

increase obtained by the use of ammonium sulphate at different times during the year can be explained in part by climatic conditions. Droughty conditions in the autumn and the retardation of all growth during the winter undoubtedly account in some measure for the smaller effect of ammonium sulphate during these periods. The great differences, however, cannot be entirely explained by climatic factors, and it must be assumed that the particular flora of the two sets of plots has been an important factor in determining the magnitude of the increase in dry matter obtained by the use of ammonium sulphate at different periods of the year. The plots containing a higher percentage of rye gave the largest increase under ammonium-sulphate treatment during the spring and early summer periods.

(b) *Influence of Ammonium Sulphate on the Botanical Composition of Pasture.*—The frequent use of ammonium sulphate during the season detrimentally affected the flora of all plots irrespective of their past manurial treatment. Burning of clovers and weeds occurred during dry weather. A great reduction in the percentage of these constituents in the flora was apparent on all plots. This reduction in the percentage of clovers and weeds was perhaps most noticeable on the plots which in the past had received no treatment. On these plots clovers and trefoils were always very conspicuous during midsummer and autumn and on this account suppression could be more easily seen. A botanical separation of hay crops cut from the plots that had been treated with ammonium sulphate during the previous season showed that the use of this fertilizer had very materially affected the flora. Some of the more striking features of these botanical separations are shown below in Table III.

TABLE III.—EFFECT OF AMMONIUM SULPHATE ON BOTANICAL COMPOSITION OF HAY.
Series II: Hay was cut on 7th November, 1930.

Treatment.	Grasses.	Clovers.	Weeds.
Untreated	65.4	25.5	9.1
Untreated plus repeated applications of nitrogen	91.2	5.6	3.2
Nitrogen, single application	60.5	20.3	19.2
Nitrogen, repeated applications	92.5	4.9	2.6
Superphosphate and potash	69.3	25.5	5.2
Super and potash plus one application of nitrogen	75.0	18.7	6.3
Super and potash plus repeated applications of nitrogen	89.7	6.4	3.9
Superphosphate	62.9	24.5	12.6
Superphosphate plus repeated applications of nitrogen	90.5	6.3	3.2

The data show that even with one application of ammonium sulphate at the rate of 1 cwt. per acre the percentage of clovers is definitely lowered. Where five applications of ammonium sulphate were made in the previous season the reduction in percentages of both clovers and weeds is very marked. The suppression of clovers and weeds is accompanied by a large increase in the percentage of grasses in the crop. In several cases the percentage of clovers has been lowered from 25 per cent. of the crop to 6 per cent. of the crop. Grasses have shown an increase from 60 per cent. of the crop to over 90 per cent. of the crop. The past manurial treatment of the crops has had little influence on clover-suppression, if repeated applications of ammonium sulphate have been made. Plots formerly untreated and others receiving for seven years a complete manure were affected botanically in a similar way under ammonium-sulphate treatment.

During the year following the conclusion of these detailed experiments with ammonium sulphate the very detrimental effect in suppressing clovers and in opening up pasture sward was clearly marked on all the plots. Where 1 ton of ground limestone per acre had been applied in the season previous to the conduct of the experimental work, the detrimental effect of repeated applications of ammonium sulphate was much less marked.

(c) *Chemical Composition of Pasture.*—Data dealing with the effect of frequent applications of ammonium sulphate on the chemical composition of pasture have not yet been compiled, but they show that there is a striking seasonal variation in the composition of pasture, irrespective of its manurial treatment. During the drought periods of February and March a great drop in the percentage of phosphate, nitrogen, and soluble ash occurred on all plots. During periods of high rainfall the percentage of these ingredients stood at a comparatively high level. The effect of manurial treatment can be clearly traced in the percentages of particular constituents in pasture grass. This is well illustrated by the high percentages recorded for phosphoric acid, potash, and nitrogen in the spring period in the case of plots where manures containing these plant-foods have been applied.

The use of ammonium sulphate has again depressed the lime content of pasture in the early spring, but the depression is not so marked as was the case for the corresponding plots during the previous year. Continuous mowing of the plots, resulting thereby in an increase in the clover content, probably is responsible for this less marked effect of ammonium sulphate on the lime content of the pasture-cuttings.

GENERAL.

The following papers and bulletins have been published during the period under review:—

- (1) "Influence of Ammonium Phosphate on the Yield and Composition of Meadow Hay," by H. O. Askew.
- (2) "Effect of Season and Fertilizer on the Yield of a Typical Dairying Pasture—Part I," by T. Rigg and H. O. Askew.
- (3) "Titanium in Some New Zealand Soils and Pastures," by H. O. Askew.
- (4) "Effect of Season and Fertilizer on the Chemical Composition of a Typical Dairying Pasture—Part II," by H. O. Askew and L. Bishop.

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