



Bio-Chel[®] Carbo+

A super concentrated plant carbon designed to provide and catalyse carbon sequestering and support optimal soil bioactivity.

Bio-Chel Carbo+ is a blend of modified organic acids derived from living lignin, a nature-based and renewable raw material that is rich in carbon and sugars. **Carbo+** acidifies irrigation water, improves water penetration, helps free up bound nutrients in all soils and supports the growth and activity to soil microorganisms.

Carbo+ naturally acidifies irrigated or sprayed water to help maintain soil pH, reduce soil alkalinity and improve water penetration into the soil.













Carbo+ slowly dissolves bicarbonates normally present in the soil and irrigation water, freeing calcium to build a healthy soil structure and prevent soil capping.

Carbo+ is high in carbon (50%+) so will support soil carbon levels and act as a catalyst to increased carbon sequestering.

Carbo+ reduces the incidence of localised dry spots and improves water percolation and distribution to maintain uniform soil moisture, especially under irrigation and will reduce irrigation requirement with regular use.

Carbo+ improves the efficiency of applied fertilisers by solubilising nutrients such as phosphorus, calcium and sodium tied up in soils, reducing build-up of minerals in the soil leading to increased growth parameters.

CROPS

-  Wheat
-  Barley
-  Oats
-  Oilseed Rape
-  Vegetables
-  Sugarbeet
-  Tree Fruit
-  Asparagus
-  Legumes
-  Brassicas
-  Potatoes
-  Bush Fruit
-  Bulb Crops
-  Turf
-  Leaf Salads

Analysis of Carbo+

| | | | |
|---------|-------|---------------|-------|
| Carbon | 28.0% | Plant Sugars | 5.0% |
| Calcium | 0.5% | Organic acids | 15.0% |
| Sulphur | 1.0% | | |

The importance of Soil Carbon

Maintaining and increasing soil carbon content will give substantial benefits. Greater soil carbon helps to maintain soil structure by forming stable, larger aggregates that hold plant-available water in intra-aggregate pores and larger inter-aggregate pores that create greater soil permeability, aeration and drainage to prevent water logging and conversely will aid moisture retention during periods of low rainfall.

More importantly adequate soil carbon level (3-6%), provides organic matter and energy to support microbial growth and activity which in turn unlocks a reservoir of organic N, P and other nutrients for plant productivity.

Having healthy levels of soil carbon also results in a more physically cohesive soils which resist soil losses by wind or water erosion and by protecting occluded organic matter within the larger aggregates.



Also, with all of the recent changes to mitigate climate change, increasing carbon levels stimulates further carbon sequestering and storage by soils which become far more energetic in long term carbon storage.

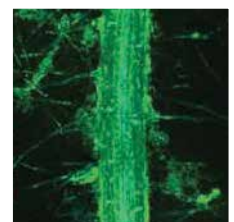
Carbo+ in the Rootzone of Crops

Within the rhizosphere, or root zone of crops, complex interactions are constantly occurring between plant roots and soil microbes.

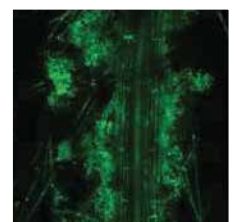
The microbes live in the soil and gain needed energy sources from plants while aiding in nutrient transfer to plants and creating an environment more conducive to good root growth.

The addition of **Carbo+** to a standard fertiliser programme can increase microorganism population of six different functional groups. These groups include the beneficial bacteria species *Bacillus* and *Trichoderma* both of which support crop health and importantly support crop roots to limit susceptibility to infection from disease.

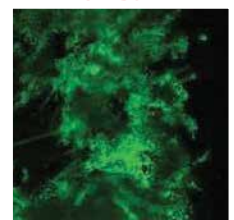
The picture (right) illustrates the level of bacteria on roots under the support of Bio-Chel **Carbo+**.



CONTROL



100 UG ML-1 BIO-CHEL CARBO+



200 UG ML-1 BIO-CHEL CARBO+

Carbo+ Nutrient availability & uptake

Within **Carbo+** there is a complexed blend of organic acids which have the ability to both reduce soil pH and to unlock the nutrient potential of any soil especially those which have become overloaded in bonded nutrients such as phosphorus, calcium and sodium. Nutrient management in arable soils has long been a problem for many farmers and growers as it is far easier to add nutrient rather than manage what is already present. However effective nutrient management, especially

for phosphorus, has been shown to be an extremely important factor in root and crop production. **Carbo+** persistently breaks down the salt bonds between cation and anion nutrients to unlock their potential and significantly increase their availability for use by crops. **Carbo+** also complexes nutrients by the organic acids and lignin present within its natural formulation so retains them in available form far longer, supporting greater crop potential whilst building a long term energetic soil.

Directions for use of Carbo+

Carbo+ can be used in two ways; as a pre-season application to load carbon or as a crop application to aid all the benefits we have highlighted.

| Application | Rate | Timing |
|---|------------------------------|--|
| Pre-season Carbon Boost | 30L/Ha | Anytime up to 1 week before planting to lift carbon by 0.015%/m ³ of soil. For deficient soils multiple applications over time is advised based on annual analysis. Apply in 400-800L/ha of water for optimal efficacy. |
| Grass Cereal Crops | 4-8L/Ha | 2 applications. Apply pre-drilling or as a dressing at sowing. Apply second application after 4-6 weeks along with liquid fertiliser or herbicide applications. Apply in 400-800L/ha of water for optimal efficacy. |
| Oilseed Rape | 4-8L/Ha | 2 applications. Apply pre-sowing or as a dressing at sowing. Apply second application after 4-6 weeks along with liquid fertiliser or herbicide applications. Apply in 400-800L/ha of water for optimal efficacy. |
| Sugarbeet | 3-6L/Ha | 2 applications. Apply pre-drilling or as a post drill dressing. Apply second application after 4-6 weeks along with liquid fertiliser or herbicide applications. Apply in 400-800L/ha of water for optimal efficacy. |
| Potatoes | 4-8L/Ha | 2 applications. Apply dressing at planting into furrows. Apply second application after 4 weeks along with liquid fertiliser or herbicide applications. Apply in 400-800L/ha of water for optimal efficacy. |
| Root Vegetables | 4-8L/Ha | 2 applications. Apply dressing at planting. Apply second application after 4 weeks along with liquid fertiliser or herbicide applications. |
| Leaf Salads | 4-8L/Ha | Apply pre-planting in 500-1000 litres of spray or via overhead irrigation. |
| Bulb Crops | 4-8L/Ha | 2 applications. Apply dressing at planting. Apply second application after 4 weeks along with liquid fertiliser or herbicide applications. |
| Tree Fruit | 8-12L/Ha | Apply 12L at the beginning of the season with sterile strip sprays or via irrigation to energise the rootzone and at 6 week intervals with other soil spray application to optimise soil pH and provide optimal benefit. |
| Berry Fruit | 4-8L/Ha | Apply to soil crop pre-planting. For Substrate grown crops apply 4 litres monthly to optimise rootzone EC and to optimise root nutrient uptake. |
| Turf | 60-120mls /100m ² | Apply 2-3 times throughout the season in 100-150L of water to energise the rootzone. Ideally apply before rain or irrigation for optimal penetration. |
| Fine Sportsturf, Greens and Tees | 30-120mls /100m ² | Apply 120mls for the initial application and then monthly at 30-90mls per 100m ² to provide optimal benefit. Allow to penetrate into the rootzone and irrigate after each application. |

Compatibility

Carbo+ is generally compatible with fertilisers and agrochemical applications however it is strongly advised that when mixing with any other products for the first time a jar test is conducted for compatibility. Special caution should be given to liquid starter fertiliser or in-furrow insecticide applications due to potential compatibility issues.

Due to the active nature of **Carbo+** do not store in a fertiliser solution for an extended period of time.

Always apply and mix with plenty of water as **Carbo+** is acidic and may be damaging to soft plant tissues at high concentrations. Never store in liquid fertiliser mixes. Always apply solutions containing **Carbo+** on the day that they are mixed. Always store above 5°C. Do not allow to freeze.

For more detailed application rates per crop, please visit engagecropsolutions.com or speak to an Engage advisor. Always read the label before use.

Carbo+ is a rootzone amendment product and best results will be achieved by direct soil application. Always read the label and follow instructions when mixing **Carbo+** with other fertilisers and pesticides.

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