

Using recycled gypsum to improve potato growing conditions



Potatoes grown in soil with recycled gypsum



Potatoes grown in untreated soil

Background

Adding gypsum to soil is a traditional way of improving its condition. This improves soil structure leading to better drainage during the winter, and a wider weather window for establishing, maintaining and harvesting the crop. It also improves water-holding capacity during the summer, which reduces hardness and cracking from compacted and baked soils so benefiting plant growth.

The maintenance and improvement of soil structure is vital in sustainable crop production especially in high yielding / high value crops such as potatoes.

Gypsum used in agriculture is usually mined or quarried, depleting natural resources. WRAP (Waste & Resources Action Programme) funded a field trial to assess whether recycled gypsum is also effective as a soil treatment in commercial potato production. The trial has shown positive findings:

- improved crop quality - reduced growth; cracks and improved skin finish;
- increased sulphate content of the soil;
- simple application; and
- potentially higher net profit.

What is recycled gypsum?

Recycled gypsum is mainly produced from waste plasterboard from construction and demolition sites. It is not simply crushed-up or shredded, but carefully processed to remove all other materials and contamination. It is usually a sand-like powder and is comparable to agricultural gypsum, safe to handle and use. A production quality specification is being developed to give further reassurance to users.

“It is very encouraging to observe the benefits that using gypsum has had on the soil characteristics and the quality of potatoes.”



The trial

The WRAP funded trial was undertaken by the Research and Development department of Velcourt Ltd. The trial was conducted on a farm near Woodbridge, Suffolk, using a field that had frequently been used to grow root crops and vegetables. The result of this cropping history had left a sandy loam soil that was structurally poor with minimal organic matter. The field was known to lie wet during winter months, leading to late lifting of vegetables and further damage to the soil structure from heavy harvesting machinery.

‘Estima’ potatoes were grown in the trial as part of a supply contract for pre-pack potatoes.

The field was divided up into trial plots: some left untreated, some treated with agricultural gypsum, and some treated with recycled gypsum. Recycled gypsum was applied using standard farm spreading equipment – a lime spreader – calibrated to apply 3t/ha.

Some plots were given two applications at 3t/ha to achieve 6t/ha in total, to compare the results from different application rates.

Once the gypsum was applied, normal farm practices continued to prepare the ground, plant the seed, and maintain and harvest the crop.

During the growing season nitrogen (N) fertiliser was applied across the plots at different rates between 126kgN/ha and 300kgN/ha. This evaluated the extent to which the gypsum treatment improved the efficiency of use of inorganic fertilisers by the plants.

Analysis

A number of assessments were made before, during and after the trial to determine the effect of the gypsum treatments, including:

- soil characteristics;
- crop growth and disease;
- yield; and
- tuber quality.



Any opportunity of using a waste-derived product to enhance the yield or quality of a crop must be a 'win-win' situation."

Keith Norman, Technical Director, Velcourt R&D Ltd

Results/Benefits

The overall quality of the potatoes grown with recycled gypsum was higher than those in the untreated soil:

- growth cracks were significantly reduced in occurrence and size; and
- skin finish and bloom appeared much improved, leading to a brighter and more marketable product.

As a result, growers may be able to achieve a higher premium for the potato crop, especially those targeting the pre-packed market.

Other positive results include:

- the gypsum also increased the available sulphate in the soil, which was previously depleted. It is possible that longer term use, or use on heavier soil types, could improve soil bulk density; and
- standard spreading equipment can be used to apply recycled gypsum. No changes are required to the operations which follow – bed forming, planting, crop maintenance and harvest.

The farmer who undertook the trial was impressed by the performance of recycled gypsum and is committed to using it in future. Seeing the final crop convinced him of the benefits through its effects on the soil, the crop and skin finish quality.

Considerations

Current Regulations still classify recycled gypsum as a waste. Any grower considering using it should discuss with their Waste Regulator's local official and obtain any necessary waste exemption or licence.

However an overall higher net profit may be achievable from the improved quality of the crop. The total investment using recycled gypsum – licensing, material cost application at 3t/ha – can be equivalent to as little as 1.5%* of the market value of the crop.

The full trial report and details of recycled gypsum suppliers can be found at www.wrap.org.uk/plasterboard

*50ha at 3t/ha, Environment Agency paragraph 7A exemption application, typical market rates in 2007. See economic evaluation in trial report.



WRAP works in partnership to encourage and enable businesses and consumers to be more efficient in their use of materials and recycle more things more often. This helps to minimise landfill, reduce carbon emissions and improve our environment.

WRAP is developing a number of initiatives which are supporting the segregation, collection and recycling of waste plasterboard, and the development of end-market uses for the resulting recycled gypsum.

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