

BLACK GOLD

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Anyone watching 'Gardeners' World' on TV on March 18th 2016 would have seen Monty Don dig a planting hole and, before placing a potted plant in it, thrust his arm into a black sack and place a handful of black material he referred to as 'biochar' into the bottom of the hole. Obviously, biochar is the 'in thing'.

At the height of the Industrial Revolution, coal was nicknamed 'black gold'. Its connection to horticulture was purely as a source of heat for growing plants in glasshouses. Today the most important garden relevance of its chemical relative - charcoal - is not as a fuel for barbecues, but as a soil improver. Over the years, many substances have been loosely described as 'soil improvers' and classified under two headings: inert and organic. But we need to combine these labels in recognition of the attention now being given to the physical and biological properties of charcoal when used as a soil additive. Hence the term 'biochar'.

Apparently, some tribes in the Amazon forest have used charcoal as a soil improver for 2000 years. Advanced civilisations have only just cottoned on. So how does charcoal, when added to soil, improve it? In two ways: firstly, if it is in the right physical form, i.e. granular, it helps aerate the soil. Its second role is more important and, for many, unexpected. It can contain an incredible number of micropores, occupied by naturally occurring soil micro-organisms. These include beneficial bacteria and mycorrhizal fungi, two major groups of micro-organisms which inhabit the rhizosphere, where they interact with plant root systems. At last, a considerable amount of scientific research is being undertaken in this area, revealing a previously unknown world of life underground. The more research reveals, the more we can attempt to modify this natural process to our own benefit.

While Monty Don was on screen, placing a handful of biochar in a planting hole, he commented that what he was using also contained mycorrhizal fungi. So his biochar was not pure charcoal, but what is termed 'enriched biochar'. New commercial products are appearing on the market based on mixing bio-char with beneficial species of mycorrhizal fungi and bacteria.

It is often remarked that extensive stands of snowdrops which have been naturalised for very long periods of time (sometimes centuries), e.g. on some country estates and in churchyards, appear disease-free, while in some gardens the repeated occurrence of snowdrop diseases is a continuing problem. What all these ancient snowdrop colonies share in common is lack of soil disturbance and the absence of chemical treatment; two essentials if a naturally stable soil eco-system is to develop over time. One of the newer revelations of research is that certain soil micro-organisms can have a hitherto unexpected beneficial effect on disease control by stimulating the plant's own disease defence system.

Perhaps at last we have an explanation for the contrast between garden and churchyard. That is why I have been experimenting in my own disease-ridden garden. I have used soil from an ancient stand of *Galanthus nivalis* in grass as an additive to a sterile compost (John Innes Seed Compost), when potting dormant bulbs. The initial results have been extremely encouraging. So the next stage is to incorporate biochar.

Although young (at four years old), the garden is fully planted so there is no way in which I can 'wipe the slate clean' before I start planting potted snowdrops grown with my own form of enriched biochar, incorporating soil from a selected site. But it may help if I can suppress the existing level of soil infection. So in late March this year [2016], I manufactured my own 'Mark 1' enriched biochar by combining a suitable grade of charcoal with a proprietary mix containing 18 species of mycorrhizal fungi, 5 species of the beneficial soil fungus *Trichoderma*, plus 3 species of bacteria.

I decided to spread the charcoal at an arbitrary rate of 250g per m², and added the proprietary mix (I used Mycogro Organic Starter Fertiliser, but other similar products are available) to the charcoal at 50% above the manufacturer's recommended m² rate. This enriched biochar was then spread as

a surface treatment over all the borders. After lightly working into the soil, a 5cm insulating blanket of mulched bark was applied to protect germinating spores from frost.

Any benefits will not be immediately apparent, because snowdrop root systems will naturally die in May, but hopefully I will start to see a Christmas present unwrapping itself in the garden by the end of December 2016.



1. A proprietary product incorporating powdered charcoal with a mixture of mycorrhizal fungi, bacteria and trace elements, made into pellets. Identity of micro-organisms unknown.



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2. A complex proprietary mix of 18 species of mycorrhizal fungi, 5 species of the beneficial soil fungus *Trichoderma* and 3 species of bacteria, formulated into granules.



3. Fine grade charcoal.



4. A population of naturalised *Galanthus nivalis* in the Lambourn Valley, known to have persisted for centuries. Time has allowed a stabilising development of soil micro-organisms.

Mycogro Organic Starter Fertiliser is available from Symbio: www.symbio.co.uk

Biochar is available at BlackBark Woodland Management: www.blackbark.co.uk