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## Effect of Biochar on Crop Growth: Research in Japan

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Biochar is defined as carbonized biomass material (charcoal), especially when it is applied to soil as a soil amendment. Biochar has been traditionally used as a soil amendment in Japan as well as in other East and South-east Asian countries. In Japan, biochar has been officially recognized as one of the Ministerial Ordinance-Designated soil amendments by MAFF, Japan, because of its improvement function of soil physical properties. In this poster I will discuss current research on biochar in Japan.

In 1980's, Dr. Makoto Ogawa shed light on "biochar" from the soil microbiological viewpoint (Ogawa & Okimori, 2010). Charcoal is a porous material with high water and air retention capacities and high alkalinity. He found that it stimulated root growth and enhanced the infection of various symbiotic microbes such as arbuscular mycorrhizal (AM) fungi. This finding promoted to use biochar to enhance indigenous AM fungi (i.e. Saito, 1990).

Recently, the findings of Amazonian Dark Earth Soil (*terra preta*), which may be formed by the addition of carbonized material from human waste, has promoted the research on biochar, because application of biochar to soil may contribute to long-term carbon storage, i.e., carbon sequestration to produce negative CO<sub>2</sub> emissions from soil (Lehman, 2006). So, it is now widely believed that biochar has the potential not only to enhance soil fertility but also to help mitigate climate change, via carbon sequestration.

Shindo et al. found that a large proportion of soil C in humus-rich Andisols is present as charcoal like materials, and that charcoal may be an important fraction in soil carbon storage (Miyazaki et al. 2010). In Japan, however, it is still not clear if biochar applied as soil amendment may contribute to long term C storage (Ueno et al. 2012).

Microbiological effect of biochar application has been suggested (Konno and Nishikawa 1993), while in most cases the effect of biochar on crop growth may be due to its improvement of soil chemical or physical properties. It should be stressed that, in spite of a lot of research on biochar application, soil chemical and physical properties are not well documented. Therefore, it is often difficult to clarify the mechanisms of biochar application on crop growth.

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