

No Benefit from Subsurface Placement of Phosphatic Fertilisers in Pasture

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THOUGH recent overseas experiments have shown that row crops use phosphate better when it is placed close to the roots than when it is broadcast, no similar beneficial effects in pastures by subsurface placement of phosphatic fertilisers were obtained in Department of Agriculture trials. On the contrary, the implement used to place fertilisers at varying depths in pasture depressed growth and the fertiliser so placed did not encourage deeper rooting of species.

THREE placement trials were established on pastures at Rukuhia Soil Research Station to investigate:—

1. Whether the subsurface placement of phosphate below the organically rich topsoil results in reduced fixation of phosphate in an organic form and consequently increased pasture growth.
2. Whether the subsurface application encourages deep rooting, thus enabling plants to withstand drought conditions.

One measurement trial was established in August 1952 on Horotiu sandy loam. Two others laid down in May 1952 were observational trials—one on Horotiu sandy loam, the other on Hamilton clay loam. All trials were

on areas where soil tests indicated low phosphorus levels. The fertilisers were placed by an implement specially designed for subsurface placement of fertiliser. It consists (see illustration below) of a triangular blade (1) supported by a stem (2) on which the blower (3), the engine (4) for driving the blower, and the hopper (5) are mounted.

Fertiliser in the hopper is activated by a worm agitator driven by a chain from a land wheel and falls into the blower. The blower, driven by the engine, ejects the fertiliser through a space in the stem into the horizontal cut made by the blade passing under the turf.

Trials

In the measurement trial subsurface applications of superphosphate at 4in. and 8in. were compared with wholly surface applications and half-surface and half-subsurface applications 4in. and 8in. deep. In the observational trials all subsurface applications were 6in. deep. The implement was run through plots of one treatment on all of the trials at 6in. depth without the application of fertiliser to measure its effect on production without the complicating effect of fertilisers.

Results

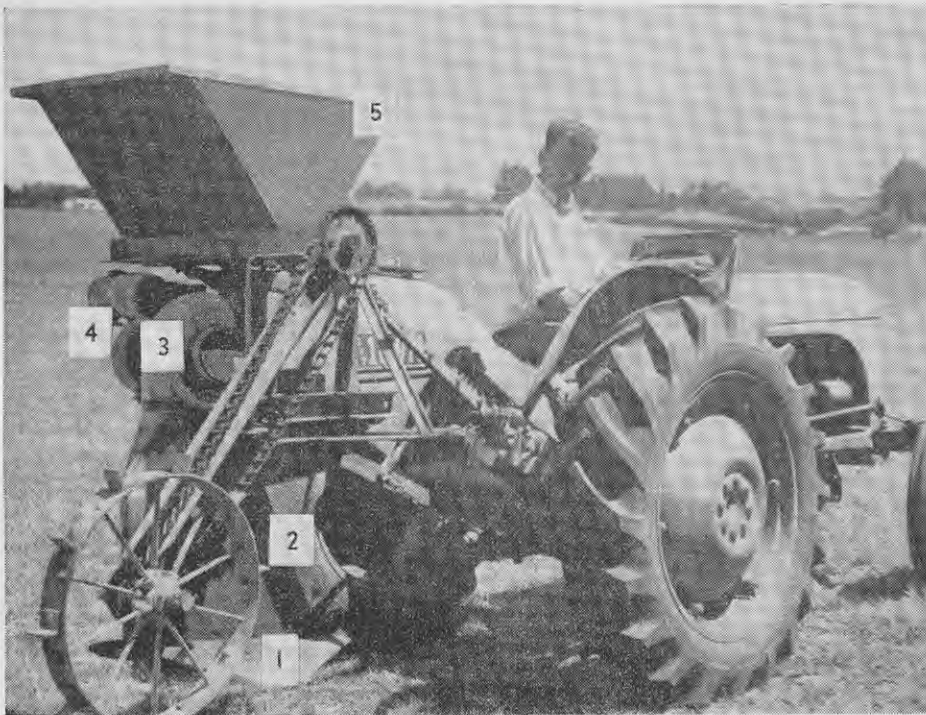
Yield data and observations over 2 years showed that plots receiving wholly surface dressings (with the implement run through the plots at 6in. depth), and those receiving half-surface and half-subsurface dressings at 4in. and 6in. depth were better than those with wholly subsurface dressings.

Use of the implement without fertiliser was detrimental to pasture production. This was especially apparent at the beginning of the trials, when all the control plots, on which the implement was not used, yielded markedly better than plots on which the implement was used.

A study of the distribution of the root system in different layers revealed that on Hamilton clay loam about 85 per cent. of roots are concentrated in the top 4in. layer. It is possible, therefore, that phosphate placed below 4in. may be less efficiently absorbed by pasture plants than surface-placed fertiliser. Chemical analysis of soil from a fourth trial where phosphate was placed 3in. deep indicated that such placement did not reduce the conversion of the phosphate into organic forms when compared with topdressing. Sub-surface placement in these soils thus appears not to reduce organic fixation or stimulate deep rooting, but rather to place phosphate in a position where it is less available to pasture plants.

Conclusions from the trials are:—

1. Subsurface placement of phosphatic fertilisers at 4in., 6in., and 8in. resulted in lower pasture yields than did surface placement.
2. The deeper the phosphates were placed the lower was the production.
3. Subsurface placement of phosphates did not encourage deeper rooting.



The implement used was specially designed for subsurface placement of fertilisers. (The key to the numbers is in the article.)