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UNIVERSITY OF BRISTOL

DEPARTMENT OF AGRICULTURE AND HORTICULTURE

AN ECONOMIC SURVEY OF THE SOMERSET WILLOW GROWING INDUSTRY

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AN ECONOMIC SURVEY

OF THE

SOMERSET WILLOW GROWING INDUSTRY.

FOREWORD.

This survey was carried out in the month of July 1932. Because of the compact nature of the Somerset willow growing area it was found possible to visit nearly all the growers. Thus the sample was exceptionally good for obtaining reliable and representative information upon the methods of cultivation and upon the costs of production of willows. In all, ninety growers were visited and records obtained, although naturally information on every point was not given by every grower so visited. For this reason the averages calculated are based upon varying numbers of growers, all those in fact who gave information upon the particular point. No figure has been arbitrarily omitted from any of the calculations.

Throughout the Report attention has been confined to the production of white and buff rods. Certain willows have been excluded from the Report. Cricket bat willows are hardly grown at all, only one small plantation being known in the area surveyed although a few cricket bat willows are grown at Street, ten miles outside the area. Tree willows (pollards), used mainly for banking purposes, are usually cut every three years thus giving a supply of stout "sticks". Details relating to the production of rods left to grow two years have been excluded, since the information is scanty and the practice very limited. Moreover to include pollards and two-year growths would have little effect beyond complicating an already detailed report.

The authors wish to express their thanks to all those who have helped in the execution of the survey. Foremost are the willow growers themselves who individually and through their Associations (the Willow Growers' Association and the Willow Industry Association) willingly gave the necessary information.

Valuable assistance was furnished, particularly in the matter of introductions, by the Somerset Rural Community Council and the Somerset Farm Institute.

Thanks are also due to our colleagues, Mr. Ogilvie and Dr. Kearns for their Appendices on Diseases and Insect Pests of Basket Willows respectively, and Mr. Hutchinson, who has contributed as an appendix, a General Review, and has rendered valuable assistance in planning the survey and in furnishing additional technical information where required for the sake of clearness.

In addition to the authors, the field work was carried out by Messrs. G. T. Roy, H. T. Horsman and J. D. Nutt.

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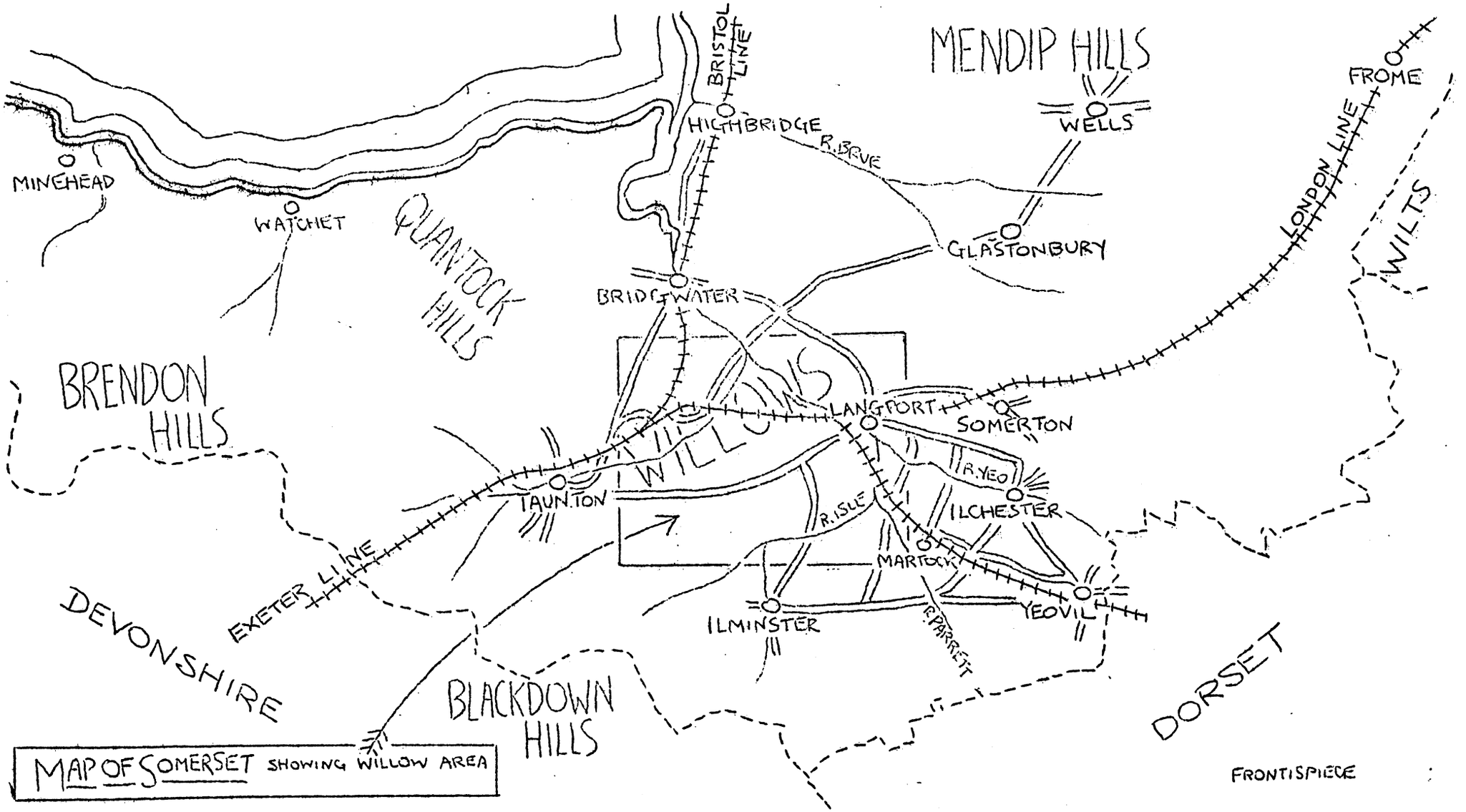

MAP OF SOMERSET SHOWING WILLOW AREA

FRONTISPIECE

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CHAPTER 1 INTRODUCTION

(1) The Willow District

(2) Total Acreage of Willows

(3) Economic Development

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(5) Proportion of Willow Acreage to Total Holding Acreage

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CHAPTER 1

1. THE WILLOW DISTRICT.

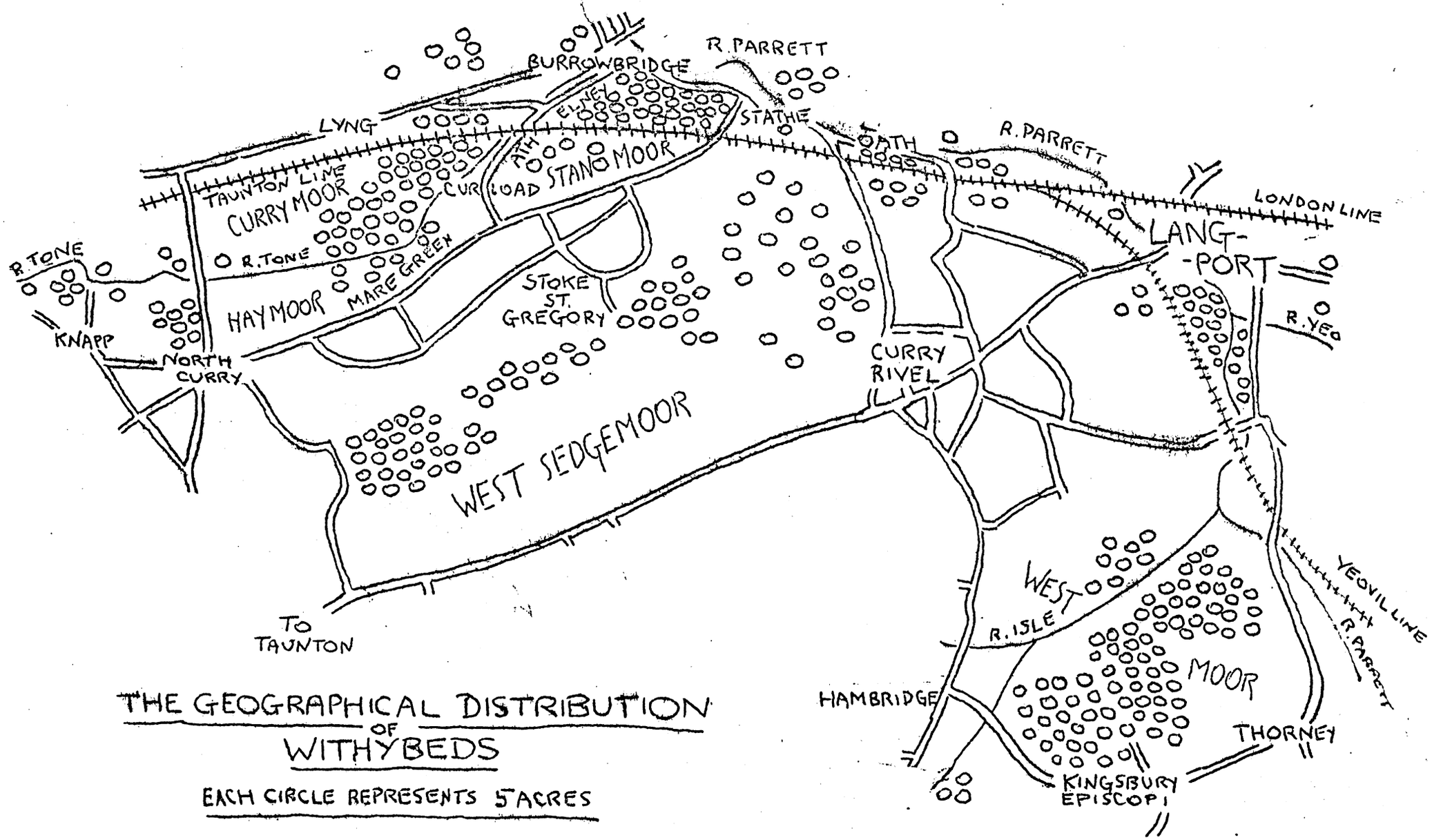
The cultivation of "withybeds" - to use the popular Somerset word - is very much a localised industry. The beds are to be found within an area, nine miles from east to west, and seven miles from north to south. This area is shown in outline on the frontispiece map. In the north-eastern corner stands the town of Langport at the Junction of the rivers Yeo and Parrett. The main line of the Great Western Railway from Paddington to the south-west peninsula passes through Langport. The north-western corner is marked approximately by the village of Burrowbridge, at the confluence of the River Tone (from Taunton) and the River Parrett (from Langport). To the south-west, the willows are found along the Tone as far as the Hamlet of Knapp, between North Curry and Creech St. Michael, the latter being on the main railway lines from London and Bristol to Taunton. To the south-east, the area stretches as far as Kingsbury Episcopi, four miles above Langport on the River Parrett.

These extensive tracts of low-lying land stretching inland from Bridgwater and Highbridge - the "moors" of Somerset - are well known through such names as Sedgmoor and Athelney. The total area of the Somerset "moors" is very much greater than the part which is devoted to willows; only upon a very few moors is found a soil which is suitable.

Although the annual returns of the Ministry of Agriculture do not provide information upon the distribution of willow acreage in Somerset, it has been possible to construct the map opposite with the help of the 25 inch Ordnance Survey maps, upon which a distinctive mark is used to indicate plots of willows, together with the exact acreage thereof. These acreages have been totalled in convenient groups and entered upon the accompanying map, where every dot represents 5 acres of willows.

The principal rivers draining the willow districts are the Tone, the Parrett and the Isle. West Moor (Kingsbury Episcopi) lies in the area between the Isle and the Parrett near their confluence, which is at the lower and northern end of the moor. Here are to be found about 450 acres of willows. Going downstream a moor is crossed just before Langport is reached, where the river Yeo flows into the Parrett about 115 acres lying in this locality. To the west of Langport are the hamlets of Wick and Oath, and Wick Moor possesses 70 acres of willows. On the right bank of the Parrett lies Aller Moor, with only about 30 acres.

Away to the south of the Parrett, between Stathe and Oath, lies West Sedgmoor, a tract about 4 miles in length. Willows on this moor cover



THE GEOGRAPHICAL DISTRIBUTION OF WITHYBEDS

EACH CIRCLE REPRESENTS 5 ACRES

approximately 385 acres. West Sedgmoor is bounded along the south-eastern side, by a wooded escarpment stretching from Langport through Curry Rivel towards the Blackdown Hills, and on the north-western side by a succession of villages and hamlets : North Curry, Mare Green, Stoke St. Gregory, Woodhill and Stathe, villages populated almost entirely with people dependent upon willow growing. West Sedgmoor is exceptionally liable to flooding, there being no river running through to carry away the water from the hills.

Stanmoor is a relatively well-shielded moor, a triangular tract lying between Stathe, Burrowbridge and Curload. To the north is the Parrett, to the west the Tone. Stanmoor accounts for about 160 acres of willows.

At Burrowbridge, the Tone joins the Parrett. In the area above Athelney, the Tone drains Curry Moor and Lyng Moor on its left bank, and Hay Moor on its right. Curry Moor and Lyng Moor, in the area between the Tone and the Taunton-Glastonbury road, have 205 acres of willows, and Hay Moor, lying between the Tone and North Curry and Mare Green, has 75 acres. In addition there are about 30 acres on West Moor on the south bank of the Tone.

There are some scattered withybeds on Hitchings and Salt Moor, north of Lyng and Lower down the Parrett, but by the time Burrowbridge is passed in the direction of Bridgwater, the willow area is being left behind, and but 50 acres can be recorded.

2. TOTAL ACREAGE OF WILLOWS.

The total acreage is made up as follows :

TABLE I

	Willow acres
West Moor, Kingsbury	450
Langport	115
Wick Moor	70
Aller Moor	30
West Sedgmoor	385
Stanmoor	160
Curry Moor and Lyng Moor	205
Hay Moor	75
West Moor, Knapp	30
Hitchings and Salt Moor	50
Total Acreage	1570

Although the total acreage is here given as 1570, many have ventured estimates and these have, as a rule, been vastly in excess of this figure, reaching even more than double. The figure of 1570 cannot be far wrong, having been compiled from the large scale Ordnance Survey Maps. "The Agricultural Output of England and Wales 1925" states that the total acreage may be estimated at 6000 acres for the country, "of which over 50 per cent was in the eight counties, Somerset, Dorset, Gloucester. Nottingham, Stafford, Lancashire, Berkshire and Suffolk".

3. ECONOMIC DEVELOPMENT

Willow cultivation consists in the planting of an area with "sets" which take root and form stocks. From these stocks a growth is thrown up in the form of a number of generally unbranched rods rea hing a height of seven or eight feet. The crop is cut every year, leaving the stock to shoot again the following spring. Sometimes, the growth is left for two years before cutting, so providing stouter rods. Tree willows found along ditches and other boundaries are usually cut every 3 years to provide a supply of sticks for stouter work. The production of cricket bat willows is a very specialised work of its own, and is rare in the area under present investigation.

The cultivation of willows and their preparation for market forms the staple industry of the locality. Such cultivation is, amongst agricultural industries. of comparatively recent date. "Withies" have certainly not been grown in this area for more than 120 years, and the pioneers in this respect undertook all the risks of a great speculation. The first withies were probably used in the making of butchers' and bakers' baskets, but for a long period the farmers of the district looked upon the new cultivation as just a novelty that would soon die out. The first beds were planted in West Sedgmoor, but in most of the moors, the first plantings are still within the memory of living inhabitants. In Curry Moor, the original plantings could not have been more than 60 years ago.

Not until the making of wicker chairs became established near at hand did the cultivation of withybeds in Somerset become generally popular. Before Mr. Slocombe began this manufacture on a considerable scale in North Petherton, the markets were too distant and limited and the production of willows too speculative. The advent of the wicker chair and of a fashion which developed a demand for it, proved to be the turning point, for it was the wicker chair which greatly stimulated the willow growing industry, and gave to it a period of prosperity. But even before the war there were signs that the wicker chair was falling out of favour, and as this decline has become more accentuated during latter years, so have the difficulties of the willow growers increased. An increase in the imports of chairs has also affected the demand for Somerset Willows. The wicker chair industry developed in Bridgwater, in North Petherton and amongst

craftsmen and growers in the willow-growing area. Today, although the local craftsman has found that the market for chairs has collapsed, there is some production of baskets of various sorts. This change has been forced, but the making of baskets recently has been upon a very much smaller scale than was the making of wicker chairs when the demand for them was at its peak.

Even about 40 years ago, there were only 3 people who sent willows to market. Around this nucleus developed the community of small growers dependent in some ways upon the large growers. In particular the marketing of the produce of the smaller grower was done through the channels developed by the larger grower. The big growers tended to accumulate the production of the entire area. In addition, the small growers obtained capital for financing their production from those who had been established sufficiently long to have accumulated reserves. As the market developed, greater independence became the lot of the withygrower, though the well-established grower maintained a strong position in marketing and wholesale distribution. Some small growers of the period of expansion came forward to positions of leadership in the district.

At the end of the war came the period of feverish economic activity, affecting all branches of industry, commerce and agriculture. The willow growing industry shared in this boom. Under the influence of high prices (reaching a peak of 27/- per bolt, where today's price is 4/6) much speculation was fostered. Small men, who invested capital at inflated prices at that time, are feeling the depression of the last few years very keenly. The wave of optimism led not only to some growth in the numbers and size of small independent undertakings, but pieceworkers also shared in the movement, for large growers, in order to allow their workers more freedom and to give them a greater and more lasting interest in the work of cultivating willows, let land to them. Sometimes these workers rented land ploughed but unplanted, sometimes both ploughed and planted. Such workers became tenants, generally having in the same person, a common landlord and wholesale purchaser, but the tenants assumed the risks of production at a time when such a responsibility under the stimulus of good profits could so increase their remuneration. These growers, too, in the present depression, find themselves overburdened, having to face reduced receipts with little financial reserves.

The small growers and small tenants, it is true, provide much of the labour themselves, yet to maintain cultivation in the face of falling income means a reduction in income for work done, even below the standard rates received by piece-workers, whilst these latter, are faced, as everywhere, by the problem of unemployment. Certainly, the days seem to have passed when the pieceworker looks forward to becoming independent, or even to working his own holding successfully in his spare time.

In addition to the types of growers considered so far , there are two other types that require mention

here.

For some growers, the cultivation of withies is but a part of their full occupation. There are general farmers in the district who have their own withy beds. Some of them regard withies as an important item and carry through the operations right to the preparation for market. A distinction can, however, be drawn between the cultivation of the withy, and its preparation as an article for basket making. This latter covers a long series of operations involving a great amount of labour and specialised attention. Where withies are but a part of the whole farming system, they are frequently sold by auction standing green in the beds, usually by half-acre plots. Other classes of withy growers are somewhat similarly situated, amongst them land valuers who own tracts of moorland, and merchants who prefer to leave to others the detailed work of preparation.

This circumstance brings into being a complementary type : the individual who does not cultivate, but who purchases a few acres when ready for cropping and who manages them from that point onwards. There are many devoting themselves entirely to such work, whilst some combine the purchase of green acres with the cultivation of their own holdings.

An account of the economic structure of the industry would not be complete without some account of alternative or supplementary occupations.

The moors are surrounded by areas devoted to grassland farming where conditions are very similar to those found in agriculture generally. The amount of labour required for willow cultivation is vastly in excess of that required to look after dairy cattle. The decline of the willow market, and the putting down to grass of considerable areas on the edge of the moors means a decided contraction in the demand for labour. In the heart of the moor, the uprooting of willow stocks means very often a return to uncultivated land. From the point of view of employment, it is imperative that the economic position of the willow industry should be strengthened.

In Kingsbury Episcopi, additional employment is found for women in the making of gloves from the unstitched supply sent from factories in Yeovil. This industry appears to have made some recovery of late, and keeps the women busy in their spare time.

On the other hand, in Stoke St. Gregory and Burrowbridge, this domestic industry does not exist. There is but one secondary industry, that of cutting moorland hay. The majority of Sedgmoor hay in the past has been sent to the mines of South Wales for the feeding of pit ponies. The hay was mixed with corn in order to give bulk. Now that electric haulage is replacing pony haulage in the pits, the ponies are no longer required, hence the demand for moorland hay is seriously diminishing and the price obtained does not

cover cost of cutting and transport; 20/- a ton is all that can be obtained now.

The quality of the hay has fallen off in recent years. The soil in the moor is not so rich, whilst wet seasons have encouraged the growth of rushes. The hay is certainly not of sufficiently good quality to feed to dairy cattle, and most dairy farmers in the district have sufficient quantity of suitable hay of their own.

Finally, employment is found for men in the work of dredging and banking the rivers, whilst the reconstruction of the Great Western lines near Durston has given an opportunity for the labourer to protect himself partially from the depression by obtaining work in insurable occupations.

The foregoing picture is not an encouraging one. In attempting to analyse the problem from the standpoint of this one particular industry, the fact that the situation is but one part of the whole economic situation covering most industries and most countries of the world, destroys the possibility of diagnosing completely the difficulties of the willow industry. There is a limit to any effort to particularise the influences at work upon the willow industry; there is a limit to the possibility of framing methods for reconstruction for a single industry as if it were a unit, isolated and alone.

4. ACREAGE OF WILLOWS ON HOLDINGS.

Statistics of willow acreage have been collected and analysed for 83 holdings. It is found that nearly half the number of holdings have not more than 5 acres of willows and that nearly three quarters have not more than ten. Since, however, there are a number of holdings with an exceptionally large acreage, those having more than 10 acres of willows actually account for more than 70% of the total willow area surveyed.

These statistics are amplified in the following table :

TABLE 2.

Willow Acreage	Holdings		Willows	
	No.	%	Acres	%
Up to 5 acres	39	47	115	12
Above 5 & up to 10 acres	21	25	177	18
" 10 " " " 50 "	22	27	540	56
Over 50 acres	1	1	134	14
	83	100	966	100

In the group "up to 5 acres" there is an average of 3 acres of willows per holding. The total of 39 holdings in this size group is made up as follows :

TABLE 3

Acres of Willows.	No. of Holdings.
0	4
1	1
2	7
3	14
4	7
5	6
	39

The 4 holdings given as having no willows are cases in which the occupier depends upon the purchase of standing crops.

5. PROPORTION OF WILLOW ACREAGE TO TOTAL HOLDING ACREAGE.

Statistics are here available from 46 holdings with a total of 1390 acres of which 400 acres are in willows. As is to be expected the proportion of willow to total acreage falls rapidly as the size of the holding increases. The figures are given in the following table :

TABLE 4

Total Acreage Groups	No of Holdings	Total Acreage	Willow Acreage	Willows as % of Total Acreage
				%
Up to 5 acres	18	72	65	90
Above 5 & up to 10 acres	5	43	27	63
" 10 " " " 50 "	13	340	150	44
Over 50 acres	10	935	158	17
	46	1390	400	..

Thus, the holdings up to 5 acres are almost entirely devoted to willow growing, while those between five and ten acres have nearly two-thirds of their area devoted to willows.

6. AGE OF STOCKS

An analysis of the age has been possible for an area of 644 acres. The classification works out as follows :

TABLE 5

	Acres	%
Under 5 years old	58	9
5 and under 10 years old	83	13
10 " " 15 " "	119	18
15 " " 20 " "	108	17
20 " " 30 " "	248	39
Over 30 years old	28	4
	644	100

These figures should be accepted with considerable reserve. It is a common practice among growers to plant new stocks in patches annually, or to restock as seasonal and economic conditions are favourable, thus avoiding too large a capital outlay at one moment. It is found, therefore, that in a large number of beds, the willows may represent any ages from one year to over 20 years. Where this is explicitly stated by the grower to be the case, the figures have been omitted from the above table, but it is not possible to say exactly how much of the acreage entered up in the group 20 years and over is actually covered by more recent planting in patches.

It is necessary also to allow for the tendency for growers to state the age of the beds in round figures, and especially should be pointed out that the age group "20 and under 30 years" is composed almost entirely of acreages that are stated to be either "20", or as "over 20 years". The table records less than one tenth of the total acreage as under five years and little more than one fifth as the total under 10 years. Well over half the total acreage (60%) is found to be 15 years or older.

In view of the fact that the yield of the willow crop declines after about the fifteenth year and that in normal practice the crop would be rooted out about the twentieth year, the figures in the above table disclose a wide gap between the actual age distribution and that which would be found under more normal economic conditions. In the next table the actual figures are compared with those which are obtained by taking the life of the stock to be twenty years and assuming a steady annual rate of replanting :

TABLE 6

	Actual Acres.	Under normal conditions. Acres	"Actual" as % of "Normal". %
Under 5 years	58	161	36
5 and under 10 years	83	161	52
10 " " 15 "	119	161	74
15 " " 20 "	108	161	67
20 " " 30 "	248	-	-
Over 30 years	28	-	-
	644	644	-

The table shows that the acreage under 5 years should be nearly 3 times what it is in practice, whilst in addition the acreage found between 5 and 10 years should be almost doubled. In fact, a considerable margin will have been allowed for when it is stated that the total acreage under 10 years old is only half what it should be and that the total acreage 15 years and upwards is double what it should be.

7. VARIETIES

Of the total 966 acres surveyed, it was possible to get a classification according to variety for a total area of 880 acres. Statistics follow for the seven leading varieties :

TABLE 7

	Acres	% of Total
Black Mole[Ж]	582½	66.2
Champion Rod	106½	12.1
Spaniards	95½	10.9
Osiers	29	3.3
Old French	20	2.3
Red Bud[ϕ]	15½	1.8
French New Kind	10	1.1
Other Varieties	21	2.3
	880	100.0

Ж or Maul

ϕ Red Bud is alternatively known as Dicky Meadows.

Amongst "other varieties" were found Harrison, London Market, Black Rod, Blue Violet, Long Skein, Trustworthy, Pyramidalis, and Kissender.

Although a very long list of varieties can be catalogued, it is seen that two thirds of the total acreage analysed is planted with Black Mole. A few quotations will serve to show the general impression of this variety :

"The best withy for the manufacturer".

"Black Mole is the best seller".

"One of the best all-round withies".

"Old-established, and one of the best grown".

"Sells better than other varieties".

"The best withy for whites and buffs".

"Strips a pure white, and is very good for working".

"Has proved a very good cropper".

"Best quality withy grown, but susceptible to rust and canker".

"Black Mole has run out for size".

"Has deteriorated since first introduced".

"Is tending to die out".

"Appears to be dying".

The opinion that the most common and well-established variety of the locality is for some reason coming towards the end of its day, is almost universal. It adds one more to the complex of difficulties into which willow growing has run.

Champion Rod is the second most important variety in Somerset and the following are selected from growers' statements :

"Longer and stouter than Black Mole".

"Good white rod : bigger than Black Mole".

"Grows bigger rods".

"Rather stouter than Black Mole".

"A good working withy, particularly useful as a white for staking".

"Bears well in early years, but unfortunately fails to maintain the bulk".

"Badly affected by rust".

"Worse than Black Mole for rust".

Spaniards. There are several varieties of Spaniards, the more frequent ones being Black Spaniard and Early Spaniard.

In regard to Black Spaniards, growers state :

"The withy is big and stout and liable to break unless grown on a very good soil".

"It may be damaged by late frosts because the stock shoots rather early".

"On account of its brittle nature, it is used principally for big work, as, for example, for travelling crates".

"It is nearly always whitened".

"Men do not care to work it".

"Gets button-top at 5 feet".

"Never used for buffs".

"Badly affected by rust".

Of the Early Spaniard, it is said :

"Worse than Black Spaniard for working purposes".

"Breaks very easily".

"Rough growing, but keeps down weeds".

CHAPTER 2 CULTIVATION

(8) Weeding : cleaning and hoeing

(9) The Cost of Weeding.

(10) Spraying

(11) The Cost of Spraying

(12) Wear and Tear of Implements

(13) Weeding and Spraying practices related.

(14) Table of Cultivation Costs

CHAPTER 2 - CULTIVATION

8. WEEDING : CLEANING AND HOEING

The principal item in the cultivation of the withybed is weeding, a process which is accomplished in either of two distinct ways.

Over by far the greater area, namely in the Stoke St. Gregory and Burrowbridge districts, weeding is performed by "cleaning" with a hook. July seems to be the principal season for this operation. Very often, cleaning is done only once; there are many who cannot afford to weed more often, whilst some have their land stocked with sheep in the spring, and this takes the place of one weeding. A second cleaning sometimes precedes cutting, so that as little weed as possible can get mixed in with the bundles to make cutting more difficult.

Cleaning practice varied considerably, as the following statements show :

"The majority of people only clean once, but some clean again in the autumn to help cutting".

"Cleaning done twice".

"Weeding done once as a rule, about July. July is the best month. Some weeds, like withywind (convolvulus) will damage the plant, and weeds would make cutting impossible".

"Cleaned once for the season".

"Usually cleaned twice".

"Cleaning will be done twice as a rule, but once will suffice if the withy gets away. Land must be managed well to do any good".

"When a bed is not properly weeded one year, it gets badly blighted in subsequent years".

"Weeds shorten the life of a plant, and make cutting more difficult. On the other hand, the withies grow straighter, and do not get blight so badly".

"One cleaning is done about July; it is not done too early, else the weeds only grow again, and the bed becomes liable to blight".

"Livestock is allowed on the ground before the shoots appear. The grass is eaten and the weeding costs kept down. The livestock comes off by the middle of May".

"Some cleaned once, some twice".

"Used to clean twice, but can only afford it once now".

"Once or twice. Ought to start in July or August. Weeding sometimes encourages blight".

"Should be done two or three times, but cannot afford it now".

"Used to weed in June and August. Now only in August owing to expense".

"Stocked until the first week in May; the weed and early shoots are eaten. One weeding only is necessary (in July after stocking)".

"Bed is cleaned only once".

"Cleaning is done by the majority of people only once, though the bed is sometimes cleaned again in the Autumn in preparation for cutting".

The foregoing deals only with hook weeding. In the Kingsbury Episcopi district, weeding is regularly performed with a hoe, in April if dry enough, and again at the end of May, or even a third time in June or July. On West Moor, there are practically no facilities for stocking with cattle or sheep. Some amount of horse-hoeing is done, and the rows are rather farther apart than in other districts.

9. THE COST OF WEEDING.

With such differences in practice, it is very difficult to give a definite figure for cost of weeding. Consequently the cost of weeding according to several practices will be separately assessed. Data for 38 holdings employing the hook, and for 26 holdings employing the hoe, are classified in the following table:

TABLE 8

HOOKED			Total Cost per acre	HOED		
Once	Twice	Thrice		Once	Twice	Thrice
Number of Holdings				Number of Holdings		
			£: s: d			
-	-	2	4:10: 0	-	2	2
-	-	-	4: 5: 0	-	-	-
-	2	-	4: 0: 0	-	1	2
-	-	-	3:15: 0	-	-	2
-	7	-	3:10: 0	-	-	1
-	-	-	3: 5: 0	-	3	-
-	6	-	3: 0: 0	-	8	-
-	-	-	2:15: 0	-	1	-
-	1	-	2:10: 0	-	1	-
-	-	-	2: 5: 0	1	-	-
5	-	-	2: 0: 0	1	-	-
7	-	-	1:15: 0	1	-	-
7	-	-	1:10: 0	--	-	-
1	-	-	1: 5: 0	-	-	-
20	16	2		3	16	7

Thus of the 38 employing the hook, 20 growers clean but once ; of the 26 that hoe, 16 hoe twice. Growers who hoe three times usually employ a hook for the last operation. The average number of cleanings is one and a half*. Of the total 64, 23 weed once, 32 twice and 9 three times. Except where stocking takes place in the spring, nearly all growers admit the necessity of weeding twice at least.

A similar table follows, but in place of entering the number of holdings, the total number of acres is entered.

TABLE 9

HOOKED			Total Cost per acre	HOED		
Once acres	Twice acres	Thrice acres		Once acres	Twice acres	Thrice acres
			£: s: d			
-	-	10	4:10: 0	-	15	5
-	-	-	4: 5: 0	-	-	-
-	5½	-	4: 0: 0	-	5½	7½
-	-	-	3:15: 0	-	-	119
-	101½	-	3:10: 0	-	-	72
-	-	-	3: 5: 0	-	22	-
-	114½	-	3: 0: 0	-	47½	-
-	-	-	2:15: 0	-	3	-
-	9	-	2:10: 0	-	1	-
-	-	-	2: 5: 0	3	-	-
40½	-	-	2: 0: 0	12	-	-
46	-	-	1:15: 0	2½	-	-
113	-	-	1:10: 0	-	-	-
35	-	-	1: 5: 0	-	-	-
234½	230½	10		17½	94	203½

Each of the 6 different practices will now be considered separately :

Hooked once

The average cost of one weeding with a hook works out at £1:14: 0 (based on Table 8) or £1:12: 0 (based on Table 9 when weighted according to acreage).

In 6 out of the 20 cases (21 acres out of 234½), the weeding was done by the occupier himself; in all other cases, labour was employed. The rate of

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* used in compilation of final costs table.

weeding has been expressed as follows :

"an acre a week".

"can do an acre in 10 to 12 days".

"an acre in a week to 10 days"

"weed one acre in a week"

Hooked twice

The average cost of two cleanings works out at £3: 6: 0 (Table 8); an additional cleaning, therefore, costs £1:12:10. Weighted according to acreage, the cost per acre is £3: 4: 0 (Table 9), again an increase of £1:12: 0 for the second weeding.

Of the 16 growers in this group, 4 are recorded as doing the work themselves; these 4 aggregate but 12½ of the 230½ acres.

The following quotations show that the amount of money spent on weeding in this group is influenced both by early livestocking and by the shortage of cash resources :

"Do most of the work myself. Used to employ much labour but it cannot be afforded at the moment".

"Bullocks are put on for a fortnight in the Spring to eat back grass and weeds".

"Bullocks are allowed to eat the fresh shoots, thus giving cleaner and stronger growth, whilst frost damage is avoided".

"Beds are stocked with sheep every Spring; saves a weeding".

"Three weedings but a stocking saves one".

Hooked Thrice

Only two growers out of the 38 employing the hook method perform this operation three times and each at a cost of £4:10: 0 per acre. It is noteworthy that one of these growers also stocks in the Spring.

"Stocked till the end of May to avoid damage from a possible late frost. Stocking and treading may be very effective in preventing canker and blight".

"Weeding is done 3 times especially if withybind is in. Can do one acre a week".

Hoed once

Only 3 growers are recorded as having hoed their land but once. The average cost is £2: 0: 0 an acre. 17½ acres are covered by these growers, and

labour is employed by all. Comments on weeding practice are appended :

"Stocked in the Spring,until the 12th or 15th of May; stock eats the grass before the willows are shooting".

"Only hoed once,as it does not pay to do any more".

"Usually twice in the past,but only once this year".

Hoed Twice

The average cost of the sixteen growers who hoed twice works out at £3: 5: 0 per acre (Table 8). The average cost weighted by acreage comes out at £3: 7: 0 per acre (Table 9).

Five of the growers do the weeding themselves, each being reckoned at 30/-, since it takes a week to hoe an acre. They account for 22½ of the 94 acres.

Eight growers have given the piece rates separately for the two hoeings; the first hoeing costs 60/- per acre in one case, 35/- in five cases and 30/- in two. The second hoeing costs 30/- in four cases, 25/- in 3 cases and 20/- in one case.

One or two growers in the North Curry district hoe the withies once and follow this by one cleaning with a hook. It can be seen above that the second hoeing costs about the same as one cleaning (i.e. hooking).

Growers coming in this group have stated :

"Hoeing is done first in April and later at the end of May; plants should then be well away and able to choke weeds. Some people weed with hooks at a still later date".

"Horse-hoeing done: good loose soil. Some plants at headlands are damaged, but the crop makes up for this loss. Two acres a day; hand hoeing one acre a week. Horse-hoeing kills weed, makes good soil and gives plenty of air".

"First hoeing in April, second in June or July".

"One hoe followed by one hook".

"Hoeing is finished about the middle of June followed by one cleaning with hook".

Hoed 3 times

Seven cases are recorded of either 3 hoeings, or (more usually) 2 hoeings followed by one weeding with a hook. The average cost per grower is £4: 1: 0 (based on Table 8), but calculated on the whole acreage of 203½, the average is £3:14:0 (based on

Table 9).

Three of the 7 growers do the work themselves, priced from £4 to £4:10: 0. They account for only 8 acres.

In the 4 examples of piece rate payment, prices are as follows :

First hoeing in each case 30/- an acre.

Second hoeing, one at 30/-, one at 25/-, two at 22/6.

Third hoeing, in each case 20/- an acre.

The statistics from the foregoing paragraphs are collected together in Tables 10 and 11.

These tables show that, whether a simple average of the per acre figures is found for all holdings, or whether an average is taken giving proportional weighting in favour of larger farms, then the average cost of weeding is £2:17: 0 an acre.

Almost throughout the table, the costs given for holdings weeded with home labour are higher than those weeded with employed labour. There is, however, always a tendency for the grower who does the necessary work himself, to spend more time upon cultivation than is spent by employed labour, so that the proportions given are probably representative.

Should there be a tendency for the cost of weeding to fall, as the size of the willow holding increases, the second table, by giving a greater weighting to the larger holdings, would show a lower average cost. This is not found to be the case for employed-labour holdings.

TABLE 10 (based on holdings)

Practice	Own Labour		Employed Labour		Total	
	No. of Holdings	Average cost per acre	No. of Holdings	Average cost per acre	No. of Holdings	Average cost per acre
		£: s: d		£: s: d		£: s: d
1 Cleaning	6	1:16: 0	14	1:13: 0	20	1:14: 0*
2 Cleanings	4	3:12: 0	12	3: 4: 0	16	3: 6: 0*
3 Cleanings	1	4:10: 0	1	4:10: 0	2	4:10: 0*
1 Hoeing	0	-	3	2: 0: 0	3	2: 0: 0*
2 Hoeings	5	3: 0: 0	11	3: 7: 0	16	3: 5: 0*
2 Hoeings) 1 Cleaning)	3	4: 7: 0	4	3:17: 0	7	4: 1: 0*
	19	3: 1: 0	45	2:15: 0	64	2:17: 0

*Utilized in the compilation of the final costs table.

TABLE 11 (based on acres)

Practice	Own Labour		Employed Labour		Total	
	No.of Acres	Average cost per acre	No.of Acres	Average cost per acre	No.of Acres	Average cost per acre
		£: s: d		£: s: d		£: s: d
1 Cleaning	21	1:16: 0	213½	1:12: 0	234½	1:12: 0
2 Cleanings	12½	3:12: 0	218	3: 4: 0	230½	3: 4: 0
3 Cleanings	4	4:10: 0	6	4:10: 0	10	4:10: 0
1 Hoeing	0	-	17½	2: 0: 0	17½	2: 0: 0
2 Hoeings	22½	3: 0: 0	71½	3: 9: 0	94	3: 7: 0
2 Hoeings } 1 Cleaning }	8	4: 4: 0	195½	3:13: 0	203½	3:14: 0
	68	2:19: 0	722	2:17: 0	790	2:17: 0

On an average, holdings are not weeded twice (actually 1.8 times). The average quantity of cleaning is only 1.5 times as against an average of 2.2 hoeings. The average number of weedings on own-labour holdings is 1.9, against 1.7 on employed-labour holdings.

There is no evidence of any saving in weeding cost per acre as the size of the holding increases. This is due to the fact that all weeding is performed by hand.

10. SPRAYING

It is clear from the following table that the practice of spraying varies considerably :

TABLE 12

No. of Times	No.of Growers	No.of Acres
0	24	123
1	5	77
2	15	196
3	6	32
4	4	27
5	1	10
	55	465

The average number of sprays per person is 1.3, in Stoke St. Gregory and Burrowbridge about once*, in Kingsbury Episcopi almost twice*. Thus roughly half the growers, representing slightly more than a quarter of the acreage for which exact data are available, do not spray at all. Their comments upon the practice may be represented by the following :

"Why spend money on things you cannot sell ?"

"No spraying done for years".

"Have never sprayed".

"Spraying not a paying proposition in last four years - clashes with haymaking".

"Never sprayed - doesn't do any good".

"Spraying not done- does not appear to do any good".

"Spraying for a pest also kills the enemy of the pest".

"Too wet last year to spray".

"Doesn't think it pays with an old bed - means more expense".

Where spraying is done at all it is usually done twice. Long Ashton Research Station has recently carried out experiments in dusting but this method has not yet been adopted outside those holdings which were used for experimental purposes. Growers seem to have a fixed idea that only a liquid application will "do the job". One great objection in the Stoke St. Gregory area to the use of horse-drawn machines is the damage which it is claimed would result to the withies if these machines were used.

11. COST OF SPRAYING

Once. The labour cost averages 4/1 per acre, although the range extends from 3/- (representing a rate of 2 acres per day) to 6/- (one acre a day). Payment is invariably at day rates for obvious reasons, and there is a tendency for growers to do this work themselves. In this group, however, only two of the five growers undertake their own spraying and these account for nine out of the 77 acres.

The cost of materials ranges from 3/- to 6/- per acre with an average of 4/1 per acre. Total cost of spraying once works out at 8/2 per acre (with a range from 6/- to 12/-). In three of the 5 cases, quantities of materials are stated :

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* Used in compilation of final costs table

"3 lbs. of a proprietary nicotine mixture to 40 gallons of water per acre".

"1½lbs. of a proprietary nicotine mixture to 30 gallons of water per acre".

"2 lbs. of a proprietary nicotine mixture to 30 gallons of water per acre".

It will be realised that 30 or 40 gallons will not be sufficient to spray an acre completely. The practice is for growers to spray in patches over the acre wherever pests and diseases appear.

Twice. Of the 15 growers in this group, labour cost statistics are available in 8 cases. For each spraying the average cost works out at 4/9 per acre, the range extending from 2/- to 6/-.

Weighted for acreage, the average cost of each spraying works out at 4/11 for labour cost.

Statistics for cost of materials are at hand in 7 cases, and the simple average per grower is 4/3, or 4/2 weighted according to acreage.

The total cost of 2 sprayings, therefore, is 18/-, or 18/2 per acre weighted.

Quantities of nicotine mixture are given as follows :

"4 lbs. in 16 gallons per acre per spray".
"1¾lbs. " 25 " " " " " ".
"1½lbs. " 30 " " " " " ".

Three Times. The results of 6 growers' figures give an average labour cost of 3/2 per acre per spray, there being 5 at 3/- (2 acres a day) and one at 4/- (3 acres in 2 days).

The cost of materials is 4/5 per grower, and weighted 4/7.

The total cost of 3 sprayings, therefore, is 22/9 per grower per acre, and if weighted according to acreage 23/-.

A comparison of the total labour cost for 2 sprayings and for 3 sprayings (being 9/6 in each case) suggests that, in general, the grower who sprays twice does it more thoroughly, whereas the grower who sprays 3 times covers the ground more quickly and spreads a greater quantity of material over the withybed with the same labour expenditure.

Four or Five Times. Since the growers who fall into these groups are mostly those who are to be found spraying repeatedly, as weather allows, over a

considerable part of the season, the figures obtained are not in sufficient detail for the calculation of costs.

Tabulation of the foregoing results.

TABLE 13

SIMPLE AVERAGE PER GROWER.

	No. of Growers	Labour Cost per acre	Materials Cost per acre	Total Cost per acre
		s: d	s: d	s: d
No spraying	24	* -	* -	-
One spraying	5	*4: 1	*4: 1	8: 2
Two sprayings	15	*9: 6	*8: 6	18: 0
Three sprayings	6	*9: 6	*13: 3	22: 9

* Used in the compilation of the final costs table.

TABLE 14

WEIGHTED AVERAGE PER GROWER

	Acreage	Labour Cost per acre	Materials Cost per acre	Total Cost per acre
		s: d	s: d	s: d
No spraying	123	-	-	-
One spraying	77	4: 1	4: 1	8: 2
Two sprayings	196	9:10	8: 4	18: 2
Three sprayings	32	9: 3	13: 9	23: 0

TABLE 15

QUANTITY OF NICOTINE MIXTURE PER ACRE

	No. of Sprays				
	One	Two	Three	Four or Five	Total
	No. of Growers				
1½ lbs.	2	1	-	1	4
1¾ lbs.	-	1	-	-	1
2 lbs.	1	3	3	-	7
2½ lbs.	-	-	-	1	1
3 lbs.	1	1	1	1	4
3½ lbs.	-	-	-	1	1
4 lbs.	-	1	-	-	1
					19

12. WEAR AND TEAR OF IMPLEMENTS FOR WEEDING AND SPRAYING

The price of weeding hooks has been stated to be from 2/6 to 4/-, the average and most popular quotation being 3/6.

On the assumption that one hook will do one acre twice over four years, the annual cost of hooks works out at 1/-.

The price of knapsack sprayers is given as from £2:10:0 to £5:0:0, averaging £4:5:0. Assuming that a sprayer lasts 5 years, the annual cost is 17/-. As the average holding is about 10 acres in size, the annual cost per acre is approximately 1/8, irrespective of the number of sprays.

The total wear and tear is consequently 2/8 per acre per annum.

13. WEEDING AND SPRAYING PRACTICES RELATED.

At this point, an analysis of the association of weeding practice and spraying practice is suggested. The following tabulates the results.

TABLE 16

	Number of Sprays				
	0	1	2	3	4
Number of growers :					
1 weed	7	4	2½	½	1
2 weeds	10	1	11½	2½	3
3 weeds	2	0	1	3	1
Acreage :					
1 weed	30½	58	35½	3½	3½
2 weeds	52¾	19	157¾	13½	17
3 weeds	12	0	3	15	10

14. TOTAL CULTIVATION COSTS

The following calculations combine the costs previously analysed in this chapter, selecting the 6 most frequent practices :

TABLE 17

Weeding		Spraying		Implements	Total
	£: s:d		s:d	s: d	£: s: d
PER GROWER					
One hook	1:14:0	None	-	*: 6	1:14: 6
One hook	1:14:0	One spray	8:2	*2: 4	2: 4: 6
Two hooks	3: 6:0	None	-	1: 0	3: 7: 0
Two hooks	3: 6:0	Two sprays	18:0	*2: 8	4: 6: 8
Two hoes	3: 5:0	Two sprays	18:0	2: 8	4: 5: 8
Two hoes & one hook	4: 0:0	Three sprays	22:9	*3: 2	5: 5:11
PER ACRE basis					
One hook	1:12:0	None	-	: 6	1:12: 6
One hook	1:12:0	One spray	8:2	2: 4	2: 2: 6
Two hooks	3: 4:0	None	-	1: 0	3: 5: 0
Two hooks	3: 4:0	Two sprays	18:2	2: 8	4: 4:10
Two hoes	3: 7:0	Two sprays	18:2	2: 8	4: 7:10
Two hoes & one hook	3:14:0	Three sprays	23:0	3: 2	5: 0: 2

*Used in compilation of final costs table (see also Section 12)

CHAPTER 3 CUTTING, HAULING AND SORTING.

15. Cutting the Withies.

16. Cost of Cutting.

17. Relation of Cutting Costs to Weeding Practice

18. Crop Yield.

19. Boating and Hauling.

20. Sorting and Tying.

21. Summary.

15. CUTTING THE WITHIES.

The implement used for cutting the crop is a round sickle-shaped "hook", rather larger than a weeding hook. The season lasts throughout the winter, commencing as soon as the leaves have fallen, in November or December. Last year, some growers cut considerable quantities in November (1931), one recording 300 bundles out of a total of 1400.

"Cutting is started in October, sometimes only finished in March".

"Sometimes has been done in October, with the leaves on; this does not appear to injure the stocks, but it should not often be done".

"Cutting done just before Christmas, just before the leaf is down. Some left until Spring, for whitening; this saves congestion in the pit".

"Cutting is done as early as possible in November".

"Cutting is commenced as soon as the leaves are off. Begun in October if possible".

"Cutting season lasts from October to March, whenever the season is suitable".

"Cutting usually done after the first 2 or 3 frosts which make the leaves fall".

"From just before Christmas to Lady Day. Have to be careful that Black Mole does not die back when cut early and ditched".

On the other hand, there are many who favour spring cutting. Such a crop is whitened and is said to be "whitened off the stock". Amongst the advantages may be mentioned the fact that spring cutting keeps back the growth of the subsequent crop, or at least prevents a too-early shoot which is damaged by frost.

"February and March are the best months for cutting - just as the willows are about to bud. They strip better if cut at this time".

"February, March and April are the best times for cutting. The withies are not liable to set rough".

"Cutting should be done by March 1st, otherwise the plant draws sap which should go to new shoots".

The grower who leaves cutting until the spring runs the risk of finding the weather unsuited to cutting. It is essential for cutting to be done as early as possible owing to the amount of work to be done. One of the main objectives in autumn

cutting is to get on with buffing during the winter months.

16. COST OF CUTTING

The problem of ascertaining the cost of cutting is in no way so complicated as in the case of weeding and spraying. Cutting obviously can only be performed once, a piece rate is paid, usually per score bundles cut - and there is more consistency in the prices stated. The cost of cutting includes carrying to the ditch or drove ready for hauling. The distribution of the 51 statements obtained is as follows :

TABLE 18

Per Score Bundles	No. of Growers	Acres
3/- to 3/6	1	134
3/6	19	243
3/6 to 4/-	1	33
4/-	27	191½
4/- to 4/6	1	14
5/-	2	36
	51	651½

The majority of growers, namely 27 out of 51, stated the cost of cutting to be 4/-ⁿ per score, but the effect of the 19 statements at 3/6ⁿ is to reduce this to an average of 3/10ⁿ per score over all growers The acreage at each stated price is given in the right hand column, from which it may be seen that the largest acreage is cut at 3/6 and, in general, the larger acreages are cut at the lower prices. Treating the whole area of 651½ acres as one unit, the average cost is 3/8½ per score bundles.

Nine growers expressed the cutting cost at so much per acre; seven of these gave a figure of £2 per acre, the others £1:15:0 and £2:1:0. At a standard of 200 bundles per acre, this would roughly equal 4/- per score.

In 22 cases, the rate of cutting has been recorded as follows :

TABLE 19

Rate of Cutting	Number of Growers
30 bundles a day	7
30 to 40 bundles a day	4
40 bundles a day	7
40 to 50 bundles a day	1

while in addition, one grower gave four days to cut an acre and two gave a week to do an acre.

It is stated that if a man cuts fifty bundles a day then it becomes necessary to follow up the cutting with a special "trimming" at, of course, an additional cost. "Trimming" consists in keeping the stock compact and shapely. Badly cut heads involve heavier costs at a later date, for example, in the cultivation and cutting in the following year. Statistics relating to trimming are inadequate for any further statement. One grower states that trimming an acre takes two days, thus costing 12/- per acre, or over 1/- per score bundles.

17. RELATION OF CUTTING COSTS TO WEEDING PRACTICE.

Figures from 38 growers provide the following result:

TABLE 20

	No. of Growers paying 3/6 a score for Cutting	No. of Growers paying 4/- a score for Cutting
Weeding once	5	9
" twice	9	10
" thrice	5	0
	19	19

The third weeding is invariably done just prior to cutting time with the definite intention of aiding the cutting operation. No grower who weeds three times has to pay 4/- a score for cutting.

18. CROP YIELD

The figures collected are consistent in placing an average crop at about 200 bolts per acre. On occasions rather higher figures are mentioned for

good crops.

"A good crop will give 200 - 300 green bolts to an acre".

"A good crop will yield 280 - 300 green bundles per acre".

"The beds give 220 - 240 bolts to an acre".

"A good recent crop cut 550 greens on 2 acres".

"On one plot of half an acre, 120 bolts were cut".

"The heaviest crop grown was one 480 bolts to an acre and a half".

"200 bolts on ½ acre for a new variety".

"200 - 250 bolts per acre, usually nearer 200 than 250".

"250 bolts per acre cut".

However, the general tone is given by such as the following :

"180 - 190 greens per acre; over 200 would be a good crop".

"Averages 200 bolts".

"180 - 200 green bundles per acre".

"200 bolts to an acre".

"200 greens".

"200 bundles reached on one piece, but the crop is usually rather less than this".

"A good year will give 200 bundles green".

"When thick the crop is 200 green bolts to an acre, but on an average is 180".

"200 bolts is about an average crop at the best period of the life of the withy".

"Average crop in West Moor (Kingsbury) 200 bolts".

"200 bundles on an average per acre".

"This year we expect about 1000 bolts on 5½ acres".

"Average crop is 200 bundles per acre".

"200 bolts per acre green".

"200 bundles per acre".

"200 bolts per acre".

"200 bundles per acre".

"450 bundles off 2½ acres last year".

"780 bundles off 6 acres".

"200 bundles per acre".

"200 bolts per acre".

"A good crop yields 200 green bundles".

"200 green bundles per acre."

"Average crop 200 bundles green".

At the other extreme, we have the following :

"120 greens per acre" (from a bed some 30 years old)

"An old bed would only give 125-150 to an acre".

"After 14 years, the cropping falls off and bed has to be carefully watched for dead stumps".

"150 to an acre. In a bad season, the number of bolts falls, and as beds reach 20 years of age, the number declines".

"700 bundles from 6 acres".

"An old bed does not give 100 greens to an acre".

"After the seventh year of growth, the crop gradually works back to a ¾ crop of 150 bolts".

"The last ten years beds have not been attended to properly and a bed over 30 years old would give only 100".

"A very poor crop on a 30 year-old bed gave only 300 bolts on 3 acres".

"From 100 - 200 bundles per acre".

"150 greens per acre"

"110 greens per acre last year, a bad year".

"Yields 150 green".

"150 - 200 green".

"A good crop will give 120 - 130 bolts per acre".

"Last year no more than 130 - 140 green bundles per acre".

In one or two cases, actual figures have been produced. In one case, the crop which grew in 1930 gave 244 bolts to the acre, whilst previous

years, working backwards, gave 317, 291 and 334. The bed is now 12 years old. The estimate for 1931 crop is 210 - 230.

Another grower provided the following figures:

for crop grown in 1931, 150 bundles; for 1930, 188; for 1929, 103; for 1928, 171; for 1927, 251; and for 1926, 220.

These figures are for a bed over 20 years of age.

The above two examples indicate how considerable is the variation from year to year, largely due to the type of season experienced; and also point to a marked difference in average level between a bed that is 12 years old now and one that is 20. The 334 bolts to an acre obtained in one year in the first example would represent the maximum obtainable by a bed at the height of its strength, probably aided by a good season, and under good management. The second example shows a rapid fall due partly to age and partly to bad seasons.

The principal factors which determine the crop obtained are the age of the bed, the soil, the season and the management.

During the first year of growth, a crop of 80 green bundles would be a good one, and as a rule, the first year's crop is stated to be valueless. Opinion differs very much regarding the second year, but without doubt, the best crops that are likely to be attained occur within the next few years, up to the seventh year or so of growth. As a rule, a reduction in yield occurs after the 12th year, although this depends upon the character of the soil.

Opinion is unanimous that the withy produces its best crop when the summer is hot and dry. In hot weather, growth may be put on at the rate of an inch a day. Rain is not wanted in the growing season. Whilst the withy is maintaining a steady growth, it is less troubled by flies, whilst if the season is detrimental to growth, spraying is also difficult, buttontop becomes serious and bushy tops are the consequence.

On account of the extensive floods in May and June 1931, one grower records a fall of at least 100 bundles per acre. It is generally agreed that the crops of recent years have suffered considerably on account of the bad seasons experienced. Many growers spoke of "spraggly" growth last year.

In certain areas, three feet of water was experienced on June 11th of 1932. The shoots were not seriously hurt, but growth was retarded. On the whole, however, the 1932 season was more favourable to withy growing than were the last few.

The ways in which weather and soil conditions influence withy cultivation would provide a very intricate and detailed study. It is not possible to analyse these influences in the present report.

The amount of attention given to cultivation, particularly to weeding, makes a great difference to the crop obtained. Weeds and withies are competitors, and good management and much valuable time have to be given in order that a good crop of withies rather than a good crop of weeds is harvested. Unfortunately, the economic conditions are not such that good management is fostered. Some growers complain that the price obtained does not pay sufficient regard to differences in quality, but more important still is the undeniable truth that market conditions have so deteriorated of late years that insufficient cash can be realised upon the sale of one year's crop to provide the wherewithal necessary for the next. But this is to anticipate subsequent sections of the report. Suffice it for now to indicate that the financial return not only depends upon the management, but management also upon the return.

Although it is difficult to classify the various statements of yields per acre an attempt has been made below to calculate an average yield as a basis for cost determination. The foregoing discussion suggests that the expected figure will be rather under 200 bundles (green). It will be noticed that in some cases, growers have given a round figure, while others have given the yield as lying between certain limits. The following table combines both types of statements from 63 growers :

TABLE 21

Yield of green bundles per acre	Stoke St. Gregory Burrowbridge		Kingsbury		Whole Area	
	No. of Growers	Acreage	No. of Growers	Acreage	No. of Growers	Acreage
over 250	1	12	1	3	2	15
250	2	11	4	152	6	163
200 -250	4	56	2	50	6	106
200	12	99	6	32	18	131
150 -200	8	49	1	3	9	52
150	6	87	0	0	6	87
120 -140	7	93	2	13	9	106
100 and under)	7	32	0	0	7	32
	47	439	16	253	63	692

By taking an average of the 63 estimates as given, a figure of 181 green bundles to an acre is obtained. The total estimate for the crop on 692 acres is 124,771 green bundles, or 180 per acre.

Before leaving this question, the degree of scatter of the cropping about this average of 181 should be commented upon. It is found that the average of the 32 highest crop estimates works out at 219 bolts an acre, whilst the average of the 31 lowest crop estimates is 142 bolts an acre.

The yield is generally higher in Kingsbury than in Stoke St. Gregory and Burrowbridge. In Kingsbury, the average yield is 212* bundles per acre whilst the average of those above 212 is 249* and the average of those below is 183*. In Stoke St. Gregory and Burrowbridge, the average yield is 171* bundles, whilst the average of those above 171 is 206*, and the average of those below is 124* bundles per acre.

19. BOATING AND HAULING.

In this particular item of cost there are very wide divergences. Weather conditions make a great difference not only to the state of the droves, but flooding may make it necessary for additional boating to be done. In some cases, where plots are particularly liable to flooding, a boat has to be purchased and kept to meet an emergency. In general, however, boating is usually put out at piece rates. On some moors, notably Stanmoor and Currymoor, there is no boating. The distance between the withy bed and the homestead also varies considerably, thus producing differences in cost of haulage. Some growers are obliged to haul their crops for several miles. On the other hand, one grower was able to state that haulage is not difficult because his withies are at the roadside; a motor lorry is hired, and the time of transport is negligible. Occasionally a grower is able to state that he does considerable hauling for others.

The statistics are sometimes given at so much per acre, but more often at so much per bundle; sometimes the figure is combined for the two items, at other times separate costs are given for boating and hauling.

From 7 growers, a combined figure has been obtained :

6/-, 10/-, 20/-, 20/-, 20/-, 20/-, 50/- per acre.

The figures themselves show a wide divergence; converted into a price per score bundles at the cropping density quoted in the particular instance,

* Used in compilation of final cost tables.

these figures become:

8d., 1/2, 2/-, 2/-, 2/11, 2/8, 5/-, per score.

Certain figures are at hand for boating costs:

"Rows 200 bundles a day."

"8/4 an acre for 130 green bundles."

"Boating costs 1/- per score."

"Boating 1/- per score."

"Boating is done at piece-rates at 1d. per bolt."

"Boating 1½ miles costs 1/3 a score."

Given per score bundles, these figures work out at:

7d., 1/3, 1/-, 1/-, 1/8, 1/3.

The last four of these growers give haulage costs at

1/8, 1/8, 2/6, 1/-

giving a total of

2/8, 2/8, 4/2, 2/3 per score bundles.

The following table lists the costs where haulage and boating are given together, or where boating is of no importance.

TABLE 22

MILES	QUANTITY	COST	COST PER SCORE
¾	score	1s.0 d.	1s.0d.
3	150	15s.0 d.	2s.0d.
1	score	1s.0 d.	1s.0d.
(1	100	15s.0 d.	3s.0d.
(½	100	10s.0 d.	2s.0d.
	100 bundles a day		1s.2d.
	bundle	2 d.	3s.4d.
	score	6s.0 d.	6s.0d.
½ rowing, unloading twice + 3 miles hauling	100	30s.0 d.	6s.0d.
	bundle	1 d.	1s.8d.
	bundle	2 d.	3s.4d.
	bundle	2½d.	4s.2d.
	100	20s.0 d.	4s.0d.
	bundle	1 d.	1s.8d.
	bundle	2 d.	3s.4d.
	score	2s.6 d.	2s.6d.
	score	1s.0 d.	1s.0d.
	bundle	2 d.	3s.4d.
	score	1s.1 d.	1s.1d.
	100	20s.0 d.	4s.0d.

Summary Table :

TABLE 23

Price range per score bundles	No. of quotations
6d. - 1s.6d.	7
1s.6d. - 2s.6d.	8
2s.6d. - 3s.6d.	9
4s.0d.	4
5s.0d.	1
6s.0d.	2
	31

This table excludes the two growers who gave boating costs, but no haulage, otherwise it includes all the holdings upon the above tables. The average cost works out at 2s.6d.* per score. The range 1s.6d.*- 3s.6d.* per score includes more than half of the number of quotations.

20. SORTING AND TYING

The bundles as brought from the withybeds are sorted into different lengths and certain unwanted material is cast out. As a rule, sorting is done into four, five, six and seven foot lengths; thus, all rods which exceed four feet, qualify for the five foot bundle, all which exceed five feet qualify for the six foot bundle. A small quantity is sometimes obtained in the eight foot length and sometimes good quality material is sorted out at 3 feet. These remarks apply to big growing varieties, whereas in the case of a fine variety the bulk of the crop may be between 3 and 5 feet. As the large bundles are difficult to manage the sorted material is tied up into half-bundles or "wads". The girth of the withybed bundle measures 3 ft. 2 ins.

Remarks on sorting :

"Sorting with different lengths, casting out those too short and those too rough"

(withies are said to be "rough" when side branches develop)

"All under 3'6" have to be thrown out"

"Cast out under four feet, weeds, roughs, and withies that are very badly cankered"

"Sorted into different sizes, 4', 5', 6', 7', throwing out roughs"

* Used in compilation of final costs table.

"Sorting and tying into half-bundles, casting out small and weeds"

"Can sort clean withies more easily and quickly than rough and spraggly ones"

"Last year a bad sample raised the cost from 2/6 a score bundles to 5/-"

Whilst rods badly cankered are rejected during the sorting, it is not the practice to sort according to quality, for there is no recognised standard. What is meant by "badly cankered" or "very rough" is left to the discretion of the individual grower (or buyer).

Cost quotations for sorting and tying are usually given per withybed bundle or per score.

TABLE 24

Piecerate per score	No. of Growers
1s.8d.	4
1s.9d.	1
2s.0d.	5
*2s.6d.	6
*2s.9d.	4
3s.0d.	2
*3s.4d.	6
3s.6d.	1
4s.0d.	2
5s.0d.	2
	33

The average cost per score bundles is *2s.9d., whilst more than half the total number of cases fall between *2s.6d. and *3s.4d.

In some cases, the rate of sorting has been given:

"Sorting is done day work at 80-100 bundles a day. The rate of pay is 6/- a day."

" Done day work nearly always. 80 a day."

"Day work: 40 bundles a day."

"50 bolts a day."

"One man sorts 40 bundles a day."

"30 bundles a day."

"30-35 bundles sorted a day."

*Used in compilation of final costs table.

On the assumption of a day wage of 6/-, the average cost of sorting and tying per score works out at 2/8, showing a difference of only 1d. from the average of the piece-rates given in the above table.

21. SUMMARY

It has been shown earlier in this chapter that the costs of cutting group themselves at two well-defined points, namely, 3/6 and 4/- per score bundles. The majority of holdings are covered by a range of 1/6 - 2/6 for boating and hauling and of 2/6 - 3/6 for sorting and tying.

These costs are tabulated below :

TABLE 25

OPERATION	COST PER SCORE	
Cutting per score bolts	3s.6d.	4s.0d.
Boating and hauling	1s.6d. - 3s.6d.	1s.6d.- 3s.6d.
Sorting and tying	2s.6d. - 3s.6d.	2s.6d.- 3s.6d.
	7s.6d. -10s.6d.	8s.0d. -11s.0d.

Thus the majority of farms will be covered by a range of 7s.6d. - 10s.6d. where cutting is assumed at 3s.6d., or 8d.0d.- 11s.0d. where cutting is assumed at 4s.0d. a score.

NOTES ON ILLUSTRATIONS.

Left hand page.

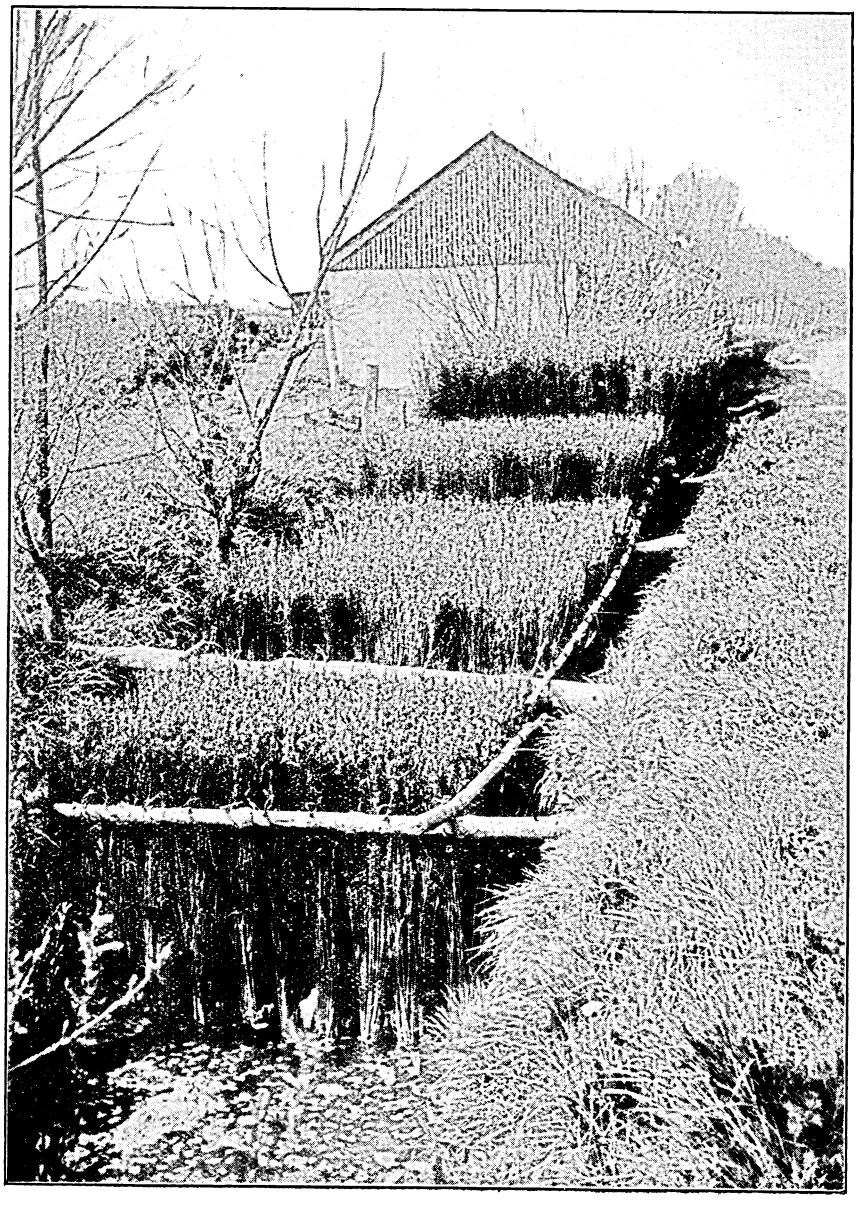
Top: Cutting withies. Note how the late floods have whitened the lower half of the withies.

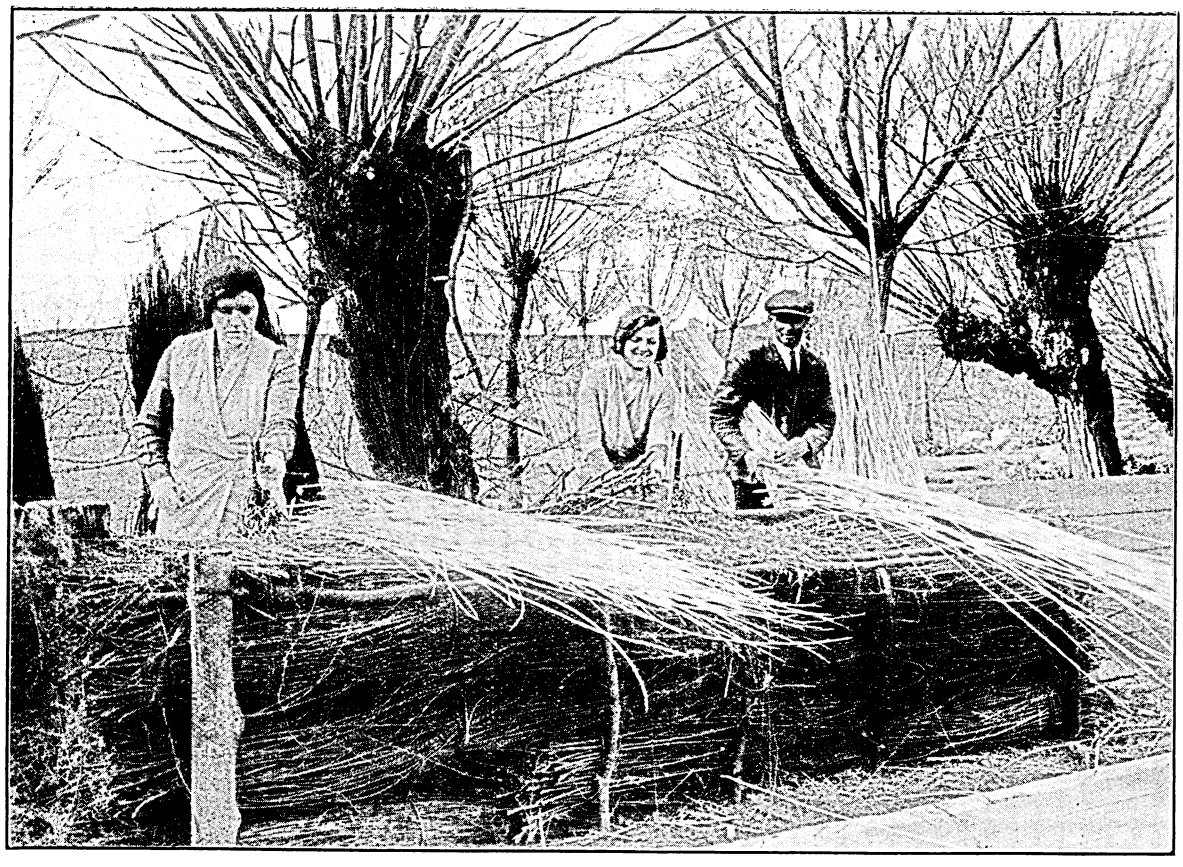
Bottom: Withies graded according to lengths and stood in a "pit" by the roadside, to await stripping.

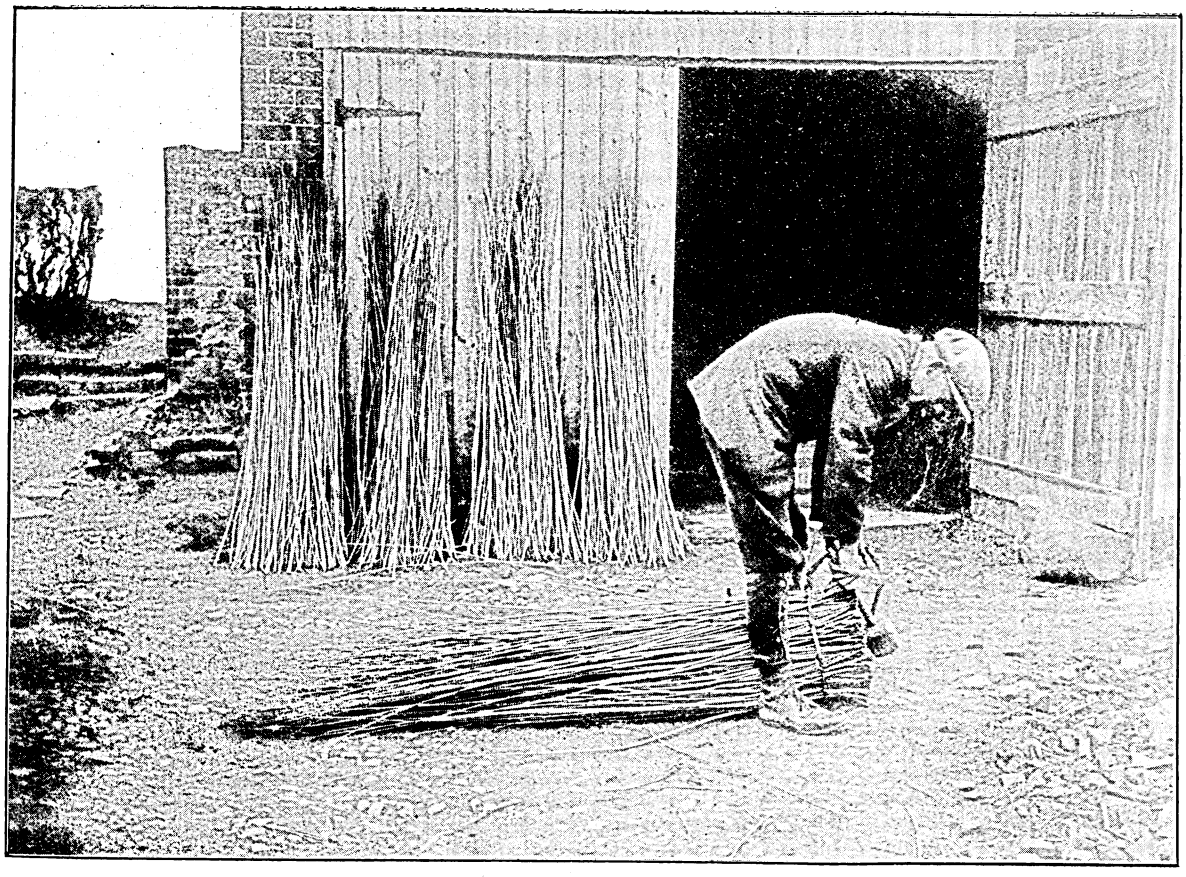
Right hand page.

Top: Stripping withies by hand. As explained in the text the withy is drawn rapidly between the jaws of the "break" fixed vertically on the bench.

Bottom: Making up "bolts" of withies.







CHAPTER 4 FINISHING PROCESSES

22. Sorted Bundles and Marketable Bundles as Proportions of Withybed Bundles.

23. Relation with Weeding and Crop cut.

24. Classes of Saleable Willows.

25. Pitting.

26. Cost of Stripping.

27. Cost of Breaks.

28. Stripping Machines.

29. Cost of Boiling.

30. Cost of Boilers.

31. Cost of Tying for Market.

32. Summary.

22. SORTED BUNDLES AND MARKETABLE BUNDLES AS PROPORTIONS OF WITHYBED BUNDLES.

In this chapter, we are concerned with those costs which are based upon the "sorted" bundle as unit; it is necessary to discover what relationship exists between the withybed bundle, the sorted pit bundle, and the marketable bundle. As a general rule, sorting is done before pitting, though in some cases, especially when the season is favourable to rapid cutting, the withies may be pitted before they are sorted, since it is not advisable to leave the withies too long out of pit.

The process of sorting examined in the last chapter has the effect of reducing bulk. In order to relate the costs analysed in this chapter to those analysed in the last, the proportion of sorted bundles to withybed bundles must be ascertained. During the processes of pitting, stripping and retying for market, a further shrinkage in bulk obtains, so that the price ultimately received per marketed bundle is for rather more than one sorted bundle and for considerably more than one withybed bundle.

In this section, these proportions are ascertained. Note that, throughout, one pit or sorted bundle is equal to two wads.

In some cases, figures have been obtained giving both the proportion of pit bundles and the proportion of marketable bundles.

> "a score of green bundles gives 2 dozen wads of 2'7", whilst 2 bundles of finished whites are obtained from 3 bundles green."
>
> "three green bundles give 4½ pit wads, which give 2 white or buff bolts."
>
> "two bundles green give 3 half-bundles, and 2½ pit half-bundles give 1 bolt of white."
>
> "1000 green bundles gave 500 sorted bundles, and a further 60 of these died in pit as the season was too dry and cold."

From eleven withygrowers it was possible to get the proportion of sorted bundles per 100 withybed bundles:

TABLE 26.

Sorted bundles per 100 withybed bundles	Number of holdings	Total withybed bundles	Total sorted bundles
90	1	1,400	1,260
80	2	8,820	7,056
75	4	10,000	7,500
60	2	970	582
50	2	5,650	2,825
	11	26,840	19,223

This gives an average proportion per grower of 70 sorted bundles to every 100 withybed bundles. Calculated from the two last columns, the average proportion is 72.

From 37 growers figures have been obtained showing how many finished white or buff bolts are obtained from 100 withybed bundles:

TABLE 27

Finished bolts per 100 withybed bundles	Number of holdings	Total withybed bundles	Total sorted bundles
80	1	5,000	4,000
75	4	3,125	2,344
70	2	1,000	700
#67	11	39,090	26,060
60	6	11,300	6,780
55	2	4,484	2,466
50	9	16,990	8,495
45	1	1,350	495
40	1	625	250
	37	82,964	51,590

(# represents the proportion 2 from 3)

The average proportion per grower of finished bundles works out at 61. Calculated from the last two columns, the average proportion is 62. The lower proportions in each case (70 and 61 respectively) are employed in subsequent calculations.

From these figures it is possible to see that those costs which are based upon the withybed bundle must be concentrated upon a smaller quantity of sorted bundles. A cost of 4s.0d. a score for cutting means a cost of 4s.0d. for 14 sorted bundles, that is, 5s,9d. per score. The price received for 61 bolts when finished has to cover the costs of the pitting and stripping etc. of 70 sorted bundles, and the costs of cultivation and cutting of as many as 100 green withybed bundles.

23. RELATION WITH WEEDING AND CROP CUT.

Is there any relationship between the proportion figures tabulated above, and other management statistics? In order to do this, tables 26 and 27 are combined, the proportion of 70 sorted bundles to 61 finished bundles (86%) being used.

TABLE 28

Sorted bundles per 100 withybed bundles	Finished bundles per 100 withybed bundles	Number of holdings
92	80	2
86	75	4
80	70	3
*75	*65	13
*69	*60	6
63	55	2
*57	*50	10
52	45	2
46	40	1
		43

* figure used in the compilation of the final costs table. The figures are calculated to the nearest 5%.

Comparison is made with:

(a) the number of weedings.
(b) the bundles cut per acre.

(a) The number of weedings

The figures here work out in the direction expected, for on 15 holdings weeded once, an average of 59% finished bundles from withy bed bundles is obtained; on 16 holdings weeded twice, an average of 61% is obtained and on 4 holdings that are weeded three times, the proportion rises to 64%.

(b) The bundles cut per acre.

It would seem that a high yield of withybed bundles per acre may be due to one of two causes; on the one hand the high yield may actually represent a good crop, yet on the other hand, it may mean that a large proportion of weed has been collected with the withies consequent upon lack of attention to weeding management, as is instanced in the bottom line of the following table.

TABLE 29

Proportion of finished bundles	Number of holdings	Average Crop per acre
75 and 80%	6	200
65 and 70%	16	169
55 and 60%	6	155
45 and 50%	10	202

24 CLASSES OF SALEABLE WILLOWS

Withies are sold finally in several different forms, principal amongst which are those known as "whites"; if cut in the autumn or winter, withies for whitening must be "pitted". Pitting consists in allowing the withies to stand in several inches of water. The whitening process commences in the spring when the sap is active, and the rods begin to shoot.

"The whitening is done from April to June."

"Whitening commenced at the end of April."

"The season for whitening is limited from April 1st until the end of July."

"Whites are stripped from the middle of April until the middle of July."

When taken from the pits, the withies are distributed to strippers; large quantities are stripped with the help of domestic labour, though large quantities in addition provide employment for women and girls at piece-rates. Very often the withies are distributed to the homes of the pieceworkers.

It is the general practice to strip the withies by hand. For this purpose, a pair of "breaks" is employed: two pieces of steel sprung together and contained in an iron or wooden frame. The withy is slashed between the steels and worked in such a way that the withy is freed of bark. Some growers have experimented with petrol-driven machines for stripping; a special section of this report deals with this.

Some withies are "buffed". This process may proceed throughout the winter months, so that occupation and employment are provided during that season. The buff appearance is obtained by boiling the withies so that organic substances contained in the bark dye the wood. After boiling, the buffs are stripped in the same way as are the whites.

A few growers possess boilers of their own, but the majority depend upon getting their boiling done at a piece rate.

Characteristic statements on buffing are given:

"Withies are whitened every year; very little buffing is done, as there is not much call for them."

"Buffing can be done all the year round, and the earlier the better, as a much better colour is obtained. Whitening is started later in the Spring."

"As a rule, more whites are prepared than buffs. When the chair trade was in full swing, there was a big demand for buffs, but it does not exist today. Buffing is better done soon after cutting."

"There is a bigger demand for white withies than for buff, though buffing can be done in any weather."

"Mostly buffed. A few whites."

"Sold buffs and whites. Buffing costs more, but is continued during the winter because it would not be possible to whiten all in the late spring."

"For the last two years, all withies have been whitened; wished some buffs had been done, as whites were not all finished until the middle of July."

"Buffing is done to keep strippers in more regular employment."

"Can buff all the year round."

"Produces buff or white according to the estimation of market; this year about half and half."

"Black Mole is usually buffed."

"Buffs can be stripped at any time."

"No buffing done for the last two years; there is no call for buffs now, so all are whitened."

"Cutting for buffing commences early in November; there is no buffing from the pit."

In addition to the markets for whites and buffs, there is a limited market for "browns": the unstripped product:

"All are sold white and buff except a few browns when rough. The rough ones are sold for the making of yeast baskets."

"A few whitened. Have made yeast baskets from browns for the last 2 years."

"All withies that are good enough are whitened or buffed, but some quantity is sold brown for yeast baskets."

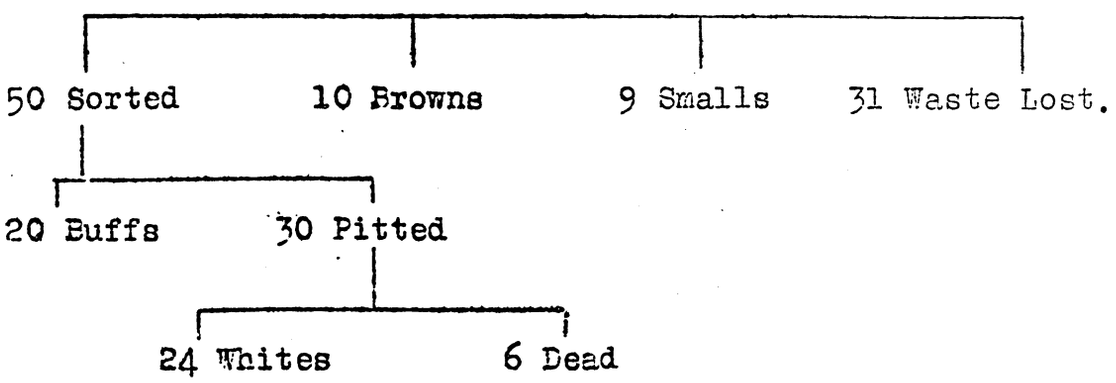
"Generally whiten them all, but this year all were sold brown."

"A few roughs are sold brown."

In one or two cases, actual figures showing how the total crop is distributed amongst the various classes have been obtained:

One grower gave sufficient information to construct the following analysis:

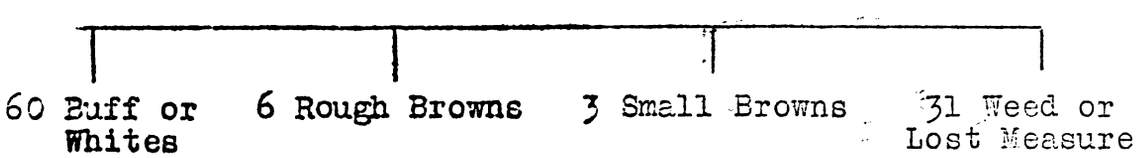
100 GREEN WITHYBED BUNDLES



This gives a saleable stock of 24 whites, 20 buffs, 10 browns, 9 small, and 6 dead saleable at a low figure.

Another grower divided his crop as follows:

100 GREEN WITHYBED BUNDLES



These examples are, of course, not necessarily characteristic of the whole industry.

It will next be necessary to analyse the costs of pitting, boiling, stripping and drying in greater detail.

25. PITTING

The costs associated with the pitting process are for the annual cleaning and the cost of carrying and placing in pit. The latter cost is usually included in the cost of sorting and tying. It was stated in one case that a man can pit about 1000 bundles in 3 days, and in another case that two men can pit 2000 bundles in a week.

In order to keep the withies free from mud, the pits have to be cleaned out ready for each season:

"A day's work is necessary to clean a pit to hold 200 bolts."

"10/- a year for pit maintenance."

"12/- a year for cleaning pit."

"one man can clean a pit in 2 days."

"pitting costs 1d. a bundle."

"a pit for 350 bolts can be cleaned in a day."

"in 2 days a pit for 500 bolts can be cleaned."

"about a day's work, done by self."

"pits are cleaned out once a year; one pit has a permanent stone bed; otherwise, rough materials, such as tree branches or ashes are used as a base. Cleaning takes about one day for a pit which holds from 300-400 bundles. One large pit holds 2000 bundles, whilst another holds 1000. It takes about a week to clean all the pits."

"pitting absorbs money when water is short; pits have to be cleaned out before the withies are put in."

From the figures available, the following table has been constructed:

TABLE 30

COST OF PIT MAINTENANCE per score sorted bundles	No. of Holdings
1d	1
2d	3
3d	4
4d	2
5d	1
6d	3
9d	2
10d	1
1/-	1
	18

The average for these 18 holdings is 5d. per score. The wide range of costs is due partly to the varying sizes of the pits and partly to the amount of cleaning out to be done; the majority of costs fall between 3d and 6d.

26. COST OF STRIPPING

The cost of stripping is very easily found, since the work is done piece-rate, at so much a bundle. Table 31 summarises the figures for 45 growers.

TABLE 31

Rate paid per bundle	Number of growers
10d	2
9d	26
8d	17
	45

The average cost per bundle is $8^{2}/3$d. or 14/5 per score. The average cost on the holdings in the Stoke St. Gregory and Burrowbridge areas is $8\frac{1}{2}$d. and on the holdings in Kingsbury Episcopi 9d, or 15/- per score.

In addition to the above, a few growers stated the cost of stripping as so much per white or buff bolt;

"stripping costs 9d. a green or 1/- a white bolt."

"costs 1/2 per white or buff bolt."

"1/1 per white and 1/2 per buff bolt."

It is impossible to estimate the value of the work done by the willowgrower himself or by his family; all that can be said is that there are some growers, at one extreme, who get all their stripping done with family labour, others who put it all out at piece-rates. Statements such as the following have been obtained :

"a lot of stripping done by family."

"done with family help."

"do a lot ourselves."

"one man employed in addition to self."

"done by self."

The following statements give an idea of the rate of stripping, from which an idea of the daily wage earned can be calculated :

"good strippers do 8 or 9 bolts a day, an average stripper 5 or 6."

"a good stripper will do 10 green bundles a day."

"6 or 7 a day is a good rate, 4 or 5 is an average. A good stripper would strip an acre in a season."

"3 bundles a day."

"has 4 strippers at work. A woman would average 3 bundles a day."

"10 or 12 people on stripping. Good strippers would do 4 bolts a day. An average is 3, though some may do 5."

"Employs 6 strippers - a stripper can deal with 4 white bolts per day, on an average."

"an average rate is 3½-4 bundles a day - sometimes 7 or 8, whilst 10 has been reached."

"a good stripper would do 4 or 5 bundles cut from stock, or 3 or 4 taken from pit."

"can strip 6 wads a day."

"a good woman can strip 3 or 4 bundles a day."

"3 or 4 bundles a day."

At the lowest rate of 3 bundles a day, the earnings would be 2/- a day or a little over; at 4 bundles a day, just under 3/-, at 6 bundles about 4/4 and at 8 bundles, 5/9. To earn 6/- a day, a stripper would have to be exceptionally good.

27. THE COST OF BREAKS

The breaks which are used to strip the withies cost a few shillings each.

TABLE 32

Cost of Breaks	Number of Growers
3/-	1
3/6	2
4/-	1
4/6	1
5/-	5
	10

The average of these 10 cases is 4/6. Each year the breaks have to be resteeled. Table 33 tabulates this cost.

TABLE 33

Resteeling	Number of Growers
9d	1
1/-	3
1/6	2
1/8	1
1/9	1
	8

The average cost is 1/3. If one break will strip 200 bundles in a season, resteeling costs less than 2d a score bundles.

28. STRIPPING MACHINES

There are many stripping machines now in use, though opinions differ very much regarding whether they are successful or not, even amongst those who have

experimented with them. The opinion of growers generally is hardly favourable towards them and in any case, the capital expenditure is rather too heavy an item for most of the growers. Here are the opinions of a number of willow growers who have not invested in a machine :

"Stripping machines have not been a very great success; they are better for buffing than for whitening; would not have one; might become a success if whitening could be performed properly."

"The machine takes off the gloss, which is of extreme value to the appearance of a withy."

"Doesn't think much of the machine. Reckons four women would do as much as a machine."

"The machines in the district free a lot of strippers, making it easier and cheaper to get stripping done."

"Hand labour is more effective for whites - machine labour for buffs."

The majority of those growers who have machines are not entirely satisfied :

"Stripping machine found useful for buffing, but not for whitening."

"Black Mole does not strip perfectly and has to be run through on the hand break afterwards."

"No running through necessary for buffs."

"Stripping machine is good for buffing, but not for whites."

"Stripping by machine is not an unqualified success."

On the other hand, one or two growers have experimented with their machines and found that by making one or two adaptations or adjustments, the machines answer very successfully and give better withies for marketing than hand breaks.

"The machine has proved successful for whites as well as for buffs. The former do not get dirty, and the gloss is well maintained. Speed is an important factor, for breaking canes and gloss is lost if the speed at which the machine is run is too great. 270 revolutions per minute is suitable, but rather less for soft willows. The tension of the breaks must be adapted accordingly."

An idea of costs can be given. The cost of machines has been stated as : £41:10:-, £38:10:-, £38:10:- , £38. The power is obtained from a petrol-driven engine costing, in different instances, £45, £27:10:-, £29. In addition the cost of machine and engine together has been stated at £64 and £80. On an average, an outlay of £70 is necessary.

It has been stated that the petrol cost of a stripping machine works out at 4d. an hour, whilst 10 wads of buffs can be worked through in an hour. Each score of sorted bundles therefore costs 1/4 in power to strip on a machine. A score of bundles would take 2 men 4 hours giving a labour cost of 4/10d per score. The grower who gave these figures would strip about 1800 bolts in all. His machine depreciation, reckoned at 10%, works out at £4:3:-, whilst engine depreciation at 20% works out at £6. The annual depreciation chargeable to 90 score bolts is £10:3:- or 2/3 per score. The total cost per score can be stated at :

Power	1s.4d
Labour	4s.10d
Depreciation	2s.3d
Total	8s.5d per score

This contrasts very well with the average cost of hand stripping, namely, 14s.5d per score.

To take another example; the machine cost £38:10:-, depreciation at 10% therefore £3:17:-. The engine cost £45, depreciation at 20%, £9. Only buffing is done on this machine and about 800 bundles are done annually. The depreciation per score is consequently 6s.5d. Two men working the machine can do 70-80 wads in a day. The labour cost of a score bundles works out at 6s.0d. The petrol cost is at the same rate as above, so that the total cost is :

Power	1s.4d
Labour	6s.0d
Depreciation	6s.5d
Total	13s.9d per score

Clearly there is not very much advantage in a machine here, apart from the fact that the grower can put some of the labour cost into his own pocket when he works on the machine himself.

Here is a third example. Cost of machine £30:10:-, depreciation £3:17:-; engine cost £27:10:-, depreciation £5:10:-. About 2500 withies are worked, so that the depreciation is 1s.7d per score bundles. The rate of work for 2 men together is 35 - 40 bundles a day. A score costs therefore 6s0d in labour. As the machine absorbs 2 gallons of petrol a day, the cost is about 1d a bundle, or 1s.8d a score.
Costs per score :

Power	1s.8d
Labour	6s.0d
Depreciation	1s.7d
Total	9s.3d per score

Another grower gave the following figures : Depreciation on engine and machine, £9:12:-. With a total

of 750 bundles to strip, depreciation works out as high as 5s.1d a score. 15 to 16 bolts are stripped per day by two men, giving a cost per score of 15s.6d. The cost of petrol per day is 4s.1½d, that is, 5s.4d per score bundles.

Power	5s.4d
Labour	15s.6d
Depreciation	2s.1d
Total	12s.11d per score

To be profitable, a machine should be worked at about 40 bundles a day, whilst a total annual crop of something approaching 2000 sorted bundles is required to keep down the depreciation cost. With lower daily speeds or lower total crops, a grower will be depending on, firstly, utilising his own labour and secondly, saving his own time if he is not going to be a loser on working the machine.

29. THE COST OF BOILING

The majority of growers pay a piece-rate for the boiling of their withies, since the upkeep of a boiler is considerable and necessitates the bulking of supplies. The boilers are in the possession of some of the principal growers who perform the boiling for the others.

The piece-rates which are paid are as follows :

TABLE 34

Piece-rate	No. of Growers
8d	1
7d	5
6d	26

For the purpose of this report, the price of 6d, is adopted for the boiling of sorted bundles, or 7d. per finished buff bundle.

30. THE COST OF BOILERS

It is not possible to calculate the cost of boiling withies per score bundles from the figures collected, since the growers who boil receive produce from other growers, for the boiling of which they receive a payment. The quantities so received are not available. Nevertheless, it is possible to give an account of the principal costs attaching to a boiler and to estimate the cost per score bundles by assuming in turn, different quantities of deliveries.

The cost of the boiler and its fixing are given as follows :

"Boiler cost £76, though part of the fixtures were already built. The cost would otherwise have been £100."

"Boiler cost £70 when bought six years ago; no repairing has been necessary yet."

"A Cornish boiler cost £40 delivered at Bridgwater, with centre tube removed. When fitted up with fire-place and bricks, the cost totalled £72:10:-. It was bought 8 or 9 years ago, whilst the previous boiler lasted over 30 years."

"The boiler cost £50 and lasted 8 or 9 years before repairing was necessary."

"A boiler cost £45, and lasts 10 years."

"The cost of a new boiler today is about £100, and it would last 15 or 18 years."

"A boiler cost £250 in 1922 - now the price would be £100."

"The cost of a boiler is £100 and the yearly depreciation is £10."

"A new boiler must be purchased every 12 or 15 years, and it costs £55 - £60."

"A boiler put in last year cost £42, whilst masonry cost an additional sum of £40 or £60. The life is estimated at from 20 to 30 years."

The average cost is, therefore, about £75. From the estimates of the life of a boiler, an average of 15 years is struck, though its actual life is very much dependent upon the care with which it is used. An average depreciation of 10% every year should suffice to cover repairs in addition, so that £7:10:- can be assumed to be the annual cost for depreciation and repairs.

The cost of fuel per score bundles is calculated from the following statistics provided by different growers :

COAL PER BOILING	BUNDLES PER BOILING	COST PER SCORE BUNDLES
5 cwts.	110 wads	2s.9d
2 cwts.	60 wads	2s.0d
3½ cwts.	45 bolts	2s.3d
3½ cwts.	20 bundles	5s.3d
5 cwts.	50 bundles	3s.0d
4½ cwts.	48 bolts	2s.10d
15 cwts.	100 bundles	4s.6d

On an average, the cost of fuel is 3s.3d. If the total feed is 3000 bundles annually, then the cost per score for depreciation and fuel is 4s.3d. For 2000 bundles annually, the cost would average 4s.9d a score, and for 4000 bundles, 4s.0d. This compares well with the charge of 10s.0d per score bundles, but it must be remembered that the charge for labour is not included.

When withies are boiled immediately after cutting, they have to be put first in cold water, which is then brought to boil. Withies which have been cut for some time can be put straight into boiling water. Boiling lasts about 7 hours.

31. TYING FOR MARKET

When the withies have been stripped, they are at first left in the sun to dry. Further drying is usually necessary under cover. Unless the drying process is thoroughly carried out the rods will show mildew if tied in bundles too soon. Some labour is expended in attending to the drying, though it is difficult to estimate. When dry, the withies are once again tied, and this time are ready for market, and are stored to await disposal. A piece-rate is paid for tying, examples of which are given below.

TABLE 35

Piece-rate per score for Tying	Number of Growers
4s.0d	3
3s.6d	17
3s.4d	7
3s.0d	4
	31

Thus the normal cost is at the rate of 3s.6d a score.

32. SUMMARY

The following figures comprise a summary of the costs examined in the present chapter.

PROCESS	PER SCORE SORTED BUNDLES
Pit maintenance (for whites)	5d
Boiling (for buffs)	10s.0d
Stripping	14s.5d
Tying	3s.6d
Total for Whites	18s.4d
Total for Buffs	27s.11d

CHAPTER V CAPITAL EXPENDITURE

(33) Introductory

(34) Ploughing and Chopping

(35) Time of Ploughing and Planting

(36) Cost of buying Sets and Planting

(37) Costs of Cultivation during First Two Years

(38) Cost of Rooting Out a Withybed

(39) Rent and Rates

(40) Depreciation of Beds summarised

CHAPTER 5 - CAPITAL EXPENDITURE

33. INTRODUCTORY

Under this heading, the expenses which have to be considered are :-

(1) ploughing and chopping the land ready for planting willows.

(2) purchasing and planting willows.

(3) cultivating for two years, since a remunerative crop is not obtained until the third year of growth.

(4) the cost of rooting out and burning the stocks at the end of the life of the bed.

Since there has been very little new planting done during the past few years, only on very few occasions could details of the capital outlay be obtained. In Chapter 1 it was pointed out that a very high proportion of the beds are unduly old, and in assessing the charge to be made for depreciation against crops being harvested in latter years, it is naturally done by writing off a proportion of the original outlay. Considering the present economic situation of the industry, the cost of replacing beds now standing in the moors may not be the same as the cost actually incurred about twenty years ago. As a rule, it is probably the replacement cost which has been obtained, although the survey in general did not allow for such precision. On the other hand, where beds were planted during the period at the end of the war when prices were very high, the figures remain fast in the mind of the grower and it is these which have been sometimes quoted. One willow-grower stated that it cost him £20 in 1919 to plough 6 acres, whereas to-day it would cost him £10, whilst sets for planting were taken from ordinary bolts priced at 10/-, again about double of the price to-day.

Another grower stated that just after the war it cost £300 to put down 4 acres including ploughing, chopping, cleaning for 12 months, buying sets and planting them. Since that time, he states, it has not been possible to manage the beds properly owing to the shortage of capital under the depressed market conditions, and the original capital sunk is consequently depleted.

It seems, therefore, that for the purpose of deriving the capital charge which has to be met over the period of the life of the bed, we must assume the figure that is given to us, irrespective of whether the costs are inflated or are not, but endeavouring at the same time to note the degree of variation experienced.

34. PLOUGHING AND CHOPPING

Examples of quoted costs :

"Ploughing may run to £4 an acre on difficult ground."

"Ploughing in 1919 £20 for six acres."

"Ploughing costs 50/- an acre."

"Cost of ploughing, 30/- an acre."

"Ploughing with three horses and 2 men costs per day 15/- for the horses and 12/- for the men. As it takes two days to work an acre, the cost is 54/- an acre."

"Ploughing £2 an acre."

"Ploughing 2 days an acre, with 2 or 3 horses, costing £2 an acre."

"Ploughing 30/-."

"Ploughing 30/-."

"The cost of ploughing up a grass field is 30/- an acre."

"One ploughing 25/-."

"One ploughing 27/6 an acre with 3 horses, 7" deep."

"One ploughing in the autumn, with 4 horses and 2 men, ½ acre a day, 65/-."

"Ploughing £2."

"Ploughing 50/-."

"Ploughed three times, one man and two horses, £4:10:-."

"Ploughed thrice £4."

"Tractor ploughing at 18/- an acre."

"Ploughing £2 an acre."

"November ploughing, £2:10:- an acre, - 3 horses and 2 men.

The average cost of ploughing works out at £2: 6: 9 per acre. The average of the eleven estimates below this figure, is £1:11:10 and of the nine estimates above is £3:4:11. The degree of variation is very wide because as many as 12 of the 20 figures fall either below £1:11:10 or above £3: 4:11, seven of them below and five above. This variation will be taken into account in compiling the table of total costs.

The land is usually chopped* before planting to level the ground, though this process may often follow the planting. This item has been estimated as follows :

TABLE 36

Cost per acre	Number of Growers
30/- and over	3
40/- and over	0
50/- and over	5
60/- and over	7
70/- and over	1
80/- and over	6
90/- and over	4
100/- and over	0
110/- and over	1
120/- and over	3
	30

£3:12:2 per acre is the average cost of chopping. Sixteen of the thirty quotations lie below this figure, averaging £2:13:6, whilst fourteen lie above and average £4:13: 7. 10 returns out of 30 lie either under £2:13:6 or over £4:13: 7.

The method of levelling down and cleaning the ground differs according to locality. In the Burrowbridge and Stoke St. Gregory localities, the chopping is a process which is performed in the first year of the bed and at no other time. It has already been noticed that hoeing is always performed on Kingsbury West Moor, for all ages, whereas hoeing ceases in Sedgmoor, Stanmoor, etc. when the bed begins to crop fully, and hook weeding takes its place.

Since there is a discrepancy in cost between the localities, the following table has been constructed.

* Chopping is heavy hand-hoeing, to break up the furrows.

TABLE 37

	Stoke St. Gregory & Burrowbridge	Kingsbury & Langport
Number of holdings	14	12
Average cost of chopping	£3: -: 5	£4: 7: -
Number of holdings below average	9	5
Average cost of chopping	£2:10: 1	£3: -:10
Number of holdings above average	5	7
Average cost of chopping	£3:19: -	£5: 5: 8

Of the 30 holdings for which figures for chopping are available, 26 have also provided statistics for the weeding of mature beds. Such figures are not adequate to make it possible to relate chopping to weeding practice, but they are adequate to differentiate between the two localities. It can be seen that the preliminary cost of chopping is heavier in Kingsbury and Langport. This is primarily due to the fact that in this area, a young bed is regularly hoed two, three or even four times.

Only in one or two cases did a willow-grower say that his land was rolled or dragged after ploughing.

35. TIME OF PLOUGHING AND PLANTING

The seasons for ploughing and planting are represented in the following statements :

"a new field is ploughed in October and planted in February."

"planting is done as soon as possible from the 1st December."

"a grass field is ploughed in the autumn, and planting takes place in March."

"a grass field is ploughed in the autumn."

"after grass, plough once."

"the ideal method is summer fallowing, and planting is done as soon as possible after the floods have gone."

"the land is fallowed in the previous summer."

"summer fallowing is essential for efficient preparation. One ploughing in the spring before planting."

"prefer to plough about Christmas and let the frost get at the land; sometimes harrow afterwards. Plant usually in February if it is possible to get on the land."

"plough about November and leave until February; then plant. The land is ploughed in the winter if it is possible to get in the moor. January and February are good times for planting."

"it is better to plough up and plant on a good grass field than to chop out old stocks and plant new ones."

"plough in November."

"plough a good 6" deep. Shallow ploughing useless. Towards the spring is best. Withies are planted in March."

"plough in the autumn, without harrowing, and leave until the spring. The end of January, or February is preferred for planting."

"would plough from May onwards; summer fallow; plant in the autumn."

"plough any time from December to February, clean the ground and plant in February. March is too late on account of the drying winds."

"plough in November; planting begins in March."

"plough in the spring; summer fallow; plant in the autumn."

36. COST OF BUYING SETS AND PLANTING

The ranks are placed from 20 inches to 2 feet apart. In Kingsbury, they are invariably placed 2 feet apart, but in other areas the rows are usually found a few inches closer together. An analysis of the figures shows that

(a) the width is 24" where the hoe is always used for weeding

(b) the width averages 23" where the beds are afterwards cleaned twice with a weeding hook

(c) the width averages 22" where the beds are afterwards only cleaned once with a weeding hook.

The distance between the plants in the rows is not found to differ materially in different localities

nor according to the weeding practice that is to be subsequently followed. Figures stated range from 10" to 20", averaging 14".

The number of sets planted per acre is given from 16,000 to 20,000, though the average figure works out at 19,000. Assuming that the quantity per acre varies with the width between the rows, then it can be deduced that

(a) the quantity is 18,000 where the hoe is always used for weeding

(b) the quantity is 19,000 where the beds are subsequently cleaned twice.

(c) the quantity is 20,000 where the beds are subsequently cleaned once.

The withy sets are cut from specially sorted willows which are known as "drawn withies". Drawn withies are naturally more expensive per bolt, whilst about 1000 sets can be cut from each bolt. New varieties cost about 10/- per thousand, whilst the older varieties range in price from 5/- to 7/6. On an average the cost is 6/6 per 1000. The cost per acre, at 18,000 to the acre, is, therefore, £5:17:-; at 19,000 it is £6: 3: 6, whilst at 20,000 the cost per acre is £6:10:-. The cost of the plants falls in the majority of cases, between £5:10:- and £7:10:- per acre.

The cost of cutting the sets and planting them is sometimes reckoned per acre, sometimes per thousand. Worked out on an acre basis at the quantity given in the particular instance, this cost can be summarised as follows :

TABLE 38

Cost of Cutting Sets and Planting per acre	Number of Growers
Below 60/-	4
65/-	2
70/-	3
Over 100/-	2
	11

The average cost is 70/- per acre. In one case a time rate was paid to experienced hands, $\frac{1}{4}$ acre being planted in a day paid at 10/- or 12/-. In another case, the cost was expressed thus : "one acre is planted by 2 men in 5 days."

37. COSTS OF CULTIVATION DURING FIRST TWO YEARS

In the first year of growth considerable hoeing is applied to the bed, sometimes before planting but much of it after. Whether hoeing is done before or after planting, it has already been included under the heading of chopping.

There remain with respect to the first year's growth, the processes of spraying and cutting. Most growers, even though they may not spray in later years, do spray in the earlier years of the bed. The costs ascertained in the section on spraying are utilized here. These were : for labour (done twice) 9/6 an acre, and for materials 8/6 per acre, totalling 18/-.

The cost of cutting the crop in the first year is not easy to ascertain, but it is the general opinion among growers that, the crop being very small, its sale price is just sufficient to cover the cost of cutting. Many growers have stated in a general way that the first year crop is not really saleable. Several willow-growers give the first crop as from 30 to 40 bundles per acre; one says that although 3 hoeings are needed in the first year, there is practically no crop; nearly all agree that it is negligible, the highest estimates being 70 and from 60 to 70 bundles.

The cultivation costs are again necessarily heavy in the second year of growth. Hoeing is again performed in Kingsbury, but in Burrowbridge and Stoke St. Gregory "spining" is done. This consists in turning over a layer of the ground with a spade.

> "The beds are chopped in their first year to give young plants a chance, and it helps to level the land after ploughing. After levelling it is possible to spine. Afterwards the plants are much stronger and can cope effectively with weeds."

> "In Kingsbury, chopping is done regularly every year, but for the second year it is better to spine with a spade. One spining practically suffices for the year."

> "Spining causes the second year crop to grow crooked, because weeds tend to straighten rods."

The cost of spining has been stated at figures which range from 50/- to £5 an acre. The average works out at 75/-. Those who clean their crop late, and only once annually, average 65/-, whilst those who ultimately clean twice, average 80/- an acre.

Hoeing, where this is done instead of spining, costs from 65/- to 100/- an acre, and is regularly done 2, 3 or even 4 times on young beds at the rate of about one acre a week.

TABLE 39

Cost of Spining or Hoeing in 2nd. Year	NUMBER OF GROWERS		
	BEDS IN LATER YEARS CLEANED ONCE	BEDS IN LATER YEARS CLEANED TWICE	BEDS HOED
per acre			
50/-	1	1	-
60/-	3	1	1
70/-	-	-	1
80/-	-	-	4
90/-	-	1	1
100/-	1	2	-
	5	5	7

Spraying can be estimated in the second year as in the first, that is, at 18/- an acre.

Some estimates of the crop obtained in the second year can now be given.

"Second year's crop is the best of a lifetime."

"Second year's crop reaches 150 bundles."

"Second year's crop not very good."

"Second crop is one of 150 bundles."

"Second crop 70-80 bundles."

There is not much material here to estimate the worth of the crop, and we can only assume again that the value is sufficient to offset the cost of cutting and bringing in.

38. COST OF ROOTING OUT A WITHYBED

The cost of rooting out a bed of withies has been given as follows :

TABLE 40

COST OF ROOTING	NO. OF GROWERS
£ 2:10: -	1
£ 3: -: -	8
£ 3:10: -	2
	11

In addition there is the cost either of burning the stocks on the ground, or of carting them away.

TABLE 41

COST OF BURNING OR CARTING	NO. OF GROWERS
£ 1: -: -	1
£ 2: -: -	3
£ 2:10: -	1
	5

The total cost can be expressed as £5 an acre, £3 for grubbing and £2 for carting or burning.

39. RENT AND RATES

Statistics relating to rent were obtained from 44 growers, distributed as follows :

TABLE 42

Rent per acre	No. of Growers	No. in Stoke St. Gregory & Burrowbridge	No. in Kingsbury
£5: -:-	21	14	7
4:10:--	2	2	0
4: -:-	9	6	3
3:10:-	3	2	1
3: -:-	7	6	1
2:10:-	-	-	-
2: -:-	2	2	0
	44	32	12

Thus the average rent works out at £4: 5: - per acre. For Stoke St. Gregory and Burrowbridge the average rent is £4: -: -* an acre, whilst the average of those above this figure is £5: -: -* and the average of those below is £3:10: -* . For Kingsbury Episcopi the average rent is £4:10:-*; the average of those over this figufe is £5: -: -* and of those below is £3:15:-*.
It is known that the figure quoted for rent frequently includes drainage rates, particularly in the higher quotations. It is felt therefore that the selected averages can fairly be considered as inclusive, and are used both for the annual expenditure and for purposes of calculating the capital cost incurred at the commencement of the life of a withybed.

40. DEPRECIATION OF BEDS SUMMARISED

It is now possible to add together the costs of laying down a bed of withies.

Ploughing. £2: 6: 9 an acre, with an average variation of 17/- or 18/- on either side.

Chopping. In Stoke St. Gregory and Burrowbridge £3: -: 5 an acre, with an average variation of about 15/-. Hoeing in Kingsbury and Langport, at an average of £4:-:7, with an average variation of about 20/-.

Sets per acre. One-hook beds, £6:10:- an acre, two-hook beds, £6:3:6 an acre, hoed beds, £5:17:-. Average variation works out at 20/-.

Cutting sets and planting. £3:10:- an acre.

Spraying in first year. 18/- an acre.

Spining in second year. One-hook beds, £3:5:-. an acre; two-hook beds, £4:-:-. Hoeing, where this replaces spining, averages £4:-:- an acre.

Spraying in second year. 18/- an acre.

Rent £4:10:- in Kingsbury, £4:-:- in Stoke St. Gregory and Burrowbridge.

From these figures it is possible to construct the following table :

* used in compilation of final cost tables.

TABLE 43

CAPITAL EXPENDITURE

PER ACRE

	BURROWBRIDGE. STOKE ST. GREGORY		KINGSBURY. LANGPORT.
	Beds cleaned once when mature	Beds cleaned twice when mature	Beds hoed
Ploughing	£2: 6: 9	£2: 6: 9	£2: 6: 9
Chopping 1st Year	3: -: 5	3: -: 5	4: 7: -
Sets	6:10: -	6: 3: 6	5:17: -
Planting - labour	3:10: -	3:10: -	3:10: -
Spraying 2 years	1:16: -	1:16: -	1:16: -
Spining 2nd year	3: 5: -	4: -: -	-
Hoeing 2nd year	-	-	4: -: -
	20: 8: 2	20:16: 8	21:16: 9
Rent & Rates, 2 years	8: -: -	8: -: -	9: -: -
Rooting	5: -: -	5: -: -	5: -: -
TOTAL OUTLAY	33: 8: 2	33:16: 8	35:16: 9
Annual depreciation assuming 18 years cropping	1: 7: 2	1:17: 7	1:19:10

How do these figures compare with those which have been given as all-in estimates ?

"£30 an acre would be necessary for ploughing, working and setting."

"One acre in 1928-29 cost £20 for rooting, ploughing, harrowing, purchase of Black Mole sets and planting."

"From beginning to end, planting costs £20 an acre."

"Over £20 for chopping, ploughing, sets and planting."

"Total £50 an acre."

"Total cost of planting £40 an acre."

"Total planting costs £20 an acre."

"Total cost £20 an acre."

"An acre would cost £20 for ploughing, chopping, planting, sets and cultivating for a year."

"Cost of rooting and re-bedding £20 an acre."

There is bound to be very considerable variation in these outlay costs. Judging from the degree of variation found in individual cost items, it is likely that an average variation would be found in the above costs of initial outlay, of approximately £2:10:- either way in Stoke St. Gregory and Burrowbridge, and of approximately £3:-:- either way in Kingsbury and Langport.

Finally we must add together the cost of planting and the cost of grubbing, take into account the rent and rates that must be paid even though crops are not being harvested, and divide the sum total by the number of years that the bed can be expected to last. Rent and rates average £4: 5: - per acre for each year. In an earlier chapter, the average life of a bed was given as 20 years which we shall accept even though the average life must actually be very much higher owing to the postponement of replanting. Two of these years must be deducted to allow for the planting and bringing to full crop, thus leaving a period of 18 years over which the initial outlay and other capital charges must be spread. The annual charge for depreciation works out at a little under £2 an acre.

CHAPTER VI THE COSTS SUMMARISED

41. METHOD OF COMPILATION OF FINAL COSTS TABLE

42. NOTES ON THE TABLE

43. MEANING OF THE FINAL AVERAGES

44. THE COST OF PRODUCING BUFFS

45. SELLING PRICES OF WHITES AND BUFFS

46. THE ECONOMIC SITUATION REVIEWED

CHAPTER VI

41. METHOD OF COMPILATION OF FINAL COSTS TABLE

In the sections of this report which examine the different items in the cost of production of willows, not only is the average cost determined, but the significance of the degree of variation in the costs from one grower to another is stressed. As a rule, a costs range is stated. This range is designed either to cover a majority of the growers, or to express separate averages for that half of the growers with higher costs and for that half of the growers with lower costs. For each item of cost has been found, therefore, three statistics, one representing a low cost, one representing an average cost, and one representing a high cost. It should be noticed that the low and high figures are definitely not the lowest and highest recorded.

The three series of costs are tabulated separately, for Stoke St. Gregory and Burrowbridge on the one hand and for Kingsbury Episcopi on the other. These names conveniently denote the difference in cultivation practice - hook-cleaning and hoeing respectively.

The final costs table is divided into four parts. Part I covers the costs of cultivation, on an acre basis; part 2 covers cutting, boating, hauling, sorting and tying, on a score-withybed bundles basis; part 3 includes pitting, stripping and tying for market, costs which are based on the sorted bundle, whilst part 4 deals with the depreciation of the withybed and with the overhead charges of rent and rates.

Cross references to the text are given.

Although efforts have been made to find relationships between the costs of different operations, these have been largely ignored in the compilation of the table, since the results were not conclusive. In general the aim has been to show the cost of production on the following types in each locality :

(A) low expenditure on cultivations, low yield, high costs for cutting, hauling and sorting, and low rent.

(B) average expenditure on cultivations, average yield, average costs for cutting, hauling and sorting, average rent.

(C) high expenditure on cultivations, high yield, low costs for cutting, hauling and sorting, and high rent.

The associations implied above appear reasonable and receive some support from the text. However, the reader is left to use his own judgment

COSTS OF WILLOW PRODUCTION

COST ITEM	REFERENCE	STOKE ST. GREGORY BURROWBRIDGE A	B(average)	C	KINGSBURY EPISCOPI A	B(average)	C
		£: s: d	£: s: d	£: s: d	£: s: d	£: s: d	£: s: d
PART 1 COSTS OF CULTIVATION							
Weeding labour per acre	Table 10	1:14: 0	2:10: 0	4:10: 0	2: 0: 0	3: 5: 0	4: 1: 0
Spraying labour per acre	Table 13	nil	: 4: 1	: 9: 6	: 4: 1	: 9: 6	: 9: 6
Spraying materials per acre	Table 13	nil	: 4: 1	:13: 3	: 4: 1	: 8: 6	:13: 3
Implements per acre	Table 17	: : 6	: 2: 4	: 3: 2	: 2: 4	: 2: 8	: 3: 2
Total Cultivation Cost per acre		1:14: 6	3: 0; 6	5:15:11	2:10: 6	4: 5: 8	5: 6:11
PART 2 CUTTING, HAULING AND SORTING							
Yield of withybed bundles per acre	end of Section 18	124	171	206	183	212	249
Cultivation costs per score bundles		: 5: 7	: 7: 1	:11: 4	: 5: 6	: 8: 1	: 8: 8
Cutting labour per score	Table 18	: 4: 0	: 3:10	: 3: 6	: 4: 0	: 3:10	: 3: 6
Boating and Hauling per score	Table 23	: 3: 6	: 2: 6	: 1: 6	: 3: 6	: 2: 6	: 1: 6
Sorting and Tying per score	Table 24	: 3: 4	: 2: 9	: 2: 6	: 3: 4	: 2: 9	: 2: 6
Total so far per score withybed bundles (Parts 1 & 2)		:16: 5	:16: 2	:18:10	:16: 4	:17: 2	:16: 2
PART 3 PREPARATION FOR MARKET							
Sorted bundles per 100 withybed bundles	Table 28	57	69	75	57	69	75
Costs so far (Parts 1 & 2) calculated per score sorted bundles		1: 8:10	1: 3: 6	1: 5: 2	1: 8: 8	1: 4:11	1: 1: 7
Pit maintenance per score	Table 30	: : 5	: : 5	: : 5	: : 5	: : 5	: : 5
Stripping per score	Section 26	:14: 5	:14: 5	:14: 5	:15: 0	:15: 0	:15: 0
Resteeling of breaks	Section 27	: : 2	: : 2	: : 2	: : 2	: : 2	: : 2
Tying per score	Table 35	: 3: 6	: 3: 6	: 3: 6	: 3: 6	: 3: 6	: 3: 6
Total so far per score sorted bundles (Parts 1, 2 and 3)		2: 7: 4	2: 2: 0	2: 3: 8	2: 7: 9	2: 4: 0	2: 0: 8
Total so far per score finished bundles (70 sorted give 61 finished)		2:14: 4	2: 8: 3	2:10: 5	2:14: 9	2:10: 6	2: 6: 8
PART 4 DEPRECIATION OF BEDS AND RENT							
Annual depreciation per acre	Table 43	1:17: 2	1:17: 7	1:17: 7	1:19:10	1:19:10	1:19:10
Rent and rates per acre	Table 42	3:10: 0	4: 0: 0	5: 0: 0	3:15: 0	4:10: 0	5: 0: 0
Total per acre		5: 7: 2	5:17: 7	6:17: 7	5:14:10	6: 9:10	6:19:10
Number of finished bolts per acre on basis of yields above	from Table 28	62	105	134	92	127	162
Total per score finished bundles (Part 4)		1:14: 7	1: 2: 5	1: 0: 6	1: 4:11	1: 0: 5	:17: 3
Total per score (Parts 1, 2 & 3)		2:14: 4	2: 8: 3	2:10: 5	2:14: 9	2:10: 6	2: 6: 8
Final Cost Total per score finished bolts		4: 8:11	3:10: 8	3:11: 1	3:19: 8	3:10:11	3: 3:11
Final Cost per bolt		4/5¼	3/6½	3/6½	4/-	3/6½	3/2¼

and to work out costs on any other arrangement he thinks suitable. All the possible combinations cannot be displayed in this report, but the above combinations are selected as representative.

The average cost is consistently entered in the centre column (B) for each item, so that attention can be concentrated upon these columns for each of the two districts.

42. NOTES ON THE TABLE

Part 1. Weeding labour

Table 10 provides the necessary information with one modification. It is stated beneath Table 8 in section 9, that the average number of cleanings undertaken in Stoke St. Gregory and Burrowbridge is one and a half. The centre figure is consequently the average of £1:14: - (cost of one weeding) and £3: 6: - (cost of two weedings), that is, £2:10: -.

Part 1. Spraying

It is stated beneath Table 12 that in Stoke St. Gregory and Burrowbridge one spraying is done on an average, whilst two are done in Kingsbury Episcopi. In the former area, the number of sprays are taken as 0, 1 and 3 respectively, in the latter area 1, 2 and 3 respectively.

Part 2. Yield of Withybed Bundles

The very large number of statements collected on yield strengthens the reliability of the averages used, but individual variations are liable to be very considerable. The inclusion of a larger selection of yields would make the table unduly complex. The lower yield is arbitrarily related to the lower expenditure on cultivation, the average yield to average cultivation, and the higher yield to more expensive cultivation. This has the effect of levelling out somewhat the range of cultivation costs when measured per score of withybed bundles, yet the possibility of low costs and high yield on the one hand, and of high costs and low yield on the other hand, cannot be ruled out.

Part 2. Costs

The costs in part 2 are related inversely to cultivation costs, that is, higher costs for cutting, hauling and sorting are related to lower cultivation costs, and lower costs for cutting, hauling and sorting are related to higher cultivation costs. The average costs in either case are combined with each other. Since these relationships are not conclusively supported in the text, the final effect of variations in part 2 costs is summarised thus :

A charge of 1/- a score in the cost of withybed bundles is equivalent to a charge of 1/10 a score of finished bolts, that is, 1d. per bolt. Individual costs may vary in this degree, though the final average is not affected.

Part 3. Sorted Bundles per 100 Withybed Bundles

A lower proportion is associated with a lower yield and a higher proportion with a higher yield. This procedure tends to level out the costs between the six groups. Again, the possibility of lower proportions accompanying higher yields or of higher proportions accompanying lower yields is not ruled out.

Part 3. Costs

These are subject to such little variation, that the only distinction made is that for stripping between the two localities.

Part 4. Depreciation

There is not a great difference in the figures for depreciation per acre, but a significant difference emerges when the depreciation is calculated according to the yield of finished bolts.

43. MEANING OF THE FINAL AVERAGES

The averages determined in the sections of the report have been consistently entered in column B for each locality. In each district the average cost per finished white bolt is 3/6½. In column A, lower costs are combined with lower yield, and in Stoke St. Gregory and Burrowbridge, the final cost per finished white bolt is raised thereby from 3/6½ to 4/5½. In Kingsbury Episcopi, the final cost is raised from 3/6½ to 4/-. In column C, higher costs are combined with higher yield, and in Stoke St. Gregory and Burrowbridge the final cost per finished white bolt is still 3/6½, whilst in Kingsbury Episcopi the final cost falls from 3/6½ to 3/2¼d.

It must be borne in mind that certain costs are not included in the figure of 3/6½d. These can be listed as follows :

(a) the cleaning of rhynes and ditches.

(b) the cost of boiling (for buffs).

(c) the haulage of withies to and from strippers working at a distance.

(d) the drying of withies after stripping.

(e) the cost of storing finished bundles awaiting delivery to buyer.

Apart from (b), the cost of boiling for buffs, the information obtained is insufficient for a precise

statement of cost. From the lack of emphasis laid upon these costs by the growers and from our own experience, it is felt that their inclusion would result in no material alteration in the costs as given. Occasionally a grower would state an extra penny or twopence a bolt to cover miscellaneous items.

The cost of production of buffs will receive attention in the next section. Meanwhile it is necessary to point out that apart from the sales of whites and buffs, some remuneration is received for greens and browns. In section 24 the proportions of saleable brown withies are shown in two cases. From these it is not possible to estimate the importance to the willow industry as a whole of the sale of browns, whether small or rough. Saleable browns are a by-product of the sorting process and the income obtained therefrom probably offsets the additional costs which are not included in the final table. It is impossible to say whether the sale of browns completely offsets the costs which are not included.

44. THE COST OF PRODUCING BUFFS

At the end of section 29, it is stated that the additional cost of boiling is 7d, per finished buff bolt. For two reasons the final cost of the buffs is, however, not as much as 7d. in excess of the cost of the white. In the first place, the cost of pitting is avoided, although this is an almost negligible item. In the second place, a saving is effected since there is much less chance of finding rods dead. The proportion of finished buff bolts to green withybed bundles is higher than the proportion of white bolts. If a proportion of 70 finished bolts is obtained instead of 60, then the saving would be sufficient to offset completely the cost of boiling.

45. SELLING PRICES OF WHITE AND BUFFS

As a rule, a grower sells his withies all-in, at a certain price. The potential buyer examines the withies from the point of view of size and quality, and if terms are agreed upon, the withies are sold at so much a bolt for all sizes.

"Two acres of last years whites are now tied and unsold. Not even a dealer calls with a view to buying. Dealers only buy from hand to mouth and avoid carrying stocks. Once you could sell them before being stripped."

"Market fell off shocking."

"Old stocks are still in the hands of merchants and they are not ready to buy at all."

"Stocks are becoming unsaleable and even when sold it is very difficult to get the money."

"Merchant takes the lot irrespective of size. Direct dealing means stocks of small withies on hand."

"Twenty or thirty bundles still in stock from 3 years ago. Unless some 6 foot can be thrown in, stocks cannot be sold."

"Last night some buffs were taken into Bridgwater and sold at 2/- a bolt because the grower was short of money."

"Wont get 5/- a bolt this year. Probably average 4/6."

"4/6 to 5/- a bolt is the local price to small growers who usually take an average price for all sizes."

"Fetch about 5/- a bolt."

"Best quality 5/-, poor quality 4/-."

"Average price 4/9."

"4/6 for white and buff irrespective of length."

"Has had no buyers for the last two years."

"Whites 4/9 a bolt."

"Whites and buffs 5/- a bolt."

"Prices received 7 ft. and 8 ft. 6/- for white and 5/9 for buff.
6 ft. - 5/6 for white, 5/3 for buffs.
4 ft. and 5 ft. - 5/6 for white and 5/- for buff."

"Whites and buffs from last year still on hand."

"Flat rates for all lengths - usually a little more for whites than for buffs."

The following table can be constructed from the information given :

TABLE 44

Price per bolt.	No. of Growers
6/-	1
5/6	6
5/3	3
5/-	12
4/9	6
4/6	23
4/3	2
4/-	1
	54

The average price received is 4/9½d a bolt.

46. THE ECONOMIC SITUATION REVIEWED

The ascertained average cost of production of a bolt of white willows is 3/6½d. The average selling price is stated to be 4/9½d., providing a margin of 1/3 a bolt. At first sight this figure suggests that the industry should be in flourishing condition, for the margin provides a figure of 35% on costs. It would be fallacious, however, to measure the prosperity of the willow growing industry by contrasting the cost of production and the selling price of the white bolt. Two very important factors must be brought into account; firstly the annual income that this profit gives to the grower and secondly, the bulk of withies that remain on hand unsold.

Even though a high rate of profit on costs is shown, a low annual income may be received if the size of the holding is small and the output of produce is limited. Nearly half of the total number of growers surveyed possessed less than 5 acres of willows. In Stoke St. Gregory and Burrowbridge, the average production of white bolts is 105 to the acre (part 4 of costs table). The average income from a 5 acre holding of willows is consequently £32:16: -. In Kingsbury Episcopi the average production is 127 white bolts and the average income from 5 acres of willows is £39:14:-.

The cost of 3/6½d a bolt is obtained by charging all labour, inclusive of family labour. It is apparent from the above income figures that a grower must turn a considerable amount of the labour cost into his own pocket if he is going to earn an adequate income. From the material collected it is not possible to give a precise account of the amount of family labour, though it is possible to state the problem in another way. What proportion of the total labour cost must be turned into the grower's own pocket if his annual income is to be equivalent to the standard rate for agricultural workers paid throughout the year? The standard rate in Somerset is 30/6 a week for ordinary adult workers. This represents an annual income of £79:6:-. If the grower with 5 acres of willows is to receive an annual income of £79:6:-, he must combine with the profit he makes of £32:16:- in Stoke St. Gregory or of £39:4:- in Kingsbury Episcopi, a wage-income of £46:10:- in the former area, or £39:12:- in the latter. This means that in Stoke St. Gregory, a 5 acre grower must turn 1/9½d of the cost of 3/6½d into his own pocket if his income is to be equivalent to that of an agricultural worker. In Kingsbury Episcopi a 5 acre grower must turn 1/3 of the cost of 3/6½d into his own pocket.

It is now necessary to enquire what proportion the figures of 1/9½ and 1/3 respectively form of the total labour cost involved in producing a bolt of white willows. The following table provides the requisite information :

TABLE 45

LABOUR COST OF WHITES

Labour Cost	Reference	Stoke St. Gregory & Burrowbridge	Kingsbury Episcopi
Weeding per acre	Part 1.	2:10: -	3: 5: -
Spraying per acre	Part 1.	: 4: 1	: 9: 6
Capital expenditure per acre	Table 43 less sets & rent	:12: 7	:13: 4
Total per acre costs		3: 6: 8	4: 7:10
Yield	Part 2	171	212
Costs per score withybed bundles		-: 7: 9	: 8: 4
Cutting to Tying	Part 2	: 9: 1	: 9: 1
Total per score withybed bundles		:16:10	:17: 5
Sorted per 100 withybed bundles	Part 3	69	69
Costs per score sorted bundles		1: 4: 7	1: 5: 4
Pitting, stripping, tying	Part 4	:18: 4	:18:11
Total labour costs per score sorted bundles		2: 2:11	2: 4: 3
Total labour costs per score finished bundles		2: 9: 4	2:10: 9
Labour costs per finished bolt.		2/5½d	2/6½d

In Stoke St. Gregory and Burrowbridge, the average labour cost for producing a bolt of white willows is 2/5½d. Consequently a grower with 5 acres must do ¾ (72%) of the work himself, if he is to make an income equivalent to 30/6 a week. In Kingsbury Episcopi, a grower must do ½ (49%) of the work himself to earn 30/6 a week.

In order to complete this study, it is necessary to give an answer to another question. How many acres must a grower cultivate if he is to obtain an income of 30/6 a week when all the labour is employed and paid for?

The grower in Stoke St. Gregory and Burrowbridge makes a profit of 1/3 a bolt on 105 bolts per acre, that is £6:11:3 per acre. An income of 30/6 a week, or £79: 6: - per annum can be obtained, therefore, by cultivating 12 acres. In Kingsbury Episcopi, the grower makes an average profit of 1/3 a bolt on 127 bolts per acre, that is £7:18: 9 per acre. The 30/6 a week income can thus be earned from the cultivation of 10 acres.

The assumption has been made in the foregoing discussion that the entire production of willows is sold. The fact that large stocks of willows remain unsold in the hands of the growers complicates the problem in such a way that the financial position of the growers is even more serious than the preceding paragraphs indicate. In the course of the survey, a very definite impression was obtained of the seriousness of the problem of unsold stocks on hand. The existence of large stocks on hand is due, either to the prevalence of canker in the willows, making them valueless for basketmaking, or to a real decline in the demand for willows consequent upon the rise of alternative materials and upon the general trade depression. The change in demand requires further investigation before definite conclusions can be stated, whilst with respect to the prevalence of canker, it must be remembered that the stocks on hand were grown in bad seasons, and that in other seasons the willows might be almost free from canker.

Nevertheless, the report shows that even if all stocks are cleared, a grower with 5 acres must be able to attend to 3 acres himself if he is to earn 30/6 a week, whilst he must be able to attend to almost his entire crop if it is considered that a manager should earn more than an ordinary worker, a very formidable undertaking. A man with 3 acres or less cannot earn the equal of an agricultural worker.

If it be said that the solution of the problem consists in raising the acreage of willows grown from say, 5 acres to 10 acres, two further problems immediately arise. The grower must first of all provide additional capital, for another 5 acres would require a sum of £170. If 5 acres can only provide £79:6:- with very hard work for the grower, it is definitely impossible for him to find an additional £170 for capital, and if his present beds are themselves urgently requiring replanting, then an increase in acreage is entirely out of the question.

The second problem that arises concerns the effect that increased acreage has upon prices. Should the demand for willows not be capable of absorbing a considerable increase in the supply, the price will consequently fall or the increased supply will remain unsold, and profits will diminish accordingly. If the growers in possession of capital were to follow this policy, bankruptcy would be certain for large numbers of smaller and financially weaker growers. Therefore, until the probable trend of demand for willows has been investigated, it is impossible, and even very dangerous, to urge an extension of the area under willow cultivation.

Quite apart from the economic aspects of extending the willow acreage, the large number of small growers have great difficulty in undertaking the replanting of the beds they now possess. The low income derived from cultivation and management, combined with a number of bad seasons and stocks on hand, leads the grower to cut his expenses. The report shows that this may easily result in greatly increased costs per finished bolt especially when beds are old. This further depletes the financial resources of the grower, and replanting is still less possible. These circumstances make it imperative to approach the problem from the point of view of income, and not from the point of view of profit on costs.

APPENDIX

THE DISEASES OF BASKET WILLOWS IN SOMERSET

by LAWRENCE OGILVIE, M.A., M.Sc.,

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I. THE RUST OF SALIX TRIANDRA (RUST CANKER)

This disease is by far the most serious of all those affecting basket willows. The fungus in question has been identified by the writer as Melampsora Amygdalinae a species not previously recorded from England, and its life history has been fully worked out (3,4,5).

The main source of infection in the spring is infected dead leaves lying on the gfound. These bear winter spores (teleutospores) which on germination give rise to secondary spores (sporidia) which infect the young shoots, producing on them orange coloured cushion-like cankers. These bear the spring spores (oecidiospores) which again infect the developing leaves, giving rise in turn to summer spores (uredospores). A succession of the latter is produced throughout the summer. Sometimes the green rod is infected, in which case a canker is produced, which renders the rod useless for basket making. When the rods are peeled these cankers appear as black areas, caused by the bark adhering to the wood at these points. Such affected rods are disfigured and break easily.

If the rods remain uncut these cankers give rise to summer spores (uredospores) in the spring and so serve as a means of infection for the subsequent crop. Under normal circumstances, however, the rods are cut in the winter or early spring.

Laboratory experiments have shown that the uredospores germinate only when in contact with water and that practically germination is greatly checked above 24°C. (5). As a consequence the disease is of little importance during warm and dry summers.

Control Measures

(a) Late cutting of rods. During 1932 sporidia were first produced about April 10th (when the shoots were ½ inch long) and continued to be produced till about May 18th. It is thus evident that any agency which will prevent infection during that time will keep the crop free from rust. This is the explanation of the valuable results obtained from late cutting of the rods, whereby the emergence of the shoots is thrown back several weeks. Similar results are sometimes obtained from stocking the fields with cattle or sheep, a common practice amongst growers.

(b) Destruction of the First Shoots. Preliminary experiments in 1932 along the same lines indicated that good results may be obtained by spraying the plants with a tar oil winter wash when the shoots are some three inches

high. The shoots produced later were practically free from rust and produced excellent rods, while many of the weeds between the rows were destroyed.

(c) Use of copper fungicides. Laboratory experiments have shown that spores of the fungus are killed by a dilution of copper sulphate equivalent to a concentration of about ½ parts of copper in a million (5) and small scale experiments have indicated that Bordeaux misture or copper lime dust will prevent the development of the rust. Large scale experiments were inconclusive in 1932 owing to the scarcity of rust.

(d) Drainage. Observations indicate that initial oecidial infections are prevalent in certain spots year after year, usually hollows where water tends to collect and washings of dead leaves tend to accumulate. It is suggested that such areas should either be drained by ditches giving a fairly rapid run off, or, if this is not possible, that the stumps should be grubbed up. Otherwise they tend to be centres of serious initial infection.

(e) Resistant Varieties. The rust appears to be confined to Salix triandra, of which all the common varieties are attacked. The work of Mr. H.P. Hutchinson in breeding new varieties appears to be likely to yield valuable results from the point of view of resistance.

II. THE RUST OF SALIX VIMINALIS (the Osier Willow).

This rust attacks only the leaves, on which uredospores and teleutospores are formed. No stem cankers are formed, hence little damage is done, beyond a certain amount of premature leaf fall in autumn. The rust has been identified by the writer as Melampsora Larici-epitea, a species having its alternate (oecidial) stage on the common larch.

III. 'BLACK CANKER'.

The disease known as 'black canker' has been very thoroughly investigated by Dr. R.M. Nattrass, formerly Advisory Mycologist at Long Ashton (1,2,). Most varieties of basket willows are infected, but osiers (Salix viminalis) are not often seriously attacked, while the leaves of S. purpurea remain free. The fungus in question, Physalospora miyabeana, first attacks the leaves in May and may travel down the leaf to the rods, on which cankers much resembling those of the rust cankers are formed. The fungus may also attack the tips of the rods, causing a characteristic die-back of the extremities.

Outbreaks of the disease may be controlled effectively by frequent sprayings with Bordeaux mixture.

Unpublished observations of the writer indicate that the fungus also attacks pollard willows (S. fragilis) growing at the sides of the fields and that spores blown from these may serve as an important means of infection of the withy fields.

IV. DIE-BACK OF STUMPS

Work is in progress on a die back of stumps which is prevalent in the willow beds at Long Ashton and apparently also found in the willow growing area.

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THE INSECT PESTS OF BASKET WILLOWS IN SOMERSET.

by H. G. H. Kearns,

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The two principal species of basket willows grown in Somerset are Salix triandra (e.g. Black Maul, Champion) and, to a much less extent, Salix viminalis (Osiers). Each species is subject to attack by a number of different insect pests, of which the most important are as follows:-

I. Salix triandra.

Brown Beetle (Galerucella lineola).
Willow Aphides
"Button Top" Midge (Rhabdophaga heterobia).

and usually of local importance:

Elephant Beetle (Cryptorrhynchus lapathi).
Willow Rod Midge (undetermined sp.)
Bean Gall Sawfly (Pontania sp.)

II. Salix viminalis.

Willow Aphides
Willow Leaf Roller Moths (Depressaria conterminella and other sp.)

and usually of local importance:

Blue Beetle (Phyllodecta vulgatissima)
Elephant Beetle (Cryptorrhynchus lapathi)

The intensity of the attacks of the above-mentioned pests varies considerably from season to season, but in every year the total loss of quality rods from insect damage is considerable (1).

The Principal Insect Pests of Salix triandra varieties.

The Brown Beetle (G. lineola).

These beetles (2) appear in some seasons at the time of bud burst. They may congregate in large numbers on the stools and consume the leaf tissues as fast as they develop. More usually they leave hibernation quarters later and during June lay eggs on the upper portions of the growing rods. At the end of the month the larvae appear and consume the foliage near the growing point. The damage caused by the adults and larvae result in the formation of side shoots which spoils the rod.

The adults cannot be economically killed by means of washes, but in those seasons when they assemble in numbers on the stools, many may be killed by means of a derris dust (rotenone content not less than 0.15 per cent.) The larvae are readily killed by the application of nicotine and lead arsenate washes (incorporating suitable spreaders). A mixed wash containing the nicotine and arsenate provides the best results if applied at the time of the hatching of the eggs.

Willow Aphides "Blight".

Willow Aphides in some seasons cause very severe injury to the crop by feeding on the terminal portion of the rods. Even a slight attack causes an appreciable check to the normal growth of the rod and frequently results in the development of side shoots.

These insects may be controlled by the application of a nicotine wash, but it is essential that the spraying is carried out rapidly and efficiently before the attack assumes any severity. The destruction of weeds helps to reduce the attacks by eliminating alternative host plants for the aphides.

"Button Top" Midge (R. heterobia)

The adult Midge lays a number of eggs on the terminal portion of the rod, with a later consequent development of a rosette of leaves, which prevents any further terminal growth of the rod. There are two broods of the Midges in a season and the pest hibernates over the winter as puparia in the "rosettes" and in the soil. It is probable that the adoption of a regular spray programme applied for other pests would incidentally give some control of the Midge.

The Principal Insect Pests of Salix viminalis varieties.

Willow Aphides.

The damage and method of control are similar to those for Salix triandra described above.

Leaf Roller Moths.

In some seasons a large number of the young rods are spoiled in May by the larvae of the Leaf Roller Moths. The larvae feed on the terminal portion of the shoot and roll a leaf around themselves, and it is on this account that the pest is difficult to control. The application of a mixed contact and stomach poison wash immediately the first signs of an attack are noticed provides a satisfactory control.

Blue Beetle (P. vulgatissima)

The Blue Beetle has a similar life history to that of P. vitellinae (3). It is usually double brooded in a season. The adults feed on the terminal portions of the rods, and the larvae on the lower surface of the leaves. The defoliation causes the death of the terminal

bud and side shoots develop. The pest may be controlled by means of a finely divided lead arsenate wash (incorporating a suitable spreader) provided it is applied prior to the hatching of the majority of the eggs.

Other Insect Pests.

Methods of controlling the Elephant Beetle, Willow Rod Midge and the Bean Gall Sawfly have yet to be worked out, but it is doubtful on account of the sporadic nature of the attacks if it would be economical to apply regular annual methods of control.

Methods of Insect Control Adopted in Somerset.

In Somerset a regular annual spraying programme in not carried out. Proprietary nicotine soaps are applied when considered necessary by means of Knapsack sprayers in order to check the attacks of Aphides and the Brown Beetle. This method of spraying is very slow and cannot give satisfactory results. Usually only portions of a crop which are most severely attacked are sprayed. The lack of power or horse drawn spraying outfits makes it impossible to apply any wash in an economically efficient manner.

A Suggested Spray Programme for the Control of Insect and Fungus Pests.

It is fully proven fact that one of the important factors in the economic production of a crop is the efficient control of pests. This applies equally well to basket willows and large crops of first quality rods cannot be obtained without an adequate spray programme. Research work at Long Ashton has shown that a number of efficient mixed insecticidal and fungicidal washes could be used on willows, thus avoiding the necessity of spraying separately for insect and fungus pests. The spray dates recommended for the control of Rust are well suited for the control of the major insect pests, thus three applications of a Bordeaux-Nicotine Wash would go far to overcome the major pests of Salix triandra varieties. An efficient wash is of little value unless it is efficiently applied and power spraying is the only adequate method of dealing rapidly and efficiently with a willow crop. The successful production of willows depends largely on the adoption of an annual spray programme.

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GENERAL REVIEW.

by H. P. Hutchinson, B.Sc.

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In the compilation of this Report, the Willow Officer rendered assistance at the outset in suggesting the lines along which the enquiry should be made and, at later stages, in supplying explanatory facts in cases where, for the sake of clearness, additional information appeared to be necessary. As many suggestions which the Officer had the opportunity of making during the final stages of preparation have been accepted by the Authors, the few salient points in the Report as now presented on which comment can be made are the following:-

Area under Willows.

For the first time an acreage figure is given which can be accepted as reasonably accurate. In spite of reduction in willow acreage during late years the claim that 3000 acres of willows were grown in the county must be regarded as an exaggeration. The area now stated (1600 acres) agrees reasonably well with the amount of willow output of the area as supplied by the Great Western Railway Company - the chief carriers of the Crop - in 1926-27.

Gross and Nett Yields.

The figures given in the Report are of the greatest value since they forcibly reveal the heavy loss incurred during the sorting processes. The waste in converting Gross, to Nett, yield is due to a small extent to the presence of weed gathered with the Crop, but primarily to the presence of rods damaged as a result of fungus and insect attacks on the growing Crops. These facts as stated should stimulate all who are concerned with the willow crop to concentrate their efforts on the adoption of methods which will lead to effective control.

The figures expressing crop yields deserve further consideration. Translated to weights they would approximate to between 2 and 4 tons per acre as extremes. Compared with the yields which have been obtained in the past in Somerset, when the majority of beds were younger, and crops received more cultivation attention, and in other willow growing areas of the country, they are low. Five and six tons per acre of the fine topped varieties such as Black Maul, Champion, Spaniards and Newkind and Whissender used to be obtained, while from six to ten tons of the full topped varieties such as Mealy Top, Brown Merrin and Longskin were general. Potentially all

basket willow varieties are capable of producing much higher yields than those now obtained by present commercial methods, as proved by weights recorded in the course of the variety trials carried out at Long Ashton Research Station, where the soil could not be regarded as the type suitable for the willow crop. The weights from the plots under experiment expressed in yields per acre, were as follows:-

Variety	Yields at per acre. One year old Rods	Two year old Sticks.
Black Maul	6 tons	11 tons
Champion	6 "	12¼ "
Spaniards	6½ "	12 "
Whissender	6 "	10¾ "
Longskin	9 "	18 "
Brown Merrin	7¼ "	11 "

Methods whereby yields can be improved are concerned with variety, soil fertility and crop management.

The variety factor has been under investigation at Long Ashton since 1926. Many new hybrids having yielding qualities superior to the varieties now grown commercially, have been bred during this period. As complementary to this work the Somerset County Council established in 1929 and have since maintained Variety Trial Beds at Athelney and Muchelney. For the past three years all the sets of the varieties which have been proved to possess qualities of outstanding merit have been purchased by the local growers for planting purposes.

The soil fertility problem is largely a matter of plant nutrition. As a general rule it may be accepted that the richer the soil is in plant food the heavier the yields will be. Taken altogether the Somerset willow growing area could be regarded as fertile land, but in spite of the accretions due to the annual fall of leaf and sedimentation on the beds after floods it would be reasonable to conclude that annual crops of 3 tons per acre would result in a deficiency of at least some of the food constituents essential to the satisfactory development of the willow crop. Detailed experimental work on the manurial requirements of the basket willow which were carried out at Long Ashton during four successive seasons with the same plants, gave the following result:- Nitrogen and Phosphorous are the most essential of the food elements required by the willow crop. The field experiments based on this evidence which have been attempted present particular difficulties. These arise from the frequent occurrance of floods and their attendant obstacles at the times when the manures could be best applied. There may be occasions when the application of a quick acting manure would be profitable but the vagaries of seasons are much adverse to the carrying out of field experiment work, on the results of which conclusive evidence could be obtained,

Crop management comprises many operations from the preparation of the land for the crop, and those performed annually and throughout the lifetime of the beds. Although the Report gives divergent figures on the establishment and management costs of the crop, these can be readily explained on the grounds of the very different soil conditions, and the varying degrees of thoroughness exercised in performing the work. The practice of growers in their choice of planting distances (which vary but slightly) probably cannot be improved, but under present conditions, especially those affecting labour, the suggestion that a more economic method of production is possible by growing the crop on high rather than low, heads deserves consideration. Cases have been observed where the advantages which tall crowns give to the young shoots in enabling them to grow without impediment have been sufficient at later stages to produce an amount of growth which acts as a Smother Crop on the weeds below.

The Control of Pests is, by far, the most important factor in Crop Management at the present time, since profitable production so largely depends on the degree of freedom from disease which can be secured. The heavy reduction in Gross yield as shown by the figures in the Report strikingly emphasizes this point. Rough (branched) rods are generally the results of insect attacks, while the canker or rust fungus takes heavy toll in actual loss of rods which are discarded in the operation of sorting, and in reducing the value of the finished bolt because of the more or less slightly damaged rods which it contains. The difficulties in the way of securing adequate control of the canker fungus are due to various causes the chief being:-

1. The presence of many host plants on field boundaries which enable the fungus to survive from one year to the next.

2. The naturally favourable conditions for development of the fungus afforded by the willow crop. The dense growth and the general wet conditions frequently render spraying operations impossible.

3. The present inadequacy of the spraying outfit. Considerable advance in overcoming this difficulty could be made if co-operation, having in view the introduction of more efficient spraying equipment could be established between growers, spraying machine manufacturers and the Staff of the Research Station.

The financial aspect of the Industry as shown by the figures given in the Report will probably lead to much discussion.

If as stated, £7 per acre be the profit to the grower after labour and all other charges have been met, the industry could, at least be considered to be a profitable one, especially as the type of land devoted to willows is suitable for no other crop which could be expected to give the same returns. As regards the future of the industry there is little evidence at the present time that the country's requirements in wicker ware is permanently on the decline. The official figures given of the values

of the Imports of willow rods and basket ware continue to be very substantial. Further, as improvements in the trade of those industries which require large quantities of baskets arise, it may reasonably be forecasted that the demand for willows will increase.

In concluding the appendix to the Report, the Willow Officer wishes to record his appreciation of the valuable services rendered by the Somerset County Council in establishing and maintaining the two willow variety trial beds at Athelney and Muchelney.

ADVISORY WORK.

The University of Bristol co-operates with the Staffs of the Department of Agricultural Education of the Counties of Gloucester, Hereford, Somerset, Wiltshire and Worcester in providing free advice to farmers, growers and landowners under the Advisory Scheme of the Ministry of Agriculture. Requests for advice should, in the first instance, be addressed to the Agricultural Organiser for the county concerned. The Organisers for the five counties in the Western (Bristol) Province are:-

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BULLETIN NO. 2. Sugar Beet Trials 1927 and Report of Sugar Beet Conference, February 1928.

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BULLETIN NO. 4. Mole Destruction Experiments.

BULLETIN NO. 5. The Wiltshire Agricultural Accounting Society – Analysis of Four Year's Financial Accounts.

BULLETIN NO. 6. Cost of Production of Sugar Beet in Hereford and Worcestershire (1925-6 – 1929-30).

BULLETIN NO. 7. A Bulletin for Somerset Farmers, 1925–1929.

BULLETIN NO. 8. An Economic Inquiry into the Production of Strawberries.

FARM ACCOUNTS: Continuous Series.

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ISSUE NO. 2. Production in Relation to Capital and Costs. 1929 Crop.

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