

Biochar produced from fruit processing wastes contains large amounts of plant nutrient elements

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Biochar produced from fruit processing wastes contains large amounts of plant nutrient elements (particularly K,Ca,Mg,P). This biochar is particularly valuable for use in the organic production of fruit crops where chemical fertilisers are prohibited and large amounts of biochar may be applied to improve soil physical properties We have determined the amounts of nutrients in nine fruit waste biochars (700-33,000mgK/Kg, 350-14300mgCa/Kg, 190-13,400mgP/Kg, 60-5400mgMg/Kg, 90-1430mgS/Kg). The speciation of elements in biochar has been determined by SEM-EDS and XRD. The variation in water-solubility of elements is due to a combination of the diverse solubilities of crystalline compounds and the action of the microporous fabric of biochar in restricting diffusion into/out of biochar grains placed in water or soil.

When biochar grains are placed in moist soil about half of the total K and soluble salts diffuse from the grain into soil within six weeks. Generally, all of the Ca and most of the P remain in the grains. and additional Ca diffuses into the grain from the soil (mean result for ten soils). These diverse results can be explained on the basis of the several crystalline compounds in biochar and the high cation exchange capacity of biochar. Clearly the plant nutrients in biochar cannot be considered as rather dilute forms of chemical fertilizers. Complex processes in biochar and associated soil are in play that will affect the supply of nutrients to plants. In particular biochar acts as both a source and a sink of plant nutrients while the microporosity of biochar affects the rate at which nutrients are delivered to plant roots.

Despite the complexity of biochar/soil reactions it is evident that biochar could be an effective fertiliser for organic horticulture once appropriate management strategies are developed. `