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MARCH 1965

*Raspberries - Cost of production*

ECONOMIC REPORT No. 86



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# RASPBERRY AND STRAWBERRY ESTABLISHMENT AND PRODUCTION COSTS

*by*

**EDITH M. WRIGHT, B.Sc., N.D.A.**

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**THE EDINBURGH SCHOOL OF AGRICULTURE**  
WEST MAINS ROAD  
EDINBURGH 9

*Dept of economics*

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RASPBERRY AND STRAWBERRY  
ESTABLISHMENT AND PRODUCTION  
COSTS

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EDITH M. WRIGHT, B.Sc., N.D.A.

DEPARTMENT OF ECONOMICS

STAFF

J. D. NUTT, B.A., N.D.A.  
A. BLYTH, M.A.  
J. D. ROWBOTTOM, B.Sc.  
W. B. DUTHIE, B.Sc.  
J. A. MACLENNAN, B.Sc.  
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A. D. BULL, B.Sc.  
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A. HUME, B.Sc., N.D.A.  
J. L. ANDERSON, B.Sc.  
F. ROBERTS, B.A., M.Sc., Dip.Ed.

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- C. Miscellaneous:- Reports on various aspects of management, including work study.

Copies of these publications may be obtained on request to the Secretary of the College or the Advisory Economist.

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## FOREWORD

The production of soft fruit comprises only a small percentage of the total output of Scottish agriculture which, in the main, is organised for the production of fatstock, milk, eggs and sale crops, such as grain and potatoes. In some areas, however, where conditions, natural and/or economic, have favoured the development of soft fruits as farm crops, farmers have incorporated these in their farming systems. Raspberries, in particular, and strawberries, to a lesser degree, are the two more important soft fruit crops which have been developed in this way.

In this report, Miss Wright has brought together a very considerable volume of information on the production and disposal of these crops. It is evident that, with this type of crop, it is extremely difficult, even more than is the case with the usual farm crops, to arrive at any firm estimates of costs of production or returns which can be regarded as reflecting the general situation of all producers. Such factors as the length of life which can be expected of plantations of fruit, the differences in growing techniques and the differences in market objectives preclude anything like the degree of standardisation which may be accepted in the case of the more usual farm crops. Example costs and returns are quoted based on the more usual techniques and costs of production and what may be regarded as normal levels of returns.

The main interest must, however, be centred on the detailed breakdown of the costs and on the returns obtained from the different market outlets. The figures showing the distribution of each element of cost incurred by each grower in the sample, together with quoted average figures, indicate not only the more general incidence of costs but also the extent to which the grower may incur higher or lower costs. Yields and returns, largely influenced by the particular market in which the fruit is sold, are also extremely variable. The overall picture is one of highly specialised production techniques producing crops for markets which are equally highly speculative in respect of the quantities which can be taken up and the prices which can be paid. Thus, although it is not possible to indicate what should be standard production procedure and costs, there is much of value which can be derived from the study of the data presented in this report.

J. D. Nutt  
Advisory Economist

## ACKNOWLEDGMENT

The College thanks all the growers who provided information for this report, for their care in recording data and their patience in explaining their husbandry.

## INTRODUCTION

The acreage of raspberries grown in Scotland in 1963 was 6444\*, which produced an estimated 10.2 thousand tons\* of fruit. This was 79.9 per cent of the acreage and 78.9 per cent of the production in the United Kingdom. The estimated yield in Scotland was 31.6 cwt per acre\*, approximately the same as the 10 year, 1954-63, average of 32.1 cwt, which was slightly higher than the corresponding 10 year average of 29.3 cwt for England and Wales. In 1963, 92.0 per cent of the Scottish acreage was in the counties of Angus and Perth, 48.1 per cent in the former and 43.9 per cent in the latter county. Fife accounted for 1.8 per cent.

By comparison, the proportion of the United Kingdom acreage of strawberries grown in Scotland was small, the 1963 acreage of 1641\* being 9.8 per cent of the total and the estimated Scottish production of 1.8 thousand tons\* being only 5.2 per cent of the total for the whole country. The estimated yield for Scotland of 22.3 cwt\* per acre in 1963 was below the 10 year average of 27.6 cwt which itself was lower than the comparable 10 year average of 35.5 cwt for England and Wales. The acreage of strawberries in Scotland was much more widely distributed than was the case with the raspberry acreage. The county of Angus accounted for 25.9 per cent, Perthshire 23.2 per cent, Fife 2.4 per cent, the Lothians 23.0 per cent and 25.5 per cent in other counties, mainly in the south-west.

For both crops there are costs of establishment and, in the case of raspberries, disestablishment, which have to be charged against the fruiting life of the plantation. Raspberries are cropped for 5 to 10 years; usually no fruit is produced in the first year and a small crop (up to half a normal crop) in the second year of life. Sometimes the canes are slow to establish, the second year is unproductive (really a repeated first year) and the half crop is not produced until the third year of life. In this study the first and second (and when necessary the third) years have been regarded as establishment years, and the costs incurred in these years less the returns from the fruit picked form the establishment cost. Maincrop strawberry plantations in this area of Scotland are planted one year and cropped for the following 3 or 4 years and a similar costing procedure was followed, charging the costs incurred in the first year of life against the fruiting years.

Details of the costing method are given in Appendix I. Unless it is otherwise stated, the "per acre" figures given in the report are calculated from the actual acreage of fruit, excluding the acreage of endriggs, roads etc., although all costs associated with the endriggs etc. (rent, cleaning costs) have been included. In calculating average figures each case has been given equal weight.

\*Source: M.A.F.F. statistics. The acreage figures include the non-fruiting areas, such as establishing plantations, spawn and runner beds etc.

PART I

A. RASPBERRY ESTABLISHMENT

Information on establishment costs collected in 1961 and 1962 has been used to augment that collected in 1963; in all, data were available from 32 growers - 7 in 1961, 12 in 1962 and 13 in 1963. In some cases it was possible to cost the plantations separately during their second year of life.

FIRST YEAR

PLANTATION SIZE

The average size of the 32 first year plantations was 3.34 acres of fruit. Twenty-three of the plantations were under 5 acres in size, 6 were between 5 and 10 acres and 2 were between 10 and 15 acres. The distribution is given in Table 1.

TABLE 1 DISTRIBUTION OF PLANTATIONS BY SIZE

Acres	Under 1	1.0- 1.9	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	over 10	Total
No. cases	6	8	5	3	2	2	2	1	1	-	2	32

Some details of the varieties grown in this sample of plantations are given in Table 2. Twenty-five of the growers grew only 1 variety; the most popular variety was Malling Jewel.

TABLE 2

A. Distribution of Plantations According to Variety Grown

Variety	Jewel	M	Burnet- holm	Exploit	Lloyd George	Several	Total
No. cases	14	5	2	2	2	7	32



B. Average Proportion of Varieties where several were Grown

Variety	Jewel	Lloyd George	M	Exploit	Burnet-holm	Enter-prise	Promise	Total
Per cent	55	13	12	6	5	5	4	100

PREVIOUS CROPPING AND MANURING

The general aim of the growers was to plant on land which was clean and in good heart. In 2 cases the costed establishments followed immediately after an old raspberry plantation and in  $1\frac{1}{2}$  cases after an establishment which had failed in the previous year. In  $4\frac{1}{2}$  cases, where there was 1 year between old and new plantations, a potato crop was taken and in 1 case wheat. Where there was a gap of 2 years between old and new plantations, the land was cropped with potatoes twice in 1 case and with a grain crop followed by potatoes in the other 2 cases. This accounts for 12 out of the 32 cases, i.e. 37.5 per cent. Amongst the other 20 cases the establishment followed a 3 year ley in 3 cases, potatoes in 7 cases; of the 9 which were in grain, turnips or peas the year before establishment, 6 had been in either potatoes or ley 2 years before and 2 in potatoes 3 years before. The prevalence of the potato crop where there was only a short break between successive fruit plantations illustrates the need which sometimes arises for a cleaning crop with a relatively high output.

TABLE 3 DISTRIBUTION OF PLANTATIONS ACCORDING TO PREVIOUS CROPPING

Previous crop	Fruit		Potatoes	Ley	Grain	Other Roots	Peas	n.a.*	Total
	Rasps	Straws							
No. cases:									
1 year before	$3\frac{1}{2}$	-	$13\frac{1}{2}$	3	9	1	1	1	32
2 years before	7	$1\frac{1}{2}$	$6\frac{1}{2}$	5	8	3	-	1	32
3 years before	9	2	3	9	4	-	-	5	32

\* n.a. = not available

Organic manure in the form of dung or grass ploughed in had been made available to 13 of the crops grown previous to establishment and 2 years previously in another 4 cases. All the potato crops had fairly heavy dressings of fertiliser, whether or not they were dunged, of 8 to 10 cwt per acre.

The level of manuring in the years before planting determines the charge made against the plantation for manurial residues. In this sample the value of manurial residues varied from nothing to over £30 per acre. Three quarters of the values however were under £10 per acre and the average of these was £4.5.

MATERIALS USED

Manures

Dung was applied to 25 of the plantations before establishment. The amount put on ranged from 4.3 tons to 58.3 tons per acre. The distribution is shown in Table 4. Half the plantations received between 15 and 25 tons per acre, the average amount applied on these 16 plantations being 18.9 tons per acre.

Lime was applied to 4 plantations and a heavy dressing of slag to 1 plantation.

TABLE 4    DISTRIBUTION OF PLANTATIONS ACCORDING TO AMOUNT  
OF DUNG APPLIED PER ACRE

Tons	Nil	0-4	5-9	10-14	15-19	20-24	25-29	30 & over	Total
No. cases	7	1	1	4	8	8	2	1	32

Excluding the slag and top dressings of nitrogen, 25 of the plantations received fertilisers, including the 7 plantations which had not received dung. The amounts of fertiliser applied are shown in Table 5. Where fertilisers were applied, about one third of the plantations received 2 or 3 cwt per acre and about two-thirds received 5, 6 or 7 cwt per acre. A higher proportion of the smaller dressings (7 out of 9 cases) was put on after planting than of the heavier dressings (6 out of the 14 for which the information was available).

TABLE 5. DISTRIBUTION OF PLANTATIONS ACCORDING TO  
AMOUNT OF FERTILISER APPLIED PER ACRE

Cwt	nil	1.0- 1.9	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 10.9	11.0- 11.9	12.0- 12.9	Total
No. cases: excl. N top dressings	7	-	5	4	1	4	4	5	1	-	-	1	-	32
incl. N top dressings	6	1	4	2	4	3	3	6	2	-	-	-	1	32

In 20 cases compound fertilisers were used; in 2 cases sulphate of potash and bonemeal, in 2 cases bonemeal only and in 1 case a phosphatic fertiliser. In 11 cases a special (high potash) raspberry compound was used and in only 1 of the other 9 cases was the N:P:K ratio not less than 1:1:1½.

Nitrogenous top dressings were given to 8 of the plantations during the summer months, varying from 0.9 to 2.1 cwt per acre. The average amount used was 1.5 cwt per acre.

The average amount of fertiliser applied on the 32 plantations was 4.5 cwt per acre, including the top dressings but excluding the slag. The average dressing on the 26 plantations on which fertiliser was used was 5.5 cwt per acre. For the group which received dressings of 15 to 25 tons of dung (16 cases) the average fertiliser application was 5.1 cwt, including 0.7 cwt of nitrogenous top dressing.

#### Canes

The number of canes required per acre varied with such factors as the width between the rows, distance in the row and double or single planting. Row widths varied according to the space needed for interrow cultivations and spraying. Narrower rows could be used by the special berry tractors (5'6") or horses (5') than by ordinary farm tractors (6'6"). Difficulties sometimes arose with the narrower rows if, for example, a contractor was called in to do some spraying. At least half the plantations were planted with 6' between the rows. The row widths used are given in Table 6.

TABLE 6 DISTRIBUTION OF PLANTATIONS ACCORDING TO WIDTH OF ROWS

Row width	5'	5'2"- 3"	5'6"	5'8"- 10"	6'	6'6"	n.a.	Total
No. cases	1	1	6	4	15	1	4	32

Where there were differences in planting distances along the rows according to variety, the usual distinction made was between Jewel and all other varieties. Table 7 has been drawn up to show the planting distances for these two groups.

TABLE 7 DISTRIBUTION OF PLANTATIONS ACCORDING TO DISTANCE  
BETWEEN PLANTS IN THE ROW

Plant distance	18"	21"	24"	27"-28"	30"	36"	n.a.	Total
No. cases : Jewel double/ single planting	5 1S, 2S-D, 2n.a.	1 1S	6 3S-D, 2D 1n.a.	1 1S	6 1S, 3S-D, 2D	-	4 4n.a.	23 4S, 8S-D, 4D, 7n.a.
No. cases : Other varieties double/ single planting	-	-	5 2S, 1D, 2n.a.	1 1n.a.	7 1S, 3S-D, 1D, 2n.a.	1 1S	2 2n.a.	16 4S, 3S-D, 2D, 7n.a.

S = single planting; D = double planting; S-D = between single and double

Of the plantations with known planting distances, approximately one third of the Jewel were at 18", 24" and 30" respectively, whereas the other varieties were planted approximately half and half at 24" and 30", with none at less than 24".

Comparing the number of canes theoretically needed for single and double planting with the numbers actually used, more than the number needed for single planting were used on a higher proportion of the Jewel plantations than those of other varieties, i.e. approximately three quarters of the 16 Jewel plantations compared with approximately half of the 9 plantations of other varieties. The quantities of canes actually used are given in Table 8.

TABLE 8 DISTRIBUTION OF PLANTATIONS ACCORDING TO NUMBER  
OF CANES PLANTED PER ACRE

Thousand canes	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 10.9	Total
No. cases:										
Single planting		6	1	1				1		9
Single/double planting		1	5	1	3					10
Double planting					2	2	1		1	6
n.a.	1	3		1	2					7
All methods	1	10	6	3	7	2	1	1	1	32

In this sample 7 of the growers planted only their own canes, either from spawnbeds or young plantations, 5 growers planted partly their own and partly purchased canes and 20 growers planted only purchased canes. The prices paid for canes in 1963 varied from £3 to £15 per thousand in this sample, which was too small (9 cases) to give any reliable bases for the different varieties, grades and quantities sold. Where growers used their own canes, these have been entered at the cost of digging plus an appropriate share of spawnbed costs, if any.

Weedkiller

Simazine was used on 11 of the 32 plantations. The amount applied varied from 1.0 to 4.4 lb per acre. The range is shown in Table 9. It was not known whether overall or band spraying was practised but, as the recommended rates of use of the weedkiller are 4 lb and 2 lb per acre for these methods respectively, it would seem that at least 2 plantations were sprayed overall and that 7 were band sprayed. Excluding the 2 cases using over 4 lb per acre, the average amount used was 2 lb per acre (8 cases). The average for the 10 cases, where the quantity used was known, was 2.5 lb per acre.

TABLE 9 DISTRIBUTION OF HOLDINGS ACCORDING TO AMOUNT  
OF WEEDKILLER USED PER ACRE

lb	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	n.a.	Total
No. cases	5	2	1	2	1	11

Other Sprays

Soil insecticides were used by only 4 growers at planting time.

Tar oil winter wash was applied by 1 grower and D.D.T. by another grower who picked some fruit in the year of establishment.

WORK DONE

In 2 cases the details of the work done were not recorded.

Preparing the Ground

This was done by wheeled tractor except in 1 case where a horse was used for ploughing and ridging and 1 case where a Ransome crawler was used for ridging.

The time taken to plough and work the ground varied from 1.6 to over 30 hours per acre. The times taken are given in Table 10. Excluding the cases where the work took more than 12 hours per acre, the average time for 22 cases was 5.8 hours per acre.

TABLE 10 DISTRIBUTION OF PLANTATIONS ACCORDING TO TIME TAKEN TO PLOUGH AND WORK THE GROUND WITH A TRACTOR, PER ACRE

Hours	under 2	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.9	10.0-11.9	12.0-13.9	14.0-15.9	16.0-17.9	18.0-19.9	over 20	n.a.	Total
No. cases	1	7	4	5	2	2	1	-	2	1	2	2	29

In 2 cases some stones were removed from the ground before planting and in 1 case some hand hoeing was done.

The ground was known to have been ridged up before planting in 27 cases and not ridged in 1 case. The range of times taken for this operation is given in Table 11. The average of the 14 cases with a time of under 3 hours per acre was 1.5 hours per acre.

TABLE 11    DISTRIBUTION OF PLANTATIONS ACCORDING TO TIME  
TAKEN TO RIDGE UP BY TRACTOR BEFORE PLANTING, PER ACRE

Hours	under 1	1.0- 1.9	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	n.a.	Total
No. cases	2	9	3	-	1	3	-	-	-	1	8	27

Manuring

Fertilisers were known to have been spread by tractor in 6 cases and by hand in 16 cases. This job took an average of 0.2 hours per cwt by tractor and 1.0 hours per cwt by hand.

Dung was spread by contract in 2 cases. In 20 cases the hours were available and, excluding 3 cases with unusually high hours, the average time taken was 1.1 man hours and 0.4 tractor hours per ton spread.

Planting

The time taken to plant the canes varied from 11.4 to 64.0 hours of manual work per acre; the distribution of these times is given in Table 12.

TABLE 12    DISTRIBUTION OF PLANTATIONS ACCORDING TO TIME TAKEN  
TO PLANT, PER ACRE

Hours	10-14	15-19	20-24	25-29	30-34	35-39	40-49	50-59	60-69	n.a.	Total
No. cases	3	7	5	1	9	-	2	1	1	3	32

The variation in the time taken was partly due to the number of canes used and the number of plantings made per acre. The time taken per thousand canes planted in various ways is given in Table 13.

TABLE 13    DISTRIBUTION OF PLANTATIONS ACCORDING TO TIME TAKEN  
TO PLANT 1000 CANES

Hours	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	over 10	Total
No. cases: planted singly		3	1	3	1				1	9
"    double	1	4		1						6
"    between S & D	1	2	1	2		1	1			8
"    n. a.				4			1	1	1	7
All	2	9	2	10	1	1	2	1	2	30

The time taken on two-thirds of the plantations was between 3 and 6 hours per thousand canes planted. Excluding times of over 7 hours per thousand, the average time for canes planted singly was 5.1 hours and for canes planted double 3.7 hours per thousand canes. The total time taken to plant an acre for these same cases averaged 15.7 hours for those planted singly and 25.9 hours for those planted double.

Women and boys were engaged in planting on 17 of the plantations; they did 36 per cent of the work on average over all the plantations.

Cleaning Operations

Some interrow or hand cleaning was carried out during the first summer on all plantations except 1 of those where weedkiller was used. Women and boys did 43 per cent of the hand work on average over all the plantations. Weedkiller was used on 11 of the plantations.

On the 21 plantations where no weedkiller was applied, the average time spent on interrow work was 5.5 hours per acre for the 19 cases where a tractor was used. (A horse was used on 1 plantation.) Hand cleaning work on 20 of these plantations took an average of 55.8 hours per acre. The ranges in the hours worked are given in Table 14.



TABLE 14     DISTRIBUTION OF PLANTATIONS ACCORDING TO TIME SPENT  
CLEANING PER ACRE: NO WEEDKILLER USED

A.     Interrow Cultivations with Tractor

Hours	Nil	2-3	4-5	6-7	8-9	10-19	over 20	n.a.	Total
No. cases	3	6	4	2	2	1	1	2	21

B.     Hand Cultivations

Hours	Nil	0-19	20-39	40-59	60-79	80-99	100- 199	over 200	n.a.	Total
No. cases	2	5	4	3	2	-	3	1	1	21

Weedkiller was used on 11 plantations. The average time spent applying weedkiller on 10 of these plantations where a tractor was used to apply it was 1.5 hours per acre for the tractor. In all except 1 of these 10 cases 1 man did the work - in the odd case a boy was there also. In the eleventh case the weedkiller was applied by hand.

The average time spent on cleaning these 11 plantations was 3.8 hours with a tractor and 16.9 hours of hand work. The range of times taken is given in Table 15.

TABLE 15     DISTRIBUTION OF PLANTATIONS ACCORDING TO TIME SPENT  
CLEANING PER ACRE, WEEDKILLER USED

A.     Interrow Cultivations with Tractor

Hours	nil	0-4	5-9	10 & over	n.a.	Total
No. cases	3	3	3	1	1	11

B. Hand Cultivations

Hours	nil	0-9	10-19	20-29	30-39	40-49	50-59	n.a.	Total
No. cases	3	1	3	1	-	-	2	1	11

The cost of cleaning for the 2 groups (users and non-users of weed-killer) has been calculated using the average physical quantities from the 32 costs and 1963 costs for the various items (see Table 16). In this sample the weedkiller users spent less but, without measurement of the cleanness of the land at the beginning and end of the season, the real economy of the methods cannot be assessed.

TABLE 16 COST OF CLEANING THE ESTABLISHMENTS, PER ACRE

		£
(a) No weedkiller used:		
Interrow + hand work:	37.3 man hours @ 5s. 10½d.	10.9
	24.0 woman hours @ 3s. 1½d.	3.7
	5.5 tractor hours @ 4s. 3d.	1.2
	Total	15.8
(b) Weedkiller used:		
Interrow + hand work:	13.4 man hours	3.8
	7.3 woman hours	1.1
	3.8 tractor hours	0.8
Applying weedkiller	1.5 man hours	0.4
	1.5 tractor hours	0.3
2.5 lb Simazine @ £1.55		3.9
	Total	10.3

RENT

For the 13 plantations costed in 1963, the rent ranged from £1.7 to £17.2 per acre, the average being £6.0.

TOTAL COST

An example of a first year establishment cost has been built up in Table 17, using selected physical data from this study and 1963 prices for the various items. The physical data were selected so that where possible a single known method was quoted. In this example expenditure amounts to £134 per acre. The cost of the canes, £72, is a little more than half the total cost, the other costs amounting to £62 per acre. The effect of some possible variations in the cost of the canes on the total establishment cost per acre is given in Table 18.

TABLE 17 EXAMPLE OF COST OF RASPBERRY ESTABLISHMENT, PER ACRE

(Spring Planting: Approx. 1st Six Months' Work)

Variety Jewel, Certified Standard Stock, Planted Double at 2' x 6'\*

<u>Work Done</u>	<u>Hours</u>		
	men	women & boys	tractor
Applying dung @ 1.1 man hr & 0.4 tractor hrs per ton	20.8	-	7.6
Ploughing, working ground	5.8	-	5.8
Ridging	1.5	-	1.5
Applying fertilisers by hand @ 1 hr per cwt	5.1	-	-
Planting @ 3.7 hrs per thou	17.0	9.6	-*
Care of crop - interrow cultivations	3.8	-	3.8
applying weedkiller	1.5	-	1.5
hand cultivations	9.6	7.3	-
Totals	65.1	16.9	20.2
<u>Costs</u>			
Materials:		£	
Dung, 18.9 tons @ £0.85		16.1	
± Fertiliser: raspberry, 4.4 cwt @ £1.0		4.4	
±                  nitrogenous, 0.7 cwt @ £0.725		0.5	
± Canes, 7.2 thou (purchased) @ £10 per thou		72.0	
± Weedkiller, 2.5 lb simazine @ £1.55		3.9	
Work:			
± Man hours, 65.1 @ 5s. 10 <sup>1</sup> / <sub>2</sub> d.		19.5	
± Woman hours, 16.9 @ 3s. 1 <sup>1</sup> / <sub>2</sub> d.		2.6	
± Tractor hours, 10.2 @ 4s. 3d.		4.3	
		<u>123.3</u>	
Rent		6.0	
Manurial residues		<u>4.5</u>	
Total		<u>133.8</u>	
(Costs, including planting cost of £6.5, excluding cost of canes = £61.8)			

\*For variations in this cost see Table 18.

± Variable costs, total £84.7 including tractor fuel at 1s.4d. per hour

TABLE 18 SOME POSSIBLE VARIATIONS IN COST OF PLANTING  
AND CANES, PER ACRE

A. Planting Cost at Different Distances (Planted Singly)

Planting distance	6' x 24"	6' x 30"	5'6" x 30"	5'6" x 18"
Canes required per acre, thousands	3.6	2.9	3.2	5.3
Time required per acre @ 5.1 hrs per thou, hours	18.4	14.8	16.3	27.0
Cost of above work per acre, £	4.5	3.6	4.0	6.6
Establishment costs per acre, excluding cane costs, £	59.8	58.9	59.3	61.9

B. Total Establishment Cost at Above Distances with Various Canes

	£	£	£	£
1. Certified Jewel or Promise @ £10 per thou	36.0	29.0	32.0	53.0
1st year estab. cost per acre	95.8	87.9	91.3	114.9
2. Uncertified Jewel @ £7.5 per thou	27.0	21.8	24.0	39.8
1st year estab. cost per acre	86.8	80.7	83.3	101.7
3. Uncertified Promise @ £3.5 per thou	12.6	10.2	11.2	18.6
1st year estab. cost per acre	72.4	69.5	70.5	80.5

The example of a first year cost of £133.8 given in Table 17 may be compared with the actual 1963 costs in the sample. The range in the 1963 costs is given in Table 19; these costs averaged £117.0 per acre and all except 2 were lower than the example.

TABLE 19     DISTRIBUTION OF 1963 PLANTATIONS ACCORDING TO  
FIRST YEAR ESTABLISHMENT COST PER ACRE

£	under 60	60-79	80-99	100- 119	120- 139	140- 159	160- 179	180- 199	over 200	Total
No. cases	1	3	1	3	3	-	1	-	1	13

The main difference between the example cost and the actual cases is in the cost of the canes per acre, as in only 2 cases was this as high as in the example (where certified Jewel were planted double). In all except 1 case the actual cane costs were considerably higher than they would be for uncertified Promise planted singly at the same distance. The range in the cost of canes in the 1963 sample is given in Table 20. The average cost was £43.8 per acre.

TABLE 20     DISTRIBUTION OF 1963 PLANTATIONS ACCORDING TO COST  
OF CANES PER ACRE

£	under 10	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	Total
No. cases	1*	-	2**	4**	2	1*	1*	1*	1	13

\* represents 1 case where some or all own canes used for planting.

The costs other than canes in the example amount to £62 per acre, which compares with an average cost of £73.2 for the 1963 costs in the sample. The range of these 1963 costs is given in Table 21.

TABLE 21     DISTRIBUTION OF 1963 PLANTATIONS ACCORDING TO COSTS  
OTHER THAN CANES, PER ACRE

£	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	over 100	Total
No. cases	1	2	1	2	2	2	1	-	2	13

### Inter-cropping

Too little information was available to enable the profitability of inter-cropping to be judged. Only 10 of the 32 first year plantations which were costed were inter-cropped (with potatoes in 5 cases, potatoes and carrots in 1 case, turnips in 2 cases, beetroot in 1 case, cabbage and kale in 1 case). Several growers said that they intended to stop or had stopped growing inter-crops because the damage done to the canes by, for example, potato harvesting was not offset by the extra income. Others, however, valued the extra income and maintained that potato haulm gave some protection to the young canes.

### SECOND YEAR

This refers to the year following establishment.

Eight plantations were costed which had not made sufficient growth in their first year to bear fruit in the second year and which were therefore not posted and wired. Sixteen plantations were costed which were posted and wired in their second year and from which fruit was picked in that year. The data for these 2 groups is given separately.

### PLANTATIONS NOT POSTED AND WIRED IN SECOND YEAR (NOT CROPPED)

Of the 33.8 acres in this category, 28.6 acres were of the variety Jewel, 3.2 acres were M's and 2.0 acres Lloyd George.

The canes were known to have been cut down on 1 plantation only.

Gaps were filled on 6 of the 8 plantations, the number of canes used being 1.4 thousand per acre if averaged over the 8 cases or 1.9 thousand over the 6 cases. In 3 cases the canes were purchased and in 3 cases home-produced. The time taken to do this job averaged 7.6 man hours per thousand planted over the 4 cases for which the information was available.

All the plantations received compound fertiliser - eith raspberry or potato - at an average rate of 5.1 cwt per acre. In 3 cases a nitrogenous top dressing was also applied at an average rate of 1.6 cwt per acre or 0.6 cwt for the 8 cases. Dung was applied to 3 plantations at an average rate of 9.3 tons per acre or 3.6 tons per acre averaged over the 8 cases. Shoddy was applied to 2 plantations at an average rate of 2.8 tons per acre or an average of 0.7 tons for the 8 cases.

Weedkiller was used on 5 of the plantations at an average rate of 2.6 lb for the 3 plantations where the quantity used was known. One plantation was sprayed by contract; the average time for the other 4 was 1.5 hours per acre for a man and a tractor.

Cleaning operations where weedkillers were used averaged 19.4 woman and 15.9 man hours of hand work in the 4 cases where the hours were available and 4.9 hours of tractor work for the 5 cases. Cleaning operations where weedkillers were not used (3 cases) averaged 15.4 hours of tractor work; for the 2 cases where the hours were known for the hand work the average was 3.1 woman and 45.6 man hours.

An example of a second year cost (not posted and wired) has been drawn up in Table 22, using the physical quantities from these 8 cases and 1963 costs for the various items.



TABLE 22 EXAMPLE OF COST OF SECOND YEAR PLANTATION NOT  
POSTED AND WIRED, PER ACRE

<u>Work Done</u>	Hours		
	men	women & boys	tractor
Filling gaps, @ 7.6 hrs per thou	10.6	-	-
Applying dung @ 1.1 man hrs and 0.4 tractor hrs per ton	10.2	-	3.7
Applying fertilisers by hand @ 1 hr per cwt	5.7	-	-
Care of crop - interrow cultivations	4.9	-	4.9
applying weedkiller	1.5	-	1.5
hand work	15.9	19.4	-
Totals	48.8	19.4	10.1
	£		
<u>Costs</u>			
Materials used:			
*Canes, 1.4 thou @ £10	14.0		
Dung, 9.3 tons @ £0.85	7.9		
Fertiliser -			
* raspberry, 5.1 cwt @ £1.0	5.1		
* nitrogenous, 0.6 cwt @ £0.725	0.4		
*Weedkiller, 2.6 lb Simazine @ £1.55	4.0		
Work:			
Man hours, 48.8 @ 5s. 10½d.	14.3		
*Woman " , 19.4 @ 3s. 1½d.	3.0		
*Tractor " , 10.1 @ 4s. 3d.	<u>2.2</u>		
	50.9		
Rent	<u>6.0</u>		
Total	56.9		

\*Variable costs, total £27.1

PLANTATIONS POSTED AND WIRED IN SECOND YEAR (CROPPED)

Posting and Wiring

With the variation in row widths and variation in the distance apart of posts in the rows, the number of posts used varied from 100 to 338 per acre. The range is shown in Table 23. The average number used per acre was 208 posts.

TABLE 23 DISTRIBUTION OF PLANTATIONS ACCORDING TO NUMBER OF POSTS USED PER ACRE

No. posts	100- 124	125- 149	150- 174	175- 199	200- 224	225- 249	250- 274	275- 299	300- 324	325- 349	Total
No. cases	3	3	3	2	2	3	3	3	-	2	24

The cost of new posts ranged from 1s. 1d. to 3s. 9½d. per post, the average being 2s. Their life was variously assessed - 10 growers expected to use the posts for only 1 plantation, 7 expected to use half the posts twice and 7 expected to use all the posts for at least 2 plantations. With all these variations the charge for posts varied from £6.4 to £28.8 per acre.

The quantity of wire used per acre also varied according to the width of the rows and according to the number of wires used - 2, 3 or 4. The range in the amount used is shown in Table 24.

TABLE 24 DISTRIBUTION OF PLANTATIONS ACCORDING TO AMOUNT OF WIRE USED PER ACRE

Cwt	2-2.9	3-3.9	4-4.9	5-5.9	over 6	Total
No. cases	7	5	6	6	1	25

The wire cost £4.2 per cwt on average, variations being due to the quantity purchased and the gauge of the wire. Seventeen growers expected the wire to last for 2 plantations, 4 for only 1½ plantations and 3 growers for 3 or 4 plantations.

With such differences in the quantities of materials used per acre the time spent on this job varied widely. For 11 plantations, for which the time for posting was available separately, this took 17.6 man hours and 0.7 tractor hours per acre on average. The average time for wiring on 10 plantations was 12.8 man hours per acre. The total time taken for posting and wiring was available for 29 plantations. The range in this cost is shown in Table 25.

TABLE 25 DISTRIBUTION OF PLANTATIONS ACCORDING TO  
MANUAL WORK INVOLVED IN POSTING AND WIRING PER ACRE

Hours	under 10	10-19	20-29	30-39	40-49	50-59	60-69	70-79	over 100	Total
No. cases	2	4	10	3	5	-	2	1	2	29

Excluding the 5 cases where over 60 hours were spent per acre, the average time taken to post and wire was 24.7 man, 2.3 woman hours and 0.9 tractor hours per acre.

If posts are set 15 yards apart in rows 6' apart, 192 are needed per acre and at 2s. per post, with an expected life of  $1\frac{1}{2}$  plantations, the charge per acre would be £12.8. Using 2 wires (12 gauge), 3.5 cwt would be needed for an acre and at £4.2 per cwt, with an expected life of 2 plantations, the charge per acre for wire would be £7.4. Taking the average time for erecting posts and wires, the total charge for posting and wiring comes to £28.1 per acre. (See Table 26.)

TABLE 26 EXAMPLE OF COST OF POSTING AND WIRING  
(6' ROWS) PER ACRE

	£
*Posts, 192 @ $\frac{2}{3}$ x £0.1 per post (15 yard intervals)	12.8
*Wire, 3.5 cwt @ $\frac{1}{2}$ x £4.2 per cwt (2 wires, 12 gauge)	7.4
Man hours, 24.7 @ 5s. 10 $\frac{1}{2}$ d. per hour	7.3
*Woman hours, 2.3 @ 3s. 1 $\frac{1}{2}$ d. per hour	0.4
*Tractor hours, 0.9 @ 4s. 3d. per hour	0.2
	28.1

\*Variable costs, total £20.7

### Growing Costs

On 12 of the 16 plantations which were cropped in their second year, some lacing or clasping was done after posting and wiring. The amount of this winter work was small compared with a mature plantation, averaging 5.2 hours per acre for the 10 plantations for which the hours were available. Four-fifths of the work was done by women. The average amount of twine used was 6.6 lb in the 6 cases where the information was available. The average cost per acre for 8 cases was £1.1.

Blanks had to be filled in 2 cases, using an average of 0.2 thousand canes per acre.

Only 1 plantation received dung (5 tons per acre) and this received no fertiliser.

The amount of fertiliser applied to the other 15 plantations averaged 6.4 cwt per acre, of which 0.9 cwt were a nitrogenous fertiliser. The rest of the fertiliser application consisted of potassic straights in 2 cases and a high potash compound in the other 13 cases. The fertilisers were spread by hand in 9 cases and mechanically in 6 cases. The time taken to spread the fertiliser averaged 0.6 man hours per cwt by hand (average of 6 cases) and 0.2 hours per cwt by tractor (average of 6 cases).

Weedkiller was used on 8 of the 16 plantations, in 1 case at the rate of 1 lb per acre, in 4 cases at 1.6 lb per acre and in 2 cases at about 4 lb per acre. The average amount used was 2.2 lb per acre (7 cases). The average time taken to apply the weedkiller was 1.4 hours for 1 man and tractor per acre.

Where weedkiller was used the average time spent on interrow cultivations was 5.7 hours and on handwork 26 hours per acre. The latter included 13.5 woman hours.

Where no weedkiller was used the average time spent on interrow cultivations was 4.0 hours with a tractor and 0.4 hours with a rotary hoe; the average time spent on handwork was 40 hours per acre. The latter included 9.4 woman hours.

If the cleaning costs are calculated using these average times and 1963 costs, there is no difference between the users and nonusers of weedkiller in this sample (see Table 27). Of course it is impossible to draw any conclusion from this comparison because the groups are small and the need for and effectiveness of the cleaning operations were not known. This annual cost gives no indication of the economy of using weedkillers when the full life of the plantation is considered.

TABLE 27 COST OF CLEANING PER ACRE

	Weedkiller	
	Used	Not used
No. cases	8	8
	£	£
Interrow cultivations and hand work	8.7	12.7
Weedkiller (2.2 lb @ £1.55 per lb)	3.4	-
Application of weedkiller	0.5	-
Total	12.6	12.7

Eight of the plantations were sprayed with D.D.T. against the raspberry beetle. In 1 case this was done by contract; the average time taken for the other 7 was 1.4 hours per acre for 1 man and tractor. Various types of D.D.T. spray were used, so that the only figure which can be quoted is the average cost of the materials per acre, £0.7.

Yield and Returns

The yield of fruit from these 16 second year plantations varied from 0.5 to 36.0 cwt, the average being 11.0 cwt. The yield range is given in Table 28.

TABLE 28 DISTRIBUTION OF SECOND YEAR PLANTATIONS ACCORDING TO YIELD PER ACRE

Cwt	under 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	Total
No. cases	3	6	4	-	2	-	-	1	16

The yields of plantations of Jewel covered a similar range to those of other varieties. The average yield of the 11 Jewel plantations was 11.4 cwt and that of the other and mixed varieties 9.8 cwt.

The fruit from the 11 Jewel plantations was sold as pulp in 5 cases, to the canners in 4 cases, partly as pulp and partly for canning in 1 case, and partly as pulp and partly to the fresh market in 1 case. The fruit from the plantations of other varieties was sold for canning in 1 case and as pulp in 4 cases. Taking the 10 plantations which were costed in 1963, the average yield was 9.7 cwt and the average difference between returns for the fruit and the picking costs was £50.7 per acre (or £5.2 per cwt). Table 29 gives an example of the balance between costs and returns for a cropped second year plantation.

TABLE 29    EXAMPLE OF COSTS AND RETURNS FOR A CROPPED  
SECOND YEAR PLANTATION, PER ACRE

<u>Work Done</u>	Hours		
	men	women & boys	tractor
Winter work - lacing or clasping	1.0	4.2	-
Applying fertilisers by hand @ 0.5 hrs per cwt	3.2	-	-
Care of crop - interrow cultivations	5.7	-	5.7
applying weedkiller	1.4	-	1.4
hand work	12.5	13.5	-
applying D.D.T. spray	1.4	-	1.4
Totals	25.2	17.7	8.5
<u>Costs</u>	£		
Materials:			
*Twine, 6.6 lb	1.1		
Fertiliser -			
* raspberry, 5.5 cwt @ £1	5.5		
* nitrogenous, 0.9 cwt @ £0.725	0.7		
*Weedkiller, 2.2 lb @ £1.55	3.4		
*D.D.T. spray	0.7		
Work:			
Man hours, 25.2 @ 5s. 10½d.	7.4		
*Woman " , 17.7 @ 3s. 1½d.	2.8		
*Tractor " , 8.5 @ 4s. 3d.	1.8		
	<hr/> 23.4		
Rent	6.0		
Total growing cost	<hr/> 29.4		
<u>Returns</u>			
11 cwt fruit -			
3.7 cwt canning @ £147 per ton	75.0		
7.3 cwt pulp @ £131 " "			
Picking cost @ 3½ lb (i.e. £1.63 per cwt)	<hr/> 17.9		
Margin on fruit, returns less picking cost	57.1		

\*Variable costs, total £14.7

### DISESTABLISHMENT OF PLANTATIONS

Before the canes can be dealt with the posts and wires have to be removed from the ground and, as they are often expected to have more than 1 plantation life, this job must be done with reasonable care. Some information was collected over the 3 years from 16 growers about this activity but unfortunately in some cases only the method or cost was recorded and not the hours of work involved.

The time taken to cut the strings and remove the posts and wires varied from 8.7 man hours with no tractor hours up to 36 man hours with 18 tractor hours per acre. In 6 cases the "man" hours were between 8 and 13 hours, in 3 cases between 22 and 24 hours and in 2 cases between 36 and 38 hours per acre. The average time taken in these 11 cases was 17.4 hours by men, 1.7 hours by women and boys, and 2.8 hours by tractors.

The destruction of the canes and stools was done in 2 ways, by the traditional method of ploughing out, collecting and burning or by chopping up with a rotovator. (In 1 instance a forage harvester was put over the plantation prior to rotovating.) Supporters of both methods would claim that each reduced disease - the first by burning infected plant material, the second by the action of the tannin in the rotting canes on the eelworms which carry the virus infections. Information on their method of destroying the canes was available from 13 growers, 5 of whom collected and burnt them and 8 of whom rotovated them. The average time spent on dealing with the canes by rotovating was 3.6 hours for 1 man and tractor per acre, an average of 6 cases. The average time spend collecting and burning (an average of 4 cases) was 60.6 "man" hours and 14.3 tractor hours or, if 1 case with very high hours is excluded, an average of 32.8 hours of manual work (i.e. 22.1 man hours and 10.7 woman hours) and 7.1 hours of tractor work for 3 cases. Average costs for the 2 methods have been calculated using these average times and 1963 wage rates. These are given in Table 30.



TABLE 30 COSTS OF DISESTABLISHING PLANTATIONS, PER ACRE

			£
(1) Removing posts and wires	17.4 man hrs	@ 5s. 10 <sup>1</sup> / <sub>2</sub> d.	5.1
	*1.7 woman hrs	@ 3s. 1 <sup>1</sup> / <sub>2</sub> d.	0.3
	*2.8 tractor hrs	@ 4s. 3d.	0.6
			<u>6.0</u>
(2) Destroying canes by rotovating	3.6 man hrs		1.1
	*3.6 tractor hrs		0.8
			<u>1.9</u>
(3) Destroying canes by burning	22.1 man hrs		6.5
	10.7 woman hrs		1.7
	7.1 tractor hrs		1.5
			<u>9.7</u>
(1) + (2)			7.9
(1) + (3)			15.7

\*Disestablishment by rotovating: variable costs, total £0.7

CHARGE AGAINST FRUITING PLANTATION FOR ESTABLISHMENT AND  
DISESTABLISHMENT

The incidence of second year crops varied. Thirty of the 45 growers, who provided information between 1961 and 1963, expected second year crops, 7 did not expect them, 3 expected them sometimes and for 5 no information was recorded. This would give a possible 25 per cent failure rate (10 in 40), sometimes falling to 18 per cent (7 in 40). Considering the second year plantations which were costed, these were cropped by 14 growers, not cropped by 5 and partly cropped by 3 growers. This gives a possible failure rate of 36 per cent (8 in 22), sometimes falling to 23 per cent (5 in 22). Of the 16 second year plantations of Jewel, 5 were not cropped, i.e. 31 per cent, and of the 8 plantations of other or mixed varieties 3, or 28 per cent, were not cropped. Taking the 1963 costs only, 14 second year plantations were cropped, 1 was partly cropped and 5 were not cropped, giving a

failure rate of 30 or 25 per cent including or excluding the partial failure. The failure rates here for Jewel and other plantations were both 1 in 4, excluding the partial failure which was Jewel. These failure rates are all higher than the growers' expectations and it may be, therefore, that the costings were done in years which were particularly unfavourable to the establishment of raspberries or that the sample, which was small, was biased. The variety Jewel is known to be more difficult to establish than most other varieties and the costed sample may contain an unrepresentatively high proportion of this variety. It may also be that growers are incurably optimistic about their chances of "instant" establishment.

The average expected total life of a plantation was 8 years (39 cases).

The cost examples have been put together in Table 31 in order to calculate the total charge per full fruiting year. The highest and lowest costs likely to be incurred using purchased canes have been used in this table. The most usual charge will be that for 6 years at full fruiting, i.e. the average life of 8 years less 2 establishment years.

The charge per year against the fruiting plantation is, of course, greater if more or better quality canes are used than if they are not but it is not so much greater that it is not worthwhile if a longer fruiting life or heavier crops are obtained.

TABLE 31 TOTAL ESTABLISHMENT AND DISESTABLISHMENT COSTS PER ACRE,  
AND CHARGE PER FULL FRUITING YEAR

Variety Type of cane Planting method (at 2' x 6')	Jewel/Promise certified double £	Jewel/Promise certified single £	Promise uncertified single £
First year cost	133.8	95.8	72.4
Share of extra (unproductive) second year cost ( $\frac{1}{4}$ of £56.9)	14.2	14.2	14.2
Posting and wiring	28.1	28.1	28.1
Disestablishment (by rotovating)	7.9	7.9	7.9
Second year cost	29.4	29.4	29.4
Gross charge against full fruiting years	213.4	175.4	152.0
Credit second year crop (11 cwts) margin on fruit, returns less picking costs	57.1	57.1	57.1
Net charge against full fruiting years	156.3	118.3	94.9
Annual charge per full fruiting year if 6 years @ full fruiting	26.1	19.7	15.8
7 " " " "	22.3	16.9	13.6
8 " " " "	19.6	14.8	11.9
Total variable costs	70.5	34.1	8.4
Charge per year over e.g. 6 years fruiting	11.8	5.7	1.4

B. FRUITING RASPBERRIES

THE SAMPLE

Thirty-six fruiting plantations were costed in 1963. Nineteen of these were in Perthshire, 14 in Angus and 3 in Fife. The holdings on which the costing was done varied from small holdings on which soft fruit was the main enterprise to farms of over 200 acres on which soft fruit was one of many enterprises and of varying size and importance in the farm economy. The range in the size of the holdings is shown in Table 32.

TABLE 32 DISTRIBUTION OF PLANTATIONS  
ACCORDING TO SIZE OF HOLDING

Acres	under 10	10-19	20-29	30-39	40-49	50-59	60-69	100-149	150-199	200-249	over 250	Total
No. cases	8	4	1	-	1	2	1	2	7	3	7	36

Where possible the whole fruiting acreage of raspberries on a holding was costed, whatever ages and varieties this included.

The size of the plantations costed varied from 0.7 to 84.0 acres of fruit, the average being 10.62 acres with 0.58 acres of associated endrigg, roads and so on. The plantation sizes are shown in Table 33.

TABLE 33 DISTRIBUTION OF PLANTATIONS ACCORDING TO  
ACREAGE OF FRUIT COSTED

Acres	under 5	5-9	10-14	15-19	over 20	Total
No. cases	16	6	9	1	4	36

The average age of each plantation was calculated and the distribution of these is given in Table 34. The average of the 34 average ages which were available was 5.6 years.

TABLE 34 DISTRIBUTION OF PLANTATIONS ACCORDING TO AVERAGE AGE

Years	under 3	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	over 7.0	n.a.	Total
No. cases	1	3	7	7	8	8	2	36

The average proportions of different ages and varieties of fruit are given in Table 35.

TABLE 35 AGES OF PLANTATIONS: VARIETIES GROWN

A. Average Proportions of Fruit of Different Ages in the Plantations

Years	2	3	4	5	6	7	8	9	10-13	n.a.	Total
Per Cent	2	11	18	18	16	17	6	5	2	5	100

B. Average Proportions of Fruit of Different Varieties in the Plantations

Variety	Jewel	Exploit	Mixed	Promise	Lloyd George	Enterprise	Burnetholm	n.a.	Total
Per Cent	43	18	15	9	6	2	1	6	100

Row widths and planting distances within the rows varied between holdings and sometimes according to variety on a particular holding. A summary of row widths and planting distances is given in Table 36.

TABLE 36 DISTRIBUTION OF PLANTATIONS  
ACCORDING TO PLANTING DISTANCES

Row Width	Distance between plants in row						Total
	1'6"	2'0"	2'4"	2'6"	Mixed	n.a.	
5'0"		1		1	1		3
5'2"					1		1
5'6"			1	2	1	1	5
5'8/9/10"	1				2		3
6'0"	2	6		4	2		14
6'4"			1				1
6'6"		1	1				2
7'0"		1				1	2
Mixed					2		2
Total	3	9	3	7	9	2	33

COSTS AND RETURNS

The average costs and returns for the whole sample (36 cases) are given in Table 37. Labour, regular plus casual, was the largest item in the growing cost (43.7 per cent) and in the harvesting cost (83.4 per cent) and also by far the largest single item in the total cost (65.3 per cent). The share of establishment was the next largest item, being 11.6 per cent of the total cost.

TABLE 37     AVERAGE COSTS AND RETURNS FOR FRUITING  
RASPBERRIES, PER ACRE

<u>Growing Costs</u>			<u>£</u>	<u>% total cost</u>
Materials:	dung (incl. work leading & spreading)		4.2	2.3
*	fertilisers		7.6	4.2
*	twine		1.7	0.9
*	weedkiller		1.6	0.9
*	other sprays		0.9	0.5
*	miscellaneous		0.2	0.1
Work: *	casual labour		10.1	5.6
	regular labour		26.0	14.4
*	tractor and rotovator		2.6	1.4
	horse		0.7	0.4
	Rent		6.0	3.3
*	Share of establishment costs (incl. variable costs £8.0)		21.0	11.6
	<b>Total Growing Cost</b>		<u>82.6</u>	<u>45.6</u>
 <u>Picking Costs</u>				
*Materials:	punnets, trays		7.1	3.9
	barrels, pails		0.9	0.5
Work: *	casual labour (incl. pickers' transport etc.)		68.3	37.7
	regular labour		13.8	7.6
*	tractor		0.3	0.2
*Haulage of fruit			7.0	3.9
Cold storage			1.0	0.6
	<b>Total Picking Cost</b>		<u>98.4</u>	<u>54.4</u>
	 <b>Growing + Picking Cost</b>		<u>181.0</u>	<u>100.0</u>
 <u>Returns</u>				
		<u>% by wt.</u>	<u>cwt.</u>	
Fruit	- fresh	13	5.84	62.4
	canning	34	15.00	106.8
	jam	52	22.96	149.8
	house etc.	1	0.45	3.0
	<b>Total</b>	100	44.25	322.0
Canes				3.8
	<b>Total</b>			<u>325.8</u>
	<b>Net Margin</b>			80
			144.8	

\*Variable costs, total                     £113.4  
\*Gross Margin (returns less variable costs) £212.4

Table 38 shows the average seasonal work requirements.

TABLE 38 AVERAGE SEASONAL WORK REQUIREMENTS  
PER ACRE

	Hours				
	regular	casual	tractor	hand rotovator	horse
Autumn and winter, cultivations etc.	56.7	23.5*	0.3	-	2.2
Spring and summer, cultivations etc.	41.3	21.4*	10.9	1.0	5.2
Total	98.0	44.9*	11.2	1.0	7.4
Picking	52.8	*	1.4		0.4
*plus some piecework					

GROWING COSTS (Materials used)

Manures

All the plantations received some form of manure; in 12 cases this consisted wholly or in part of dung, in 7 cases wholly or partly of a fertiliser containing some organic material and in 30 cases wholly or partly of an inorganic fertiliser. The weights of dung and fertiliser used are shown in Table 39; the average quantities used in the different combinations are given in Table 40. The average dressings over

TABLE 39 DISTRIBUTION OF PLANTATIONS ACCORDING TO:-

A. Quantity of Dung Applied per acre

tons	nil	0-4	5-9	10-14	Total
No. cases	24	4	6	2	36



B. Quantity of Fertilisers Applied per acre

cwt.	nil	0-1.9	2.0-3.9	4.0-5.9	6.0-7.9	8.0-9.9	10.0-11.9	over 12	Total
No. cases	1	-	6	11	9	3	4	2	36

the whole sample (36 cases) were 6.7 cwt. of fertiliser and 2.3 tons of dung per acre. This dressing of dung is equivalent to 10 tons every 4 years.

TABLE 40 MANURING PER ACRE

Manures applied	No. cases	Quantity applied			Fertiliser analysis			Cost of fertiliser dressing
		dung	fertilisers organic	fertilisers inorganic	N	P	K	
		tons	cwt.	cwt.	units	units	units	£
Dung only	1	9.0	-	-	-	-	-	-
Dung + organic fertiliser	2	12.7	12.6	-	63	63	132	20.9
Dung + inorganic fertiliser	9	5.2	-	5.3	55	42	80	5.5
Organic fertiliser only	3	-	6.7	-	61	33	43	9.2
Organic + inorganic fertiliser	2	-	5.0	4.3	98	50	79	12.0
Inorganic fertiliser only	19	-	-	6.6	72	43	96	6.8

The dung dressing appears to be low in 4 cases because only part of the fruiting plantation was covered - the dressed area received between 10 and 15 tons per acre in each case. Two growers purchased dung for the raspberries.

Where dung and an inorganic fertiliser were used, the dressing of fertiliser was 1.3 cwt. lower than where inorganic fertiliser only was used; the fertiliser used with the dung had a relatively higher phosphatic content per cwt.

Twine

The amount of twine used to tie the canes to the supporting wires varied with the method of wiring and with the number and growth of the canes. Where the canes are held between 2 wires, clipped together at intervals, no tying is necessary. Only 1 grower in this sample used double wires at both the top and the bottom, 20 used a double wire at the bottom and tied the canes at the top, and 15 used single wires and tied at both the top and the bottom of the canes. The average amount of twine recorded as used where the canes were tied only at the top was 6.6 lb. per acre (average of 12 cases); where they were tied top and bottom it was 14.3 lb. per acre (average of 12 cases). The quality and cost of the twine varied but no attempt was made to distinguish the grades, although the use of a poor quality may cause some extra work retying after bad weather. The average cost of the twine per acre was £1.2 where the canes were tied at the top only and £2.4 where they were tied top and bottom. The ranges of quantity and cost are given in Table 41.

TABLE 41 DISTRIBUTION OF PLANTATIONS ACCORDING TO  
AMOUNT AND COST OF TWINE USED PER ACRE

A. Tied at top only

lb.	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	7.0-7.9	8.0-8.9	Total
No. cases	2	1	1	1	3	4	12

£	0.60-0.79	0.80-0.99	1.00-1.19	1.20-1.39	1.40-1.59	1.60-1.79	Total
No. cases	3	1	3	4	5	4	20

B. Tied top and bottom

lb.	11.0-11.9	12.0-12.9	13.0-13.9	14.0-14.9	15.0-15.9	16.0-16.9	18.0-19.9	over 20	Total
No. cases	3	4	1	1	-	1	-	2	12

£	1.60-1.79	1.80-1.99	2.00-2.19	2.20-2.39	2.40-2.59	2.60-2.79	2.80-2.99	3.80-3.99	4.00-4.19	Total
No. cases	2	1	3	2	2	2	1	1	1	15

Weedkillers

These were used on 12 plantations, 10 of which were wholly sprayed and 2 partially. A soil-acting herbicide was used on all these plantations but the quantity used varied. In 2 cases the spraying was done by contract and the quantity used was not known; the average amount used on the other 10 plantations was 2.9 lb. per acre sprayed. The range of quantities used is shown in Table 42.

TABLE 42 QUANTITIES OF WEEDKILLER USED, PER ACRE SPRAYED

lb.	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	n.a.	Total
No. cases	2	2	3	3	2	12

In addition, contact sprays were used on endriggs by 2 growers at a cost of £0.1 per acre of fruit.

The range in the cost per acre of weedkillers is given in Table 43. The average cost was £4.8 per acre.

TABLE 43 COST OF WEED SPRAYING MATERIAL PER ACRE SPRAYED

£	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	7.0-7.9	8.0-8.9	n.a.	Total
No. cases	2	-	1	3	1	2	1	1	1	12

Other Sprays

One plantation was sprayed against canespot at a cost of £0.2 per acre for lime sulphur; 1 plantation was sprayed against raspberry moth costing £0.9 per acre for tar oil winter wash.

Twenty-five growers sprayed their plantations against the raspberry beetle. Two plantations were sprayed by contract. For the other 23 plantations, the average cost of materials was £1.2 per acre sprayed. Some form of D.D.T. was used by 17 growers, malathion by 1, partly both by 2, and liquid derris by 1 grower. The variation in the cost of the material is shown in Table 44.

TABLE 44 COST OF ANTI-BEETLE SPRAY PER ACRE SPRAYED

£	under 0.5	0.5- 0.9	1.0- 1.4	1.5- 1.9	2.0- 2.4	2.5- 2.9	over 3.0	Total
No. cases	3	9	6	2	1	1	1	23

Miscellaneous Costs

These were the costs of a small quantity of posts and wires which were replaced on 9 plantations. The costs on the individual plantations varied from £1.8 to £0.1 per acre.

WORK DONE

Winter Work

The winter work in a raspberry plantation can be done at any time after the end of the previous fruiting season when there is labour available and can thus provide useful work on an arable farm at slack times during the winter.

The winter work has been taken to include cutting strings, slackening wires, digging, cutting out, carrying off and burning canes, maintenance of posts and wires, adjusting wires, lacing and topping. A varying amount of this work was done by piecework.

The average time taken to do the usual winter work on the 26 plantations where all the work was paid for on an hourly basis was 94.7 hours per acre. The range in the time taken was wide and is given in Table 45.

TABLE 45 DISTRIBUTION OF PLANTATIONS ACCORDING TO HOURS SPENT ON WINTER WORK PER ACRE

Hours	under 50	50-74	75-99	100-124	125-149	150-174	over 175	Total
No. cases	3	7	4	7	3	1	1	26

It is obvious that the cost of the work per acre depended partly on the hours worked and partly on the proportion of the work done by women, who were paid at approximately half the men's rate per hour.

TABLE 46 AVERAGE TOTAL HOURS OF WINTER WORK,  
HOURS OF FEMALE LABOUR AND COST PER ACRE

Hours worked	under 50	50-74	75-99	100- 124	125- 149	150- 174	over 175
Av. total hrs.	37.0	58.1	90.7	110.3	135.1	154.7	248.5
Av. wms. hrs. (incl. above)	13.8	28.2	44.0	42.7	62.1	-	248.5
Total cost, £	9.4	12.9	19.5	26.3	31.2	45.8	38.8

The cost of piecework on the 10 plantations where it occurred averaged £7.9 per acre. The range is shown in Table 47. On 1 holding with nearly 100 per cent of piecework, the only job which was not done in this way was the maintenance work on the posts and wires. On the other 9 plantations strings were cut by piecework in 3 cases, canes dug in 1 case, cut out in 5 cases, carried off in 2 cases, wires replaced and reclassified in 2 cases, canes laced in 7 cases and topped in 2 cases.

TABLE 47 DISTRIBUTION OF PLANTATIONS ACCORDING TO COST OF  
WINTER PIECEWORK PER ACRE

£	nil	0-4.9	5.0- 9.9	10.0- 14.9	15.0- 19.9	20.0- 24.9	25.0- 29.9	Total
No. cases	26	4	4	1	-	-	1	36

The variation in the cost of the winter work is shown in Table 48. The overall average cost of this work was £19.8 per acre, the average being £14.6 for the 10 plantations where some piecework was done and £21.8 where no piecework was done.

TABLE 48 DISTRIBUTION OF PLANTATIONS ACCORDING TO COST OF WINTER WORK PER ACRE

£	under 10	10.0- 14.9	15.0- 19.9	20.0- 24.9	25.0- 29.9	30.0- 34.9	35.0- 39.9	40.0- 44.9	45.0- 49.9	Total
No. cases:										
Hourly work only	2	7	3	6	3	2	1	1	1	26
Hourly + piecework	2	3	3	-	2	-	-	-	-	10
All plantations	4	10	6	6	5	2	1	1	1	36

The different winter jobs were not always recorded separately, so 2 groups of jobs were taken to find the range of costs associated with each group. The results for the plantations for which this detail was available are given in Table 49. The average cost for the jobs in group A. was £12.1 and for those in group B. £6.7, giving an average total cost for winter work on these 27 plantations of £18.8 per acre.

TABLE 49 DISTRIBUTION OF PLANTATIONS ACCORDING TO COST OF:-

A. Cutting strings, slackening wires, removing clips, digging, cutting out, carrying off and burning

£	under 5	5-9	10-14	15-19	20-24	25-29	over 30	Total
No. cases	2	8	12	3	1	-	1	27

B. Adjusting and care of posts and wires, lacing and topping

£	under 2.5	2.5- 4.9	5.0- 7.4	7.5- 9.9	10.0- 12.4	12.5- 14.9	over 15.0	Total
No. cases	1	11	7	3	1	1	3	27

More details of the work done were available on 14 plantations and, although this is a very small sample, the details are given in Table 50 as a matter of interest.

TABLE 50 TIMES TAKEN FOR WINTER JOBS ON  
14 PLANTATIONS PER ACRE

Job	No. cases	Work done		Total cost		
		hourly basis	on piecework	average	range	
		hours	£	£	£	£
Cut strings - 1 string	8	9.3	-	2.0	4.5	0.5
2 strings	6	12.7	0.4	2.8	4.4	1.2
Slacken wire, unclip	8	4.2	-	1.0	2.3	0.3
Dig, cut out, carry off and burn canes	14	36.5	0.5	6.9	19.2	3.5
Replace wires, clip	8	4.5	-	1.1	2.1	0
Maintain posts and wires	14	4.5	..	1.1	7.7	0
Lace and top canes -						
1 string	8	21.7	-	4.1	8.5	1.0
2 strings	6	9.5	2.0	4.6	5.7	2.8
All jobs	14	72.6	1.6	17.5	30.6	8.8

Canes were known to have been dug from 11 plantations and in 10 cases some were used or sold. The time taken to dig cannot be related to the numbers dug, as it is not known how many were dug altogether, only the number used being recorded.

The cost of some autumn weeding has been excluded from the costs of winter work and included with the summer cleaning costs; it amounted to £0.8, £2.5 and £3.3 per acre on the 3 plantations concerned. Similarly, hours spent during the winter on 2 plantations painting barrels and pails have also been excluded from the calculation of the cost of winter work. The work of painting cost £1.4 per acre in both cases.

#### Spring and Summer Work

Dung was led and spread using a horse in 1 case (12.4 hours per acre), by hand only in 2 cases (average 3.3 hours per acre) and using a tractor in 7 cases (average 0.6 tractor hours and 1.5 hours of manual

work per acre). The cost of this work of leading and spreading was included in the charge for dung.

Fertilisers were spread by hand in 13 cases, by hand with some use of a tractor in 5 cases and by 1 man and tractor in 13 cases. The time taken to spread by hand varied from 1.0 to 12.8 hours per acre, the average being 4.9 hours. The time taken by 1 man with a tractor varied from 0.7 to 4.0 hours per acre, the average being 1.6 hours. In neither case were the variations apparently due to the application of different weights of fertiliser per acre.

Where dung was applied to the plantation the 2 traditional ploughings, away from and towards the canes, were done by tractor in 7 cases and by horse in 1 case. For the 7 plantations where this was done by tractor it took an average of 4 hours per acre for all the ploughing. In the other 3 cases only the covering operation appears to have been done.

The amount of cleaning work done varied greatly and the need for and effectiveness of the work was not known. Cleaning costs have been grouped according to whether weedkiller was used or not. One plantation where weedkiller was used on part of the acreage has been omitted from both groups. Where no dung was applied, ploughing has been counted as a cleaning operation. (Eight plantations were ploughed twice and 1 was ploughed once where no dung was applied.) Over the whole sample the power used for interrow cultivations was a tractor in 33 cases, a rotovator in 2 cases and a horse in 1 case. These 3 costs have been excluded from the following tables on comparative cleaning costs.

Weedkiller was sprayed by contract in 2 cases, by hand in 1 case and by 1 man and tractor in 9 cases. (In 2 of these cases more than 1 man was used with the tractor.) Where it was a 1 man and tractor job, the average time taken was 1.4 hours per acre. (The time spraying the endriggs with contact spray has been excluded from these figures.) The average cost of the work when done by 1 man and tractor was £0.8 per acre sprayed. The total cost of applying the weedkiller - material plus work - varied widely as is shown in Table 51. The average cost was £6.0 per acre sprayed.



TABLE 51 DISTRIBUTION OF PLANTATIONS ACCORDING TO TOTAL  
COST OF APPLYING WEEDKILLER PER ACRE SPRAYED

£	under 2	2-3	4-5	6-7	8-9	10-11	12-13	Total
No. cases	1	1	5	2	2	-	1	12

The average time spent on interrow cultivations, using a tractor, was 4.2 hours where weedkiller was used and 10.6 hours where it was not used. The ranges in times spent are shown in Table 52.

TABLE 52 DISTRIBUTION OF PLANTATIONS ACCORDING TO  
TIME SPENT ON INTERROW CULTIVATIONS (WITH TRACTOR)  
PER ACRE

Hours	under 2	2.0- 3.9	4.0- 5.9	6.0- 7.9	8.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- 17.9	over 30	Total
Weedkiller used	3	3	1	2	-	1	-	-	-	-	10
Weedkiller not used	1	5	4	2	2	1	3	1	1	2	22

Excluding 3 plantations where some or all of the hand cleaning work was done by contract, the average time spent on hand cleaning was 35.8 hours where weedkiller was used and 46.3 hours where it was not used. The ranges in times taken are shown in Table 53. These include any time spent removing surplus spawn.

TABLE 53 DISTRIBUTION OF PLANTATIONS ACCORDING TO TIME SPENT  
HAND CLEANING PER ACRE

Hours	nil	0-24	25- 49	50- 74	75- 99	100- 124	125- 149	150- 174	175- 199	n.a.	Total
Weedkiller used		5	2*	2		1*					10
Weedkiller not used	3	4	4	2	3	1			1	1	19

\*includes some autumn cleaning in 1 case.

The autumn cleaning work which was omitted from the winter work has been included here - it took 10.5 and 12.5 hours per acre in the 2 cases.

The average cleaning costs for the users and non-users of weed-killer are given in Table 54 and also the range of costs. Both the average total costs and the range were much the same for both groups, 2 of the non-users having total costs higher than those of the users, 4 non-users having costs lower than the lowest cost users. These samples are, however, too small to enable any conclusions to be drawn about the economics of the use of weedkiller and, moreover, the cleanness of the land before and after this season was not known, so that the need for and efficiency of the cleaning operations cannot be related to the costs incurred.

TABLE 5A AVERAGE COSTS OF CLEANING PER ACRE

A. Average Cost of Cleaning per acre

	Weedkiller	
	used	not used
No. cases	10	22
Acreage costed	11.5	7.1
	£	£
Cost of interrow cultivations (tractor)	2.2	5.4
hand	7.1	10.9
" "		
all	9.3	16.3
Cost of weedkiller	5.2	-
" " application of weedkiller	1.2	-
Total Cost	15.7	16.3

B. Distribution of Plantations According to Cost of Cleaning Cultivations per acre

£	under 5	5.0-9.9	10.0-14.9	15.0-19.9	20.0-24.9	30.0-39.9	40.0-49.9	50.0-59.9	Total
Weedkiller used	3	3	3		1				10
Weedkiller not used	4	5	3	5	2	1	1	1	22

C. Distribution of Plantations According to Total Cleaning Cost per acre

£	under 5	5.0-9.9	10.0-14.9	15.0-19.9	20.0-24.9	25.0-29.9	30.0-39.9	40.0-49.9	50.0-59.9	Total
Weedkiller used		2	4	2	1		1			10
Weedkiller not used	4	5	3	5	2		1	1	1	22

The amount of the total cleaning costs which was incurred by the weedkiller users after the application of the weedkiller is shown in Table 55. In 2 cases it was known to have included the removal of surplus spawn, in 1 case of broken canes, and in another case of perennial weeds; amongst the other 6 the work consisted of hand-hoeing in 2 cases, rotovating in 1 case, and both hand and tractor work in 3 cases.

TABLE 55 DISTRIBUTION OF PLANTATIONS ACCORDING TO COST OF  
POST-SPRAYING CLEANING OPERATIONS PER ACRE

£	nil	0-1.9	2.0- 3.9	4.0- 5.9	6.0- 7.9	8.0- 9.9	10.0- 11.9	Total
No. cases	1	3		3		2	1	10

Spraying against the raspberry beetle was done by contract in 2 cases. In all cases a tractor was used; in 3 cases a hired spraying machine was employed. The range in the time taken to spray 1 acre once is given in Table 56; the average time was 1.4 hours per acre sprayed. In 2 cases the man hours recorded were greater than the tractor hours.

TABLE 56 DISTRIBUTION OF PLANTATIONS ACCORDING TO TIME TAKEN  
TO SPRAY AGAINST BEETLE, PER ACRE SPRAYED

Tractor hours	under 0.5	0.5-0.9	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	Total
No. cases	1	3	11	2	3	2	22

The total cost of spraying against the beetle, i.e. materials plus work applying, is given in Table 57.

TABLE 57     DISTRIBUTION OF PLANTATIONS ACCORDING TO TOTAL COST  
OF SPRAYING AGAINST BEETLE, PER ACRE SPRAYED

£	under 1.0	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	over 3.0	Total
No. cases	4	5	8	2	5	1	25

Rent

This varied from £1.7 to £17.0 per acre of fruit, the average being £6.0.

SHARE OF ESTABLISHMENT CHARGE

Establishment was costed on the same holding as the fruiting plantation wherever possible, otherwise an average cost was used. The average of the share of establishment costs charged against the fruiting plantations was £21 per acre per annum. The range is shown in Table 58.

TABLE 58     DISTRIBUTION OF PLANTATIONS ACCORDING TO CHARGE  
MADE AGAINST FRUITING PLANTATION FOR ESTABLISHMENT

£	under 5	5-9	10-14	15-19	20-24	25-29	over 30	Total
No. cases	3		4	7	15	3	4	36

TOTAL GROWING COST:

The total growing cost of 75 per cent of the plantations costed was below £90 per acre. Some of the other 25 per cent were well above this figure and the average for the whole sample was £82.6. The distribution of the costs is given in Table 59.

TABLE 59     DISTRIBUTION OF PLANTATIONS ACCORDING TO  
GROWING COST PER ACRE

£	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150-159	over 200	Total
No. cases	4	8	4	6	5	1	2	2	-	1	1	1	1	36

YIELD

Some fruit was lost at harvest time because of adverse weather conditions - rain spoilt the fruit or prevented picking at the right time or wind blew fruit off the canes. Twenty-seven growers were able to estimate these losses - 13 had lost no fruit, 7 had lost less than 5 cwt. per acre and 7 had lost between 11 and 14 cwt. The average loss for these 27 plantations was 3.85 cwt. per acre. Another 3 growers knew that they had lost some fruit but were unable to estimate the extent of the loss.

The range in yield was from 20.6 to 74.3 cwt. per acre. The distribution is shown in Table 60.

TABLE 60     DISTRIBUTION OF PLANTATIONS ACCORDING TO ACTUAL  
YIELD PER ACRE

cwt.	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	Total
No. cases	4	1	5	3	11	3	1	2	-	3	3	36

No simple relationships between yield and manuring, plant population, age of plantation or total growing cost could be found.

RETURNS

These varied according to yield and the proportions sold in the fresh market, to canneries and to jam manufacturers. The amount of fruit

sold in the fresh market was not large, as the prices paid for canning and jamming fruit were considered reasonable; in some cases consignments of fresh fruit to England early in the season fetched poor prices and were discontinued.

The average prices received per ton sold in the different ways were £217.3 in the fresh market, £147.0 from canners and £130.9 from jam manufacturers. Prices varied in each category and this was particularly so in the sales to the fresh market. The ranges are given in Table 61. (For the returns net of all haulage charges see Table 67.)

TABLE 61    DISTRIBUTION OF PLANTATIONS ACCORDING TO PRICE  
RECEIVED PER TON FOR FRUIT

A. Sold in Fresh Market

£	under 100	100- 124	125- 149	150- 174	175- 199	200- 224	225- 249	250- 274	275- 299	Total
No. cases	1		2**	2		3*	3**	1	5*	17

\*Represents 1 case wholly or partly net of haulage charges

B. Sold to Canners

£	under 100	100- 109	110- 119	120- 129	130- 139	140- 149	150- 159	160- 169	Total
No. cases	1			1	5	4	11	5	27

C. Sold to Jam Manufacturers

£	120-129	130-139	140-149	Total
No. cases	7	24	1	32

The proportion of the individual crops sold in different ways is shown in Table 62.

TABLE 62 DISTRIBUTION OF PLANTATIONS ACCORDING TO PROPORTION OF INDIVIDUAL CROPS SOLD IN DIFFERENT WAYS

A. In Fresh Market

Per cent	nil	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100	Total
No. cases	19	9	2	1	2	-	-	-	1	-	2	-	36

B. To Cannery

Per cent	nil	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100	Total
No. cases	9	4	2	4	4	1	4	1	2	3	-	2	36

C. To Jam Makers

Per cent	nil	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100	Total
No. cases	4	3	2	2	3	1	2	6	5	-	3	5	36

Twenty-eight of the growers sold their fruit in more than 1 way and 12 of these sold in all 3 ways. Details are given in Table 63.



TABLE 63    DISTRIBUTION OF PLANTATIONS ACCORDING TO WAYS  
OF SELLING FRUIT

No. of Outlets Utilised	Outlets	No. cases
1	Fresh market only	1
	Canners only	2
	Jam makers only	5
2	Fresh market + canners	1
	Fresh market + jam makers	3
	Canners + jam makers	12
3	Fresh market + canners + jam makers	12..

The range in the average returns per acre is given in Table 64 according to the type of sale made. There was a very general increase in return per acre as the proportion of the higher priced fruit (canning and fresh) increased. The average yields for these type of sale groups were between 43 and 48 cwt. per acre except for the jam manufacturing group, which averaged 33.7 cwt. per acre, and the fresh market + jam manufacturing group, which averaged 60.0 cwt. per acre.

TABLE 64    DISTRIBUTION OF PLANTATIONS ACCORDING TO FRUIT  
RETURNS PER ACRE, IN TYPE OF SALE GROUPS

Type of sale*	Return per acre, £											Total
	under 150	150-199	200-249	250-299	300-349	350-399	400-449	450-499	500-549	550-599	over 600	
F									1			1
F + C										1		1
F + J					1	1					1	3
F + C + J				6	3	1			2			12
C			1		1							2
C + J	1	3	1	3			2	1	1			12
J	1		2	2								5
All	2	3	4	11	5	2	2	1	4	1	1	36

\*F = Fresh market; C = Cannery; J = Jam makers

The effect of yield per acre upon fruit returns per acre is far greater than the effect of the return per ton, as is shown in Table 65. The average return per ton for these yield groups was between £140 and £145, except for two groups where the proportion of fruit sold in the fresh market was high, i.e. the 40 to 49 and 70 to 79 cwt. yield groups.

TABLE 65 DISTRIBUTION OF PLANTATIONS ACCORDING TO  
FRUIT RETURNS PER ACRE, IN YIELD PER ACRE GROUPS

Return for fruit per acre, £	Yield per acre, cwt.						Total
	20.0- 29.9	30.0- 39.9	40.0- 49.9	50.0- 59.9	60.0- 69.9	70.0- 79.9	
Under 150	2						2
150-	3						3
200-		3	1				4
250-		5	6				11
300-			5				5
350-				2			2
400-				1	1		2
450-					1		1
500-			1		1	2	4
550-599			1				1
600 and over						1	1
All	5	8	14	3	3	3	36
Return per ton, £	141.3	144.8	152.1	140.9	140.2	150.9	
Proportion sold -							
fresh, per cent	-	7	18	3	2	32	
canning, per cent	40	33	33	36	33	32	

HARVESTING

Because of the difficulty of recording separately the cost of picking fruit for several types of sale from the same plantation, and the fact that only 8 of the growers picked for a single type of sale, only partial information on the picking costs for different types of sale is available.

Picking started in the week beginning 15 July on 6 plantations, the week beginning 22 July on 13 plantations and the week beginning 29 July on 6 plantations - a total of 25 for which the dates were

available. Picking finished on these plantations over a longer period - the week beginning 12 August on 6 plantations, 19 August on 6, 26 August on 7, 2 September on 3, 9 September on 1 and the week beginning 16 September on 2 plantations. The number of days when some picking was done is given in Table 66 for 22 plantations.

TABLE 66    DISTRIBUTION OF PLANTATIONS ACCORDING TO  
NUMBER OF DAYS ON WHICH SOME PICKING WAS DONE

Days	10-14	15-19	20-24	25-29	30-34	Total
No. cases	2	5	9	2	4	22

The grower usually provided the following items in addition to the labour, weighing equipment, and sometimes cold storage:-

- (1) When picking for the fresh market: punnets, trays and transport.
- (2) When picking for canners: neither containers nor transport.
- (3) When picking for jam manufacturers: pails, barrels and transport.

The punnets and trays for fresh market fruit cost an average of £29.9 per ton (15 cases), varying from £59.8 to £11.8. In 6 cases haulage costs were not known, as returns net of these charges were quoted. In 2 cases, where the fresh sales were wholly or partly local, the costs of haulage were £4.4 and £17.3 per ton respectively. In the other 9 cases the average cost of haulage was £34.5 per ton, ranging from £15.8 to £73.2.

Although the canners normally provide baskets and transport from the holding to the factory, 5 of the growers in this sample transported the berries themselves and in 1 case provided the baskets also. Excluding this 1 grower, whose haulage cost was £6.5 per ton, the average cost of haulage for the other 4 growers was £2.5 per ton.

Pails and barrels used for picking and transporting the fruit for jam manufacturing can last many seasons. The charge for these averaged £1.2 per ton of fruit sold in this way, ranging from nothing to £9.6. (Unlike the charge for punnets and trays which varies directly with the quantity of fruit picked, this is a charge on fixed equipment which may be adequate to deal with a larger tonnage than is

picked this way in any particular year.) Thirteen of these growers had haulage costs which averaged £1.0 per ton for these 13 cases or £0.4 per ton averaged over the 32 cases where fruit was sold for jam manufacture. The highest haulage cost was £3.2 per ton.

Weighing equipment of one or more types was necessary for payment of piecework and for despatch weights. This equipment normally has a long life and the depreciation charge was small. Maintenance costs were also low.

Cold storage facilities were available to 10 of the growers altogether but used by only 7 growers during the 1963 season. The charge per acre for these facilities (depreciation + running costs) was under £4 in all except 1 case.

Returns for the 3 types of sale net of charges for containers and haulage are given in Table 67. The average net return was £171.4 per ton for fresh market fruit, £145.9 for canning fruit and £128.9 for jamming fruit.

TABLE 67 DISTRIBUTION OF PLANTATIONS ACCORDING TO RETURN PER TON NET OF CHARGES FOR CONTAINERS AND HAULAGE

A. Fresh Market Sales

£	loss	100-	125-	150-	175-	200-	225-	250-	Total
		124	149	174	199	224	249	274	
No. cases	1	1	4	3	2	1	4	1	17

B. Canning Sales

£	under	100-	110-	120-	130-	140-	150-	160-	Total
	100	109	119	129	139	149	159	169	
No. cases	1			1	5	7	9	4	27

C. Jam Manufacturing Sales

£	under 120	120-124	125-129	130-134	135-139	Total
No. cases	1	3	12	15	1	32

The cost of all the labour for picking (i.e. regular and casual labour, including pickers' transport and miscellaneous costs) varied widely; excluding 1 case where some weeding was done during picking, the highest cost per ton, £67.1, was more than 3 times as great as the lowest cost, £19.4. The range of costs is given in Table 68. Half of the 36 costs were between £30 and £40 per ton.

TABLE 68 DISTRIBUTION OF PLANTATIONS ACCORDING TO  
COST OF LABOUR FOR PICKING, PER TON

£	under 20	20-24	25-29	30-34	35-39	40-44	45-49	over 50	Total
No. cases	1	1	6	10	8	6		4*	36

\*includes some weeding in 1 case

The proportion of regular labour in the total picking costs varied from nothing up to 50 per cent. The range is shown in Table 69. The average proportion was 16.8 per cent of regular labour in the total cost. The amount of regular labour is not a measure of the amount of supervision, as in some cases "regular casual" workers did some or all of this.

TABLE 69 DISTRIBUTION OF PLANTATIONS ACCORDING TO  
PROPORTION OF COST OF PICKING LABOUR  
ATTRIBUTABLE TO REGULAR LABOUR

Per cent	nil	0-9.9	10.0-19.9	20.0-29.9	30.0-39.9	40.0-49.9	50.0-59.9	n.a.	Total
No. cases	1	8	15	6	2	2	1	1	36

In 10 cases some of the casual work was paid for on an hourly basis; in the 1 case where some weeding was done during picking, all payment was on this basis.

Where the casual work was paid for according to the weight of fruit picked, there were usually different rates for picking into pails for jam and for basketing, i.e. canning and fresh market fruit. In some cases there was a difference between the rates paid for the 2 types of basketed fruit. Amongst the 14 cases for which details of the rates of payment were available, 10 used differential rates and 4 did not. Of the 10, 7 differentiated only between picking into pails and baskets, the difference being  $\frac{1}{2}$ d. per lb. in 3 cases and 1d. in 4 cases; the other 3 paid an extra  $\frac{1}{2}$ d. per lb. for canning fruit compared with jamming fruit and a further  $\frac{1}{2}$ d. per lb. in 2 cases and 1d. in 1 case, for the fresh market fruit.

A breakdown of the picking labour cost is given in Table 70, excluding the 1 case where some weeding was included in the picking cost.

TABLE 70 BREAKDOWN OF AVERAGE PICKING LABOUR COST, PER TON  
(35 cases)

	£
Casual labour - piecework	28.2
hourly rates	0.7
Pickers' transport	0.8
"    miscellaneous	0.2
Regular labour - ordinary time	6.1
overtime	0.4
Total	36.4

Transport was provided for the pickers in 18 cases; the cost amounted to £6.7 per ton in 1 case but the average was £1.6 per ton. Miscellaneous costs for pickers occurred in 11 cases. In 2 cases they included a charge for dormitories of £1.6 and £1.1 per ton respectively. The other costs included water, fuel, food and drink and averaged £0.4 for the 11 cases concerned.

Excluding 5 cases where all the haulage costs for the fruit were not known and 1 case where some weeding was included, the total picking costs ranged from £20.4 to £127.4 per ton. These tended to be lowest for fruit picked for jam manufacturing. Table 71 gives the range for the different types of sale.

TABLE 71     DISTRIBUTION OF PLANTATIONS ACCORDING TO TOTAL  
COST OF PICKING PER TON

£	20-29	30-39	40-49	50-59	60-69	over 100	Total
No. cases:							
F						1	1
F + J		1			1		2
F + C + J		3	4	1			8
C		1			1		2
C + J	2	7	2	1			12
J	1	2	2				5
All	3	14	8	2	2	1	30

The per ton margin of fruit returns less harvesting costs ranged from £57.5 to £129.2 and averaged £100.1 over the 36 cases. The range is shown in Table 72 for the various types of sale.

TABLE 72     DISTRIBUTION OF PLANTATIONS ACCORDING TO MARGIN PER TON  
(FRUIT RETURNS LESS HARVESTING COSTS)

£	50-59	80-89	90-99	100-109	110-119	120-129	Total
No. cases:							
F			1				1
F + C						1	1
F + J			2	1			3
F + C + J		1	2	6	2	1	12
C	1	1					2
C + J		2	4	4	2		12
J		1	2	2			5
All	1	5	11	13	4	2	36



RETURNS FOR CANES

Canes were sold from 5 plantations; the quantity sold varied from 0.4 to 3.4 thousand per acre. Returns for canes per thousand varied from £5.0 to £14.2 and returns per acre from £1.9 to £42.5. Own canes were used from 7 plantations; the quantity used varied from 0.1 to 1.2 thousand per acre. These were valued at cost of digging. This ranged from £0.4 to £12.9 per thousand.

NET MARGIN PER ACRE

This is the margin of all returns (fruit + canes) over all costs.

The range of net margin per acre is given in Table 73. There was a very considerable variation in the net margin per acre from a loss of £10.7 to a profit of £334.0.

TABLE 73    DISTRIBUTION OF PLANTATIONS ACCORDING TO  
NET MARGIN PER ACRE

£	loss	0-49	50-99	100-149	150-199	200-249	250-299	300-349	Total
No. cases	1	4	6	9	8	2	4	2	36

The factor which had the biggest effect upon the net margin per acre was the yield of fruit. This is shown in Table 74.

TABLE 74    DISTRIBUTION OF PLANTATIONS WITH DIFFERENT YIELDS  
ACCORDING TO NET MARGIN PER ACRE

Yield, cwt.	Net margin per acre, £								Total
	loss	0-49	50-99	100- 149	150- 199	200- 249	250- 299	300- 349	
20-		4	1						5
30-			3	4	1				8
40-	1		2	5	6				14
50-						2	1		3
60-					1		1	1	3
70-79							2	1	3
All	1	4	6	9	8	2	4	2	36

The average net margin for each yield group is given in Table 75. It will be seen that the growing cost per acre in these groups was erratic - there was no relationship between growing costs per acre and yield or net margin per acre. Harvesting costs per acre naturally rose with increasing yield and were higher in the groups where some of the fruit was sold fresh. Total costs per acre therefore tended to rise with increasing yield but were more than compensated for by the increasing returns per acre. Returns per ton did not vary much from group to group except where some fruit was sold in the fresh market.

TABLE 75 AVERAGE COSTS AND RETURNS FOR VARIOUS YIELD GROUPS

Yield per acre, cwt.	20-29	30-39	40-49	50-59	60-69	70-79
No. cases	5	8	14	3	3	3
Age of plantation, years	6.0	5.1	5.7	5.3	6.0	5.2
<u>per acre</u>	£	£	£	£	£	£
Growing cost	58.3	67.6	100.2	62.0	97.7	84.4
Harvesting cost	48.6	71.3	111.5	91.7	119.7	160.6
All costs	106.9	138.9	211.7	153.7	217.4	245.0
Returns for fruit	154.4	245.1	327.8	391.1	470.5	543.7
Net margin excluding canes	47.5	106.2	116.1	237.4	253.1	298.7
Return for canes	4.9	4.8	4.4	-	2.8	2.9
Total Returns	159.3	249.9	332.2	391.0	473.3	546.6
Net Margin	52.4	111.0	120.5	237.4	255.9	301.6
	%	%	%	%	%	%
Proportion sold in fresh market	-	6.5	17.5	2.6	2.1	32.3
" " for canning	39.7	33.1	33.1	35.5	32.7	32.2
<u>per ton</u>	£	£	£	£	£	£
Harvesting cost	39.4	42.9	50.8	33.1	35.4	44.2
All returns	141.3	144.8	152.1	140.9	140.2	150.9
Net Margin	46.5	63.2	55.0	85.6	75.8	83.6

PART II

A. STRAWBERRY ESTABLISHMENT

THE SAMPLE

Strawberry establishment was costed on 15 holdings in 1963 and these data have been augmented by using the physical information from plantations on 8 other holdings which were costed in 1961. Only 1 out of these 23 growers planted in the autumn of the year; all expected to crop their plantations for several years, excluding the first year. Of those costed in 1963, 6 growers expected to crop for 3 and 9 for 4 years; 1 grower in 1961 had expected 3 and 7 had expected 4 crops.

The acreages costed are shown in Table 76.

TABLE 76 DISTRIBUTION OF ESTABLISHMENTS ACCORDING TO SIZE

Acres	under 1	1.0- 1.9	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	Total
No. cases	6	6	3	3	1	2	2	23

PREVIOUS CROPPING AND MANURING

The crops which preceded these strawberry establishments are shown in Table 77.

TABLE 77 CROPS PRECEDING STRAWBERRY ESTABLISHMENT

Crop	Strawberries or raspberries	Roots	Grain	Grass	Market garden crops	Fallow	n.a.	Total
No. cases	6	7	2	1	2	1	4	23

All the root crops and all of one and part of the other market garden crop received fairly heavy manuring which included dung in 5 cases. The fallowed land was also dunged so that, if the grass crop is included, 7 of the plantations received some organic manure in the year preceding establishment. One plantation was on land taken out of grass and one on land dunged two years previously. Altogether 9 of the plantations out of the 19 with known manurial histories had some organic residues.

MATERIALS USED

Manures

During establishment 1 plantation received no manures, 3 received dung only, 7 received fertiliser only and 12 received both dung and fertiliser. The amounts applied are shown in Table 78. They covered

TABLE 78 DISTRIBUTION OF PLANTATIONS ACCORDING TO MANURING DURING ESTABLISHMENT, PER ACRE

A. Quantity of Dung Applied

Tons dung	under 10	10-19	20-29	30-39	40-49	50-59	80-89	n.a.	Total
Dung only	2				1				3
Dung + fertiliser		4	2	2	1	1	1	1	12

B. Quantity of Fertiliser Applied

cwt. fertiliser	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	7.0-7.9	8.0-8.9	9.0-9.9	10.0-10.9	Total
Fertiliser only	1	1			2			1		2	7
Fertiliser + dung		2	2	1	1	1		1	2	2	12

a wide range and the quantity of fertiliser applied did not appear to be inversely related to the amount of dung used, rather the reverse. In the 7 cases where fertiliser only was used, the average amount applied was 5.9 cwt. per acre. Where both dung and fertiliser were used (12 cases) the average amounts were 29.6 tons and 6.0 cwt. respectively. The average amount of dung applied, where only dung was used, was 18.2 tons per acre. In 9 cases the fertiliser used was a compound with a high potash content, in 3 cases it was sulphate of potash, in 1 case slag and in 6 cases some kind of organic manure.

### Runners

Planting distances and, therefore, the number of runners used per acre varied quite widely as is shown in Table 79. The most usual distances were 36 inches between the rows and 18 inches between the plants in the row. Even within the group planting at 36 by 18 inches, for which the theoretical number of runners required is 9680 per acre, the number of plants used varied from 8.0 to 13.1 thousand, the average of 11 cases being 9.9 thousand.

TABLE 79    DISTRIBUTION OF PLANTATIONS ACCORDING TO PLANTING  
DISTANCES, INCHES

Row width	Planting distance within row						Total
	9-10	15	18	24	36	n.a.	
27		1					1
30	1	1	1				3
33-34	1	1					2
36			12*	1	1		14
n.a.						3	3
Total	2	3	13	1	1	3	23

\*1 of these varied from 18-20 inches

### Soil Insecticide

This was used at planting time against leather jackets on only 3 plantations. The material cost between £0.5 and £6.0 per acre.

Weedkiller

Spraying against weeds in young plantations at increasingly early stages was becoming possible during the period of these costings, but only 5 of the growers used this method of weed control. The quantities used were not known in every case. The cost varied from £1.5 to £10.0 per acre sprayed.

WORK DONE

Applying Dung and Fertilisers

The time spent leading and spreading dung was very variable. The average time taken to spread a ton of dung was 1.3 man hours and 0.8 tractor hours.

Working Ground

The time taken to plough, work the ground and mark off for planting varied from 3.4 to 37.5 hours per acre. The range is shown in Table 80. Excluding the one case where over 30 hours per acre were taken for this work, the average numbers of man and tractor hours spent were 9.6 and 8.8 hours respectively.

TABLE 80 DISTRIBUTION OF PLANTATIONS ACCORDING TO TIME SPENT PREPARING GROUND FOR PLANTING, PER ACRE

Tractor hours	2.5-4.9	5.0-7.4	7.5-9.9	10.0-12.4	12.5-14.9	15.0-17.4	17.5-19.9	over 30	Total
No. cases	3	5	6	1	1	1	2	1	20

The time spent applying fertiliser on 7 plantations, where this was done by hand down the row after planting, varied from 0.3 to 2.0 hours per cwt. per acre, the average being 0.9 hours. Where the fertiliser was applied using a tractor and spreader before planting, the time taken varied from 0.1 to 0.8 hours per cwt. per acre, the average being 0.4 hours.

Planting

Planting was done by hand on all the costed plantations, in 1 case by piecework. The total number of hours taken to plant an acre varied

from 40 to 152, the hours for men and women being in the proportion of 7 to 11 over the whole sample. As the number of runners planted per acre varied so much, the planting time per thousand runners was calculated wherever possible and the results are given in Table 81.

TABLE 81     DISTRIBUTION OF PLANTATIONS ACCORDING TO  
TIME TAKEN TO PLANT 1000 RUNNERS

Hours	3	4	5	6	7	8	9	10	16	Total
No. cases	1	1	1	3	4	2	2	1	1	16

The average time taken per thousand runners was 7.8 hours for the times with the greatest incidence in Table 81 (i.e. 6 to 9 hours per thousand). This was also the average time taken to plant where 10 thousand runners were used per acre (9 cases).

Cleaning

Both the time taken and the methods used to keep the plantations clean after planting varied greatly, but as no assessment was made of the cleanness of the land before, during and at the end of the costing period, the need for and effectiveness of the work done cannot be related to the cost. The times taken using different methods of cultivation are given in Table 82 to show the extent of the variation. It will be obvious that the number of cases is too small for any conclusion to be drawn from this table, particularly as the cleanness of the land was not known.



TABLE 82 CARE OF THE CROP AFTER PLANTING,  
INCLUDING FILLING OF BLANKS, PER ACRE

	No. cases	Interrow cults hours		Hand work hours
		man	tractor	
<u>No weedkiller used</u>				
Hand rotovator + hand work	5	14.2	14.2	215.9
Tractor (using rotovator) + hand work	5	7.3	7.3	192.5
Tractor (using steerage hoe + rotovator) + hand work	1	24.1	24.1	55.8
Horse hoe + hand work	1	12.0	6.0	122.0
Tractor only	1	9.6	9.6	-
Hand work only	3	-	-	82.7
Average	16	9.6	9.2	154.2
<u>Weedkiller used</u>				
Tractor (using rotovator) + hand work	3	3.4	3.4	146.4
Hand work only	1	-	-	85.0
Average	4	2.6	2.6	131.1

The time taken to spray with weedkiller varied from 1.1 to 3.7 hours for a man and tractor, the average being 2.1 hours per acre.

Deblossoming was known to have been done on 2 plantations, where it took 10 hours per acre in 1 case and 8.1 hours in the other.

RENT

The average charge for rent in the 1963 sample was £7 per acre.

TOTAL COST

An example of a strawberry establishment cost has been drawn up in Table 83, using the most usual methods in the 23 costs and charging the items at 1963 rates.

TABLE 83 EXAMPLE OF COST OF STRAWBERRY ESTABLISHMENT, PER ACRE

(Spring planting, approx. first 6 months work)

	Hours		
	men	women, boys	tractor
<u>Work Done</u>			
Applying dung, @ 1.3 m.hrs. and 0.8 t.hrs. per ton	38.5		23.7
Ploughing, working ground, marking out	9.6		9.6
Applying fertiliser by machine, @ 0.4 hrs. per cwt.	2.4		2.4
Planting at 36" x 18" (10,000 runners)	30.0	48.0	
Care of crop -			
interrow cults (tractor & rotovator)	9.6		9.2
hand work, including filling blanks	77.6	76.6	
Totals	167.7	124.6	44.9
<u>Costs</u>			
£			
<u>Materials:</u>			
29.6 tons dung @ £0.85			25.2
*6 cwt. fertiliser @ £0.97			5.8
*10 thou. runners @ £5			50.0
<u>Work done:</u>			
*Casual - women @ 3s. 1½d. (124.6 hrs.)			19.4
Regular - men @ 5s. 10½d. (167.7 hrs.)			49.3
*Tractor - @ 4s. 3d. (44.9 hrs.)			9.6
Rent			7.0
Manurial residues b.fwd. and charged			6.9
Total			<u>173.2</u>
Over 3 years fruiting: charge per year			57.7

\*Variable costs, total £78.0

Charge per fruiting year £26.0

The annual charge to set against the fruiting years of the plantation has been calculated on the basis of 3 years fruiting. All growers expected a plantation to crop for at least 3 years - some expected and most hoped for another crop but were not certain of obtaining it.

Table 84 shows the distribution of the actual individual establishment costs for the 15 plantations costed in 1963.

TABLE 84     DISTRIBUTION OF 1963 PLANTATIONS ACCORDING TO  
ESTABLISHMENT COST PER ACRE

£	under 100	100- 119	120- 139	140- 159	160- 179	180- 199	over 250	Total
No. cases	2	2	2	3	3	1	2	15

B. FRUITING STRAWBERRIES

THE SAMPLE

Twenty fruiting plantations were costed in 1963. The size of these plantations, excluding endriggs and roads, is shown in Table 85A. The average size of plantation was 2.74 acres; the average amount of endrigg and road associated with the planted area was 0.20 acres. The average age of the plantations was 2.8 years. The distribution of the plantations according to their average age is shown in Table 85B and the proportions of different ages and varieties in Table 86A and B.

TABLE 85 DISTRIBUTION OF PLANTATIONS ACCORDING TO:-

A. Area of Fruit

Acres	under 1	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	7.0-7.9	8.0-8.9	Total
No. cases	6	5	2	1	2	1	1	-	2	20

B. Average Age

Years	2.0-2.4	2.5-2.9	3.0-3.4	3.5-3.9	4.0-4.4	Total
No. cases	5	6	6	2	1	20

TABLE 86 AVERAGE PROPORTION IN PLANTATIONS OF:-

A. Different Ages

Years	2	3	4	5	over 5	Total
Per cent	38.6	42.0	17.6	1.4	0.4	100.0

B. Different Varieties

Variety	Talisman	C.Favourite	Red Gauntlet	C.Vigour	Merton Princess	Huxley Giant	Regina	Total
Per cent	34.1	31.1	29.4	2.7	1.8	0.7	0.2	100.0

The planting distances used for these plantations are given in Table 87. Half the plantations were planted at 36" by 18".

TABLE 87    DISTRIBUTION OF PLANTATIONS ACCORDING TO  
PLANTING DISTANCES

Row width, inches	Distance between plants in row, inches					Total
	9/10	15/16	18/20	28	n.a.	
30	1	2	1			4
32/33	1	1				2
34		1				1
36		1	10	1		12
n.a.					1	1
Total	2	5	11	1	1	20

COSTS AND RETURNS

Table 88 gives the average costs and returns for the whole sample.

TABLE 88     AVERAGE COSTS AND RETURNS FOR 20 FRUITING  
STRAWBERRY PLANTATIONS, PER ACRE

<u>Growing Costs</u>		£	%
*Materials:	fertiliser, 4.5 cwt.	5.6	2.4
*	shoddy, 0.3 ton	1.9	0.8
*	weedkiller	1.6	0.7
*	other sprays	0.7	0.3
*	straw, 1.3 ton	11.4	4.9
Work: *	casual labour	10.7	4.6
	regular labour	27.8	11.9
*	tractor and rotovator	2.9	1.2
	horse	0.6	0.3
	Rent	7.2	3.1
	*Share of establishment costs (inc. variable costs of £22.5)	<u>44.6</u>	<u>19.1</u>
	<b>Total Growing Cost</b>	<u>115.0</u>	<u>49.3</u>
 <u>Picking Costs</u>			
*Materials:	punnets, trays	23.6	10.1
Work: *	casual labour (incl. pickers' transport etc.)	68.4	29.3
	regular labour	13.7	5.9
*	tractor	0.3	0.1
*Haulage of fruit		11.5	4.9
	Depreciation of barrels and pails	0.2	0.1
	Cold storage	<u>0.7</u>	<u>0.3</u>
	<b>Total Picking Cost</b>	<u>118.4</u>	<u>50.7</u>
	<b>Growing + Picking Cost</b>	<u>233.4</u>	<u>100</u>
 <u>Returns</u>			
		% by wt.	cwt.
Fruit -	fresh	51	21.39
	canning	43	17.92
	jam	5	2.27
	house etc.	<u>1</u>	<u>0.52</u>
	<b>Total</b>	<u>100</u>	<u>42.10</u>
	<b>Net Margin</b>		<u>341.3</u>
			<u>146.2</u>
			<u>107.9</u>
			<u>46.2</u>

\*Variable costs, total     £158.9  
Gross margin (returns less variable costs)     £182.4

The average amounts of work done are given in Table 89.

TABLE 89 AVERAGE SEASONAL WORK REQUIREMENTS, PER ACRE

Work Done	Hours				
	man	woman and boy	tractor	hand rotovator	horse
Care of crop -					
autumn	31.6	14.2	1.1	3.2	5.7
spring	85.1	52.6	4.1	5.3	-
Total	116.7	66.8	5.2	8.5	5.7
Picking	48.1	*	1.4	-	0.2

\*plus some piecework.

MATERIALS USED

Manures

No dung was applied in this sample, although 1 grower used some shoddy. The weights of fertiliser used, excluding the shoddy, are given in Table 90. The quantity used varied from nothing up to 12.9 cwt.

TABLE 90 DISTRIBUTION OF PLANTATIONS ACCORDING TO AMOUNT OF FERTILISER APPLIED PER ACRE

cwt.	nil	0.0-0.9	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	7.0-7.9	8.0-8.9	over 9	Total
No. cases	2	-	2	2	2	2	5	1	1	2	1	20

per acre. The average amount applied, on the 18 plantations where it was used, was 5.0 cwt. excluding the shoddy. The cost per cwt. varied from £0.78 to £1.86, the average being £1.22.

Weedkiller

This was used by 10 growers, i.e. half of the growers in the sample. In 9 cases this was a soil-acting spray and in 1 case a contact spray was used for spot clearance. The quantity of soil-acting weedkiller used varied. One grower used approximately 1 lb. per acre, 2 used approximately 1.5 lb., 2 approximately 2 lb., and 2 approximately 2.5 lb. The average amount used by the 7 cases was 1.8 lb. and the average cost was £3.0 per acre.

Other Sprays

Four growers used these - in 3 cases against aphids, 1 against mildew, 1 against botrytis and 1 against mildew and botrytis.

Straw

Thirteen of the 20 plantations were strawed and in another case a mulch was made to serve this purpose. There was a wide variation in the amount of straw used (see Table 91). Excluding 1 diseased plantation, the average amount of straw used was 2.15 tons per acre and the average cost of the straw was £18.4 per acre.

TABLE 91 DISTRIBUTION OF PLANTATIONS ACCORDING TO QUANTITY OF STRAW USED PER ACRE

Tons	0.5- 0.9	1.0- 1.4	1.5- 1.9	2.0- 2.4	2.5- 2.9	3.0- 3.4	3.5- 3.9	4.0- 4.4	4.5- 4.9	5.0- 5.4	Total
No. cases	2	3	-	1	2	1	1	-	1	1	12

WORK DONE

Manuring

Fertilisers were applied by machine in 3 cases, taking an average of 2.0 man hours and 1.2 tractor hours per acre. The other growers did the work by hand, taking from 1.5 to 16.5 hours per acre. The



time taken by hand was apparently unrelated to the weight of fertiliser put on per acre. Table 92 shows the time taken per acre; the average time, excluding 1 very high case, was 5.3 hours.

TABLE 92 DISTRIBUTION OF PLANTATIONS ACCORDING TO TIME TAKEN TO SPREAD FERTILISER BY HAND, PER ACRE

Hours	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	7.0-7.9	8.0-8.9	9.0-9.9	16.0-16.9	n.a.	Total
No. cases	2	-	2	2	1	4	-	1	1	1	1	15

Spraying

The contact weedkiller was applied by hand with a knapsack sprayer. The soil-acting weedkiller was applied by a tractor (a one man job) and in 2 cases this was done by contract. The time taken in the other 7 cases varied from 0.7 to 2.7 hours per acre, the average being 1.7 hours per acre.

Strawing

The time taken to straw the plantations varied widely and the sample was too small for any conclusion to be drawn about the average time taken to straw using different quantities of straw per acre. The overall average time taken was 58 hours per acre. The range in times is given in Table 93.

TABLE 93 DISTRIBUTION OF PLANTATIONS ACCORDING TO TIME TAKEN TO STRAW, PER ACRE

Hours	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	Total
No. cases	1	-	1	1	5	1	-	2	1	12

Defoliation

Defoliation was not practised by all the growers and could not always be distinguished from other operations. Where it was distinguishable the operation was performed by hand in 1 case and by tractor in 5 cases. In 3 of these cases a forage harvester was used, in 1 case a mower and in 1 case a rotovator. This work took 25.6 hours per acre when done by hand, 1.8 hours with with the mower and rotovator and an average of 0.8 hours with the forage harvesters. Because of the difficulty of distinguishing this work, this job has been included in the general cleaning costs.

Cleaning

The average time spent in cleaning has been calculated for the 2 groups of plantations, i.e. where weedkiller was and was not used (see table 94).

TABLE 94 AVERAGE TIME SPENT IN CLEANING OPERATIONS,  
HOURS PER ACRE

	Weedkiller used				Weedkiller not used				
	interrow work			hand work	interrow work				hand work
	man	tractor	hand rotovator		man	tractor	hand rotovator	horse	
Autumn	2.1	0.6	1.6	33.0	17.9	1.6	4.9	11.4	37.3
Spring	5.2	1.5	3.7	60.8	9.8	3.3	6.5	-	114.3
Total	7.3	2.1	5.3	93.8	27.7	4.9	11.4	11.4	151.6

No subdivision according to the method of cleaning was possible, as the sample was small and tractor, hand rotovator, horse and hand work were used alone and in many combinations. No assessment was made of the need for or effectiveness of the method of weed control adopted so that it is not possible to draw any conclusion from the fact that the average cost of cleaning where weedkiller was used was considerably lower than in the plantations where it was not used -

£23.5 compared with £46.9 per acre - particularly as in both groups the average covered a wide range of costs. The range in the cost of the cleaning work and of the total cleaning costs (i.e. work + weed-killer where used) is given in Table 95, together with the average costs for the 2 groups of plantations.

TABLE 95 CLEANING COSTS PER ACRE

A. Average Cost of Cleaning

	Weedkiller	
	used	not used
No. cases	10	10
Acreage of fruit, acs.	3.35	2.14
Average age of plantations, yrs.	2.7	2.9
	£	£
Cost of interrow cultivations	3.4	11.9
" " hand work	<u>16.1</u>	<u>35.0</u>
" " all work	19.5	46.9
" " weedkiller + application	<u>4.0</u>	<u>-</u>
Total Cleaning Cost	23.5	46.9

B. Distribution of Plantations According to Cost of Cleaning Work

£	under 10	10-19	20-29	30-39	40-49	50-59	120-129	Total
No. cases:								
Weedkiller used	5	-	1	3	1	-	-	10
Weedkiller not used	1	2	3	1	-	1	2	10

C. Distribution of Plantations According to Total Cleaning Costs

£	under 10	10-19	20-29	30-39	40-49	50-59	120-129	Total
No. cases:								
Weedkiller used	3	2	-	3	2	-	-	10
Weedkiller not used	1	2	3	1	-	1	2	10

If the 2 excessively high costs are excluded from the non-users group, the average cost for this group falls to £27.6, which is only £4.1 more than the average for those using weedkillers (£23.5). It will be seen from Table 95C that the weedkiller users fell into 2 groups, 1 of which kept the total cleaning cost down to £8.1 per acre on average; the other spent £39.1 per acre on average. Not much of the cleaning cost was incurred after the weedkiller had been applied, except in 1 case in the high cost group where it was £16.1 per acre. In 2 other cases in this group postspraying cleaning operations cost £2.4 and £4.2; in 1 case in the low cost group £1.3 per acre was spent on post spraying cleaning. The pre-spraying cleaning costs averaged £4.0 per acre in the low cost group and £30.5 in the high cost group. This may mean that the low cost group were operating on cleaner land than the high cost group, possibly because they had used weedkiller in previous seasons and reduced the weed bank to a certain extent, that they were timely in their operations or, of course, that they just let the weeds grow. If, however, it is assumed that all the growers were aiming at a similar level of cleanness in their crops, it would appear that the use of weedkiller can considerably reduce the cost of cleaning.

RENT

Rents ranged from £1.7 to £16.7 per acre in the sample, the average being £7.2.

SHARE OF ESTABLISHMENT

The charge against each fruiting plantations for its share of establishment costs was individually calculated wherever possible and ranged from £25.5 per acre per year to £89.5 (see Table 96). A charge of £46.3 was made on the holdings for which no data on establishment were available. The average for the 20 cases was £44.6 per acre.

TABLE 96    DISTRIBUTION OF PLANTATIONS ACCORDING TO ANNUAL  
SHARE OF ESTABLISHMENT CHARGE PER ACRE

£	20-29	30-39	40-49	50-59	60-69	70-79	80-89	av. chg.	Total
No. cases	1	5	5	1	1	-	1	6	20

TOTAL GROWING COSTS

These ranged from £67.7 to £281.9 per acre; their distribution is shown in Table 97. This includes rent, share of establishment, sprays, fertilisers, straw and the cost of cultivations. Share of establishment and cost of cultivation are the largest items.

TABLE 97    DISTRIBUTION OF PLANTATIONS ACCORDING TO TOTAL  
GROWING COSTS PER ACRE

£	60- 79	80- 99	100- 109	120- 139	140- 159	160- 179	180- 199	200- 219	220- 239	240- 259	260- 279	280- 299	Total
No. cases	5	7	2	3	-	-	1	-	1	-	-	1	20

YIELD

The yield of fruit varied from 10.85 to 108.26 cwt., excluding 1 diseased plantation from which only 2.83 cwt. per acre was picked. Table 98 shows the distribution of the yields.

TABLE 98    DISTRIBUTION OF PLANTATIONS ACCORDING TO YIELD  
OF FRUIT PER ACRE

cwt.	under 10	10- 19	20- 29	30- 39	40- 49	50- 59	60- 69	70- 79	80- 89	90- 99	100- 109	Total
No. cases	1	4	5	1	3	1	1	1	1	-	2	20

The 1963 season was one in which the early crops in particular were badly affected by mould; not only were yields reduced but picking costs were increased on some plantations where attempts were made to remove the mouldy berries. This made nonsense of any attempt to relate the yield obtained to variety, age, manuring or cultural practices.

RETURNS

The returns per acre were, of course, dependent upon the yield and upon the price realised for the fruit. This was either sold in the fresh market or for manufacturing. The average price received for fruit sold in the fresh market was £210.2 per ton, varying from £145.4 to £281.0 (see Table 99A). The average price received for fruit sold to canners was £124.9 per ton, ranging from £105.6 to £138.7 (see Table 99B).

TABLE 99    DISTRIBUTION OF PLANTATIONS ACCORDING TO PRICE  
RECEIVED FOR FRUIT PER TON

A. Sold in Fresh Market

£	140- 159	160- 179	180- 199	200- 219	220- 239	240- 259	260- 279	280- 299	Total
No. cases	1	3	5	2	1	1	2	1	16

B. Sold to Cannerns

£	100-109	110-119	120-129	130-139	Total
No. cases	2	-	3	5	10

Only 3 of the growers in this sample sold any fruit for jam making - 2 sold their pulp at £130 and £140 per ton respectively. The third grower had not sold his pulp when these costs were made up and it was entered at £50 per ton as the grower was uncertain of making a sale.

The proportion of the crop sold in different markets by the individual growers is shown in Table 100. The average for the whole sample was 51 per cent sold in the fresh market, 43 per cent to the cannerns, 5 per cent for jam manufacture and 1 per cent used by the growers.

TABLE 100 DISTRIBUTION OF PLANTATIONS ACCORDING TO PROPORTION OF THE CROP SOLD IN VARIOUS WAYS

A. Sales in Fresh Market

Per cent	nil	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100	Total
No. cases	4	1	3	-	-	1	-	1	-	1	2	7	20

B. Sales to Cannerns

Per cent	nil	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100	Total
No. cases	10	-	-	-	3	-	1	-	-	1	1	4	20

C. Sales to Jam Manufacturers

Per cent	nil	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100	Total
No. cases	17	1	-	-	1	1	-	-	-	-	-	-	20

The distribution of the average return per ton for the individual plantations is shown in Table 101. The average for the whole sample was £165.5 per ton, ranging from £109.4 to £267.6.

TABLE 101    DISTRIBUTION OF PLANTATIONS ACCORDING TO  
THEIR AVERAGE RETURN PER TON

£	100-119	120-139	140-159	160-179	180-199	200-219	220-239	240-259	260-279	Total
No. cases	1	7	1	3	6	1	-	-	1	20

The distribution of returns per acre is given in Table 102 according to the type of sales made, which roughly determines the returns per ton. It will be seen that the range in returns per acre in this sample was widest for those selling in the fresh market or who sold in more than



TABLE 102    DISTRIBUTION OF PLANTATIONS ACCORDING TO  
RETURNS PER ACRE

(average yield for each group in brackets - cwt.)

£	under 100	100- 199	200- 299	300- 399	400- 499	500- 599	600- 699	700- 799	800- 899	Total
Over 96% sold in fresh market		4 (14)	1 (29)	1 (41)			1 (51)	1 (86)	1 (101)	9
Over 89% sold to canners		3 (24)	1 (35)	2 (59)						6
Others	1 (3)	1 (21)			1 (48)		2 (91)			5

one way, and that increasing yield seems to go with increasing returns per acre in all groups. Table 103 shows the marked effect of yield

TABLE 103    DISTRIBUTION OF PLANTATIONS ACCORDING TO YIELD AND  
RETURNS PER ACRE

£	under 100	100- 199	200- 299	300- 399	400- 499	500- 599	600- 699	700- 799	800- 899	Total
<u>Yield, cwt.</u>										
under 20	1	4**								5
20-39		4	2*							6
40-59				2*	1		1*			4
60-79				1			1			2
80-99								1*		1
100-120							1		1*	2

\*Represents 1 case where over 96 per cent of  
fruit was sold in fresh market.

on returns per acre, although improved returns per ton due to sales in the fresh market brought increased returns per acre in most cases.

### PICKING COSTS

Picking was known to have begun during the week beginning 7 July on 7 of the plantations and during the week beginning 14 July on a further 6 plantations. It was known to have been finished during the week beginning 4 August on 6 plantations, 11 August on 3 plantations, 18 August on 2 plantations and 1 September on 2 plantations. The number of days on which some picking was known to have been done in the costed plantations is shown in Table 104.

TABLE 104    DISTRIBUTION OF PLANTATIONS ACCORDING TO  
NUMBER OF DAYS ON WHICH SOME PICKING WAS DONE

No. days	5-9	10-14	15-19	20-24	25-30	Total
No. cases	1	3	2	5	2	13

The cost of picking the fruit varied according to the type of sale being made. When paying piecework rates, it was usual to pay more per lb. to the pickers for fruit which was picked into "baskets" to be sold to the canners or in the fresh market than for fruit destined for jam manufacture, which was picked into pails. Some growers, however, preferred to pay by the hour for basketing. In this year picking costs were increased by the incidence of mould and, in 1 case, weeds as extra jobs were incorporated into the picking. A varied proportion of the work by casual labour was paid for on an hourly basis on 7 of the costed plantations. Picking into "baskets" also involved more weighing work and usually more supervision of the pickers, which increased the cost of picking per ton.

The canners normally provide containers and transport from the holding to the factory for their fruit. The grower provides containers (usually punnets and trays) and pays for haulage to the fresh market; he usually provides pails and barrels for fruit for jam manufacture.

The costs of punnets and trays and of haulage, per ton of fruit sold fresh, are shown in Table 105. Two growers who used tins for

TABLE 105    AVERAGE COST OF CONTAINERS AND HAULAGE  
PER TON OF FRUIT SOLD FRESH

	<u>Local sales</u>	<u>Away markets</u>
No. cases	7	5
	£	£
Haulage	5.5	22.7
Punnets, trays	<u>12.8*</u>	<u>35.7</u>
Total	<u>18.3</u>	<u>58.4</u>

\*punnets only in 5 out of the 7 cases

special orders have been omitted from this analysis and also 2 who had quoted their fruit returns net of haulage.

The variation in the cost of all the labour for picking is shown in Table 106. The cost of casual labour varied from nothing up to £170.5 per ton and for regular labour from nothing up to £28.3 per ton.

TABLE 106    DISTRIBUTION OF PLANTATIONS ACCORDING TO COST  
OF ALL PICKING LABOUR PER TON OF FRUIT

£	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	190-199	Total
No. cases	1	4	5	5	1	-	2+	1*	1+	20

+known to include collection of mouldy berries

\*known to include weeding whilst picking

The proportion of regular labour in the total labour cost for picking varied widely, as is shown in Table 107.

TABLE 107 DISTRIBUTION OF PLANTATIONS ACCORDING TO PERCENTAGE OF TOTAL HARVESTING LABOUR COST ATTRIBUTABLE TO REGULAR LABOUR

Per cent	nil	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100	n.a.	Total
No. cases	2	3	8	2	1	1	-	-	-	1	-	1	1	20

Tractor work was recorded on 4 of the plantations during picking time and horsework on 1.

Cold stores were used to a varying extent by 5 of the growers and another used an electric fan.

The average picking costs for the 9 plantations which sold more than 96 per cent of their output in the fresh market and for the 6 plantations which sold more than 89 per cent of their output for canning are shown in Table 108.

TABLE 108    AVERAGE HARVESTING COSTS FOR PLANTATIONS FROM  
WHICH MOST OF THE OUTPUT WAS SOLD IN A PARTICULAR WAY

	Main type of sale	
	canning	fresh
Percentage sold in this way	97	99
No. cases	6	9
Yield per acre, cwt.	37.4	40.3
	£ per ton	
Punnets, trays	1.3	26.7
Casual workers	34.5	42.3
Regular workers	8.0	7.9
Tractor work	0.3	0.2
Haulage on fruit	2.8	15.1
Barrels, pails, depreciation	0.1	-
Cold store, running and depreciation	0.4	1.3
Total harvesting costs	47.4	93.5
Return	128.5	190.3
Margin over harvesting costs	81.1	96.8

MARGINS

The range in margin over picking costs, i.e. returns less picking costs, is shown in Table 109. Only some of the growers selling their

TABLE 109    DISTRIBUTION OF PLANTATIONS ACCORDING TO  
MARGIN OVER PICKING COST PER ACRE

£	(-)99- 0	0- 99	100- 199	200- 299	300- 399	400- 499	700- 799	Total
No. cases	1	6	3	4	1	4	1	20



In Table 112 the average net margin per acre for the various yield groups is shown. In the lowest yield group the growing cost was just below the average growing cost for the whole sample (£115 per acre) but the harvesting cost per ton was very high even for fresh fruit sales, partly because a considerable amount of extra work on weeding and mouldy berry removal was included in 2 cases.

TABLE 112 COSTS AND RETURNS FOR PLANTATIONS IN  
VARIOUS YIELD GROUPS, PER ACRE

Yield per acre, tons	under 1	1.0-1.9	2.0-2.9	over 3.0
No. cases	5	6	4	5
	£	£	£	£
Growing costs	108.2	103.7	94.0	153.7
Harvesting costs	70.9	69.8	148.3	199.3
Total costs	179.1	173.5	242.3	353.0
Returns for fruit	101.9	190.2	454.9	671.4
Net margin	- 77.2	16.7	212.6	318.4
Yield, cwt.	10.5	26.3	47.0	87.7
Returns per ton, £	182.6	144.3	192.3	152.7
Percentage sold in fresh market	96.5	22.6	60.2	55.7
Percentage sold for canning	-	69.1	34.4	37.8

Returns per ton were nearly £30 below the average for fresh fruit and there was a very low yield per acre. This group made a considerable loss per acre. The second lowest yield group had similar growing and harvesting costs per acre to the lowest yield group (harvesting costs were lower per ton partly because two-thirds of the fruit was

sold for canning) and even lower returns per ton of fruit. But because of the improved - although still not good - yield, this group achieved a profit. The second highest yield group had a growing cost £20 below the sample average, picking costs per ton below average for the type of fruit picked, the highest average returns per ton and quite a good yield. The result was a good margin per acre. The highest yield group had growing costs about £40 above average, harvesting costs £22 per ton below the average for the type of fruit picked, returns below the average for the type of sales made, but with a very good yield was left with a good profit per acre.



PART III

VARIABLE COSTS AND GROSS MARGINS FOR  
RASPBERRIES AND STRAWBERRIES

These fruit crops are found as enterprises on arable farms in the College area and the results are given here in a manner which will facilitate comparison with other farm crops using the gross margin method of analysis.

RASPBERRIES

The variable costs in the example establishment and disestablishment costs were given in Tables 17, 22, 26, 29 and 30, and summarised in Table 31. For certified Jewel or Promise planted double the charge against the fruiting plantation was £11.8 per acre per year for 6 years full fruiting; for the same type of canes planted singly £5.7 per acre per year, and for uncertified Promise planted singly £1.4 per acre per year. The range in the charge used in the 1963 fruiting plantation costs is given in Table 113; the average charge was £8.0 per acre per year.

TABLE 113 DISTRIBUTION OF FRUITING PLANTATIONS ACCORDING TO  
ANNUAL SHARE OF VARIABLE ESTABLISHMENT COSTS PER ACRE

£	-		+				Total
	9-5	4-0	0-4	5-9	10-14	15-19	
No. cases	2	3	1	7	5	5	23

The share of variable costs in the total average fruiting cost amounted to £113.4 per acre (see Table 37) and the total returns were £325.8 per acre, which gave an average gross margin of £212.4 per acre. The ranges in these variable costs and gross margins are given in Tables 114 and 115.

TABLE 114    DISTRIBUTION OF FRUITING PLANTATIONS ACCORDING  
TO VARIABLE COSTS PER ACRE

£	50- 74	75- 99	100- 124	125- 149	150- 174	175- 199	200- 224	225- 249	250- 274	275- 299	Total
No. cases	5	14	9	4	1	-	-	1	-	2	36

TABLE 115    DISTRIBUTION OF FRUITING PLANTATIONS ACCORDING  
TO GROSS MARGIN PER ACRE

£	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	Total
No. cases	3	-	3	2	4	6	6	2	1	1	4	1	-	2	1	36

If the costs are grouped according to the gross margin per acre (see Table 116), it can be seen that the yield of fruit is the most important factor in determining the level of the gross margin.

**TABLE 116 FRUITING PLANTATIONS GROUPED IN QUARTILES  
ACCORDING TO GROSS MARGIN PER ACRE**

	lowest			highest
Range in gross margin, £	72 to 158	171 to 208	214 to 264	271 to 424
No. cases	9	9	9	9
Area of fruit costed, acres	20.89	8.14	5.90	5.00
Average age of plantation, years	5.5	5.4	6.0	4.6
Yield of fruit, cwt.	27.6	40.4	45.2	63.8
Percentage sold:				
in fresh market	2.2	7.0	15.8	20.4
for canning	40.4	23.5	36.8	35.7
Returns per ton, £	140.7	137.7	151.1	158.3
Regular as proportion of total labour cost:				
(a) growing, per cent	49.7	58.5	72.4	77.8
(b) harvesting, per cent	15.4	16.2	24.7	18.3
	£ per acre	£ per acre	£ per acre	£ per acre
Variable costs -				
growing (inc. share var. estab. costs)	35.4	31.2	27.8	29.6
harvesting	48.8	64.5	92.7	122.8
total	84.2	95.7	120.5	152.4
Returns, fruit + canes	193.8	275.0	342.0	493.0
<u>Gross Margin</u> (returns less variable costs)	109.6	179.3	221.5	340.6
Fixed costs allotted in enterprise costing	40.0	62.7	84.9	83.6
Net margin (gross margin less fixed costs)	69.6	116.6	136.6	257.0

STRAWBERRIES

The variable costs in the example establishment cost (Table 83) amounted to £78.0 per acre, which gave a charge of £26.0 per acre per year over 3 fruiting years. The range in the variable costs for the individual 1963 establishment costs is given in Table 117; for these 1963 cases the average per acre per year was £22.5.

TABLE 117 DISTRIBUTION OF PLANTATIONS ACCORDING TO VARIABLE COSTS IN 1963 ESTABLISHMENT COSTS, PER ACRE

£	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	Total
No. cases	3	2	2	1	2	2	-	1	-	2	15

The variable costs in the average fruiting cost (Table 88) amounted to £158.9 per acre, which set against the returns of £341.3, gave a gross margin of £182.4 per acre. The range of these variable costs is given in Table 118 and the range of the gross margins is given in Table 119.

TABLE 118 DISTRIBUTION OF PLANTATIONS ACCORDING TO VARIABLE COSTS IN COSTS OF FRUITING PLANTATIONS, PER ACRE  
(including Share of Variable Establishment Costs)

£	30-49	50-69	70-89	90-109	110-129	130-149	150-169	170-189	190-209	210-229	230-249	250-269	270-289	290-309	Total
No. cases	1	1	3	2	2	2	2	1	-	1	1	1	1	2	20

TABLE 119 DISTRIBUTION OF PLANTATIONS ACCORDING TO  
GROSS MARGINS IN COSTS OF FRUITING PLANTATIONS,  
PER ACRE

£	-		+										Total
	99- 50	49- 0	0- 49	50- 99	100- 149	150- 199	200- 249	250- 299	300- 349	350- 399	400- 449	600- 649	
No. cases	1	2	5	2	-	1	2	2	-	1	3	1	20

If the costs are grouped according to their gross margins (as in Table 120), it can be seen that the yield of fruit is the most important factor in determining the level of the gross margin.

TABLE 120 - FRUITING PLANTATIONS GROUPED IN QUANTILES  
ACCORDING TO GROSS MARGIN PER ACRE

	lowest			highest
Range in gross margin, £	-73 to +43	+66 to 131	+201 to 289	+393 to 641
No. cases	5	5	5	5
Area of fruit costed, acres	3.87	2.30	2.81	1.98
Average age of plantation, years	3.1	2.5	2.8	2.9
Yield fruit, cwt.	14.5	22.8	46.9	84.1
Percentage sold:				
in fresh market	61	42	49	75
for canning	25	58	48	18
Returns per ton, £	170.8	155.4	161.7	184.4
Regular as proportion of total labour cost:				
(a) growing, per cent	70	68	74	60
(b) harvesting, per cent	44	28	26	12
	£ per acre	£ per acre	£ per acre	£ per acre
Variable costs -				
growing (incl. share var. estab. costs)	51.2	48.6	42.0	72.2
harvesting	77.3	45.6	86.3	204.1
Total	128.5	94.2	128.3	276.3
Returns	114.3	158.6	360.1	732.6
<u>Gross Margin</u> (returns less variable costs)	- 14.2	64.4	231.8	456.3
Fixed costs allotted in enterprise costing	76.9	52.4	78.0	99.7
Net margin (gross margin less fixed costs)	- 91.1	12.0	153.8	356.6

SUMMARY

1. Data on raspberry establishment were collected from a total of 32 growers over the years 1961, '62 and '63. Example costs were drawn up based on the most usual methods of working, using 1963 prices for the inputs.
2. At the most usual planting distance (6' x 2'), the costs other than canes in the first year example cost were £61.8 per acre where the canes were planted double; £59.8 where planted singly. Cane costs varied from £72.0 per acre for certified standard Jewel or Promise planted double to £12.6 for uncertified Promise planted singly. The average cost per acre for the 1963 first year cases was £117.0.
3. For 8 second year plantations which were not cropped, the example cost was £56.9 per acre. It seemed that about 1 in 4 plantations would have such an unproductive year.
4. Data on posting and wiring from 29 growers gave an example cost of £28.1 per acre.
5. Sixteen cropped second year plantations gave an example growing cost of £29.4 per acre. With an average yield of 11 cwt. of fruit, the margin of fruit returns over picking costs in the example was £57.1 per acre.
6. Example disestablishment costs were £7.9 per acre using a rotovator (8 cases) and £15.7 per acre when the canes were collected and burnt (5 cases).
7. The total charge for establishment and disestablishment set against the expected fruiting life of the plantation varied from £156.3 per acre (i.e. £26.1 per acre per year for 6 fruiting years) for certified Jewel/Promise planted double to £94.9 (i.e. £15.8 per acre per year) for uncertified Promise planted singly.
8. Thirty-six fruiting raspberry plantations were costed in 1963; on average they consisted of 10.62 acres of fruit with 0.58 acres of associated endrigg etc. and were 5.6 years old. The average growing cost was £82.6 per acre, harvesting costs were £98.4 per acre, returns £322.0 for fruit and £3.8 for canes per acre, and the net margin was

£144.8 per acre. The average yield was 44.3 cwt. per acre; the average return per ton was £217.3 for fruit sold in the fresh market, £147.0 for canning and £130.9 for jam manufacture. Yield was the main factor affecting returns and net margin per acre.

9. Information on strawberry establishment was collected from a total of 23 growers over the 3 years 1961, '62 and '63. An example cost was drawn up (planting at 36" x 18") which amounted to £173.2 per acre. Over an expected fruiting life of 3 years, the annual charge was thus £57.7 per acre.
10. Twenty fruiting strawberry plantations were costed in 1963; on average they had 2.74 acres of fruit, with 0.20 acres of endrigg etc. and were 2.8 years old. The average growing cost was £115.0 per acre, harvesting costs were £118.4 per acre, returns for fruit £341.3 per acre and the net margin was £107.9 per acre. The average yield was 42.1 cwt. per acre; the average return per ton was £210.2 for fruit sold in the fresh market and £124.9 for fruit sold to canners. Yield was the main factor affecting returns and net margin per acre.
11. The average variable costs for fruiting raspberries were £113.4 per acre and the average gross margin £212.4 per acre. For strawberries these figures were £158.9 and £182.4 per acre respectively. Again, yield of fruit per acre was the main factor determining the level of returns and the gross margins.
12. Throughout these costings the economics of using weedkillers was difficult to assess on the basis of 1 year's data, as information was not available on the cleanness of the plantations at the beginning and end of the season.



APPENDIX

COSTING METHOD

Labour

Casual work was charged at cost.

Regular workers were charged at hourly rates calculated from the wages paid, plus perquisites, employer's contribution to insurance etc., adjusted for paid holidays, sick leave etc. Overtime was charged at the rates paid.

Family labour was charged at the same rates as hired labour.

Power

Wheeled tractors were charged at 4s. 3d. per hour.

Power rotovators etc. were also charged at 4s. 3d. per hour.

Horses were charged at 2s. per hour.

Manures

Dung was charged at 17s. per ton (unless it was purchased, when it was charged at cost) plus the cost of application.

Lime was charged at net cost plus the cost of application.

All other manures were charged at net cost on the holding.  
(Application of these is included in cultivation.)

Manurial residues

For fruit establishment, residual values were calculated according to the recommendations of the Scottish Standing Committee, as set out in the fourteenth report "Residual values of fertilisers and feeding-stuffs" and charged in full. No residues were allowed after the first year.

Proportion of cost chargeable to:-

	<u>1st crop</u>	<u>2nd crop</u>	<u>3rd crop</u>	<u>4th crop</u>
1. Dung	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$
2. Compound Manures	$\frac{2}{3}$	$\frac{1}{6}$	$\frac{1}{6}$	-
3. Inorganic Nitrogenous Manures	1	-	-	-
4. Phosphates	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$
5. Potash	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	-
6. Lime	$\frac{1}{7}$ of net cost for 7 years			
7. Grassland	Where fruit was planted after ploughed grassland, a value was put on this grass according to the following scale and the charge spread over 4 years as for dung.			

Ploughed after	1 year	38/-	per acre
"	" 2 years	52/-	" "
"	" 3 years	60/-	" "
"	" 4 years	71/-	" "
"	" 5 years	80/-	" "
"	" 6 years	88/-	" "
"	" 6 years+	88/-	" "

Rent

This was charged at cost where the land was tenanted and at a reasonable estimate of actual rental value where owner-occupied.

Special equipment

Cold stores were depreciated at 10 per cent and small equipment (pails, barrels, scales) at rates agreed with the individual growers, varying from 5 to 33 per cent.

General overheads

No charge was made.

