(5) Maize Trial

Both superphosphate and serpentine superphosphate yielded 60 bushels of shelled maize per acre.

(6) Mangel Trial

This was not harvested due to caterpillar attack on the young plants.

(7) Turnips, Swedes, Rape and Chou Moellier

A comprehensive series of trials was carried out with turnips, swedes, rape, and chou moellier. As it is unwise to sow superphosphate with the seed of these plants, the comparisons have had to be widened to include reverted superphosphate (that is, superphosphate reverted with lime), superphosphate, carbonate of lime mixtures, and proprietary manures. In addition, germination counts as well as yields have been estimated, as fertilisers with these crops have to be "safe" in this respect. In all cases both serpentine superphosphate and the manure with which it is compared are sown at the **same rate per acre.** Germination counts are given in the **number of plants per 10 feet of drill length,** and yields in **tons per acre.** Trials are of three types: "Type A" are detailed replicated trials; "Type B" are "half-drill strip" trials, which also give accurate comparisons; and "Type C" trials are simple trials where there are only a few plots of each fertiliser and statistical examination of the results is not possible.

The following table summarises the average counts and yields from 46 trials. Positive differences indicate that serpentine superphosphate has given more plants or a better yield than the fertiliser with which it is compared, and negative differences show the reverse. The numbers in brackets give the number of trials contributing to the average difference.

Treatment compared with serpentine superphosphate.	Difference (Serpentine Super minus other fertiliser).					
	Germination Counts.			Yields in tons per acre.		
	Type A	B	C	A	B	C
Super: Carb. lime (1:1) Mixture	+1.7(5)	—1.6(3)	—	—1.5(4)	—1.8(2)	—
Super: Carb. lime (3:1) Mixture	—	+0.9(4)	—	—	+2.2(2)	—
Reverted Super (all brands)	—0.2(5)	—1.1(4)	+0.1(4)	—0.9(4)	—0.1(3)	+1.3(4)
Proprietary Manures (all brands)	—	+6.1(9)	+9.3(5)	—	+6.6(6)	+4.5(4)
Farmers' mixtures (all types)	—	+27.0(2)	+4.1(1)	—	+8.4(2)	—3.3(1)
Superphosphate	+1.6(1)	—	+1.8(2)	—3.0(1)	—0.1(1)	+1.3(3)
No fertiliser	—0.1(4)	—	—	+9.4(3)	—	—

Serpentine superphosphate is similar to, but no better than, a "reverted superphosphate" (that is, one reverted with lime and with a minimum of water-soluble phosphate). The same conditions apply whether the superphosphate has been reverted at the works or by the farmer by mixing it with carbonate of lime. The trials have shown, however, that the latter mixture should be 1 part of lime to 1 part of superphosphate, and that the lime should be finely ground and the mixture allowed to "mature" for several days before sowing.

Proprietary mixtures such as "Turnip Manures," have proved unsatisfactory both in their effect on germination and on the yields resulting from treatment, and in these respects they are much inferior to serpentine superphosphate. Farmers' mixtures have given very variable results. Superphosphate has depressed germination, but the season was not sufficiently dry for this to be serious. A few trials, including a "no fertiliser" treatment, show a marked response to phosphates; all of these trials were in the Canterbury district.

Summary and Recommendations

(1) Present information indicates that serpentine superphosphate should prove a useful fertiliser for pasture topdressing in the heavier rainfall districts of New Zealand. In North Taranaki, Waihi, and North Auckland, the new mixture is giving better results than superphosphate.

(2) Serpentine superphosphate has proved a safe reverted phosphate for sowing with the seed of turnips, swede, rape, chou moellier, and other crops liable to germination injury.

(3) Serpentine superphosphate gives equivalent results to superphosphate on most of the common farm crops.

(4) Superior physical condition of the mixture makes it easier to sow, more pleasant to handle, safer to store, and less damaging to bags than superphosphate.

(5) It is possible that the magnesium and cobalt-content of serpentine superphosphate may be valuable under certain conditions.

Acknowledgments

The investigation into the possibilities of serpentine superphosphate is a truly co-operative effort, and is being carried out in collaboration with a number of officers of other Departments, whose assistance is gratefully acknowledged. The practical help afforded by the large number of farmers, members of Young Farmers' Clubs, and pupils of District High Schools throughout the Dominion is providing information which will add to our knowledge of the value of this fertiliser. Future investigations aim to define more exactly those areas and crops on which serpentine superphosphate shows to advantage.