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A SURVEY OF CEREAL HUSBANDRY AND WEED CONTROL  
IN THREE REGIONS OF ENGLAND 1969 & 1970

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A SURVEY OF CEREAL HUSBANDRY AND WEED CONTROL  
IN THREE REGIONS OF ENGLAND - 1969 and 1970

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INTRODUCTION

Comprehensive surveys of the production of the potato and sugar-beet crops, including virtually every aspect of husbandry, have been carried out and up-dated for some years by their respective commodity organisations, and detailed information on most aspects of these crops exists. Comparable data for the cereal crops which, in England and Wales, cover about 8 times the acreage of land occupied by root crops, have not been available although ADAS and large commercial firms have from time to time conducted surveys on special aspects of the cereal crop.

It is estimated that about 85% of the cereal acreage is currently sprayed with herbicide but, although various limited surveys have been carried out to assess the situation where weeds such as wild oats threaten the pattern of crop production, there is a dearth of published information on herbicide usage and on the occurrence of a wider range of weed species on a national basis. The survey that is reported here had the object of providing more general information about weed control in cereals and was completed through the voluntary collaboration of three firms of agricultural merchants with the Weed Research Organization. Although the sampling technique was not truly random and the results are not therefore fully representative of the three regions concerned, they provide a useful contribution to the knowledge of current cereal husbandry. The results of this survey should be considered in relation to a similar one carried out in S.E. Anglia in 1967 by Elliott and Cox.

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## OBJECT AND METHOD

The chief aim of the survey was to determine the types of weed present and the herbicides used in cereal crops; information was also obtained about many other factors relating to the production of cereals.

The survey was carried out on 93 farms; 33 in the North (mainly in Northumberland), 37 in the Midlands (Northants, Warwicks, Leicester, Hunts, Cambs, Beds, Herts, Bucks, Oxon), and 23 in the South West (mainly in Dorset). The farms were selected at random from the lists of customers of three firms of agricultural merchants\* who, through their own representatives, undertook the responsibility of collecting the field data. The planning, co-ordination and processing of the results were carried out by the Weed Research Organization.

On each farm, two cereal fields were selected at random and most of these were visited on four occasions, in July and December 1969, and in May and July 1970. On each occasion, the observers were required to visit the fields and to record their observations according to questions set out on specially prepared cards about the weeds, crop or soil. The questions were designed to reveal the situation at that particular time; for example, during the May visit the observers were required to distinguish between grass and broad-leaved weeds and record their occurrence according to a specified scale, with additional notes as to distribution. Some background information, for example, data on the previous cropping of a field, was obtained by questions asked during an interview with the farmer. The total number of fields recorded in the survey was 186.

## RESULTS

### 1. Size of farm, cereal acreage and soil type

In all regions the average size of farm surveyed was larger than that for the country as a whole, 66% of the farms being over 300 acres. The acreage of cereals grown was also relatively large, 50% of the surveyed farms having over 200 acres of cereals. The soil types of the fields observed were variously classified as sand, light loam, heavy loam, clay and mixed. Disregarding the mixed soils, those occurring most frequently were light and heavy loams (83%). Clay soils occurred in 14% of the fields and sandy soils in 3%. Details of the farm, cereal acreage and field soil types are given in Appendix 1.

\* Messrs. H.G. McCreath & Co. Ltd.; Messrs. Heygates Chemicals Ltd.; Messrs. Blandford and Webb Ltd.



## 2. Cereal crops in 1969 and 1970

The number of observed fields sown to cereals in 1970 was less than in 1969 because in the normal rotations some fields were sown to other crops. In 1969 the proportions of surveyed fields growing barley, wheat and oats were 59%, 30% and 10% respectively. The corresponding figures for 1970 were 79%, 15% and 6%. As the fields surveyed did not necessarily constitute the whole or any set proportion of the arable acreage of the farms no inferences should be drawn in regard to general trends in the percentages of cereals grown. The information simply shows the state of the fields as a background to the other data collected.

## 3. Rainfall

As background information about the regions, rainfall data from the Meteorological Office was obtained for 2 stations in each region. The mean monthly rainfall for 1969 and 1970, and the 10-year monthly average is given for each region in Appendix 2. The annual average rainfall for each region was 25.1 inches in Northumberland, 22.0 inches in the Midlands and 31.1 inches in Dorset. The dry October in 1969 and, to a less extent, in 1970 and the dry May in 1970 are noteworthy in regard to cultivations and crop growth.

## 4. Weeds observed

Broad-leaved weeds The weeds observed in July 1969, May 1970 and in July 1970 are shown in Table 1 in descending order of frequency of occurrence as seen in May 1970 in all regions. No other species was recorded in more than 5% of the fields, although the observers would not have recorded species when present in very small numbers. That more weeds would be observed in more fields in May before spraying or before the effects of spraying had occurred was to be expected, but the results also suggest that more weeds were visible in July 1970 than in July 1969. The data is presented in greater detail in Appendices 3a, 3b and 3c. The weeds were usually described by their common names by the surveyors; the probable identification in botanical terms is given in Appendix 3d.

Table 1. Percentage of fields in which specified broad-leaved weeds were recorded (all regions)

Weed	July 1969	May 1970	July 1970
Chickweed	10	44	21
Black bindweed	12	41	25
Knotgrass	12	39	20
Charlock	2	33	5
Fat hen	2	33	11
Redshank	18	26	11
Mayweed	8	17	16
Speedwell	5	16	13
Fumitory	1	12	3
Cleavers	0	10	1
Thistle	2	10	5



As observed in May, appreciable differences between regions occurred only in respect of six species. Of these, the biggest differences were in the cases of chickweed, charlock and fat hen. The six species were:

- Chickweed - Most in the Midlands
- Charlock - Most in Northumberland and Dorset
- Fat hen - Most in Northumberland; least in the Midlands
- Knotgrass - Most in Dorset
- Fumitory - Most in Northumberland; least in Dorset
- Cleavers - Most in Dorset; least in Northumberland

Grass weeds The most frequently recorded grass weed was couch, followed by wild oats, meadow grasses, watergrass and blackgrass. The percentage of fields in which they were observed (as an average of observations during three visits in July 1969, in May and in July 1970) is given in Table 2.

Table 2. Percentage of fields in which specified grass weeds were recorded

Weed	Northumberland	Midlands	Dorset	All regions
Couch	69	49	85	61
Wild oats	15	39	48	30
Meadow grasses	8	21	23	16
Watergrass	0	9	25	6
Blackgrass	0	10	0	4

In the regions, couch was recorded rather more frequently in Northumberland and Dorset, whereas wild oats, meadow grasses, watergrass were usually more frequent in the Midlands and Dorset. Blackgrass was recorded only in the Midlands. (See Appendix 4 for further details)

Frequency of occurrence of weeds in relation to soil type in May 1970 The obvious correlation, in Table 3, between the % of fields of different soil type (in brackets) and the % of fields in which individual weed species were recorded indicates that soil type had little effect upon the distribution of individual weeds. Only the more frequently occurring species are included. Chickweed was present on all soil types in about the same ratio as they occurred.

Table 3. Occurrence of weeds on different soil types expressed as % of fields

Weed species	Sand (3%)	Light loam (48%)	Heavy loam (35%)	Clay (14%)	No. of fields
Black bindweed	2	49	40	9	53
Charlock	0	35	46	19	43
Chickweed	3	48	38	11	58
Cleavers	0	27	55	18	11
Fat hen	2	44	42	12	41
Knotgrass	4	40	48	8	48
Mayweed	5	62	24	9	21
Redshank	3	38	53	6	32
Speedwell	0	45	33	22	18
Wild oats	0	43	43	14	37
Couch	3	43	43	11	79
Blackgrass	0	50	25	25	4



5. Herbicide application

Herbicides used in 1969 and 1970 (all regions) Table 4 shows the percentage of fields in which the various herbicides were used as single chemicals or as proprietary mixtures. In some fields different single chemicals were mixed in the tank by the farmer or were sprayed successively on different dates. These fields have been grouped together with the title "Separate chemicals" and the percentage is shown as 8% and 2% of all the fields in 1969 and 1970 respectively. Additional details are given in Appendix 5.

Table 4. Percentage of fields sprayed with different herbicides

Herbicides used	Percentage of fields	
	1969	1970
(Single)		
MCPA	33	17
2,4-D	3	6
Mecoprop	5	8
Dichlorprop	9	5
Barban	<1	<2
TCA	0	1
Other	<2	<2
Separate chemicals	8	<2
(Mixed)*		
MCPA	1	1
2,4-D	1	0
2,4-DB	2	5
Mecoprop	6	8
Dichlorprop	12	16
Ioxynil	1	3
Bromoxynil	3	5
Dicamba	4	4
2,3,6-TBA	1	<2
Benazolin	1	1
Other	0	<2
<u>Total Single</u>	60	43
<u>Total Mixed *</u>	32	47
<u>No herbicide used **</u>	8	10
	100	100

\* The first ingredient of the mixture is given as listed in the Agricultural Chemical Approval Scheme Handbook - "Approved Products for Farmers and Growers, 1971". Because of the number and complexity of the mixtures, they have not been grouped individually in the table. However, the use of the publication when considering the figures will indicate the type of mixtures encountered and assist interpretation of the results.

\*\* Some records (not included) were indeterminate; the 'nil' figures are therefore probably rather higher than shown.



Choice of chemical (all regions) From evidence obtained of the species and abundance of weeds present and of the chemicals used, an attempt has been made by an independent expert to appraise the choice of chemical (or lack of it) in the light of current recommendations, and to relate this choice to the degree of success achieved in controlling the weeds. Since the assessments presented in Table 5 are subjective and do not take all factors of choice into consideration, they should be interpreted with caution.

Table 5. Suitability of chemical used and degree of successful weed control achieved

Choice of chemical			Change in state of field in freedom from weeds from May to July 1970		
rated:	Fields No.	%	rated:	Fields No.	%
Good	45	46	Clean or much improved	49	50
Fair	34	34	Improved	32	32
Poor	13	13	About the same	11	11
Wrong	7	7	Worse	7	7
<b>Total</b>	<b>99</b>	<b>100</b>	<b>Total</b>	<b>99</b>	<b>100</b>

Date of herbicide application (all regions) The bulk of spraying was done in May; in June most spraying took place in the first week, especially in the North. Table 6 below shows the timing of the spraying in the spring of both 1969 and 1970. Data about autumn spraying and regional differences are shown in Appendix 6.

Table 6. Timing of spraying

Date of herbicide application	1969		1970	
	Percentage of fields			
March	1		0	
April	1		5	
Early May	15		18	
Mid May	32		37	
Late May	27		26	
June	24		15	
<b>No. of fields</b>	<b>164</b>		<b>84</b>	



Volume rate of herbicide application (all regions) The percentage of fields receiving different volume rates is shown in Table 7 for 1969 and 1970. Rates in the 11 to 20 gallons per acre group were used mostly, the bulk of the fields receiving spray at an intended rate of 20 gallons per acre.

Table 7. Percentage of fields sprayed at different volume rates

Vol rate gal/acre	1969		1970	
	Percentage of fields			
1-10	11		9	
11-20	83		84	
21-30	5		5	
31-40	1		2	
No. of fields	147		105	

6. Successional cereal cropping and wild oats

Cereals grown in succession The percentage of fields in which cereals were grown prior to 1970 for periods of 3,4 and 5 years (5 years being the longest period recorded) in the different regions and in total is shown in Table 8.

Table 8. Fields subject to continuous cereal growing

Period of continuous cereals years	Northumberland	Midlands	Dorset	All regions	
	Percentage of fields			Fields No.	%
3	24	12	13	31	17
4	17	22	28	40	22
5 or more	14	27	15	36	19
Other periods*	45	39	44	79	42

\* These periods were of 1 or 2 years in the 5-year period intercepted by one or more non-cereal crops.

Incidence of wild oats in continuous cereals and in cereals after grass Table 9 shows the percentage of fields in which wild oats were present when cereals were grown for 4 years (1966 to 1969) and for 5 years (1966 to 1970). The incidence of wild oats is high in continuous cereals in contrast to the results in cereals after grass.

Table 9. Wild oats observed in July 1969 (all regions)

Cropping	% of fields and level of infestation			Total no. of fields observed
	None	Slight	Moderate to severe	
Cereals for 4 years	56	25	19	52
Cereals for 5 years	58	22	20	41
Cereals after 3 yr grass	92	0	8*	13

\* represents 1 field only



7. Cereal crops and husbandry

Cereal cropping and soil type The table shows that about 80% of the fields on all soil types were drilled to cereals for not less than 3 years in 5. From 50% to 72% of the fields, according to soil type, were in cereals for not less than 4 years and from 18% to 25% for 5 years. The cropping did not appear to be greatly influenced by soil type.

Table 10. Frequency of cereal cropping (all regions)

No. of years cereals grown* in 5-yr period	Light loam	Heavy loam	Clay
	Percentage of fields		
5	23	18	25
4	36	54	25
3	26	12	30
2	12	14	15
1	3	2	5
No. of fields	69	50	20

\* not necessarily in succession

Varieties of spring barley The varieties of spring barley grown are given in Table 11 for all regions grouped together. Regional results are given in Appendix 7.

Table 11. Varieties of spring barley grown (all regions)

Variety	Percentage of fields sown	
	1969	1970
Sultan	1	27
Zephyr	22	16
Ymer	0	13
Golden Promise	3	11
Proctor	0	9
Julia	4	6
Vada	61	6
Deba Abed	2	3
Impala	7	1
Others	0	8
No. of fields	182	93



Varieties of winter wheat The number of fields sown to winter wheat was smaller than those with barley. The results are summarised in Table 12 and are detailed regionally in Appendix 7.

Table 12. Varieties of winter wheat grown (all regions)

Variety	Percentage of fields sown	
	1968	1969
Cappelle Desprez	44	44
Joss Cambier	20	22
Champlein	31	17
Maris Widgeon	5	6
Others	0	11
No. of fields	39	18

Date of sowing The date of sowing was related to latitude in autumn 1968; but in autumn 1969 and in the spring of both years, sowing in the northern region started rather late but caught up quickly and finished earlier.

Table 13. Date of sowing in relation to region

Period of sowing	Percentage of fields			No. of fields
	Northumberland	Midlands	Dorset	
<u>Autumn 1968</u>				
Oct. E	0	23	78	40
L	56	41	0	
Nov.	44	36	22	
<u>Spring 1969</u>				
March	23	45	50	129
April E	70	48	44	
L	7	5	6	
May	0	2	0	
<u>Autumn 1969</u>				
Sept. L	0	4	NR	28
Oct. E	40	31	NR	
M	60	17	NR	
Nov. E	0	39	NR	
M	0	9	NR	
<u>Spring 1970</u>				
Feb. L	0	0	7	99
March E	0	3	15	
M	2	9	21	
L	26	9	7	
April E	50	14	29	
M	17	33	7	
L	5	16	7	
May E	0	16	7	

E = early, M = mid, L = late, NR = not recorded



Seed rate The seed rates of autumn-sown wheat (1968) and spring-sown barley (1969), grouped for all regions, fell into the categories shown in Table 14 below. There were no consistent differences between regions. (See Appendix 8).

Table 14. Variation in seed rate

Autumn-sown wheat (1968)	% of fields
<u>Seed rate - lb</u>	
- 140	5
141 - 160	11
161 - 180	63
181 - 200	21
<hr/>	
No. of fields	38
<hr/>	
Spring-sown barley (1969)	% of fields
<hr/>	
- 120	5
121 - 140	30
141 - 160	2
161 - 180	59
181 - 200	4
<hr/>	
No. of fields	104
<hr/>	

Row width The results for all regions are given in Table 15. Despite an increase in recent years in the provision for 4 to 5-in. spacing on seed drills most of the cereals were drilled in 7-in. rows. The narrower row spacing was mostly used in Northumberland.

Table 15. Variation in row width

Row width (inches)	% of fields	
	1969	1970
4 - 5	12	10
6	1	1
7	84	89
Broadcast	3	0
<hr/>		
No. of fields	180	118
<hr/>		



Fertilisers It has been necessary to confine the results to the percentage of fields known to have received fertiliser because of uncertainty about the number of those to which no fertiliser was applied. The amounts applied for autumn-sown and spring-sown crops were fairly consistent in the two years, and there were no marked differences between regions.

Table 16. Percentage of fields receiving different quantities of fertilisers (all regions)

Units	applied at sowing time			applied as top dressing
	Nitrogen	Phosphate	Potash	Nitrogen
Autumn-sown crops harvested in 1969				
- 20	78	10	14	0
- 40	19	36	53	19
- 60	3	49	33	28
60+	0	5	0	53
No. of fields	36	39	36	36
Spring-sown crops harvested in 1969				
- 20	9	20	18	0
- 40	41	68	56	46
- 60	41	12	22	51
60+	9	0	4	3
No. of fields	138	137	136	39
Autumn-sown crops harvested in 1970				
- 20	84	14	15	NR
- 40	16	52	55	NR
- 60	0	29	30	NR
- 80	0	0	0	NR
80+	0	5	0	NR
No. of fields	19	21	20	NR
Spring-sown crops harvested in 1970				
- 20	11	18	15	3
- 40	31	64	57	42
- 60	41	17	23	33
- 80	17	0	4	12
80+	0	1	1	9
No. of fields	92	94	92	33

NR = not recorded



Lodging of crops In 90% of the fields in all regions in July 1969 the crops were fully standing or only slightly lodged. The figure was 96% in 1970. In both years only 2% were recorded as being substantially lodged. Differences between regions were small.

8. Harvesting (1969)

Type and date of harvesting All fields were harvested by combine - harvester. The timing of the harvest in 1969 is given in Table 17. The earlier harvest in the South is clearly shown; there was a difference of about a fortnight between North and South.

Table 17.

Date of harvesting	Northumberland	Midlands	Dorset
	Percentage of fields		
July	0	0	4
Aug. Early	0	3	35
Mid	6	21	30
Late	25	26	22
Sept. Early	25	31	9
Mid	32	14	0
Late	8	6	0
Oct. Early	3	0	0
Late	1	0	0
No. of fields	65	72	23

Straw treatment (1969) Overall in 1969 two-thirds of the straw was baled and one-third burned, but this estimate of the amount baled may be too high to apply to the country as a whole. In Dorset about 90% of the straw was saved whereas in the Midlands only half was saved.

Table 18.

Straw treatment	Northumberland	Midlands	Dorset	All regions
	Percentage of fields			
Baled	73	49	91	64
Burned	24	49	5	33
> 1 treatment	3	2	4	3
No. of fields	66	72	22	160



Date of straw disposal (1969) Since couch is shown ( see paragraph on grass weeds, page 4 ) to be the most frequently occurring weed in cereals, and early autumn cultivations are an effective means of control, the early disposal of straw is essential to a timely start. Table 19 gives the dates by which fields were cleared in 1969 for Northumberland and the Midlands only ( insufficient data was recorded from Dorset).

Table 19. Date of straw disposal

Date	Northumberland	Midlands
	Percentage of fields	
August	17	27
Sept. Early	14	29
Mid	33	21
Late	26	14
October	11	9
No. of fields	66	66

The figures of 17% and 27% of fields cleared by the end of August can be compared with that of 29% recorded in a survey of Oxfordshire in 1971. (Ref.2) Likewise the figures up to the end of September (90% and 91%) can be compared with that of 95% by 24th September in the Oxfordshire survey.

### 9. Cultivations

Types of cultivation (Autumn 1969) Autumn cultivations in 1969 were recorded in Northumberland and the Midlands only. Mouldboard ploughing was much the most frequent (63% of fields). Chisel cultivations were done on 22% of the fields. Details are given in Table 20.

Table 20. Types of cultivation (Autumn 1969)

Cultivations	Northumberland	Midlands	Both regions
	Percentage of fields		
Nil	12	6	9
Mb. plough once	42	48	45
Mb. plough twice	2	2	1
Ditto plus other cults.	9	25	17
Chisel cult. once	2	0	1
Chisel cult. twice or more	9	5	7
Chisel cult. + other cults.	15	12	14
Rotary only	9	0	5
Other	0	2	1
No. of fields	65	64	129



Autumn cultivation by soil type (1969) The autumn cultivations which took place in Northumberland and the Midlands are related to the soil types in Table 21. The percentages of fields of different soil type are given for comparison with the percentages which were cultivated in the various ways. Mouldboard ploughing was done on all soil types in more or less the same proportions as they occurred. Chisel cultivations were rather more frequent on the lighter soils, and rotary cultivations more frequent on the heavy loams. There were only 2 fields which were ploughed twice and only 1 field which was chisel cultivated once without any other treatment.

Table 21.

Cultivations (Northumberland and Midlands)	Percentage of fields				No. of fields
	Sand (3%)	Light loam (40%)	Heavy loam (45%)	Clay (16%)	
Mb. ploughed once	2	42	41	15	54
Mb. ploughed + other cults.	0	48	33	19	21
Chisel cults. twice or more	23	33	33	11	9
Chisel cults. + other cults.	0	33	60	7	15
Rotary cults. only	0	20	80	0	5

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## APPENDIX 1

Farm size by region (% of farms)

Size group acres	Northumberland	Midlands	Dorset	All regions	
	%	%	%	No.	%
10 - 100	0	5	0	4	2
101 - 300	21	35	43	60	32
301 +	79	60	57	122	66
Totals:	100	100	100	186	100

Cereal acreage of farms by region (% of farms)

Cereal acreage group	Northumberland	Midlands	Dorset	All regions	
	%	%	%	No.	%
10 - 50	0	5	4	6	3
51 - 100	48	46	48	88	47
201 +	52	49	48	92	50
Totals:	100	100	100	186	100

Soil type by region (% of fields)

Soil type	Northumberland	Midlands	Dorset	All regions	
	%	%	%	No.	%
Sand	0	4	4	5	2
Light loam	27	43	44	70	38
Heavy loam	27	26	28	50	27
Clay	3	15	15	20	11
Mixed	43*	12	9	41	22
Totals:	100	100	100	186	100

\* Most of these fields were recorded as being of light and heavy loam.



## APPENDIX 2

Rainfall (inches)

	Northumberland			Midlands			Dorset		
	1969	1970	10-yr mean 61-70	1969	1970	10-yr mean 61-70	1969	1970	10-yr mean 61-70
January	2.7	3.8	2.0	2.6	2.0	1.5	3.3	4.5	2.9
February	2.4	2.2	1.5	1.5	2.3	1.2	1.9	2.6	2.0
March	1.2	1.4	1.4	2.0	1.7	1.5	2.7	2.4	2.3
April	1.3	1.6	1.7	1.4	2.4	2.0	1.1	2.2	2.5
May	3.5	0.6	2.0	3.9	0.7	1.9	3.9	0.9	2.5
June	2.2	1.0	1.8	1.4	1.4	1.8	1.5	1.6	1.9
July	1.4	3.7	2.3	2.2	2.1	2.1	1.8	2.8	2.2
August	1.4	2.0	3.0	3.1	2.6	2.3	1.4	2.6	3.0
September	2.2	1.2	2.5	0.4	1.4	2.0	1.8	3.5	2.9
October	0.6	2.0	1.8	0.1	0.6	1.5	0.3	0.9	2.6
November	4.9	2.9	3.0	2.4	4.6	2.2	4.7	7.0	3.5
December	1.5	1.6	1.9	2.1	1.2	2.0	3.5	1.2	3.1
Totals:	25.3	24.0	25.1	23.2	23.1	22.0	27.9	32.2	31.1

The rainfall figures shown are calculated from figures obtained from the Meteorological Office for six weather stations. The figures from 2 stations in each region have been averaged so that a less extreme picture is presented for the region. The weather stations were at Berwick and Acklington in the North, Cardington and Wellesbourne in the Midlands, and Upavon and Shaftesbury in the South West. There was a difference of 2 inches in the annual total (mean for 10 years) between the two stations in the North and the two in the Midlands; the difference was 5 inches between the two stations in the South West.



## APPENDIX 3a

Broad-leaved weeds observed in July 1969

Weed spp.	Northumberland	Midlands	Dorset	All regions
	% of fields in which weeds occurred			
Black bindweed	6	7	32	12
Black nightshade	0	0	0	0
Buttercup	8	0	3	3
Field bindweed	0	12	0	5
Charlock	5	0	0	2
Chickweed	17	3	15	10
Corn marigold	0	1	12	3
Cleavers	0	0	0	0
Coltsfoot	2	0	0	1
Dock	0	3	12	3
Fat hen	3	3	0	2
Fools parsley	0	0	0	0
Fumitory	2	0	0	1
Groundsel	0	0	0	0
Hemp nettle	0	3	0	1
Horsetail	0	0	0	0
Knotgrass	12	9	18	12
Mayweed	0	14	9	8
Nettle	0	0	0	0
Orache	0	0	0	0
Pansy	0	3	0	1
Parsley piert	0	0	0	0
Polygonum (other species)	2	1	0	1
Poppy	0	0	0	0
Redshank	11	19	29	18
Shepherds purse	2	0	3	1
Speedwell	12	1	0	5
Spurrey	0	0	0	0
Thistle	5	1	0	2
Vetch	0	0	0	0
Wild radish	2	0	3	1
Other weeds	8	18	32	17
No. of fields recorded	65	74	34	173



## APPENDIX 3b

Broad-leaved weeds observed in May 1970

Weed spp.	Northumberland	Midlands	Dorset	All regions
	% of fields in which weeds occurred			
Black bindweed	38	43	44	41
Black nightshade	0	0	0	0
Buttercup	3	3	6	4
Field bindweed	0	2	0	1
Charlock	48	16	50	33
Chickweed	29	62	25	44
Corn marigold	2	2	13	3
Cleavers	4	13	19	10
Coltsfoot	0	0	0	0
Dock	0	6	13	4
Fat hen	48	19	31	33
Fools parsley	0	2	0	1
Fumitory	20	8	0	12
Groundsel	0	2	0	1
Hemp nettle	2	8	0	4
Horsetail	4	0	0	1
Knotgrass	36	37	56	39
Mayweed	20	16	13	17
Nettle	2	2	0	1
Orache	0	6	0	3
Pansy	2	2	0	1
Parsley piert	0	0	0	0
Polygonum (other species)	0	3	0	1
Poppy	2	3	13	4
Redshank	29	24	25	26
Shepherds purse	0	0	6	1
Speedwell	20	13	13	16
Spurrey	0	2	6	1
Thistle	11	8	13	10
Vetch	0	0	0	0
Wild radish	4	0	13	3
Other weeds	13	3	13	8
No. of fields recorded	56	63	16	135



## APPENDIX 3c

Broad-leaved weeds observed in July 1970

Weed spp.	Northumberland	Midlands	Dorset	All regions
	% of fields in which weeds occurred			
Black bindweed	22	25	33	25
Black nightshade	0	0	0	0
Buttercup	3	0	0	2
Field bindweed	0	6	0	3
Charlock	10	2	0	5
Chickweed	24	17	25	21
Corn marigold	0	5	17	4
Cleavers	0	0	8	1
Coltsfoot	0	0	0	0
Dock	0	0	8	1
Fat hen	14	3	8	8
Fools parsley	0	0	0	0
Fumitory	3	0	0	3
Groundsel	0	0	0	0
Hemp nettle	0	0	0	0
Horsetail	2	2	8	2
Knotgrass	21	17	33	20
Mayweed	9	24	8	16
Nettle	2	0	0	1
Orache	0	0	0	0
Pansy	0	3	0	2
Parsley piert	2	0	0	1
Polygonum (other species)	0	3	0	2
Poppy	3	2	0	2
Redshank	10	13	0	11
Shepherds purse	2	2	0	2
Speedwell	17	11	0	13
Spurrey	0	0	0	0
Thistle	10	0	8	5
Vetch	0	0	0	0
Wild radish	2	2	0	2
Other weeds	12	10	8	11
No. of fields recorded	58	63	12	133



## APPENDIX 3d

Broad-leaved weeds - Common and botanical names

Black bindweed	<i>Polygonum convolvulus</i>
Black nightshade	<i>Solanum nigrum</i>
Buttercup	<i>Ranunculus</i> spp.
Field bindweed	<i>Convolvulus arvensis</i>
Charlock	<i>Sinapis arvensis</i>
Chickweed	<i>Stellaria media</i>
Corn marigold	<i>Chrysanthemum segetum</i>
Cleavers	<i>Galium aparine</i>
Coltsfoot	<i>Tussilago farfara</i>
Dock	<i>Rumex</i> spp.
Fat hen	<i>Chenopodium album</i>
Fools parsley	<i>Aethusa cynapium</i>
Fumitory	<i>Fumaria officinalis</i>
Groundsel	<i>Senecio vulgaris</i>
Hemp nettle	<i>Galeopsis tetrahit</i>
Horsetail	<i>Equisetum arvense</i>
Knotgrass	<i>Polygonum aviculare</i>
Mayweed	<i>Tripleurospermum</i> spp. or <i>Matricaria</i> spp.
Nettle	<i>Urtica</i> spp.
Orache	<i>Atriplex patula</i>
Pansy	<i>Viola</i> spp.
Parsley piert	<i>Aphanes arvensis</i>
Polygonum	<i>Polygonum</i> spp. (other than listed)
Poppy	<i>Papaver rhoeas</i>
Redshank	<i>Polygonum persicaria</i>
Shepherds purse	<i>Capsella bursa-pastoris</i>
Speedwell	<i>Veronica</i> spp.
Spurrey	<i>Spergula arvensis</i>
Thistle	<i>Cirsium arvense</i> or <i>Sonchus</i> spp.
Vetch	<i>Vicia</i> spp.
Wild radish	<i>Raphanus raphanistrum</i>

Grass weeds - Common and botanical names

Blackgrass	<i>Alopecurus myosuroides</i>
Couch	<i>Agropyron repens</i> or <i>Agrostis gigantea</i>
Meadow grasses	<i>Poa</i> spp.
Watergrass	<i>Agrostis stolonifera</i>
Wild oat	<i>Avena fatua</i> or <i>A. ludoviciana</i>



## APPENDIX 4

Grass weeds observed in July and December 1969 and May and July 1970

Weed spp.	<u>July 1969</u>			All regions
	Northumberland	Midlands	Dorset	
	% of fields in which weeds occurred			
Couch	63	36	62	51
Wild oats	22	42	38	34
Meadow grasses	9	15	18	13
Watergrass	0	11	0	5
Blackgrass	0	12	0	5
No. of fields recorded:	65	74	34	173
	<u>December 1969</u>			
Couch	29	24	NR	26
Wild oats	0	4	NR	2
Meadow grasses	11	7	NR	9
Watergrass	0	3	NR	2
Blackgrass	0	0	NR	0
No. of fields recorded:	55	70	NR	125
	<u>May 1970</u>			
Couch	64	54	100	64
Wild oats	11	38	56	29
Meadow grasses	7	24	44	19
Watergrass	0	10	75	13
Blackgrass	0	6	0	3
No. of fields recorded:	56	63	16	135
	<u>July 1970</u>			
Couch	79	56	92	69
Wild oats	12	37	50	27
Meadow grasses	9	25	8	17
Watergrass	0	5	0	2
Blackgrass	0	11	0	5
No. of fields recorded:	58	63	12	133

NR = Not recorded



## APPENDIX 5

Details of individual fields in which chemicals were used disparately

Chemical	Date applied	Dose pints per acre	Vol rate gal per acre
Dichlorprop mixture*	1.5.69	4	20
Mecoprop + 2,4-D (M)	1.5.69	6 + 1/4	20
Mecoprop mixture	14.5.69	4	25
Bromoxynil mixture	1.6.69	1	25
2,4-D + Barban (M)	22.5.69	1/2 + 2	20
Mecoprop + 2,4-D (M)	4.6.69	2 + 1/2	20
2,4-D + Mecoprop (M)**	16.5.69	NR	20
Terbutryne	21.10.68	4lb	20
MCPA	20.4.69	4pt	20
Terbutryne	17.10.68	4lb	20
MCPA	28.3.69	4pt	20
Di-allate	19.8.69	2 1/2	20
MCPA	28.5.69	4	20
Barban	10.5.69	2	20
MCPA	29.5.69	4	20
Barban	12.5.69	2	20
Dichlorprop mixture	24.5.69	4	20
Mecoprop + 2,4-D (M)	17.5.69	4 + 1/2	20
Mecoprop + MCPA (M)	15.5.69	4 + 4	20
Ioxynil mixture*	27.5.69	6	35
2,4-D	27.5.69	1/2	35
Barban	14.5.69	NR	NR
Dicamba mixture	26.5.69	4	20
Dichlorprop + MCPA (M)	22.5.69	4 + 2	20
2,4-D	NR	1/2	20
Mecoprop + 2,4-D	NR	6 + 1/4	20
Barban	26.5.70	2	20
Dichlorprop mixture	29.5.70	4	20

\* Part of field with individual chemical  
 \*\* Mixture on headlands only

(M) Mixed in Sprayer tank  
 NR Not recorded



APPENDIX 6

Date of herbicide application

Month	Northumberland		Midlands		Dorset	
	1969	1970	1969	1970	1969	1970
Percentage of fields						
September	1	NR	<1	NR	0	NR
October	6	NR	3	NR	0	NR
November	0	NR	0	NR	1	NR
March	0	0	3	0	0	0
April	0	2	0	6	2	8
Early May	0	13	18	24	30	>15
Mid May	9	32	45	39	38	46
Late May	35	32	18	21	30	>15
June	49	21	13	9	0	>15
No. of fields	61	38	74	33	38	13

NR = Not recorded



APPENDIX 7

Varieties of spring barley ( sown 1969 and 1970)

Variety	Northumberland		Midlands		Dorset	
	1969	1970	1969	1970	1969	1970
Percentage of fields						
Sultan	0	23	2	38	0	7
Zephyr	14	10	26	22	28	14
Ymer	0	13	0	0	0	0
Golden Promise	4	20	3	0	0	14
Proctor	0	3	0	10	0	22
Julia	0	3	10	10	0	7
Vada	68	5	48	5	72	14
Deba Abed	3	0	1	8	0	0
Impala	11	0	10	2	0	0
Others	0	8	0	5	0	22
No. of fields	66	39	73	40	43	14

Varieties of winter wheat ( sown 1968 and 1969)

	1968	1969	1968	1969	1968	1969
Cappelle Desprez	78	60	33	38	34	NR
Joss Cambier	11	20	14	23	44	NR
Champlein	11	0	53	23	0	NR
Maris Widgeon	0	0	0	8	22	NR
Others	0	20	0	8	0	NR
No. of fields	9	5	21	13	9	-

NR = Not recorded



## APPENDIX 8

Seed rate

Seed rate lb	Northumberland	Midlands	Dorset	All regions Fields	
	Percentage of fields			No.	%
<u>Autumn-sown wheat - 1968</u>					
- 140	0	0	22	2	5
- 160	0	20	0	4	11
- 180	67	55	78	24	63
- 200	33	25	0	8	21
Totals:	100	100	100	38	100
<u>Autumn-sown barley - 1969</u>					
- 100	0	6	0	2	2
- 120	0	9	0	3	3
- 140	15	47	33	31	30
- 160	4	0	0	2	2
- 180	72	38	67	62	59
- 200	9	0	0	4	4
Totals:	100	100	100	104	100
<u>Autumn-sown and Spring-sown cereals - (wheat, barley and oats) - 1968 and 1969</u>					
< 100	0	3	0	2	1
- 120	0	10	0	7	4
- 140	13	26	28	40	22
- 160	5	3	0	5	3
- 180	68	47	72	111	61
- 200	11	10	0	14	8
> 200	3	1	0	3	1
Totals:	100	100	100	182	100



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Technical reports available

5. A survey of the problem of aquatic weed control in England and Wales. October, 1967. T.O. Robson. Price - £0.25.
6. The botany, ecology, agronomy and control of Poa trivialis L. rough-stalked meadow-grass. November 1966. G.P. Allen. Price - £0.25.
7. Flame cultivation experiments 1965. October, 1966. G.W. Ivens. Price - £0.25.
8. The development of selective herbicides for kale in the United Kingdom. 2. The methylthiotriazines. Price - £0.25.
9. The post-emergence selectivity of some newly developed herbicides (NC 6627, NC 4780, NC 4762, BH 584, BH 1455). December, 1967. K. Holly and Mrs. A.K. Wilson. Price - U.K. and overseas surface mail - £0.25; overseas airmail - £0.50.
10. The liverwort, Marchantia polymorpha, L. as a weed problem in horticulture; its extent and control. July, 1968. I.E. Henson. Price - £0.25.
11. Raising plants for herbicide evaluation; a comparison of compost types. July, 1968. I.E. Henson. Price - £0.25.
12. Studies on the regeneration of perennial weeds in the glasshouse; I. Temperate species. May, 1969. I.E. Henson. Price - £0.25.
13. Changes in the germination capacity of three Polygonum species following low temperature moist storage. June, 1969. I.E. Henson. Price - £0.25.
14. Studies on the regeneration of perennial weeds in the glasshouse. II. Tropical species. May, 1970. I.E. Henson. Price - U.K. and overseas surface mail - £0.25; overseas airmail - £0.50.
15. Methods of analysis for herbicide residues in use at the Weed Research Organization. December, 1970. R.J. Hance and C.E. McKone. Price - U.K. and overseas surface mail - £0.25; overseas airmail - £0.50.
16. Report on a joint survey of the presence of wild oat seeds in cereal seed drills in the United Kingdom during Spring 1970. November, 1970. J.G. Elliott and P.J. Attwood. Price - £0.25.
17. The pre-emergence selectivity of some newly developed herbicides, Orga 3045 (in comparison with dalapon), haloxydine (PP 493), HZ 52.112, pronamide (RH 315) and R 12001. January, 1971. W.G. Richardson, C. Parker and K. Holly. Price - U.K. and overseas surface mail - £0.25; overseas airmail - £0.50.
18. A survey from the roadside of the state of post-harvest operations in Oxfordshire in 1971. November, 1971. A. Phillipson. Price - U.K. and overseas surface mail - £0.12; overseas airmail - £0.34.



19. The pre-emergence selectivity of some recently developed herbicides in jute, kenaf, and sesamum, and their activity against Oxalis latifolia. December, 1971. M.L. Dean and C. Parker. Price - U.K. and overseas surface mail - £0.25; overseas airmail - £0.45.
20. A survey of cereal husbandry and weed control in three regions of England. July, 1972. A. Phillipson, T.W. Cox and J.G. Elliott. Price - U.K. and overseas surface mail - £0.35; overseas airmail - £0.75.