Growing Beds Recycling Services Ltd Agricultural Grade Compost

Growing Beds Recycling Services Ltd manufacture a 0-30mm agricultural grade soil improver product "compost". It is manufactured to BSI PAS100:2018 and is compliant with the Defra Compost Quality Protocol.

Scientific research carried out on the use of this product in agriculture has demonstrated the following key benefits:

- A useful quantity of water soluble N with a slow release over time
- Increased levels of soil organic matter
- Useful quantities of P, K, Mg, S and trace elements
- Increase in soil water holding capacity
- Improved soil structure
- Reduction in cultivation passes (reduction in energy costs)
- Improved soil life
- Higher yielding crops
- Disease suppression

These effects provide a sustainable benefit to the farmland, and at the same time reduce the need for increasingly costly inorganic fertiliser materials

Compost Nutrients

The compost contains useful amounts of all major nutrients with potash and phosphorous available in significant quantities in years one and two. Available nitrogen is low but provides a slow release benefit to the growing crop.

Typical Year1 nutrient value of Growing Beds Recycling Compost

Nutrient	Total (kg/t)	Typical Availability Year 1	Fertiliser Replacement Yr 1 (kg/t)	Fertiliser Value June 2019 (£/kg)	Year 1 Compost Fertiliser Replacement Value £ per T
Nitrogen (N)	10.5	5%	**0.5**	**£0.75**	**£0.38**
Phosphate (P_2O_5)	4	50%	**2**	**£0.68**	**£1.36**
Potash (K_2O)	7	80%	**5.6**	**£0.47**	**£2.63**
Magnesium (MgO)	2.8	20%	**0.5**	**£0.56**	**£0.28**
Sulphur (SO_3)	5	10%	**0.5**	**£0.45**	**£0.23**
Total					**£5.11 per T**

Written and prepared by Ben Dyson MBPR (Fert), FACTS (FE3806)

Organic Matter Content

Additional agricultural benefits arise from the physico-chemical properties of compost. The product has a total organic matter content of nearly 300kg per tonne which will contribute to the soil as an organic conditioner. This helps hold nutrients in the root zone and makes them more available to the growing crops. The addition of organic matter will also improve soil structure, increase water holding capacity and aid disease suppression.

Typical physico-chemical properties of Compost

Bulk Density (kg/per m3)	Dry Matter (%m/m)	Moisture Content (%m/m)	Organic Matter (LOI %m/m)	C:N Ratio	pH
500	50	50	30	20:1	8

Compost Application Rates

Under the revised NVZ rules (June 2013) individual fields can receive a maximum application of 47 tonnes of BSI PAS100 compost per hectare **every 2 years** to achieve the field limit of 500kg/ha[1].

Typical nutrient availability to crops in Yr1 and Yr2 from maximum application in NVZ areas

Nutrient	Available to Crop in Year 1 & 2 applied at 47 t/ha (kg/Ha)	Fertiliser Replacement Value £/Ha
Nitrogen (N)	**25**	**£18.75**
Phosphate (P_2O_5)	**150**	**£102.00**
Potash (K_2O)	**330**	**£155.00**
Magnesium (MgO)	**50**	**£28.00**
Sulphur (SO_3)	**50**	**£22.50**
Total		**£316.25 per Ha**

A small amount of the nitrogen in the compost is water soluble and available to the growing crop in the first year. This amounts to approximately 25kg/ha of N when compost is applied at a rate of 47t/ha. Applied at 47t/ha, compost will also provide enough phosphate to meet typical year 1 requirements for most cereal crops. Compost spread rates may need to be adjusted downward in line with crop requirements on soils of P index 3 or above. The potash in the compost is abundant and readily available and this should be given consideration when planning the timing of application within a given rotation. Potatoes, onions, root vegetable crops, sugar beet, maize and oilseed rape respond well to prior compost application.

In addition to the major nutrients referred to, a slow release of sulphur is available to the growing crop; this is required for the formation of glucosinolates in brassica crops and useful to crops requiring high N inputs. Compost also typically contains 45kg/t of calcium which aids the efficient use of N and assists in plant pathogen control. Small contributions to crop requirements of magnesium and trace elements are also available.

[1] NVZ figures obtained from the Guidance for Farmers in Nitrate Vulnerable Zones https://www.gov.uk/nitrate-vulnerable-zones

Findings from Long Term Trials of Compost Use in Agriculture

The Waste & Resources Action Programme (WRAP) have been funding long-term scientific trials to assess the benefits of using compost as part of a soil improvement programme for crop growth. The trials ran from 2000 to 2010 and has proven numerous benefits including:

- **Reduced need for inorganic fertilisers;**
- **Long-term improvement in soil structure;**
- **Increased yield on a range of crops.**

The trial involved different treatments to compare the benefits of compost and each was replicated four times to ensure that conclusions were based on statistically significant data:

Treatment key

Untreated = no fertilisers

Farm Standard = Annual NPK for crop according to RB209

Annual compost = 30 t/ha per year with and without standard N

Biennial compost = 60 t/ha every 2 years with and without standard N

Improved Cereal Crop Establishment

Compost plus bagged N only **Farm standard NPK fertilisers**

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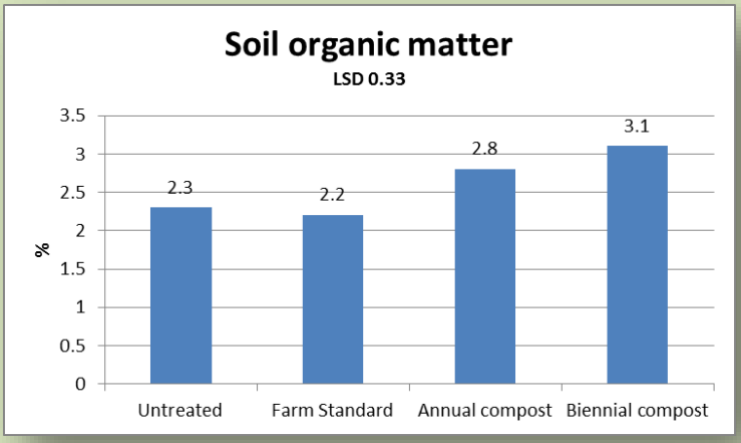
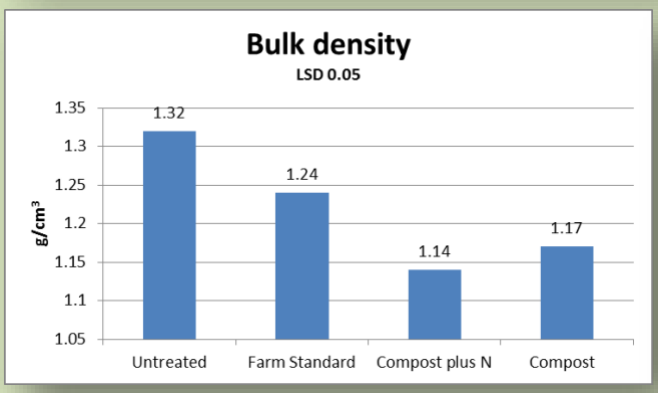
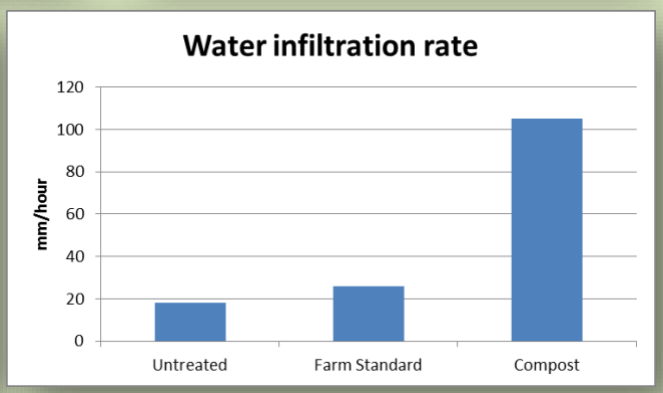
Improved Soil Organic Matter

Compost is able to supply 14 tonnes of organic matter per hectare in an application of 47 t/ha. This feeds the worms and microorganisms in the soil, which in turn build soil structure and hence improve water holding capacity and aeration. Soil becomes more friable and soil cultivations easier, reducing fuel consumption, the number of cultivation passes and your time. This leads to reduced soil bulk density, less compaction and improved water infiltration.







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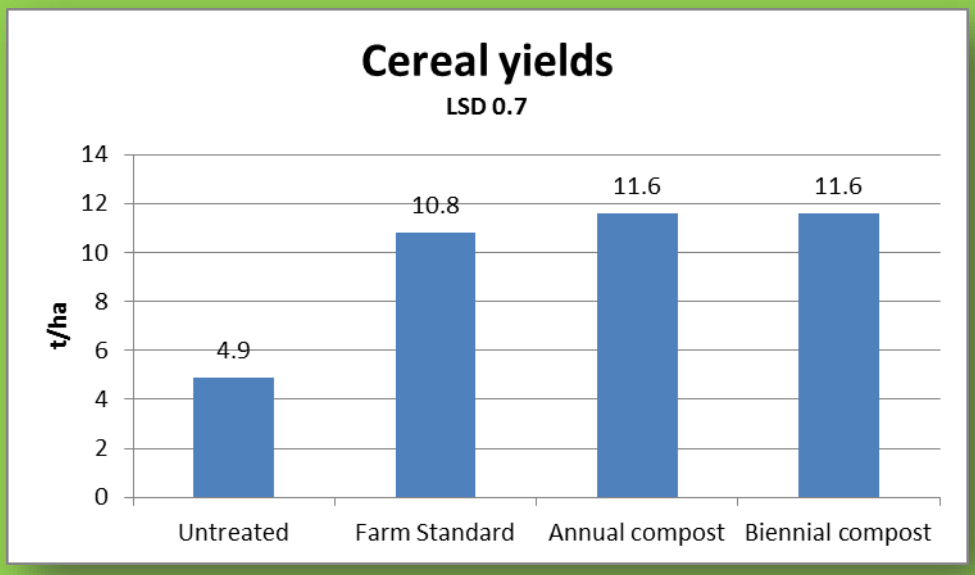
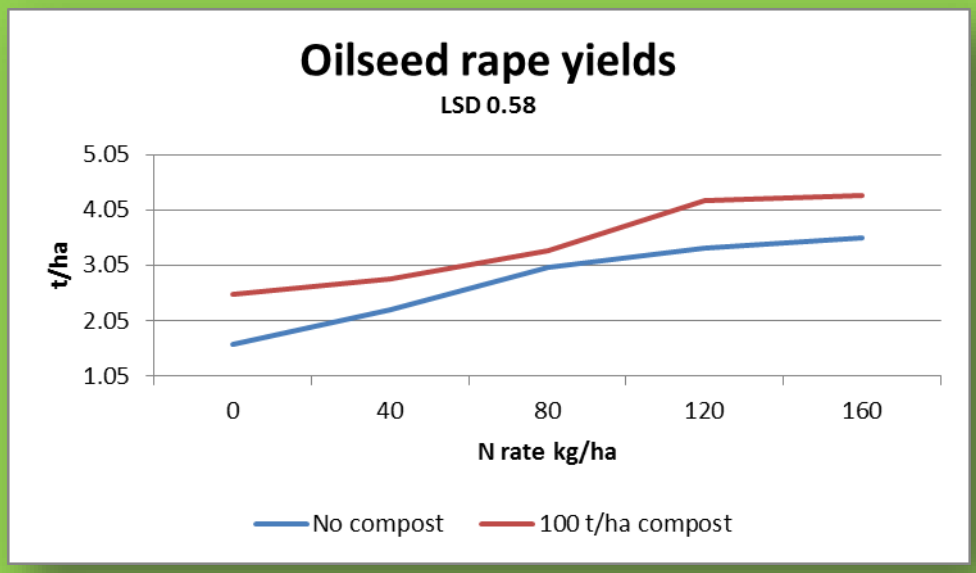
Evidence of Increased Yields

Crops suffering from stress due to spring drought or grown in soils in poor physical condition may respond to compost in the year of application. However, it often takes a few years to amend the soil biology and structure with repeat applications to see yield benefits. These beneficial effects have been shown in trials carried out in Eastern England where compost was applied annually or biennially for 10 years, where overall yield increases of 7% were achieved.





Assessment of the soil condition is important and will indicate if yield increases are likely. Improving the soil organic matter takes time and should be regarded as insurance against poor weather conditions, with yield increases as a bonus. Practical experience is reported in the WRAP-funded trials http://www.wrap.org.uk/sites/files/wrap/OAV011-005%20Report%20-%20Westrope.pdf

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Cost Benefit of Using Compost

Based on winter wheat followed by sugar beet on heavy clay soil within 25 miles of Growing Beds Recycling.

Costs	£ per Ha
Compost Haulage	£200
Compost Spreading	£100
Total Costs	£300
***Benefits**	
Total fertiliser value	£316
Potential increase in year 1 winter wheat yield @ 1T/Ha	£170
Potential increase in year 2 sugar beet yield @ 4T/Ha	£88
Total Benefit	£488
Net Cost/Benefit	**£274 per Ha**

*Although the fertiliser value to the winter wheat crop will be lower than the total fertiliser value of the compost, surplus nutrients will be beneficially utilised within the forthcoming rotation. It is also important to consider that benefits such as increased soil organic matter and reduced soil bulk density will result in significantly reduced tillage costs.

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