.6	11.6	13.0	13.2	10.4	9.5	11.9
3. Return to capital								
a) per \$ 100 (%) (1)	7.9	14.5	22.1	28.9	31.7	32.6	26.4	22.9
b) per \$ 100 (%) taking into account the profit belonging to capital only (2)	6.1	6.4	7.1	7.9	9.4	11.9	12.8	7.5
4. Farm income \$ per hect	1,241.0	1,927.0	2,882.7	3,763.3	4,238.3	4,388.3	3,744.7	3,387.0

(1) This return is estimated by considering that total profit achieved belongs exclusively to the labour or capital respectively.

(2) This return is estimated by taking into account the part of the total profit achieved, which belongs to the labour or capital respectively, and which is computed through elasticities of production (bi) by using production function analysis.

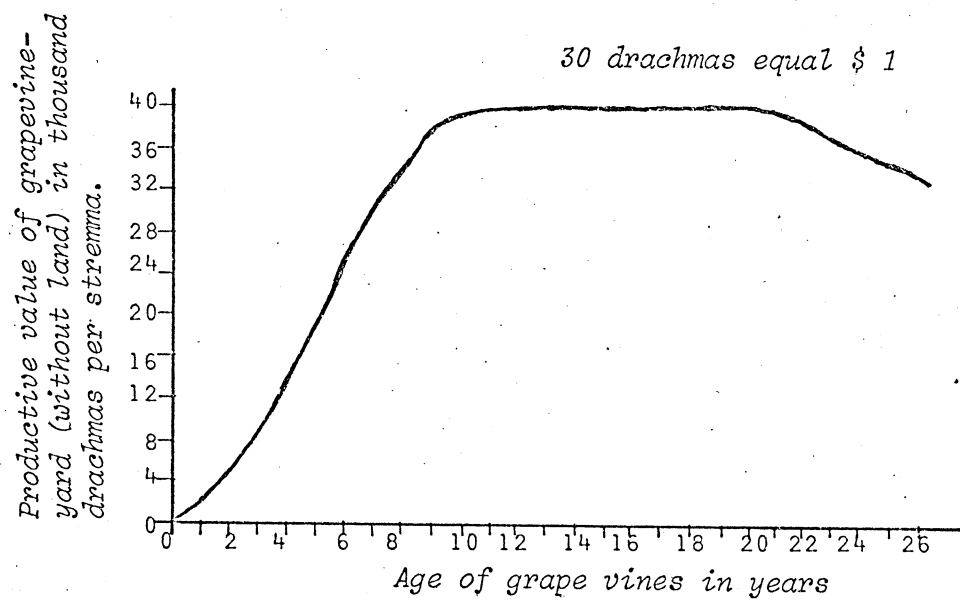


Chart 5. Productive value of grape vineyard (without land)
based on the yield achieved according to age

Table 14

Estimation of production costs and profits by increasing certain kinds of expenses

Production costs and profits		Data of 1973 (average of 26years)	Data of 1974 (average of 26years)
1. Gross output			
a) Yield	(tons/hectare)	22.12	22.12
b) Price	(\$ / tons)	200.00	200.00
Total	(\$ per hect.)	4,424.00	4,424.00
2. Production costs			
a) Land (rent)	(\$ per hect.)	333.3	333.3
b) Labour (wages)	(" ")	1,039.7	1,545.0
c) Capital (expenses)	(" ")	1,299.0	1,923.7
c1) Machinery	(" ")	333.3	743.3
c2) Fertilizers	(" ")	70.0	70.0
c3) Pesticides	(" ")	290.3	435.7
c4) Twine, packing paper, etc.	(" ")	84.0	123.7
c5) Depr., insur., and interest of capital invested as grape-vines	(" ")	211.0	211.0
c6) Depr., insur., and interest of capital invested as posts	(" ")	70.7	70.0
c7) General expenses	(" ")	68.0	68.0
c8) Interest of variable capital	(" ")	39.0	68.7
c9) Taxes	(" ")	132.7	132.6
Total	(" ")	2,672.0	3,802.0
3. Production costs	(\$ per ton)	120.67	172.00
4. Profits	(\$ per hect.)	1,752.0	622.0

ANALYSIS OF PHYSICAL AND ECONOMIC DATA
OF MACHINERY USED BY GRAPE FARMING

T a b l e 15

Hours required and percentage per farm operation performed by the farm tractor

Farm operation	<i>Hours required per farm operation and percentage per hectare</i>			
	Number of performances per year	Hours required per each performance and hectare	Total	
			Hours	%
Ploughing	2	15	30	12.0
Hoeing	3	13	39	15.5
Harrowing	1	10	10	4.0
Spraying	17	6	102	40.6
Transportation	-	-	70	27.9
Total	-	-	251	100.0

T a b l e 16

Costs of work performed by a 30 Hp farm tractor in dollars per year and per hour corresponding to a grape farm of 1.6 hectares

I. Annual utilization of tractor in hours	400.0
II. Annual costs for main tenance and operation	
A. Labour for tractor service (30 hour X \$ 0.5)	15.0
B. Capital	
1. Variable	
a) Fuel	43.1
b) Oil, greasing etc.	25.0
2. Fixed	
a) Depreciation of tractor	291.7
b) Repairs	247.9
c) Insurance	28.4
d) Interest	151.7
e) Annual expenses of shed	6.7
f) Interest of variable capital	3.4
Total annual costs	812.8
III. Costs of work	\$ /hour 2.03

T a b l e 17

Value and annual expenses of the rest (except tractor) grape farming machinery

Value and annual expenses	<i>Kinds of the remainder grape farming machinery</i>					Total
	Plough	Mechanical hoe	Harrow	Machine Sprayer	Trailer	
1. Initial value	200.0	733.3	100.0	533.3	433.3	2000.0
2. Annual expenses						
a) Depreciation	16.7	61.1	8.3	66.7	36.1	188.9
b) Repairs	8.3	30.6	4.1	33.3	18.1	94.4
c) Insurance	0.5	2.0	0.23	1.5	1.1	5.4
d) Interest	8.7	31.8	4.3	24.0	18.8	87.6
Total	34.2	125.5	16.93	125.5	74.1	376.3

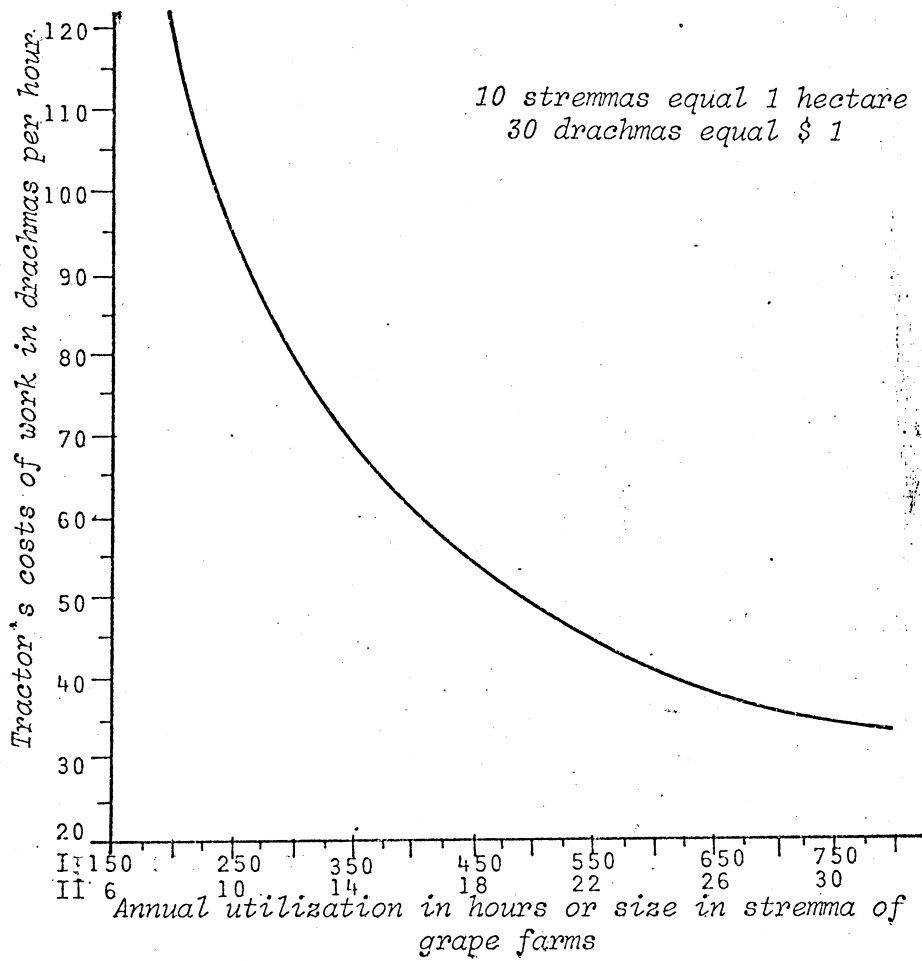


Chart 6. Tractor's costs of work in drachmas per hour according to annual utilization in hours or size in stremmas of grape farms.

Table 18

Costs of tractor and of the rest grape farming machinery corresponding to each performance of each farm operation

Size of grape farming	<i>Certain farm operations and corresponding expenses of the total farm machinery per each performance in \$ per hectare.</i>			
	Ploughing	Hoeing (mechanical)	Harrowing	Spraying (mechanical)
1.0 hectare	64.3	83.7	48.3	25.7
1.2 "	54.0	70.3	40.7	21.7
1.4 "	46.7	60.7	35.3	18.7
1.6 "	41.3	53.3	31.0	16.7
1.8 "	36.7	47.7	27.7	15.0
2.0 "	33.7	43.0	25.3	13.3
2.2 "	30.7	39.3	23.0	12.3
2.4 "	28.3	36.3	21.3	11.3
2.6 "	26.3	33.7	19.7	10.7
2.8 "	24.7	31.3	18.3	10.0
3.0 "	23.3	29.3	17.3	9.3

Table 19

Total costs of tractor and the rest grape farming machinery corresponding to the total number of performances of each farm operation

Size of grape farming	<i>Certain farm operations and corresponding total expenses of the whole farm machinery in dollars per hectare</i>					
	Ploughing (2 performances)	Hoeing (3 performances)	Harrowing (1 performance)	Spraying (17 performances)	Transportation	Total
1.0 hect.	128.3	250.7	48.3	439.0	293.3	1,159.7
1.2 "	108.0	210.7	40.7	369.7	247.3	976.3
1.4 "	93.3	181.7	35.3	319.7	214.0	844.0
1.6 "	82.3	159.7	31.0	281.7	188.7	743.3
1.8 "	73.7	142.7	27.7	252.7	169.0	665.7
2.0 "	67.0	129.3	25.3	229.3	154.0	605.0
2.2 "	61.3	118.0	23.0	209.7	140.7	552.7
2.4 "	56.7	108.7	21.3	193.7	130.0	510.3
2.6 "	52.7	101.0	19.7	180.3	121.0	474.7
2.8 "	49.3	94.3	18.3	168.7	113.0	443.7
3.0 "	46.3	88.3	17.3	158.7	106.3	417.0

ANALYSIS OF MARGINAL VALUE PRODUCTS

Table 20

Marginal productivity analysis of grape enterprise for the whole life of the vineyards (26 years) with 4 and 5 independent variables

Elasticities of production Marginal value products	4 variables	5 variables
1. Number of grape enterprises	104	104
2. Elasticities of production		
a) Land with grape vines	0.0814 ^f	
b) Land	-	-0.0309 ^e
c) Grape vines*	-	0.1459 ^f
d) Labour	0.7458 ^a	0.7309 ^f
e) Variable capital (fertil., pestic.)	0.1797 ^f	0.1698 ^f
f) Machinery	0.0509 ^f	0.0496 ^e
Sum of elasticities	1.0578	1.0653
3. R ² (coefficient of multiple determination)	0.8732	0.8640
4. R (coefficient of multiple correlation)	0.7625	0.7465
5. Marginal value products		
a) Land with grape vines (\$/hect.)	366.3	-
b) Land (")	-	-467.7
c) Grape vines* (")	-	613.3
d) Labour (\$/10hours)	16.7	16.3
e) Variable capital (\$/\$)	2.25	2.13
f) Machinery (expenses) (")	0.70	0.67
6. Opportunity costs		
a) Land with grape vines (\$/hect.)	544.3	-
b) Land (")	-	333.3
c) Grape vines* (")	-	211.0
d) Labour (\$/10hours)	5.3	5.3
e) Variable capital (\$/\$)	1.10	1.10
f) Machinery (expenses) (")	1.08	1.08
7. Marginal value products to opportunity costs ratio		
a) Land with grape vines	0.67	-
b) Land	-	-1.40
c) Grape vines*	-	2.91
d) Labour	3.17	3.10
e) Variable capital	2.05	1.94
f) Machinery	0.65	0.62

*In the grape vines are included their annual expenses

Level of probability for t

a) 0.001 > P > 0.000

c) 0.01 > P > 0.005

e) 0.10 > P > 0.05

b) 0.005 > P > 0.001

d) 0.05 > P > 0.01

f) > P > 0.10

Table 21

Marginal productivity analysis of grape enterprise according to age with 4 independent variables

Elasticities of production Marginal value products	Classes of ages and corresponding results of marginal analysis		
	4-10	11-20	21-26
1. Number of grape enterprises	44	47	13
2. Elasticities of production			
a) Land with grape vines*	-0.1828 ^f	0.5117 ^b	0.7766 ^f
b) Labour	0.7765 ^a	0.4680 ^b	0.4933 ^f
c) Variable capital (fertl., pestic.)	0.3982 ^e	0.0852 ^f	-0.0066 ^e
d) Machinery	0.0204 ^f	0.0584 ^e	0.1921 ^e
Sum of elasticities	1.0123	1.1233	1.4554
3. R ² (coef. of multiple determination)	0.7959	0.8316	0.6747
4. R (coef. of multiple correlation)	0.8921	0.9119	0.8214
5. Marginal value products			
a) Land with grape vines* (\$/hectare)	-763.67	2,834.67	3,789.67
b) Labour (\$/10hours)	17.70	11.23	10.67
c) Variable capital (\$/\$)	4.97	1.18	-0.07
d) Machinery (expenses) (")	0.26	0.92	2.72
6. Opportunity costs			
a) Land with grape vines* (\$/hectare)	511.67	569.00	540.67
b) Labour (\$/10hours)	5.27	5.27	5.27
c) Variable capital (\$/\$)	1.10	1.10	1.10
d) Machinery (expenses) (")	1.08	1.08	1.08
7. Marginal value products to opportunity costs ratio			
a) Land with grape vines*	-1.49	4.98	7.01
b) Labour	3.36	2.13	2.02
c) Variable capital	4.51	1.07	-0.06
d) Machinery	0.24	0.85	2.56

*In the grape vines are included their annual expenses

Level of probability for t

a) 0.001 > P > 0.000

d) 0.05 > P > 0.01

b) 0.005 > P > 0.001

e) 0.10 > P > 0.05

c) 0.01 > P > 0.005

f) > P > 0.10

SUMMARY AND CONCLUSIONS

The present study refers to the technical and economic analysis, by using records and accounts, of 169 grape enterprises in the region of Kavala for the year 1973. Additionally, the yield per age by each vineyard was received from 541 grape growers.

The vineyard, as a perennial crop, is studied not only according to age, but also for its whole economic life (1-26 years). This is done because the economics and competitiveness of grape production does not depend on any one year, but on the average of its whole life, and because by this way it is possible this perennial crop to be compared with other crops and especially with annual crops.

The technical and economic analysis of the production of grapes was divided into two parts. The first part refers to the establishment and development of a grape vineyard for the first three years. Under the present economic conditions it was found that they are needed about \$ 1,000 per acre for this period. In other words, the \$ 1,000 per acre include all costs during the first three years from planting until normal production begins. This three year period requires a total labour about 748,8 hours per acre. The second part, referring to the productive life (4-26 years) of the vineyard, shows that yield increase according to age and the production costs decrease according to yield. In other words, costs per ton vary inversely with yield.

The intersification of the grape production is based, at first, on the capital invested, and second on the labour absorbed because they participate 48-51% and 31-41% to the total costs respectively. On the other hand, spraying (30-34%) and picking (21-24%) make up the most important farm operations of grape vineyards.

Taking into account the profit (\$ 700 per acre) and the farm income (\$ 1,355 per acre) achieved by grape vineyards it can be said that this crop has contributed to the agricultural development of this region. The future of the production of grapes will depend on the price achieved, because the wages and the value of the various pesticides, fertilizers etc. are progressively increased.

The productive value of the vineyard (without land), based on the capitalization of return to capital, is estimated to be \$ 5,333 per acre for any one age in years between 11 and 20. The value of the vineyard in any other age (e.g. under 11 and over 20 years) is estimated by taking into account the yield achieved in relation to that obtained between 11 and 20 years.

The value of the machinery used by the grape farming is high (\$ 5,333) in relation to its size (4 acres). So, the cost of producing grapes is high (\$ 121 per ton) because of high fixed costs of machinery. Under these conditions, the machinery used can be profitable for grape production if the size of grape farming it

would be increased at least until 7,5 acres.

The analysis of the marginal productivity shows that the economics of grape production is mainly based on the vineyard, utilizing the favourable climatic conditions of this region, than on the quality of soil. The labour absorbed by this crop is utilized productively, taking into account the farm technique used in this region. Finally, the productivity of capital invested increases according to age for machinery and decreases for variable capital and especially for fertilizers. This means that machinery is better utilized by vineyard of full production (11 and over years), while fertilizers are better utilized by vineyards of increasing production (from 3 until 10 years).

The profit and income achieved by the farm families of this region can be increased by expanding grape enterprise and by increasing total production of grapes. This can be done by increasing the size of grape farming, by achieving the complete mechanization of the grape production and by organizing better the marketing of grapes.

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