Chapter (non-refereed)

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ROAD VERGES—RESEARCH ON MANAGEMENT FOR AMENITY AND WILDLIFE

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The vegetation of road verges has got to be managed, not only for highway engineering reasons but also for conservation and amenity reasons. If they are not managed the grass verges will turn to scrub, or where scrub and hedges already exist they will grow out of control and certainly lose their amenity if not their conservation value. Although we have been considering in the other papers presented at the symposium all kinds of vegetation between the edge of the road and the highway boundary, the major management problem in most parts of the country at the present time is the control of the growth of grass, tall growing herbaceous plants and noxious weeds.

From a conservation point of view the aim is diversity of habitat in order to encourage the greatest variety of wild animals and plants. However, in any one place once a suitable form of management has been evolved, it will be important to try to apply the same management from year to year. Many plants and animals have quite strict requirements for a place to live, and a community that has been built up over a period of years under one form of management can quickly be destroyed by another. The communities of wild plants of grass verges that exist now, and whose conservation is so important, have evolved under particular forms of management over many years. We can try to simulate these forms of management with the powerful machines and growth active chemicals that are now replacing hand labour, grazing and hay making. We can also use these new tools to create different conditions and new communities of plants and animals. In addition we have the opportunity on the new verges to manage them in such a way that they contribute something real to the countryside.

Amenity is not only visual but also includes tracks and paths for riding and walking, areas for picnicking and similar activities. It is a common experience that areas that look ill-kempt attract vandalism and dumping of rubbish. Nature when left to herself is rarely tidy and not necessarily attractive. For instance, dense stands of once attractive flowering plants become withered and brown as the seeds develop and ripen. Nevertheless if the plants are cut as soon as the flowers go over, there will be no seed for succeeding generations. To cut the plants at this time might be good amenity but it would be bad conservation. The visual aspects of amenity are subjective but in any given situation many people will agree on what is acceptable and certainly on what is not.

Management for amenity and conservation has got to be designed within the framework of the economics of highway maintenance, the capabilities of machines, the weather, time and labour available. Management of verges is an expensive business and from a strictly economic standpoint shows no return. It will therefore be desirable to evolve management proposals that make the minimum demands on highway authorities and yet which provide the greatest variety of wildlife habitats of acceptable amenity standards. Within this broad framework, however, there are likely to be some situations where greater expense and effort is required than highway authorities would normally be prepared to consider. Some economic value can be put on the conservation of particular plants and animals, or in preserving places of especial beauty, and we should be (and often are) prepared to pay for this. Likewise in the interests of conservation we should be prepared for limited periods of time to put up with reduced amenity in order to enable plants to seed or birds to nest.

The Nature Conservancy is supported by Government funds and is officially responsible for giving advice at a National level on the conservation of wild life. It has been involved in the question of management of road verges, particularly in respect of the use of chemical weedkillers, since the early 1950's. Early Conservancy work was published by Balme (1954, 1956); co-operation between the Conservancy, the A.R.C. Unit of Agronomy at Oxford and the Road Research Laboratory resulted in the production in 1955 of the Ministry of Transport's Circular 718, for the guidance of Highway Authorities about the use of weedkillers in controlling roadside vegetation. It is hoped that the research work now being undertaken by the Conservancy and other organisations will lead to a revision of this leaflet, to take account of developments in machinery and chemicals since that time.

The work by the Conservancy on roadside verges now falls under three headings

i. Management experiments

ii. Survey work on the physical structure and conservation value of verges

iii. Through Naturalists' Trusts, the Botanical Society of the British Isles (B.S.B.I.) and other organisations, the cataloguing of road verge sites of particular conservation importance.

Management experiments

A. Country Roads. Two experiments have been in progress on the effects of a range of management practices since 1965. This year (1969) the plots are about to be treated in the same way for the fifth year running. The treatments are listed below. (Table 1).

TABLE 1

Treatments applied to experimental plots on road verges in Cambridgeshire and Huntingdonshire

	Operation in third week of:					
	April	May	June	July	August	September
1. Untreated						
2. Untreated						
3. Maleic hydrazide	spray					
4. Maleic hydrazide and cut later	spray		cut			
5. Maleic hydrazide and 2, 4-D	spray					
6. Maleic hydrazide and 2, 4-D; cut later	spray		cut			
7. 2, 4-D	spray					
8. 2, 4-D and cut later	spray		cut			
9. Flail twice		cut			cut	
10. Flail five times		cut	cut	cut	cut	cut
11. Haymower twice, cuttings raked		cut			cut	
12. Haymower 5 times, cuttings raked		cut	cut	cut	cut	cut
13. Haymower twice, cuttings NOT raked		cut			cut	
14. Haymower five times, cuttings NOT raked		cut	cut	cut	cut	cut
15. Rotary mower twice		cut			cut	
16. Rotary mower five times		cut	cut	cut	cut	cut
17. Haymower once			cut			
18. Haymower once				cut		
19. Spare						
20. Spare						

Each treatment plot is 6 ft wide and 20 yds long, and is repeated four times in a statistical layout. One experiment is on Oxford clay in Huntingdonshire and the other on a chalk soil southeast of Cambridge. The botanical composition of the swards at the two places is different, and the chalk site is naturally richer in herbaceous plants. Records are taken monthly of the mean height of the vegetation and of the species of plants in flower, including grasses. In July/August assessments are made of the relative abundance of the plant species by means of presence/absence recording in forty 15 cm square quadrats per plot. In addition photographic records are made and also subjective assessments of the amenity ('attractiveness') of each plot. These experiments are of a long term nature, and although gross differences between the different treatments are now becoming apparent, the vegetation has not yet 'settled down' to a more or less stable situation, in the way that the plots at Bibury may now be assumed to have done after ten years of the same treatment.

There has not been the well marked decline in tall tufted grasses or increase in rhizomatous grasses as a result of application of maleic hydrazide (MH), that was described by Yemm & Willis (1962) over a similar period of time at Bibury. MH has consistently reduced flowering in grasses and in growth of the culm (flowering stem) but effects on the general height of the vegetation (see below) have worn off in most seasons six to eight weeks after treatment. Effects of 2,4-D have been to reduce the number of broadleaved flowering plants. The haymower has generally not cut so evenly or so closely as either the flail or rotary cutter. Both the latter machines and especially the flail have sometimes created bare patches. These have, however, usually been rapidly colonised by low-growing creeping plants. In general there are quite obvious visible differences between many of the treatments but, because it is the growth of the plants that has been affected rather than the actual composition of the flora, especially the dominant grasses, it is difficult to describe these differences in precise botanical terms. Nevertheless, as one might expect, certain species or groups of plants with particular ecological preferences are becoming more common in some treatments compared to others. Thus low growing plants such as Creeping Buttercup (Ranunculus repens), Birdsfoot-trefoil (Lotus corniculatus), White Clover (Trifolium repens), Hop Trefoil (T. campestre) have become more common in the plots where the vegetation is kept shorter throughout the season. In the taller plots the Composites Hardheads (Centaurea nigra) and Greater Knapweed (C. scabiosa), the Field Scabious (Knautia arvensis), the umbellifers Cow Parsley (Anthriscus sylvestris) and Hogweed (Heracleum sphondylium) have been favoured. It is worth noting that the umbellifers and composites are usually very valuable food plants for a wide range of insects including bees and also for some birds—eg Goldfinches and Linnets, whilst other birds feed on the insects. In the completely unmanaged plots the agricultural weeds Creeping Thistle (Cirsium arvense) and Bindweed (Convolvulus arvensis) have become common.

The height of the vegetation in selected treatments for the Cambridgeshire site in 1967 are shown in Figs 1 and 2.

Fig 1. Mean height of vegetation in selected treatments sprayed with MH and 2,4-D. Cambridgeshire 1967

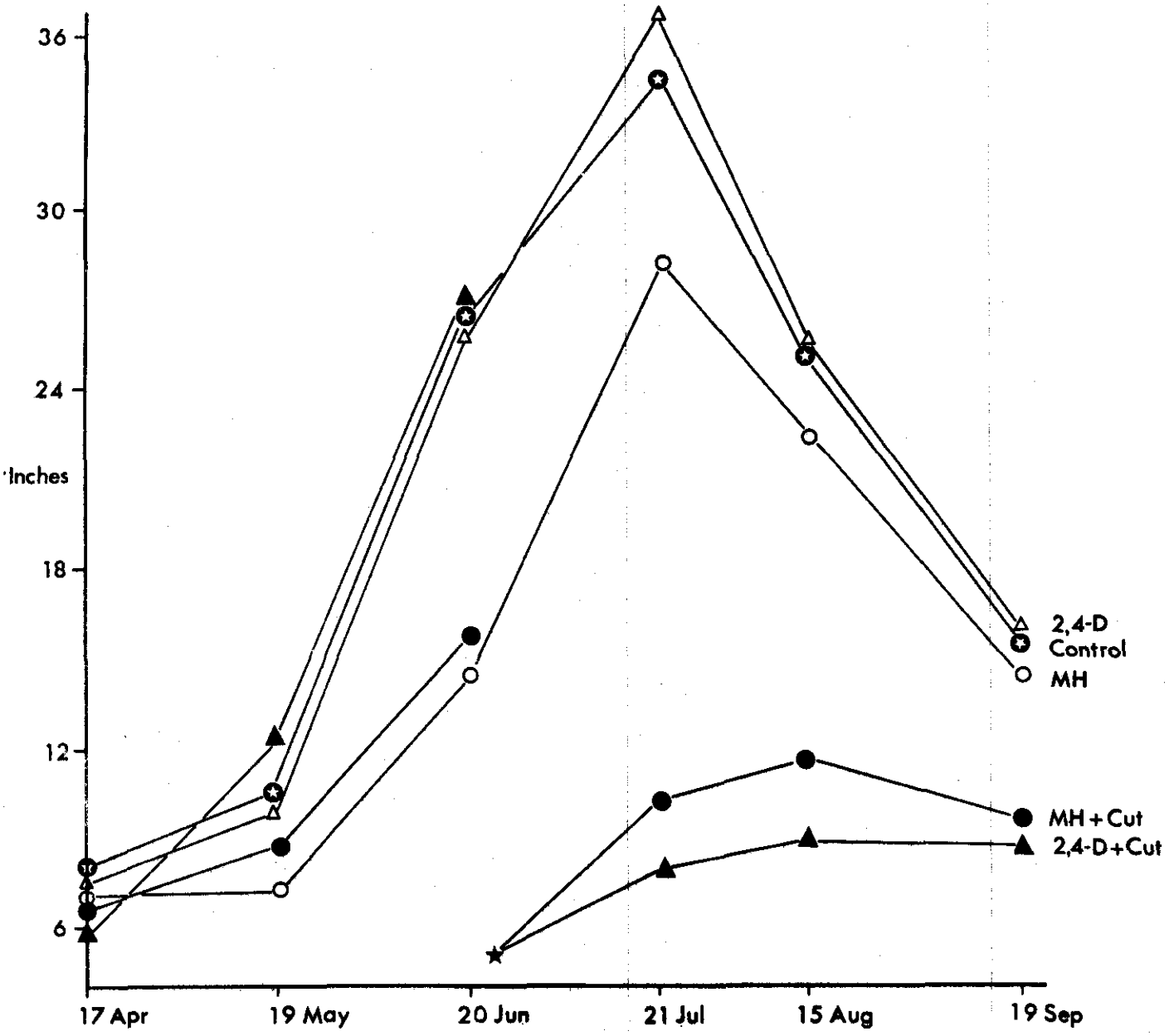
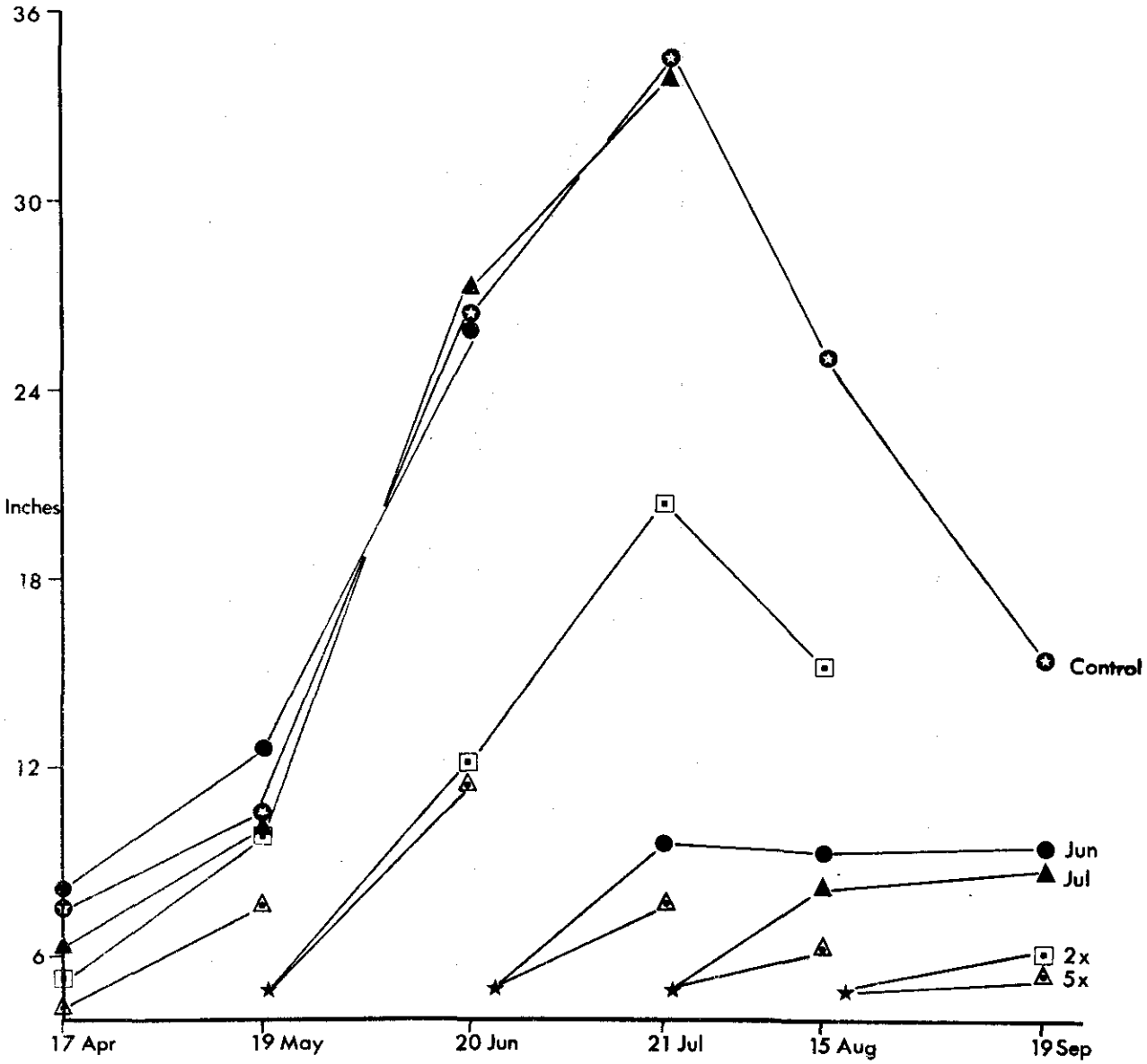


Fig 2. Mean height of vegetation in selected treatments cut with a haymower and the cuttings raked off. Cambridge 1967.



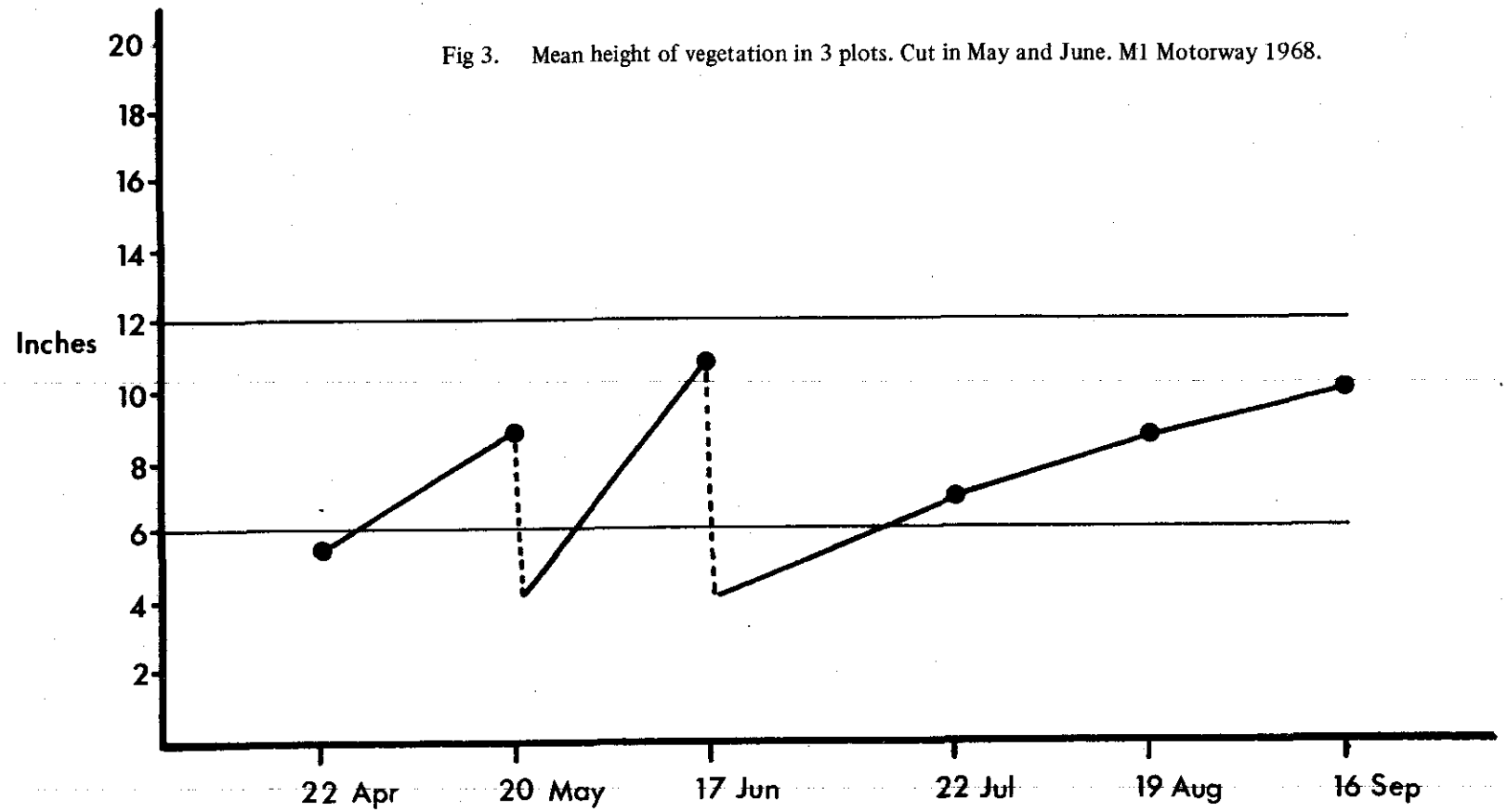


Fig 3. Mean height of vegetation in 3 plots. Cut in May and June. M1 Motorway 1968.

In both figures the curves for the untreated plots are the same and show growth to a maximum height in the middle of the season followed by a gradual collapse mainly caused by wind and rain. Of the chemical treatments (Fig 1) maleic hydrazide depressed growth for 6-8 weeks after which there was some resumption; however if the MH treatment was followed by a cut 8 weeks after application there was little further growth. In these experiments there was no effect on growth from 2,4-D (or additional effect where it was combined with MH) and the effects of cutting 8 weeks after application of 2,4-D were the same as cutting once in June (Fig 2). With these two treatments and the single cut in July (ie Treatments 8, 17 and 18) *no further cut* during the season was necessary to prevent growth of more than 12 in. but a visibility hazard would exist in the early part of the season. Where the grass was cut five times at monthly intervals it is interesting to note the *drop-off in* the rate of growth following each cut. Where the grass was cut in May there was a considerable effect lasting through the season to the second cut in August. Where it is not desired to protect spring flowering plants such as Cowslip (Primula veris) and a height of vegetation of 12 in. is tolerable, a single cut in May by itself or followed by another cut in June might well be all that is necessary. From a conservation point of view it would of course be desirable to time the cuts to avoid the peak flowering and fruiting periods of the herbaceous plants present. The results presented here are for one year only and it should be noted that the pattern of growth has varied in detail from year to year depending upon growing conditions.

B. Motorways. A further experiment was set up in 1968 on the embankments of the M1 in Leicestershire, where 20 randomised treatments are repeated at three sites between Lutterworth and Shepshed. The treatments are shown below (Table 2) and are all made by flail machines except when the banks are too wet, when rotary cutters are used.

TABLE 2

Treatments applied to experimental verges on the M1 Motorway in Leicestershire.

	Cut in third week of:				
	April	May	June	July	September
1	X				
2	X	X			
3	X		X		
4	X			X	
5	X	X	X		
6	X	X		X	
7	X		X		X
8	X	X	X		X
9	X	X	X	X	X
10		X			
11		X	X		
12		X		X	
13		X	X	X	
14		X	X		X
15		X		X	X
16		X	X	X	X
17			X		
18				X	
19					
20					

These banks are a sample of the hundreds of acres of recently established grassland associated with the current road building programme. As no economic use seems likely for this land, management sympathetic to the conservation of wildlife would be justifiable. This experiment is again of a long term nature. Records being taken at the moment are of height of the vegetation and of plants in flower in the different treatments at monthly intervals. In due course, when the vegetation has 'settled down' to the effects of the treatments more detailed analyses will be made of the botanical composition.

C. Discussion. Very few grasses have leaves longer than 30 cm (12 in.); notable exceptions amongst common road verge species are found in the genus Festuca (fescues), also Cock's-foot (Dactylis glomerata), False Oat-grass (Arrhenatherum elatius), Timothy Grass (Phleum pratense) and Tor Grass (Brachypodium pinnatum). The choice of an acceptable height of vegetation by Highway Authorities is therefore fairly critical, because if it is possible to prevent the development of the culm (flowering stem) by cutting or the use of MH, subsequent growth of leaves of the majority of grasses is unlikely to exceed 12 in. This height is recommended for many situations on trunk roads and motorways by the Ministry of Transport (1968). As shown (Fig. 1) it is possible to keep to this height by the use either of a single spray of MH in April and a subsequent cut about mid-May, or (Fig 3) by a cut in May and another in June. However if a height of 6 in. is the maximum permissible, this can only be achieved by very frequent cutting of the leaves of the plants, perhaps every three weeks or so at the beginning of the season (Fig 2). It should be noted that these observations probably apply to the Midlands and eastern parts of the country but not necessarily to the wetter parts of the west. Also that they apply to verges or parts of verges where the height of the vegetation has to be controlled. From a conservation point of view, many broadleaved plants are flowering during the months of May and June and this is not the best time to cut them. One hopes, therefore, that where height of vegetation is not important, management can be arranged to avoid the main flowering and seeding period for many plants.

Surveys

A survey was made in 1967 of the physical structure and flora of a sample of road verges in England and Wales. It is hoped that it will be possible to relate the botanical composition of these sites to the management that they have received in the past; thus providing additional information about the effects of different types of management on the development of plant communities. This work is being extended by members of the B.S.B.I. and other organisations to whom we are most grateful. Further survey work is planned to relate the vegetation of road verges and other boundary situations with the weed flora of agricultural land. This is important in relation to the pressures from farmers on Highway Authorities to manage verges to control or eliminate agricultural weeds. The status of these plants on verges and their significance there as sources of seed or propagules for infestation of farm land has not been studied in any detail. There are, however, reasons for supposing (see Chancellor in this symposium) that they may not be so important as is often made out.

Cataloguing

The work of the Conservancy in collecting data from Naturalists' Trusts and other organisations about verges of especial interest has been mentioned by Perring (this symposium), and there is no need to discuss it further here.

Conclusions

It has to be remembered that different species of grasses and other plants respond differently to different management treatments, especially in relation to time, and that geographical and climatic factors will also modify the effects. What we hope to do from our experiments is to show the sort of effects that may occur and to indicate how they might apply in general. As diversity is our aim there is no question of our making general blanket proposals—each area ought to be managed in the way that gives the most favourable result. This is a counsel of perfection but it does point the need for close liaison between Highway Authorities and local conservation and amenity organisations. In this work, because of their special knowledge of the wildlife of their own areas, the County Naturalists' Trusts should play a leading part, and many are already doing so.

In conclusion it is a pleasure to acknowledge the interest and help of the Cambridge and Isle of Ely, the Huntingdon and Peterborough and the Leicestershire County Councils, together with the Ministry of Transport, with whose co-operation the experiments referred to in this paper are being made.

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