Biochar as liming of peat based growing media

**Biochar and Peat**

The ash content gives to many biochars an alkalinity that can be exploited for neutralizing the acidity of peat, in place of using lime. Moreover biochar can give to growing media additional benefits, promoting for instance water and nutrient retention and availability and darkening pale substrates.

The effectiveness of an alkaline pine wood biochar is in correcting the acidity of a white peat and the effects on the early stages of growth of plants were studied both on the 0-10 mm biochar and on three particle-sized fractions.

**Experimental design**

- **Incubation experiments**
  - (21°C, 30% relative humidity)
  - **Effect of different doses of biochar on peat pH**
    - Doses: 0, 2.5, 5, 10, 20, 40 g/peat
  - **Effect of particle size fractions on the liming power of biochar**
    - Particle size fractions: <1 mm, 1-2 mm, 2-3 mm
  - **Analytical methods**

- **Plant bioassays**
  - Effect of biochar on % germination and early development of cress (Brassicaceae; Lepidium sativum L., L. campestre L., L. esculentum L.)
  - Biochar and particle fraction doses: 0–30 g/peat
  - Germination index % = (germination % * root mean length of sample / germination % * root mean length of control) * 100
  - Leaf elongation index % = (leaf length of sample / leaf length of control) * 100

**Results**

**Effect of particle sized fractions on liming effect**

**Biochar increases peat pH**

A minimum biochar rate of 30% v/v is required to bring up the pH level in the peat to values compatible with most of the plants grown in pots (up to 5.5).

**Biochar can favour plant growth**

Biochar as it is (10-0 mm) induces strong inhibition of germination and early root development of cress, particularly at the lowest tested dose. The coarsest size fractions are responsible for this effect for their low neutralizing power and probably for the promotion of discontinuity in the liquid interface between roots and solid surfaces. When finest textured particles of biochar are tested, a sharp increase in Munio-Lisa Vitality Index occurs. At 40% rate of biochar the germination and seedling development of cress is greater than that obtained in peat limed with calcium carbonate.

Barley growth is affected by biochar in a similar way to cress: biochar as it is, and its coarsest fractions, induce a reduction in root elongation, higher at 30% v/v dose. Nevertheless root elongation of barley is less inhibited than cress (20% of reduction in root elongation index at the high dose of biochar). Moreover, the finest fractions lead to a stimulation in the root growth reaching values higher than that of control. The liming effect of this fine fraction is probably accompanied by an amelioration of the physical and chemical properties in root environment.

**Conclusion**

These preliminary results suggest that biochar can be considered a valuable component in formulating growing media and highlight the key role of biochar particles size, that affect the effectiveness of biochar ability to increase pH and to support plant growth.

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