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Report for 1923-1924 With the Supplement to the Guide to the Experimental Plots Containing the Yields per Acre Etc.



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Potash on Potatoes

Rothamsted Research

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The new method does not, however, enable the slag to be completely characterised and there are still differences in effectiveness which cannot be explained. Slags No. 1, 6, 7 and 8 were compared in the sheep grazing trials at Rothamsted over a period of four years. The gains in live weight of sheep over those obtained on the unmanured plots have been :—

| | 1921 | 1922 | 1923 | 1924 | Total benefit in 4 years., lb. live weight per acre. Slagged over unslagged land. |
|------------|------|------|------|------|---|
| Slag No. 7 | 50 | 19 | 62 | 18 | 149 |
| " " 8 | Nil | Nil | Nil | 30 | 30 |
| " " 6 | Nil | Nil | 15 | Nil | 15 |
| " " 1 | Nil | 21 | 7 | Nil | 28 |

It is obvious that No. 7 is by far the most effective of these slags, being better even than No. 1 which was known to act well on other soils, but no chemical test so far tried would show this superiority to a prospective purchaser. At the time we obtained the slag neither the makers nor ourselves knew or even suspected that it would prove any better than No. 8 or as good as No. 1, nor can we yet explain why it should be so. It seems clear that somewhere in its history this slag received some treatment which, if it could be repeated on other slags, might greatly enhance their agricultural value. A possible clue has been furnished by the manufacturers and an observation has been made in the chemical laboratory which may furnish the solution of a very attractive problem.

A third important chemical factor has been discovered during the past season by Dr. Brenchley and Mr. Page. Some of the slags examined were found to contain substances harmful to the plant. This does not, of course, mean that they actually damaged the crop: what happened was that in these particular slags the beneficial effect of the phosphate present was in part counteracted by the harmful substance. All these problems are being followed up and the co-operation of the slag makers is secured through the Permanent Basic Slag Committee of the Ministry of Agriculture. In the meantime farmers who have applied slag to their grass and obtained disappointing results are requested to communicate the facts to the Director.

POTATOES.

The experiments with the different potash manures begun in 1921 have been continued (p. 120). The muriate and the sulphate of potash behave nearly but not quite alike, the muriate giving sometimes a slightly better and sometimes a slightly less yield than the sulphate. The determining factor is partly rainfall, the sulphate tending to give the higher yield in drier conditions and the muriate in wetter, but there is something beside this, for in 1924 the sulphate came out the better in spite of the wetness of the season.

Addition of other chlorides (*e.g.*, salt) to the muriate, is, however, injurious; neither kainit nor sylvinit gave the full benefit expected from the potash because of the harmful effect of

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the salt. This is to some extent mitigated by additions of dung, but the crop always falls below that obtainable from the muriate or the sulphate. The results at Rothamsted are:—

YIELD OF POTATOES WHEN SULPHATE OF POTASH IS USED = 100.

| | 1922 | | 1923 | | 1924 | |
|---------------------------------|---------------|------------|---------------|------------|---------------|------------|
| | Without dung. | With dung. | Without dung. | With dung. | Without dung. | With dung. |
| Muriate of Potash | 106 | 98 | 98 | 105 | 98 | 99 |
| Sylvinite ... | 89 | — | 87 | 84 | 108 | 105 |
| Rainfall (March-May inclusive). | 4.08 | | 5.64 | | 8.95 | |

These fertilisers affect the quality of the potatoes. Of the complete manured plots, those receiving sulphate of potash produce tubers with the highest percentage of dry matter.

| Potassic Fertiliser Used. | Percentage Dry Matter of Potato Tubers. | | | | |
|---------------------------|---|-------|-------------|--------------|------|
| | Rothamsted. | | Reaseheath. | Seale-Hayne. | Usk. |
| | 1922 | 1923 | 1922 | 1922 | 1923 |
| Sulphate ... | 24.26 | 21.73 | 21.68 | 24.4 | 23.6 |
| Chloride ... | 22.02 | 20.85 | 19.63 | 22.3 | 22.5 |
| Low Grade Salts | 19.68 | 17.87 | 17.28 | 22.7 | 21.0 |
| No Potash ... | 23.07 | 20.65 | 17.62 | 25.7 | 22.1 |

The tubers grown with low grade potash salts (kainit, sylvinit) are the lowest in dry matter content, coming out even below those grown without potash.

The percentage of starch in the dry matter is an important quality factor, and in all tubers so far analysed the value comes out higher for the sulphate of potash than for any of the other salts.

| Potassic Fertiliser Used. | Yield in tons per acre. | Dry Matter per cent. in Tubers. | Starch per cent. in Dry Matter. | Starch. Tons per acre. |
|---------------------------|-------------------------|---------------------------------|---------------------------------|------------------------|
| Sulphate ... | 8.30 | 24.26 | 65.84 | 1.325 |
| Chloride ... | 8.32 | 22.02 | 64.00 | 1.175 |
| Low Grade Salts ... | 8.06 | 19.68 | 58.20 | 0.925 |
| No Potash ... | 2.47 | 23.07 | 57.16 | 0.325 |
| Control ... | 2.98 | 23.36 | 58.20 | 0.405 |

Magnesium sulphate continues to give interesting results; its effect on potatoes has been beneficial at several centres though we cannot yet explain why.

| Complete Artificial. | Rothamsted. | | | Blaydon. | | Walbottle. | | Newton Abbot. |
|-----------------------------|---------------|---------------|------------|---------------|------------|---------------|------------|---------------|
| | 1922 No Dung. | 1923 No Dung. | 1923 Dung. | 1922 No Dung. | 1922 Dung. | 1922 No Dung. | 1922 Dung. | 1922 Dung. |
| No Magnesium Sulphate ... | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| With Magnesium Sulphate ... | 102 | 104 | 104 | 108 | 114 | 118 | 129 | 117 |
| | 97 | 108 | 104 | | | | | 120 |