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A SURVEY FROM THE ROAD OF THE PROGRESS OF
CEREAL HARVESTING AND STUBBLE CULTIVATION
IN OXFORDSHIRE IN 1971.

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A SURVEY FROM THE ROAD OF THE PROGRESS OF CEREAL HARVESTING
AND STUBBLE CULTIVATION IN OXFORDSHIRE IN 1971.

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SUMMARY

The survey was carried out by observing an average of 870 cereal fields during each of four periods, beginning in mid-August. At this time the crops were still standing in 71% of the fields. The harvest was virtually completed (97%) by 10th September after a long spell of fine weather. On that date 51% of the fields were clear of straw but not cultivated; an additional 17% had been cleared and were cultivated. On 24th September, from which date the beneficial effects of further soil disturbance on the control of the couch grasses would gradually be reduced, 45% of the fields had been cultivated. No standing crops were then observed and straw was still present on only 5% of the fields. The survey was carried out from the road by observers travelling as passengers in vehicles. Because the method is not widely practised it is fully described and its merits discussed.

INTRODUCTION

Investigation at the Weed Research Organization (Cussans 1970) and the experience of farmers and others have shown that stubble cultivation early in the Autumn is very important for the control of the couch grasses (Agropyron repens) and (Agrostis gigantea) and volunteer cereals. Cultivation which disrupts couch rhizomes and thus stimulates bud growth at a time when rhizome production is minimal weakens the plant. Successive cultivations and consequent destruction of aerial shoots causes further debility. Successful control depends on a timely organization of the harvest operation so that the fields are cleared of straw and are ready for cultivations. In order to assess current practice and to record the progress of harvest a survey was made in Oxfordshire and adjoining counties in Autumn 1971 of the state of cereal fields during four periods beginning in mid-August. The results are contained in this report. The survey was carried out by observation from travelling vehicles and since few surveys by such methods have been published, the method is described fully and its merits are discussed..

The science of surveying includes the feature of matching the techniques of enquiry, of which there are many, to the type and scope of information required. Observation of large areas is obviously made quickly by aerial survey; a postal survey is useful for reaching many individual people easily; where personal interviews are required a survey is obviously slower and more costly; and when agricultural data is required and it is necessary to walk over fields to record observed items, the survey is even more time-consuming. Roads and railways allow fast but superficial observation of the countryside and the reason that they are not more frequently used as view points is probably that the

* Surveys section.

scope of the information obtainable is limited to very direct and simple observations and to the immediate location of the routes. Nevertheless the method has the merit of speed and range and there are circumstances where the technique can be used and its advantages exploited. In Canada, Lindsay (1952) refers to reconnaissance methods from automobiles used by Bassett (1951), and Groh and Dore (1945), to map common ragweed (Ambrosia artemisiifolia) and milkweed (Asclepias syriaca) respectively. In Australia, Nihill (1968) used the method for assessing the incidence of wild oats in wheat, barley, linseed and pea crops. In this country in 1969, a pilot survey from the road with a similar object to the present one was carried out by the Weed Research Organization. The WRO, because of its widespread programme of field experiments, has many of its experimental staff, frequently in teams of two, travelling on road journeys of varying distances and regularity. Advantage was taken of this circumstance and of the experience from the pilot survey to plan two further surveys based on a similar technique in 1971, one of which was to estimate the proportions of sprayed and unsprayed cereal fields over areas of the Midlands and South of England by using easily seen indicator plants (Chancellor and Phillipson 1971); the other is the main subject of this report.

METHOD

The survey took place during the four periods 16th to 20th August, 23rd to 26th August, 6th to 10th September, and 21st to 24th September.

An average of 870 fields was observed during each period.

The items recorded were:

1. Whether the cereal crop was still standing.
2. When combined, whether the straw was either,
(a) still present in swathe or in bales, or
(b) cleared.
3. Whether cultivations had taken place on the cleared stubble.

Simple forms, illustrated in the Appendix, were provided for completion by the passengers who acted as observers as they travelled in WRO vehicles during the normal course of their duties. The journeys were not necessarily made on regular dates or routes, and whilst much of the work was done by these teams, it was necessary for the permanent survey staff to 'fill in the gaps' left in some areas during the two later periods. The observers recorded on any convenient stretch of road the necessary data about every cereal field in succession usually up to a maximum of 50 fields per stretch. In most cases one side of the road, usually the left, was observed, but occasionally it was feasible to observe the fields on both sides. The journeys were outlined on half-inch maps to ensure that records from routes which overlapped could be discarded. The approximate location of the valid journeys is shown on the maps Fig 1 to 4. They took place on various classes

of road including those unclassified and were mostly within a radius of 20 miles of Begbroke, Oxfordshire. A few journeys were made substantially outside this area and the records thus obtained have been included, but separately, because the areas represented were not usually covered on more than one occasion and the number of fields recorded was relatively small. The periods of observation were up to 5 days but most records were obtained within periods of 3 days. Where an operation was taking place at the time of observation it was classified as completed. The completed forms were handed to the Surveys Officer who arranged for the data to be analysed.

RESULTS

The numbers and percentages of cereal fields observed in the four different harvesting and cultivation stages during the four periods of observation are given in Table 1(a). Similar results are given in Table 1(b) obtained by the sporadic journeys into Buckinghamshire, Bedfordshire, Cambridgeshire, Kent and Northamptonshire during the periods stated. In Fig 5 the results for the Oxfordshire area have been plotted as curves to indicate the general sequence and timing of events. The rainfall recorded at WRO, Begbroke, is shown for each day.

It will be seen that in the Oxfordshire area combine harvesting was virtually completed in the period ending 10th September when less than 3% of the cereal fields remained to be cut. By that time 29% of the fields were harvested but had straw remaining in swathes or in bales (uncarted), whilst 51% had straw cleared (either bales carted or swathes burnt). Meanwhile cultivation of stubbles had progressed at a steady rate so that 17% of fields had been done. Thereafter following the completion of combining, the rate of cultivation increased until in the period ending on 24th September, 45% of the fields had been completed and the proportion of straw left to be dealt with was only 5%. The 50% of cleared stubbles remaining included those that had been undersown to grass or clover, but this item was not recorded because of the difficulty of distinguishing accurately between volunteer cereals and undersown grasses when travelling past partially obscured fields (by hedges etc) in a vehicle. In the other areas (Table 1(b)) progress appears to have been rather slower, but the number of fields recorded were much fewer and the figures given may not represent accurately the whole county areas. Also the trends cannot be shown because of lack of data during successive periods.

Table 1 No. & % of fields at different stages of harvest and cultivation.
(Figures in brackets are percentages)

Area	Period	Crop standing	Crop combined		Total No. of fields	
			Straw present	Straw cleared		
			Cultivation not started	Cultivation * started		
(a)						
Oxon & adjacent counties.	16 Aug. to 20 Aug.	724 (71)	193 (19)	58 (5)	50 (5)	1025 (100)
	23 Aug. to 26 Aug.	350 (47)	228 (31)	96 (13)	64 (9)	738 (100)
	6 Sept. to 10 Sept.	25 (3)	226 (29)	399 (51)	130 (17)	780 (100)
	21 Sept. to 24 Sept.	0 (0)	47 (5)	472 (50)	416 (45)	935 (100)
(b)						
Bucks, Beds, & Cambs.	24 Aug. to 25 Aug.	98 (54)	56 (31)	16 (9)	10 (6)	180 (100)
Kent.	6 Sept. to 8 Sept.	6 (5)	52 (49)	45 (41)	6 (5)	109 (100)
Northants.	8 Sept. to 9 Sept.	9 (6)	60 (41)	59 (41)	17 (12)	145 (100)
Beds & Cambs.	13 Sept.	1 (2)	14 (29)	22 (46)	11 (23)	48 (100)

* Includes use of plough, tined or rotary cultivator.

DISCUSSION

Harvesting progress

Harvesting in many years might be expected to proceed erratically because of rainfall; however, during the period of the present observations there was only one day in the Oxford area when an appreciable amount of rain fell so that it seems reasonable to depict the harvesting progress by smooth curves (Fig 5) provided these are recognised as not being mathematically precise. The results nevertheless give a reasonably reliable indication of the average progress. It should be borne in mind that there were small areas, almost certainly consisting of individual farms or groups of farms, which were more forward than others.

Whilst the results are of immediate value in providing recorded data instead of the impressions which sometimes have to be relied on to assess a situation, they should also be of greater value for comparison with results of similar surveys in future years. Without earlier recorded data to refer to, the impression is that the speed of straw clearance and stubble cultivations relative to time of harvest recorded by this survey was faster than in the same district in previous years, even allowing for weather conditions. The high incidence of stubble cultivation recorded co-incides with advice, based on research on control of the couch grasses and volunteer cereals, to cultivate the maximum amount of land as soon as possible and to reserve the more costly but less labour-intensive herbicide techniques for severe infestations or for adverse weather conditions.

Size and randomness of field sample

Compared with other methods of survey the size of the sample of fields recorded in the Oxfordshire area was substantial. Its ratio can be estimated approximately from the known ratio of cereal acreage to the total area of Oxfordshire, and by assuming an average cereal field size. If an average size of 20 acres were assumed the sample would be approximately 1 field in every 18.

The routes followed by the observers other than those from the Surveys Section were related to the demand of other work and therefore provided in a certain respect a random coverage of the survey area. The journeys in some cases followed the same routes during successive periods but frequently did not do so. The survey staff covered routes only in the last two periods when it became apparent that the number of journeys made by the other staff was dwindling with the onset of Autumn. On these occasions areas were chosen where there were obvious gaps in coverage but the routes were not specially selected other than by choosing mainly secondary roads which formed a practical way around the area.

The maps (Figs 1 to 4) illustrate the pattern of journeys made. The records were such that it would be possible in future years to re-survey the same road lengths but the fields would not be identifiable partly because the observers did not record the exact starting point as a particular field and partly because crop rotations would cause changes in the cereal field pattern. These factors are useful in that they ensure the anonymity of the individual field observations.

From a statistical point of view the objection might be raised to the 'roadside' technique that a biased sample is inevitable if farmers treat fields by roadsides differently from other fields. Whether this is so to any appreciable extent is a matter of opinion. If it were true it would be unlikely to contribute more than a very minor source of error in a survey of the kind described.

Labour requirement

The co-operation of existing teams of WRO staff in making the observations ensured that much of the work was done at no extra expense. However, even if staff were to undertake journeys specifically for a survey of this type, the man-hours required to complete it would be extremely low compared with one involving farm visits. Although the rate of recording fields fluctuated enormously, between 50 and 100 cereal fields per hour could be observed by a team of two in farming areas where there was a substantial proportion of fields with cereals growing in them. Working by this means, it would be feasible to plan a survey to follow routes approximating to radii or concentric circles from a base and to follow exact routes on successive dates if such a technique were relevant to the data required.

Limitations

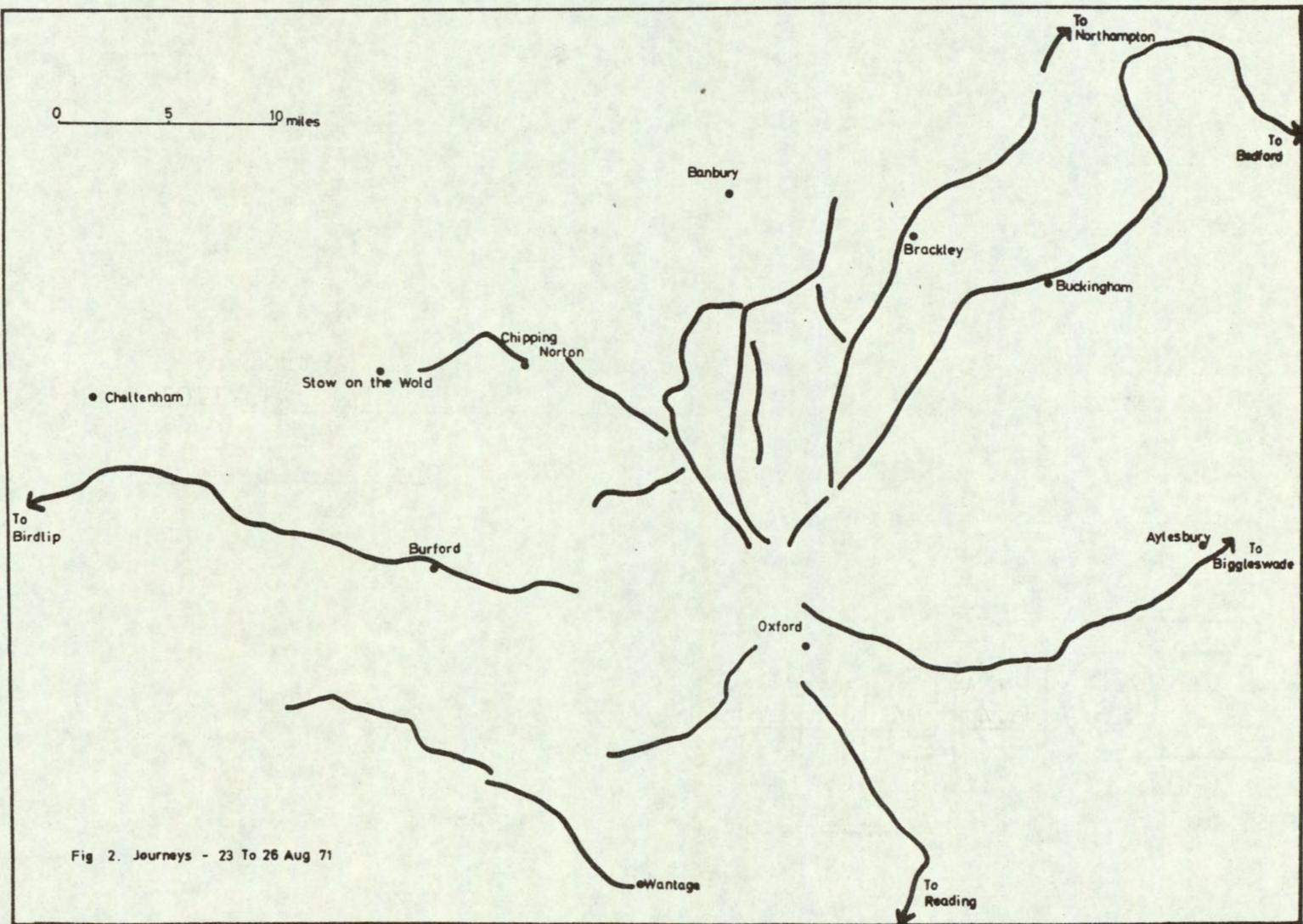
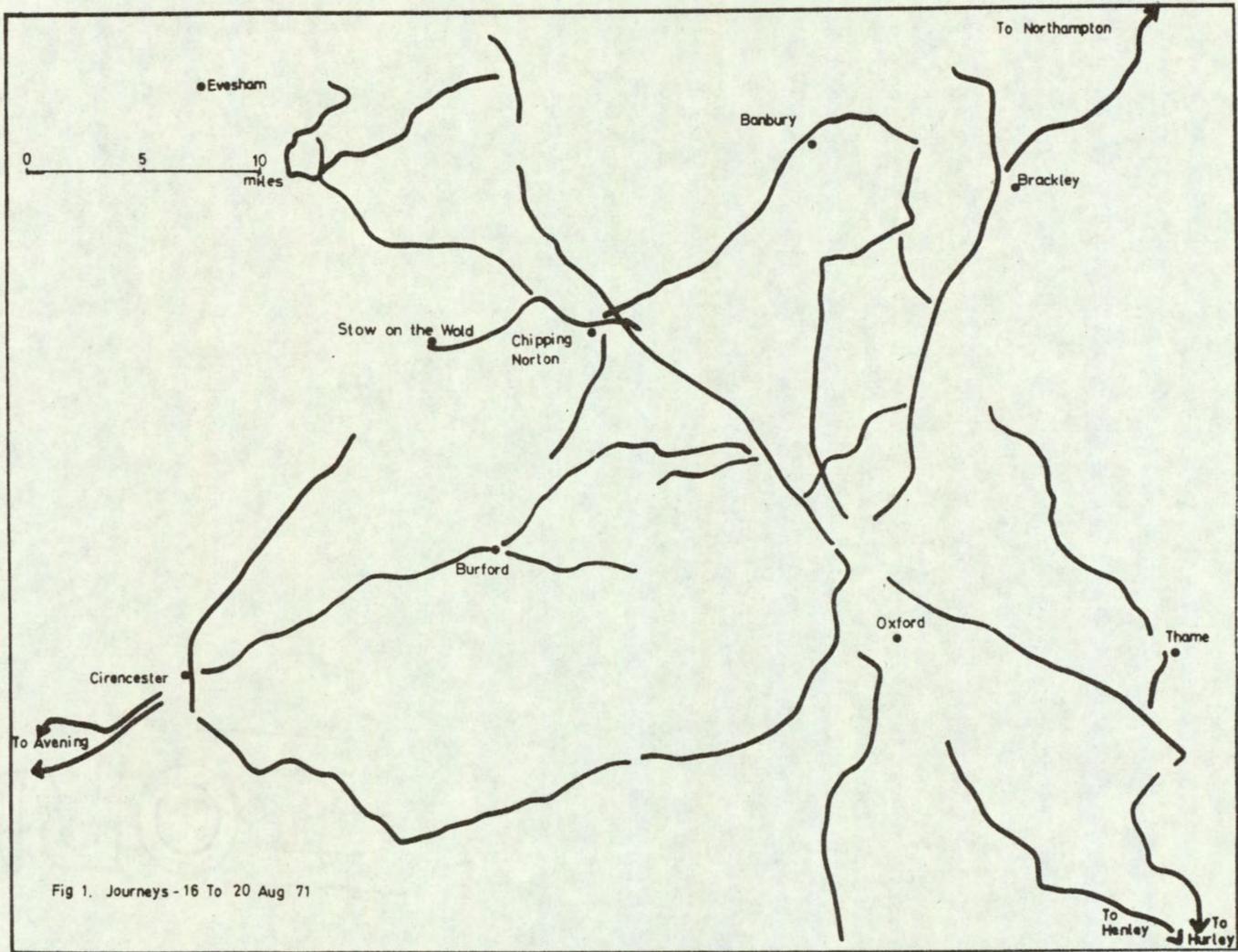
Experience showed that only very obvious field states could be recognised when travelling, especially where, in some areas, tall hedges obscured the view. For recording, the use of five or six symbols representing the items observed was found to be practical. These were recorded in numbered 'boxes' on the forms, each box representing a field. As a road safety precaution it is essential that the vehicle driver is not involved in the observations.

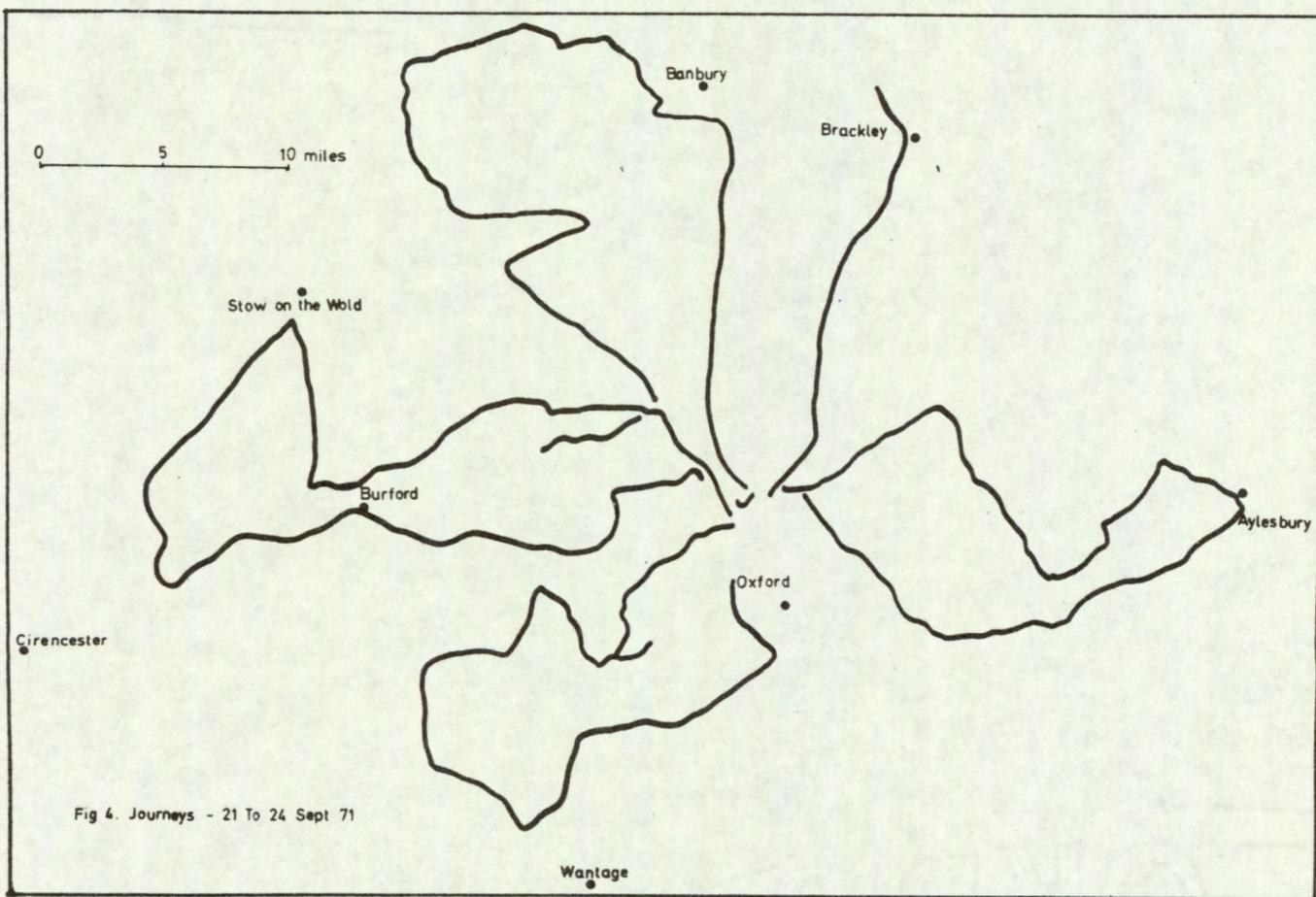
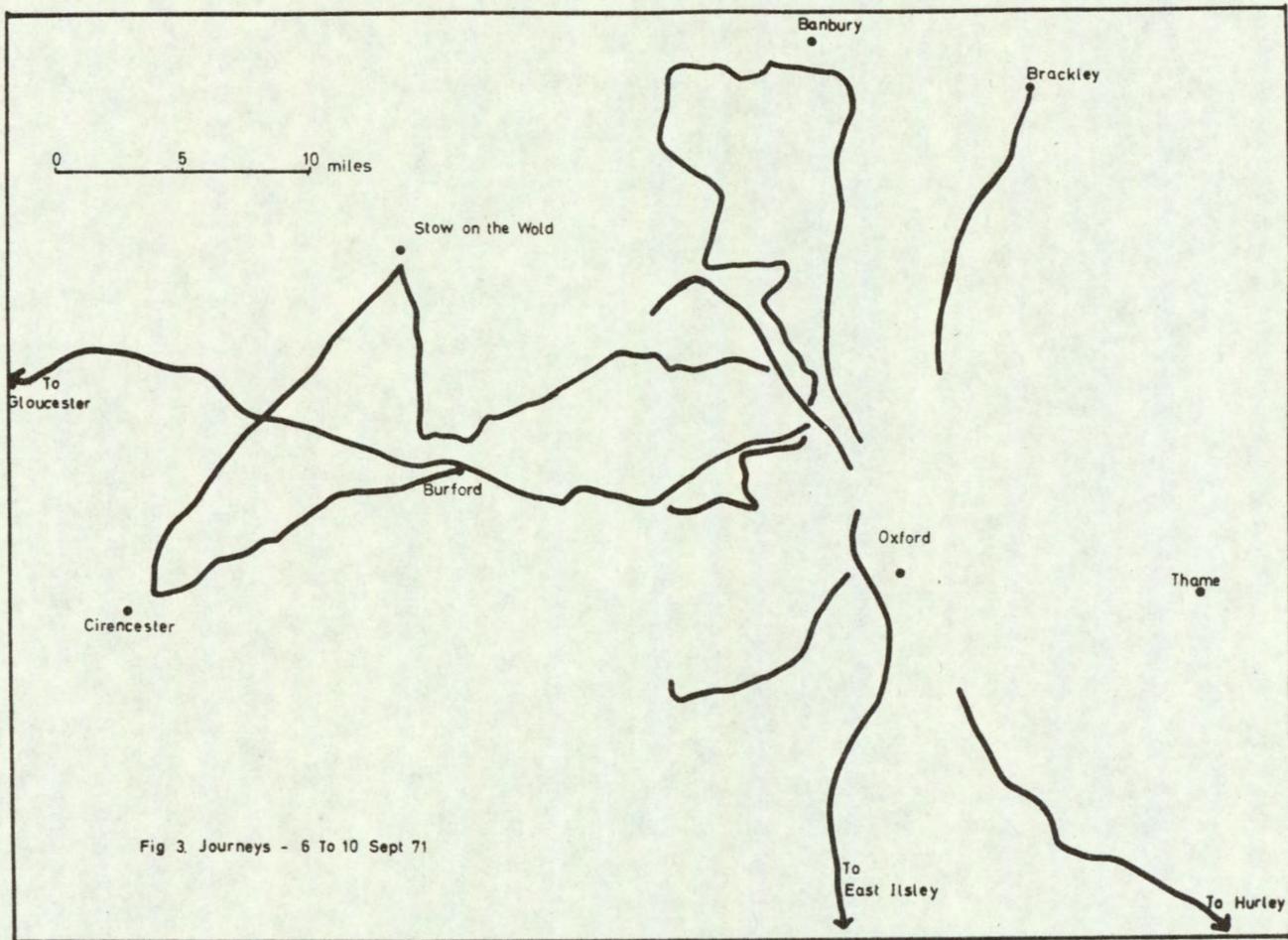
ACKNOWLEDGEMENTS

Thanks are due to all WRO colleagues who readily took part in collecting the data during their journeys and to those who read and commented on the report, also to Mrs. J. McDonnell who assisted in the work throughout all its stages. The work of J.G. Elliott and T.W. Cox who initiated and carried out the pilot survey in 1969 is also gratefully acknowledged.

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APPENDIX

ARC Weed Research Organization.

Observations from the roadside of the state of harvest of cereals and of subsequent cultivations.

NOTES FOR SURVEYORS.

The purpose of the survey is to relate to the date of the observation

- (a) whether the cereal fields have been combined,
- (b) whether the straw is still present,
- (c) whether cultivations have started.

1. Observe cereal fields only.
2. Observe every cereal field you can identify with certainty on one side of the road in succession up to a maximum batch of 50 fields per stretch of road. The precise number in a batch is not important but try to record not less than 10 fields per stretch of road.
3. Use a new 'block' of figures (Field Nos.) for each different stretch of road.
4. Record the appropriate symbol against each field number as in the example below. Use the symbols shown overleaf
e.g. Field No.: 1 X 2 C 3 C 4 S 5 C 6 P 7 X 8 X 9 S 10 P
5. Identify the stretch of road observed by recording the villages. A convenient method will be to start observing, say, on the left immediately on leaving a village and continuing as long as practicable, possibly to the outskirts of another village along the road. Record the road no. if it is classified.

e.g. Road from: Yarnton via: Cassington To: Witney
Road No. B 4449 then A 40

6. Please return the forms on completion to:

APPENDIX

Name of observer _____

- Symbols: X = Not yet combined
 C = Combined but straw still present (in swathe or bale)
 S = Stubble only, straw cleared (carted, burnt etc.)
 P. = Stubble ploughed or cultivated.
 ? = The field had been ploughed (or cultivated) but I am not sure whether it had been in cereals.

Note: In the case of any operation in progress or partly done, regard it as completed.

Road from: _____ via: _____ To: _____

Road No: _____

County: _____

Recorded on left / right _____ date: _____ office use

Field No:											office use				
	1	2	3	4	5	6	7	8	9	10	X	C	S	P	?
11	12	13	14	15	16	17	18	19	20						
21	22	23	24	25	26	27	28	29	30						
31	32	33	34	35	36	37	38	39	40						
41	42	43	44	45	46	47	48	49	50						

Road from: _____ via: _____ To: _____

Road No: _____

County: _____

Recorded on left / right _____ date: _____ Office use:

Field No:											Office use:				
	1	2	3	4	5	6	7	8	9	10	X	C	S	P	?
11	12	13	14	15	16	17	18	19	20						
21	22	23	24	25	26	27	28	29	30						
31	32	33	34	35	36	37	38	39	40						
41	42	43	44	45	46	47	48	49	50						

Road from: _____ via: _____ To: _____

Road No: _____

County: _____

Recorded on left / right _____ date: _____ Office use

Field No:											Office use				
	1	2	3	4	5	6	7	8	9	10	X	C	S	P	?
11	12	13	14	15	16	17	18	19	20						
21	22	23	24	25	26	27	28	29	30						
31	32	32	34	35	36	37	38	39	40						
41	42	43	44	45	46	47	48	49	50						