

Potential of Biochar in Growing Media

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New Research in Additives

Biochar - climate saving growing media

Potential of Biochar in Growing Media

- ▶ Biochar Production
- ▶ Biochar Properties

Biochar Applications

Growing Trials - In House - External

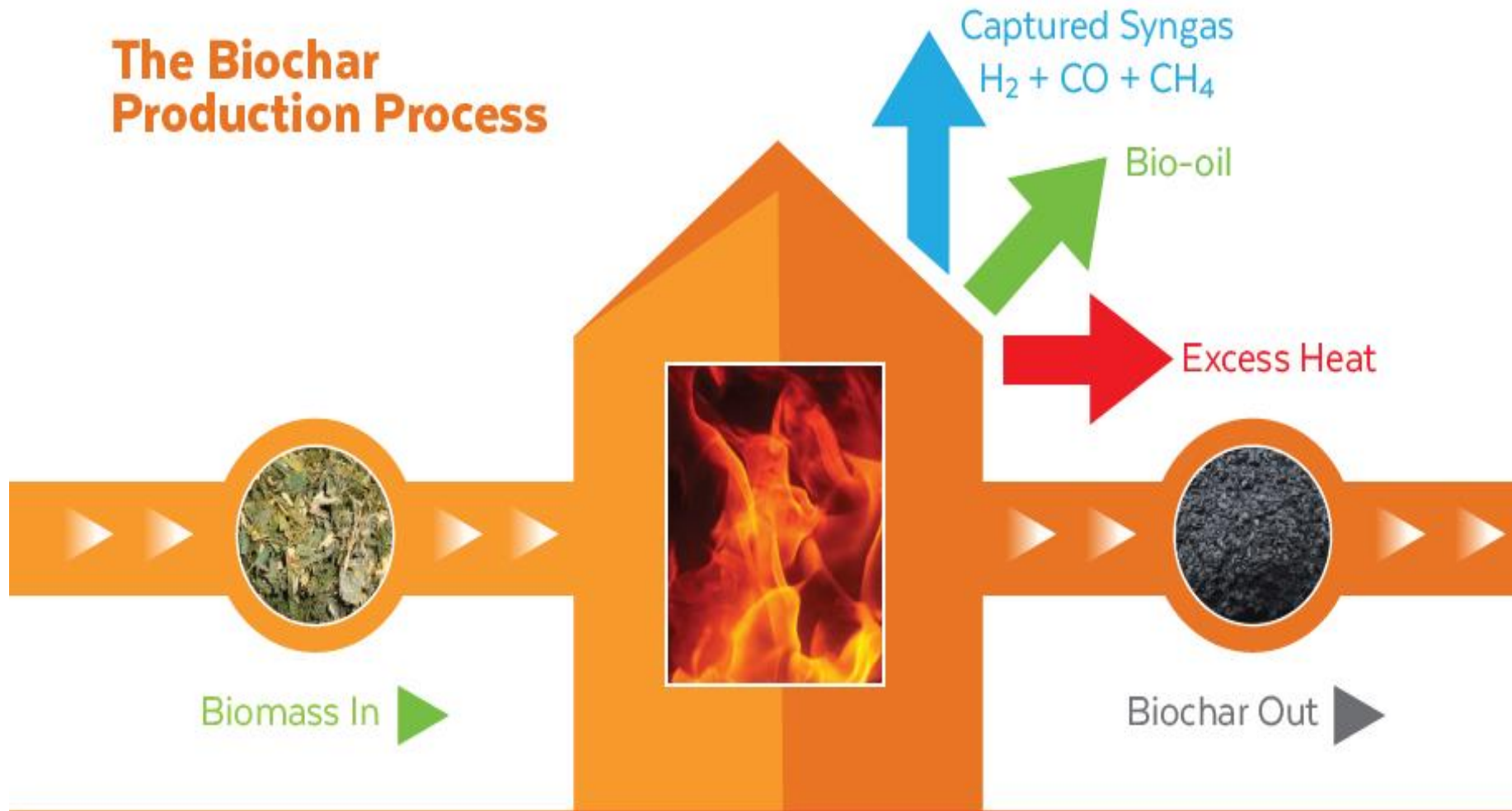
- ▶ Seedling Production
- ▶ Herbs/Tomatoes
- ▶ Nursery stock
- ▶ Green roof
- ▶ Disease Suppression

Environmental Benefits

- ▶ Greenhouse Gases

Conclusion

The Biochar Production Process



- **Biochar; a carbonaceous solid product of pyrolysis**
- **Few material that actively removes carbon from the atmosphere**
- **Suitable for a range of agricultural use e.g. animal feed, environmental e.g. filter and horticultural e.g. growing media**



- **Biochar Effect on plants can be Positive, Neutral and Detrimental**
- **Biochar production process can be tailored to form “Designer Compost” that has specific chemical and physical characteristics**
- **At this stage we do not know all the characteristics that is most suitable for use as a growing media**

Improves nutrient availability by increasing cation exchange capacity, captures nitrate

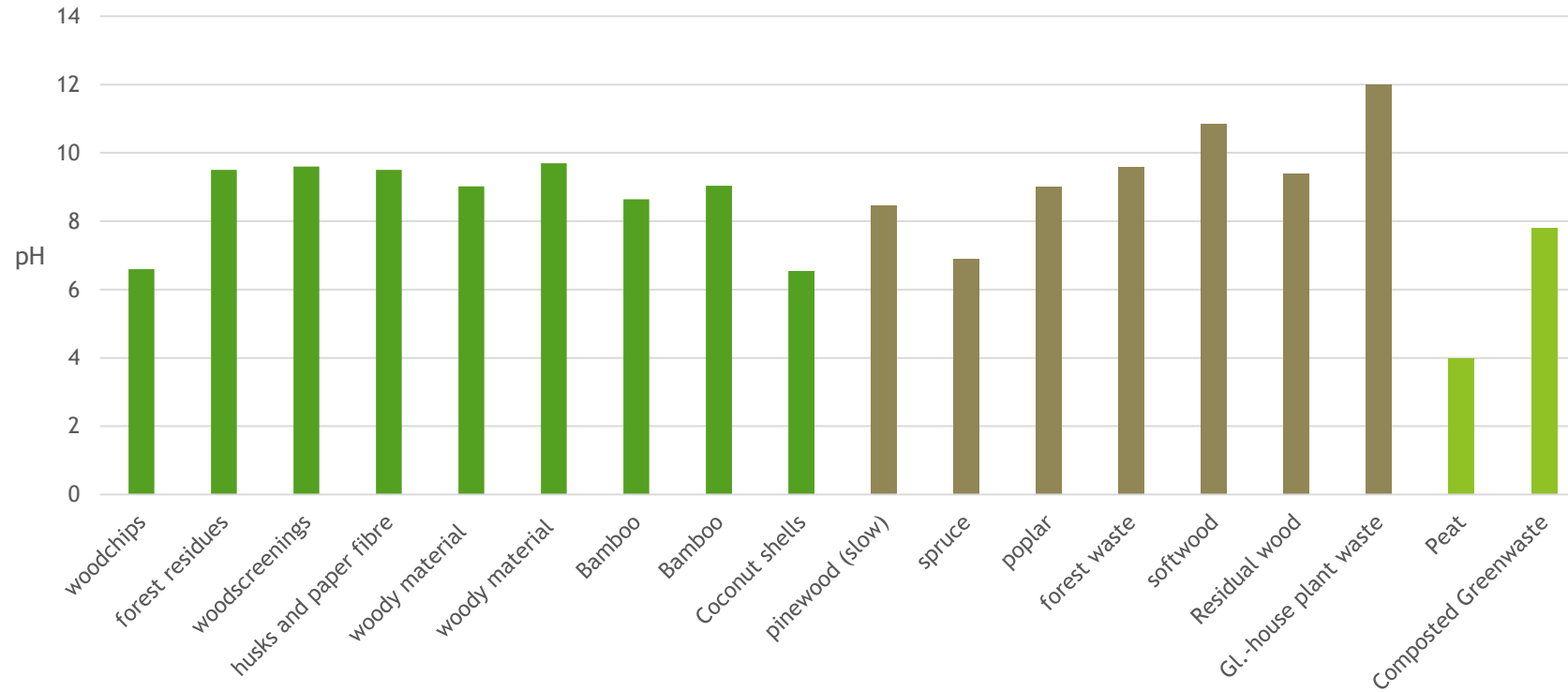
Physical properties/water retention, saturated hydraulic conductivity and aeration depending on particle size.

Increases pH

Increases physical and chemical stability

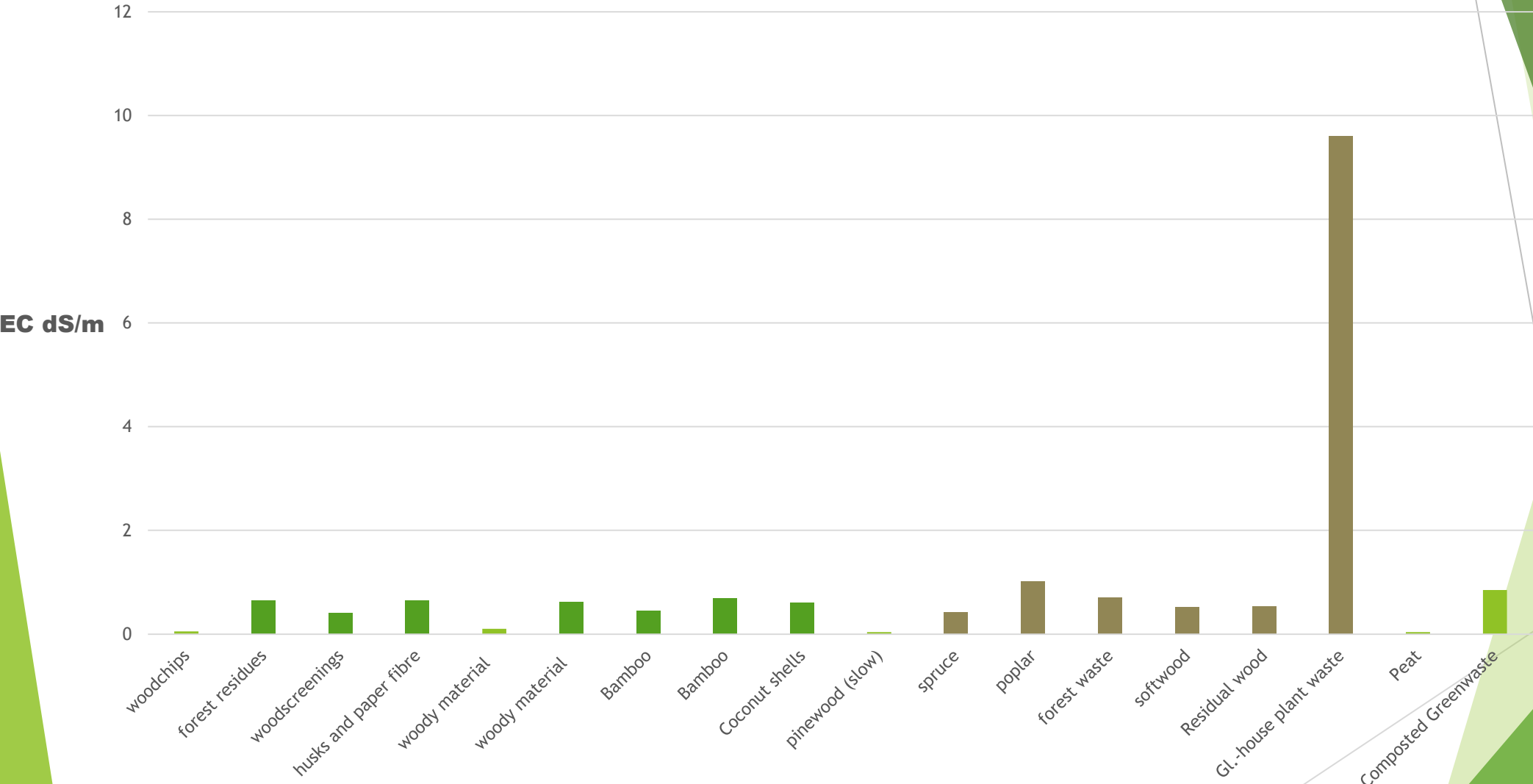
Fine dust- must be moistened before use

pH of various biochars destined for use as a component of growing media



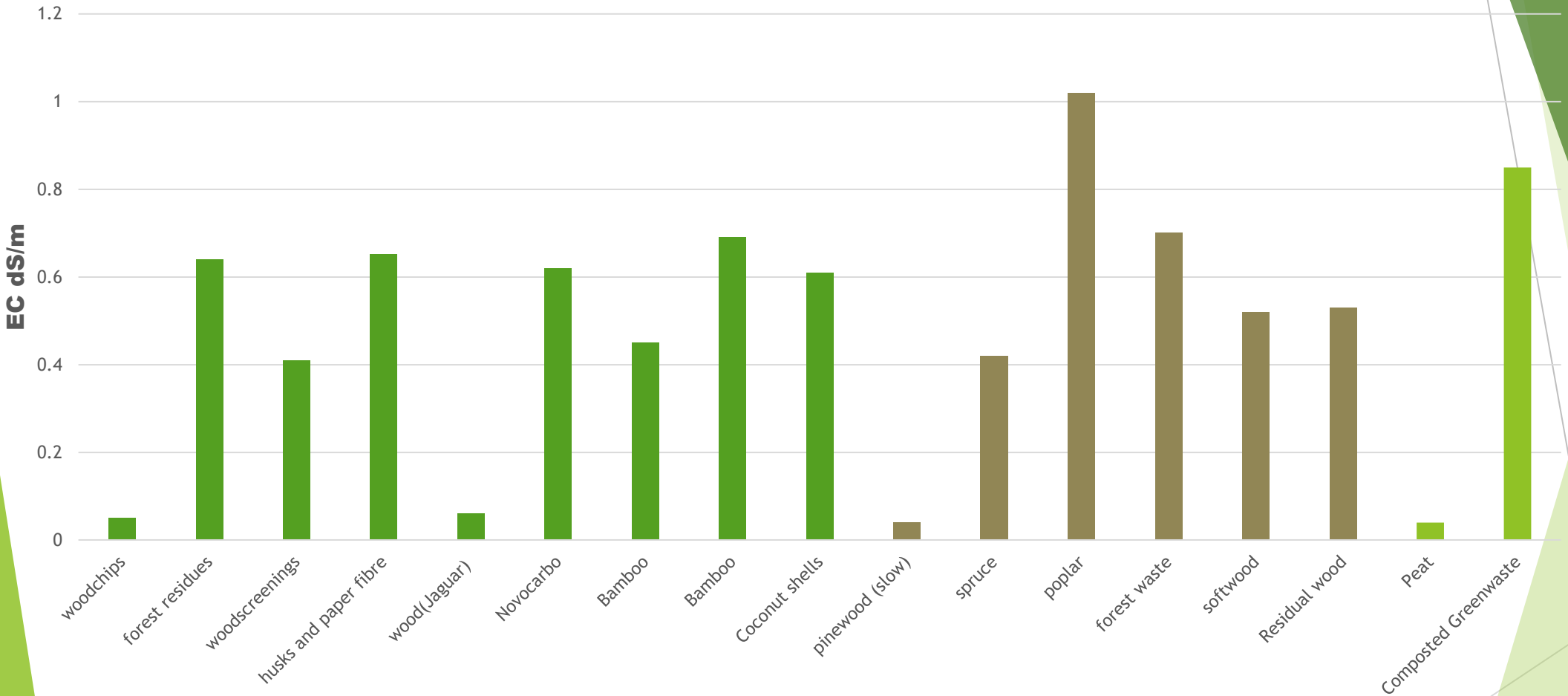
Feedstock, "green" our data, other published data

EC of various biochars destined for use as component of growing media



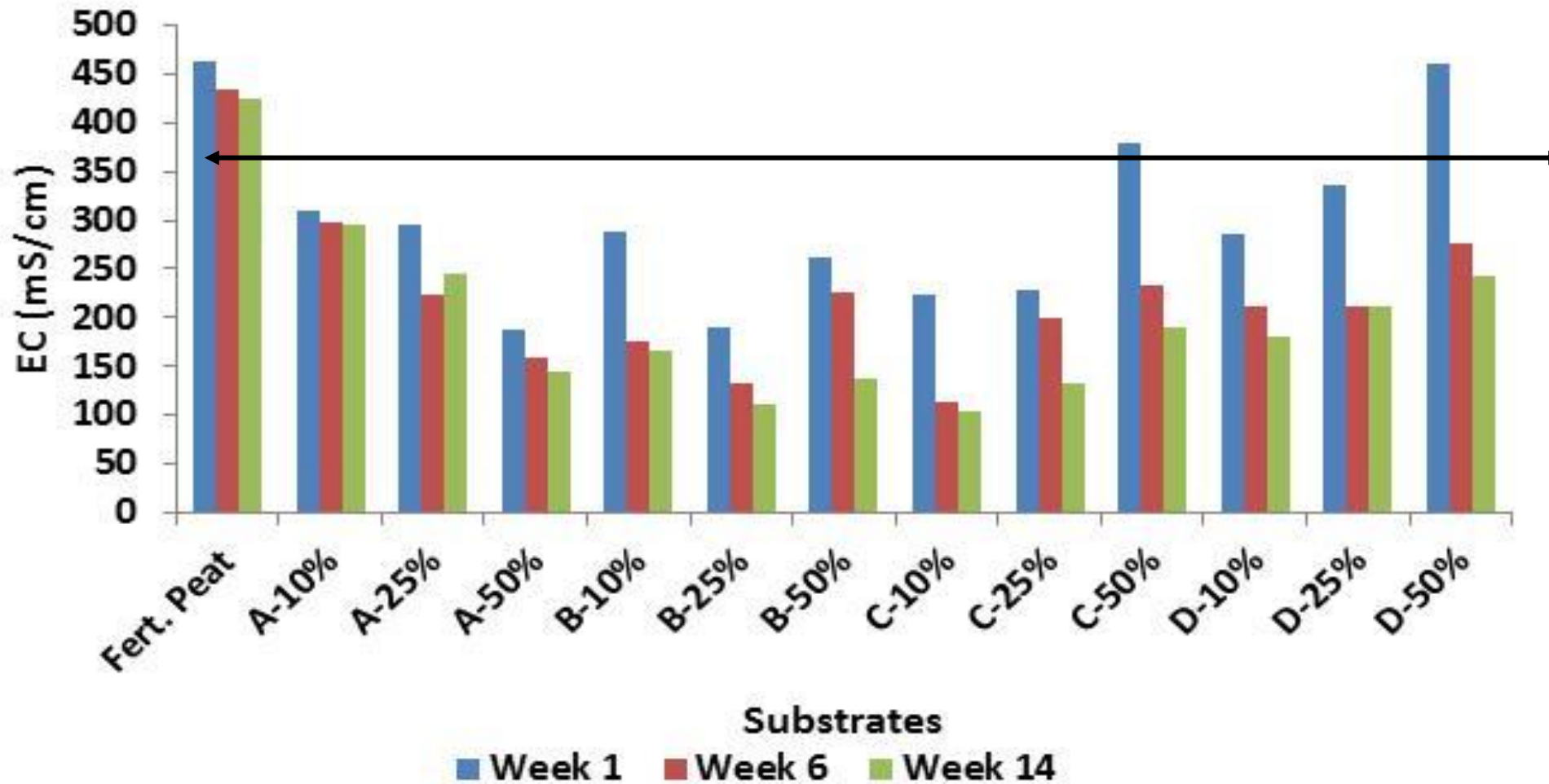
Feedstock "green " our data" other published data

EC of various biochars destined for use as a component of a growing media

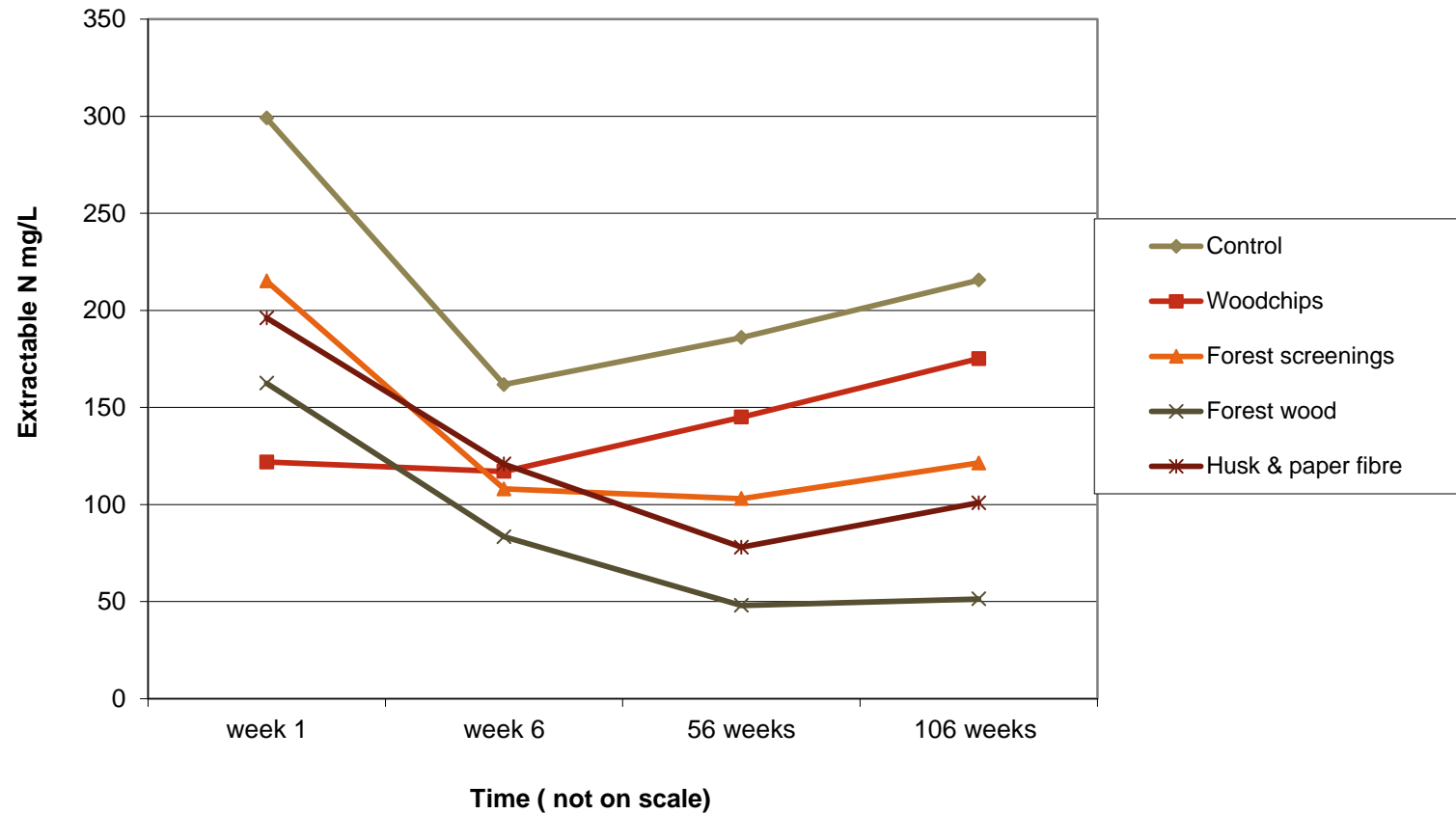


**Feedstock "green" our data other published data.
Note one very high figure omitted**

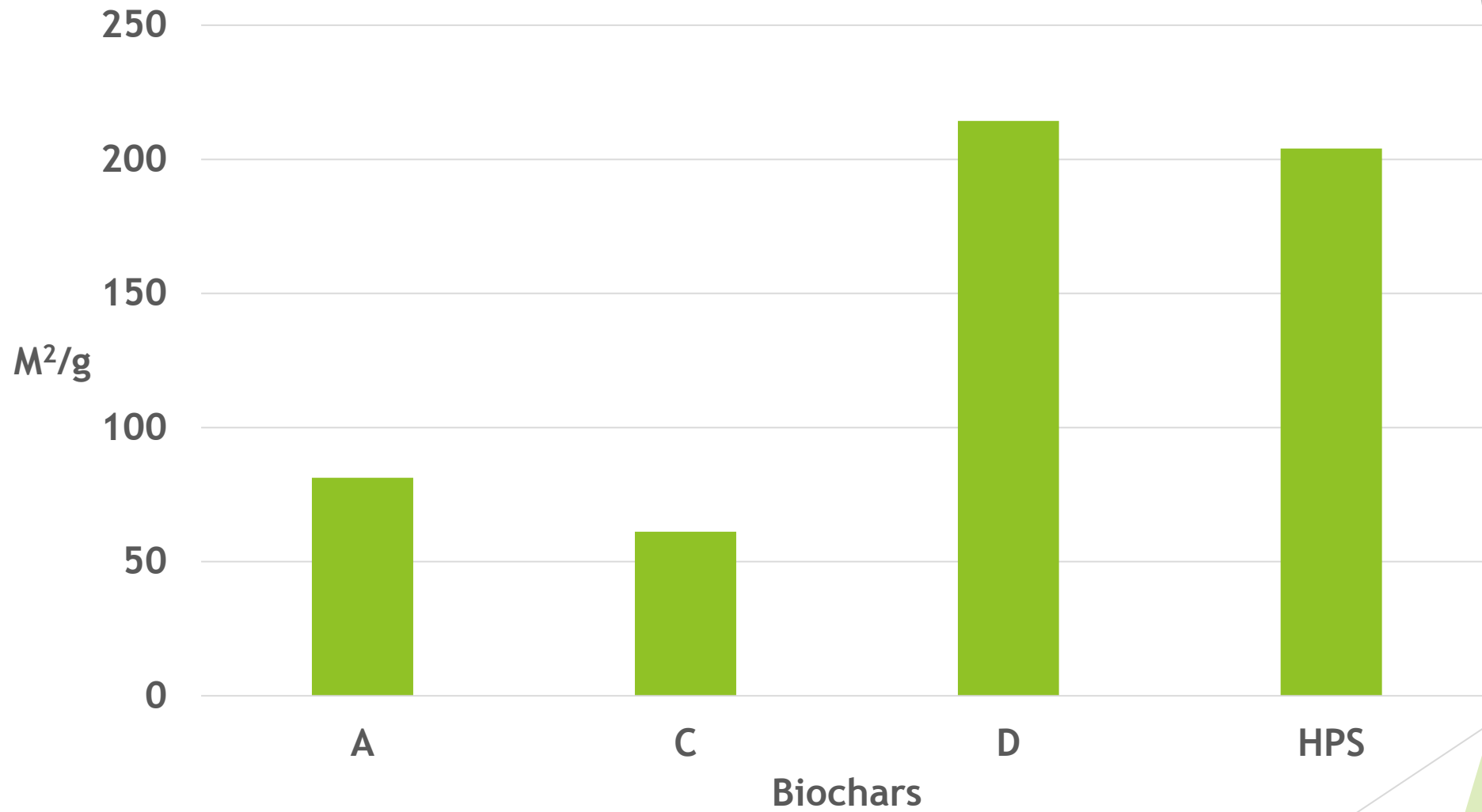
Effect of biochar addition on electrical conductivity of peat-biochar mixtures



Nitrogen dynamics over 2 years with biochar added to peat at 10% v/v



SURFACE AREA OF SOME BIOCHARS





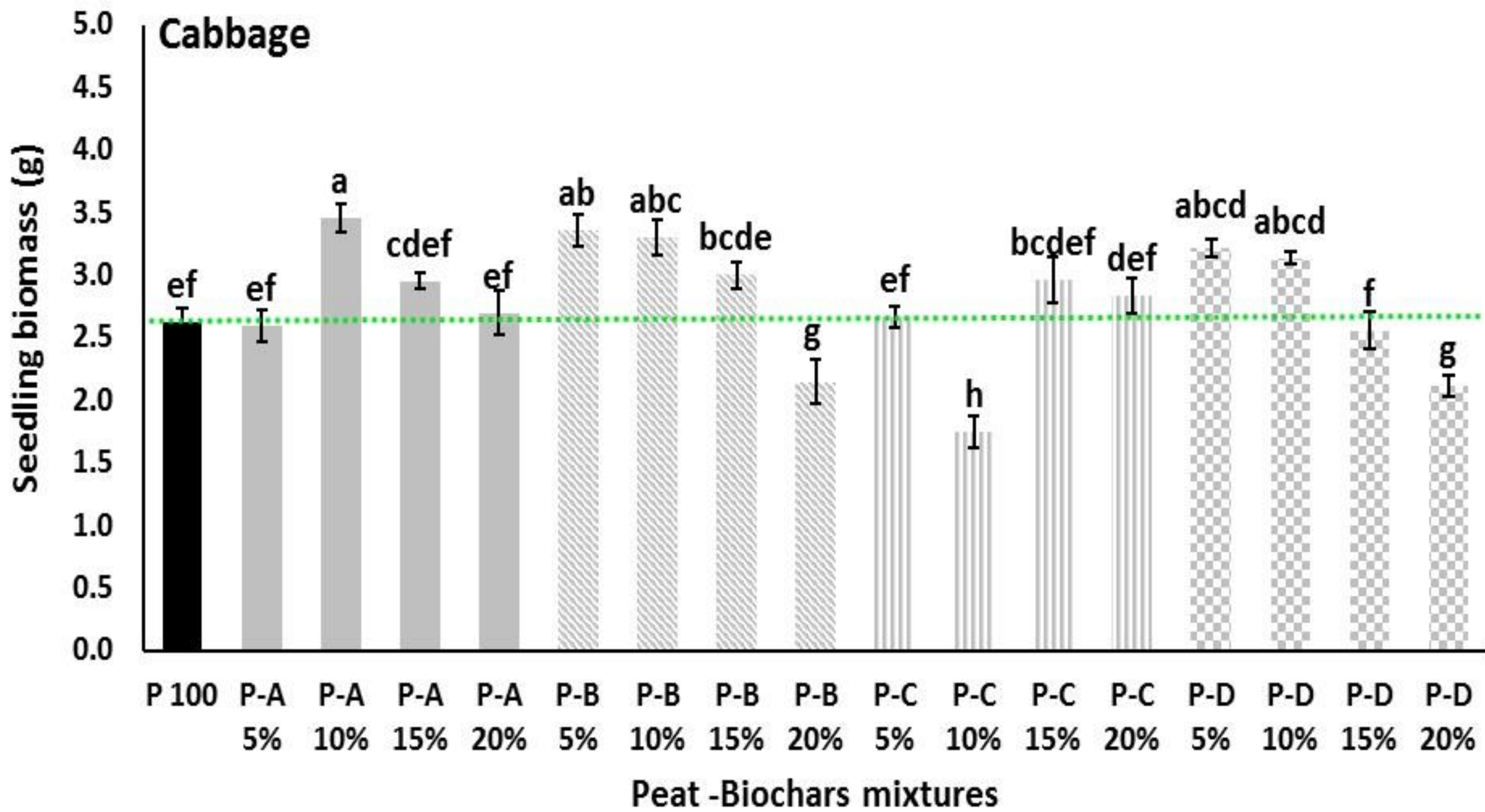


P 100 P:Carbon Terra 5% P:Carbon Terra 10% P:Carbon Terra 15% P:Carbon Terra 20%



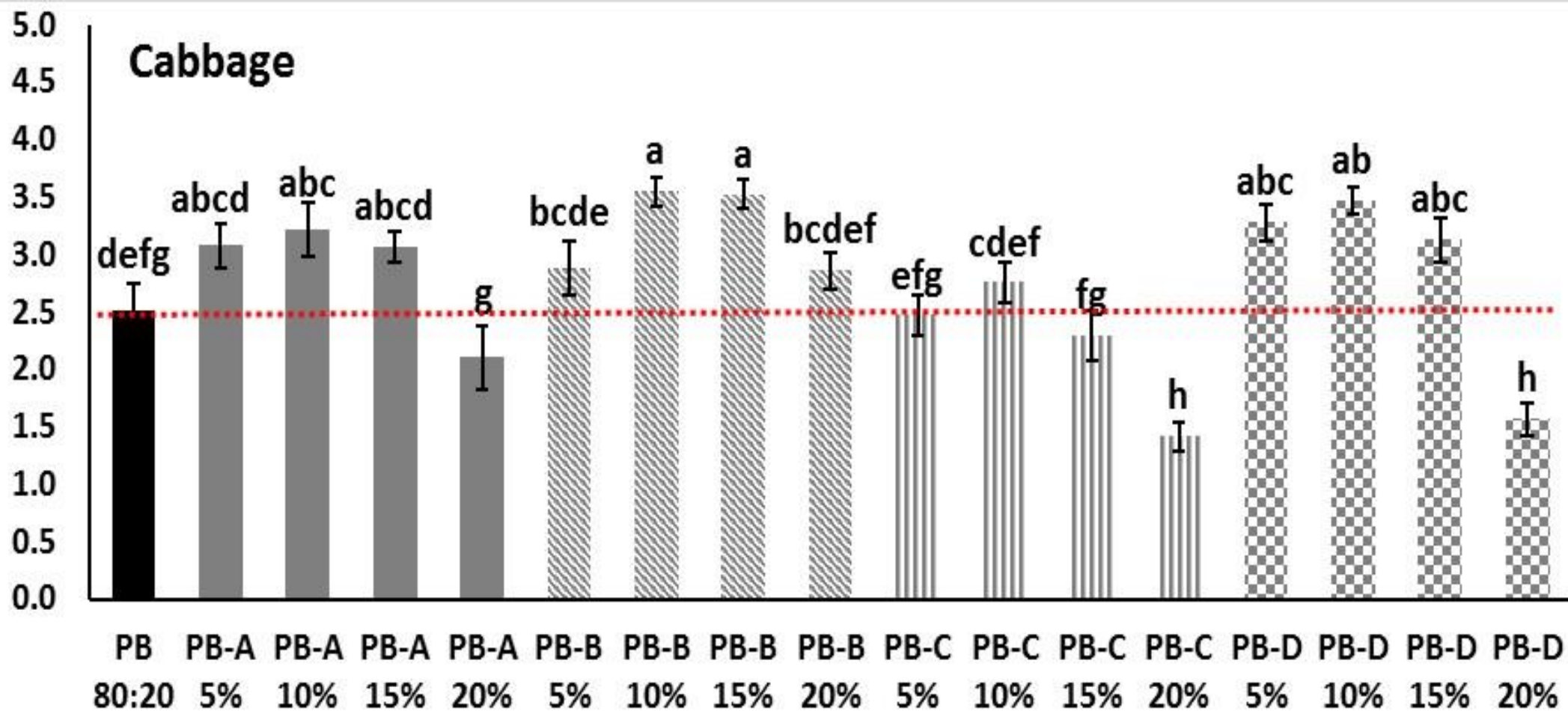
P 100 P:Schmidt 5% P:Schmidt 10% P:Schmidt 15% P:Schmidt 20%

Cabbage

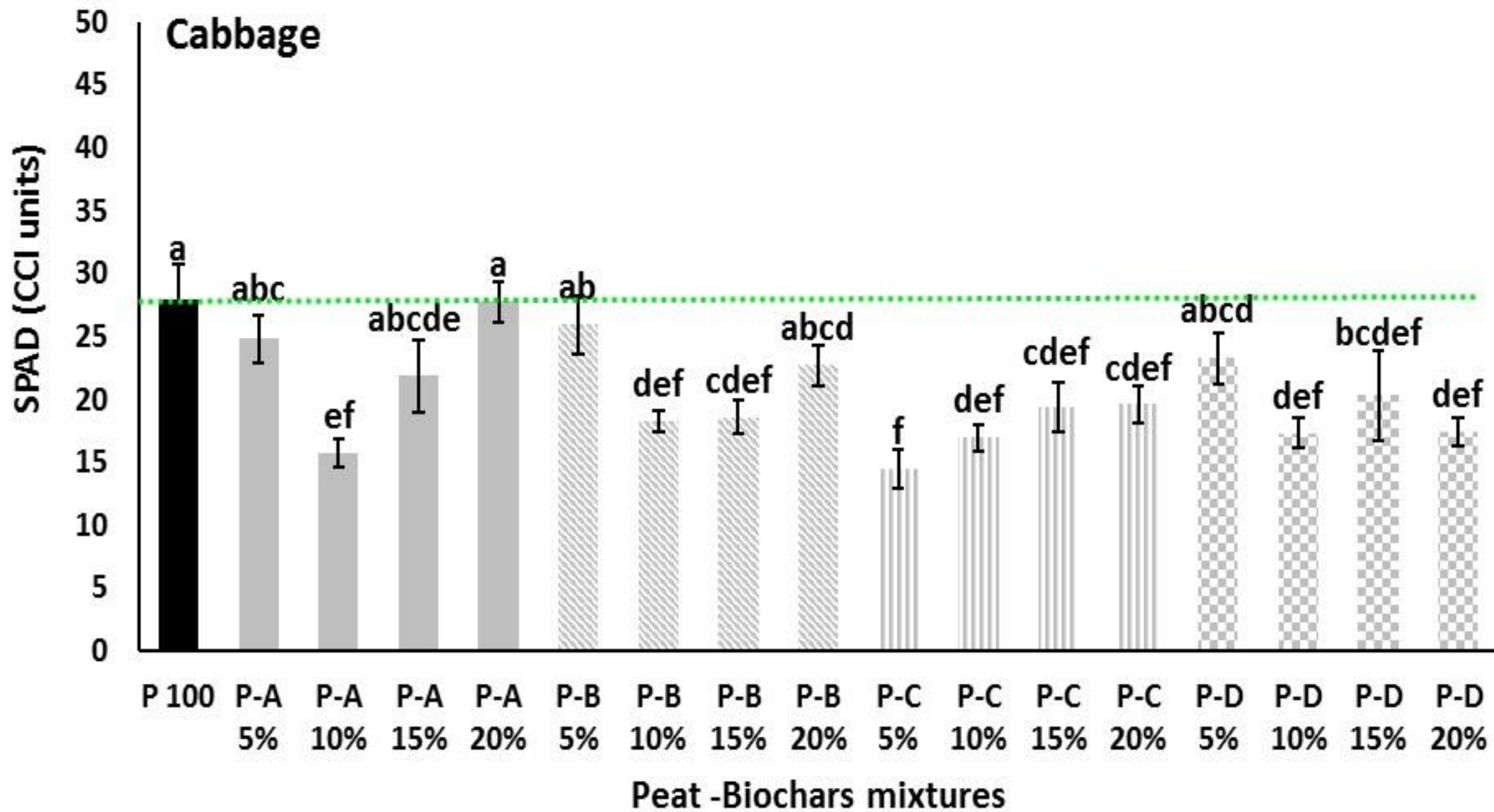


Cabbage

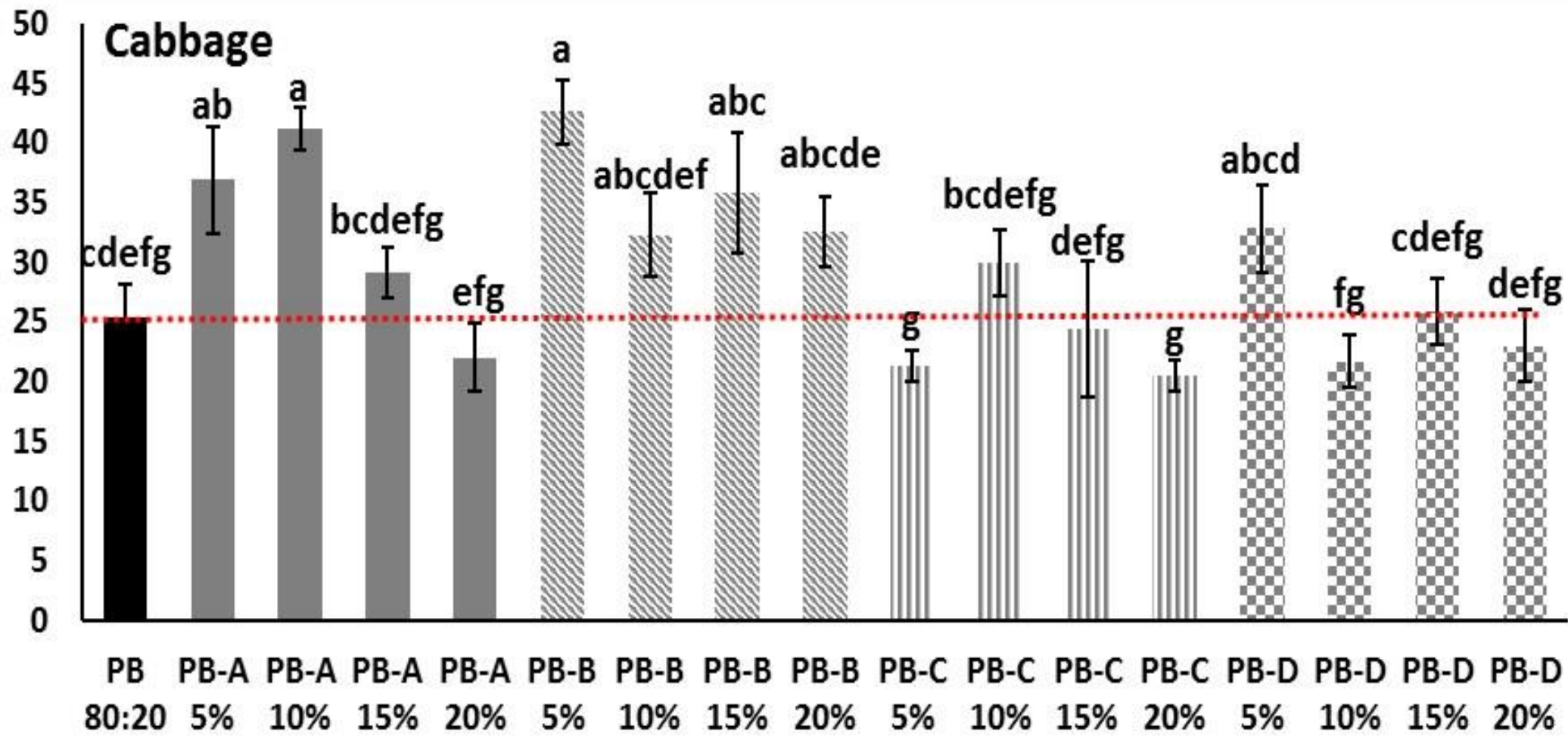
Seedling biomass (g)



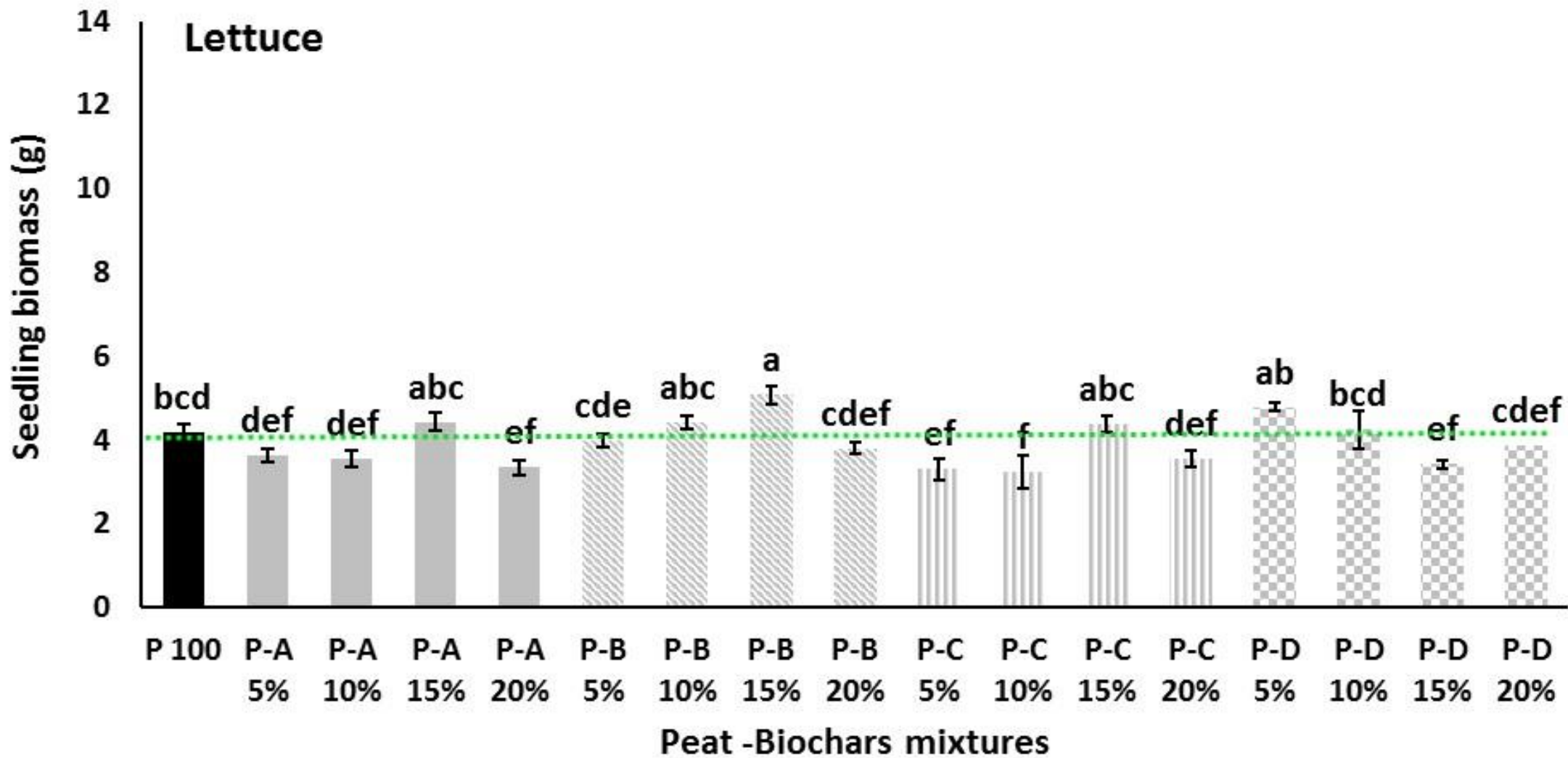
Peat -Black peat-Biochars mixtures

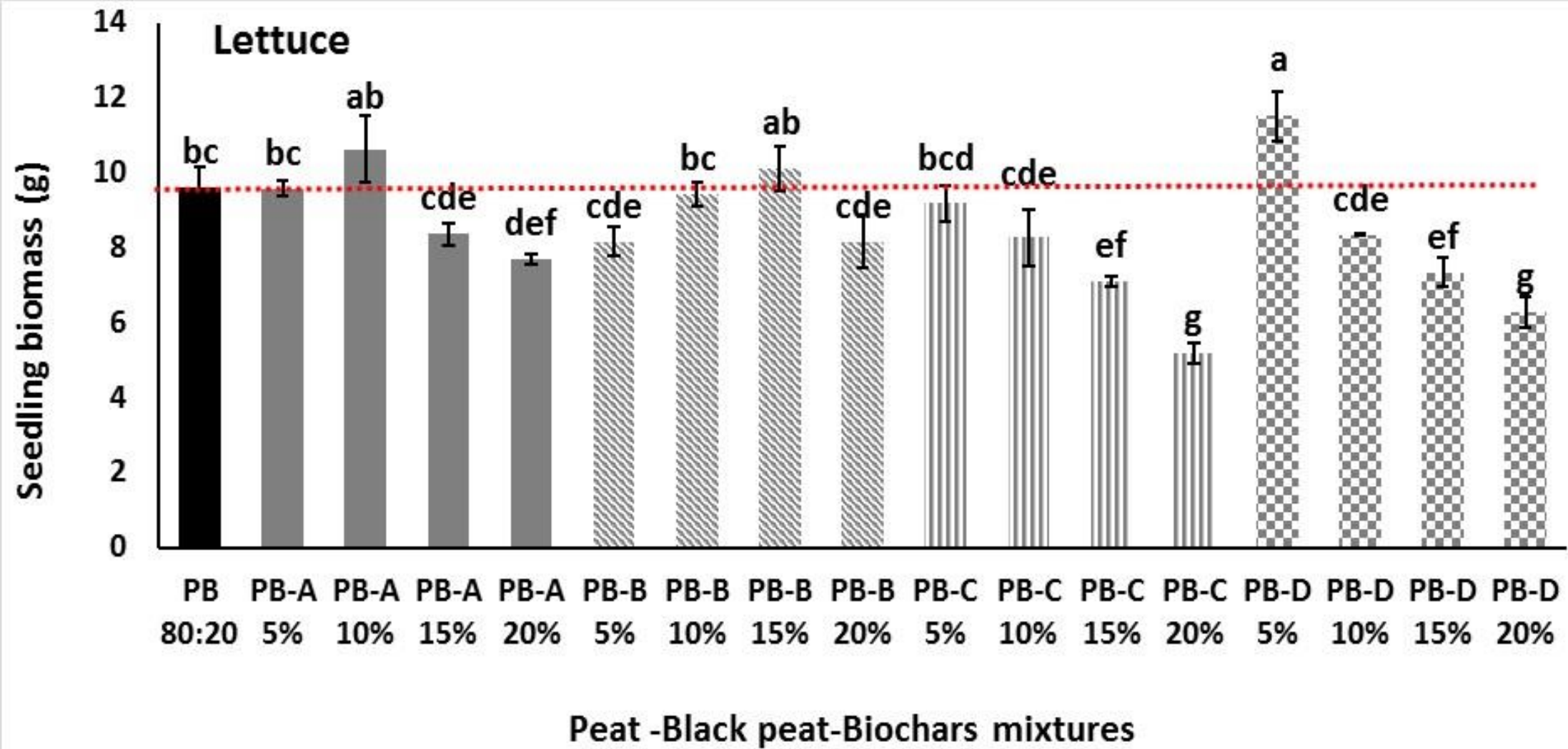


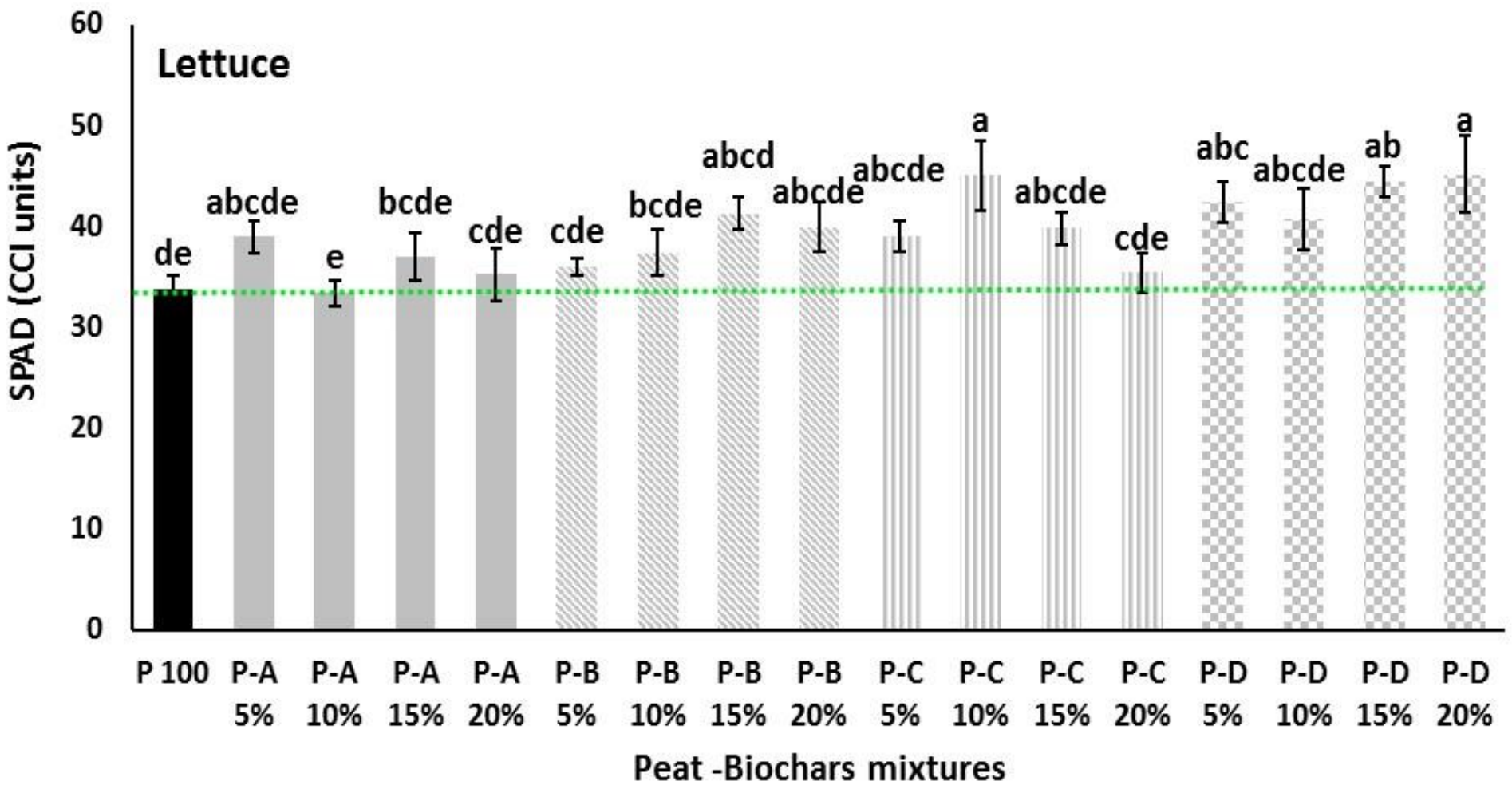
SPAD (CCI units)

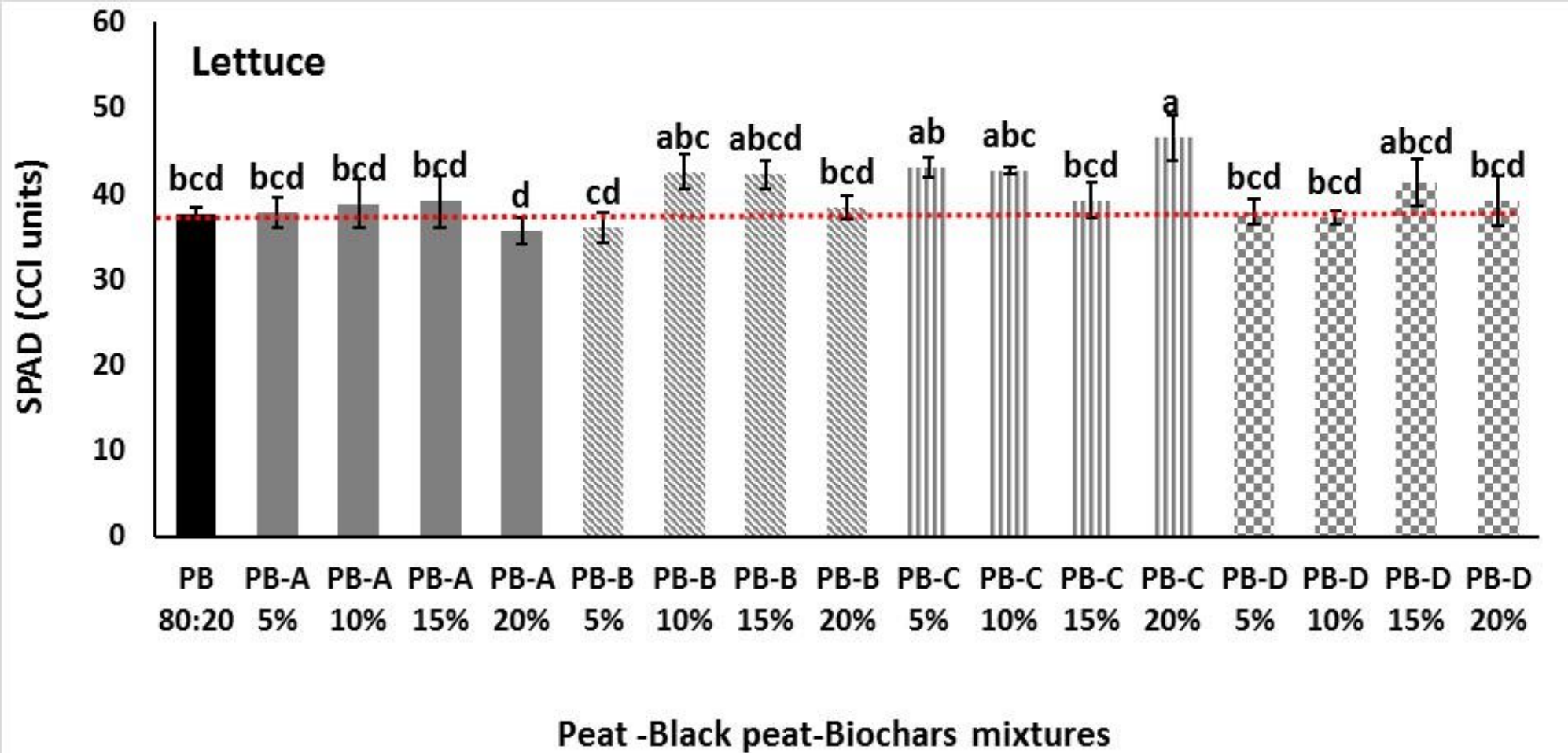


Peat -Black peat-Biochars mixtures

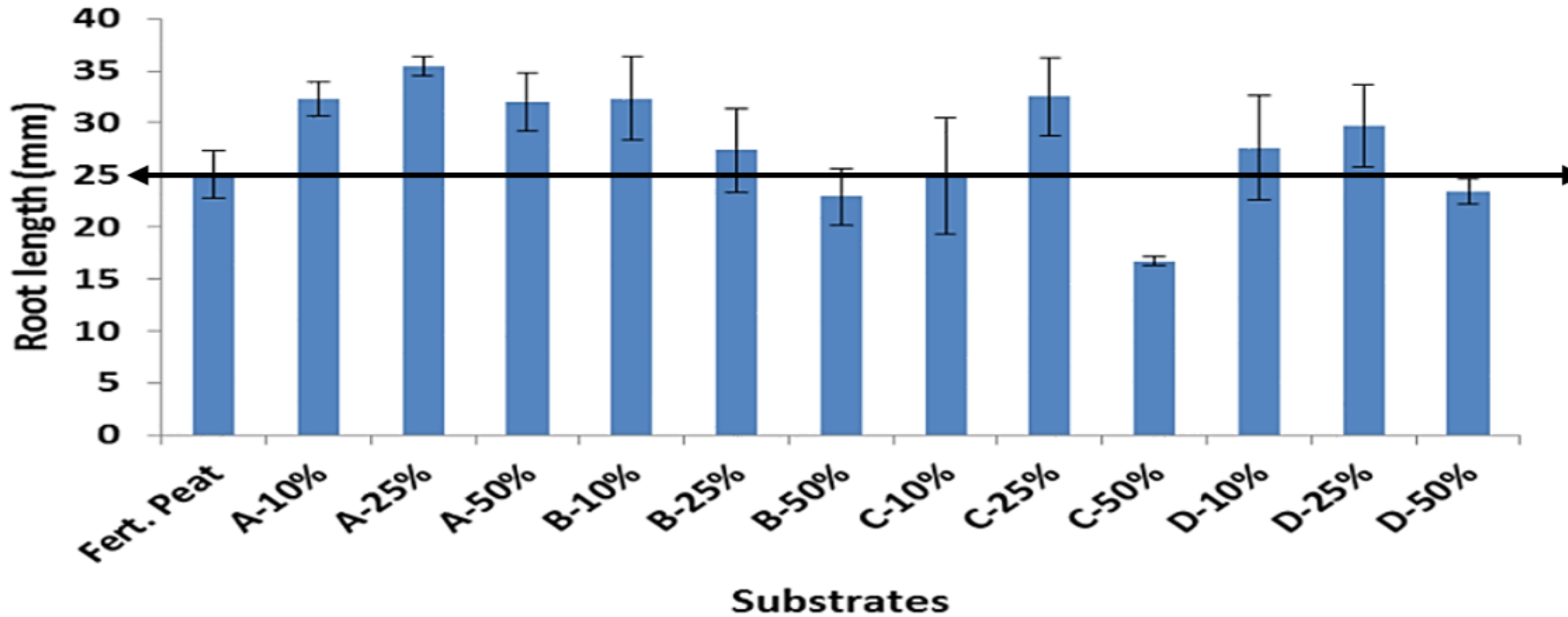








Effect of root length in peat-biochar mixtures in comparison to peat



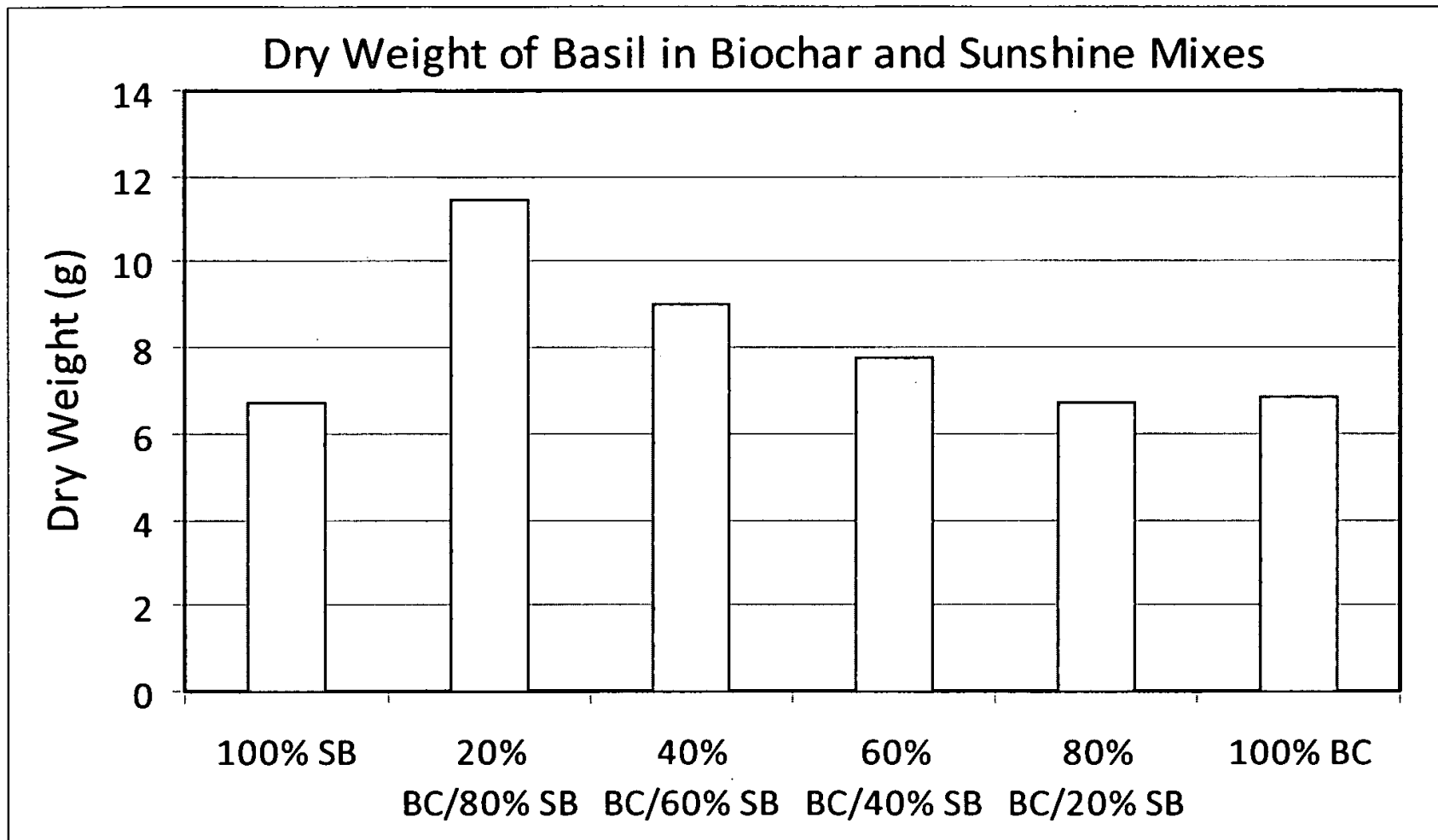
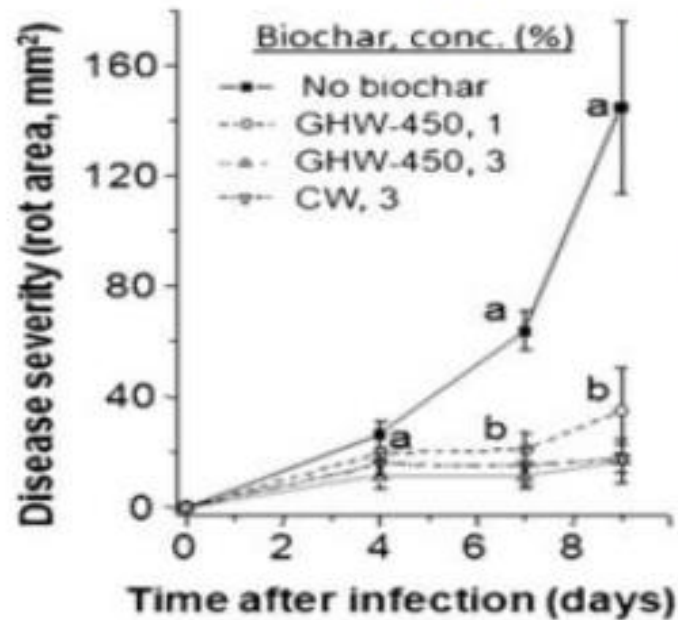


Figure 26

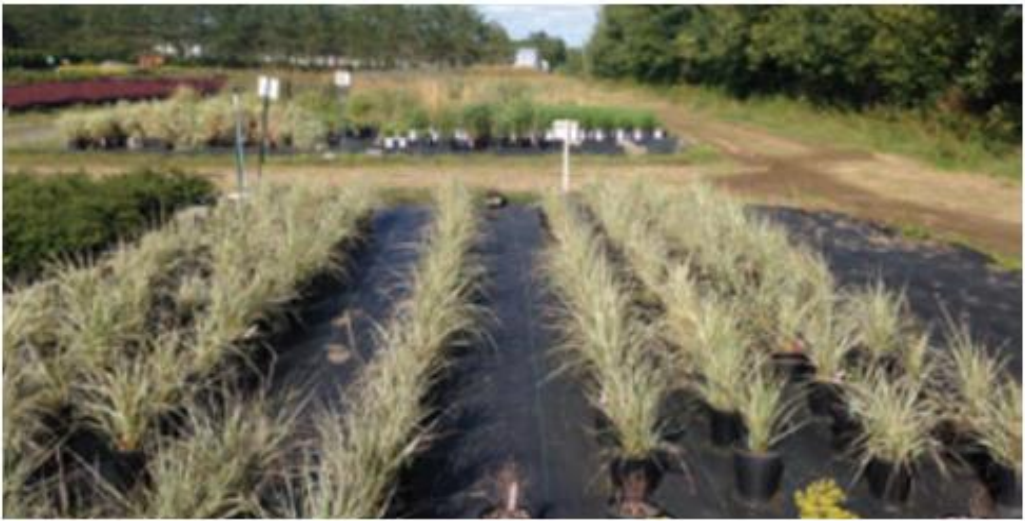
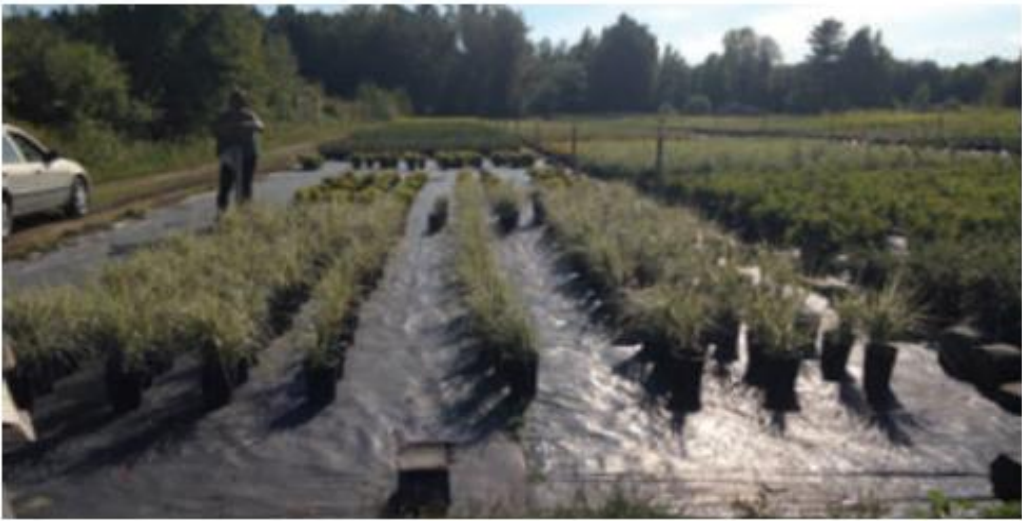
Biochar in Horticulture & Substrates

Fig. 1 Effect of biochar amendment on development of gray mold on attached strawberry leaves. Plants were grown in coconut:peat potting medium amended with either greenhouse waste (GHW-450) or citrus wood (CW) biochar for 25 days. *Botrytis cinerea* infection is presented as rot area through nine days. Bars represent the standard error of the mean of six replicates. Data points labeled by a common letter are not significantly different according to Fisher's protected LSD test. Pictures (bottom) represent gray mold on strawberry leaves 9 days after *B. cinerea* infection from treatments of no biochar (left), 1% GHW-450 (middle), and 3% GHW-450 (right)

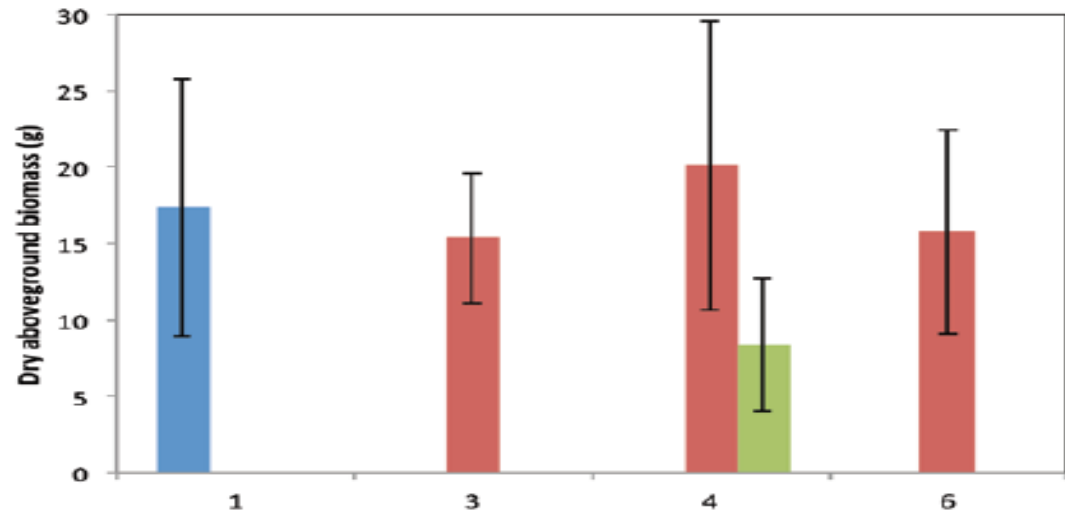


Meller-Harel et al. 2012
Jaiswal et al. 2014
etc. (→ E. Graber)

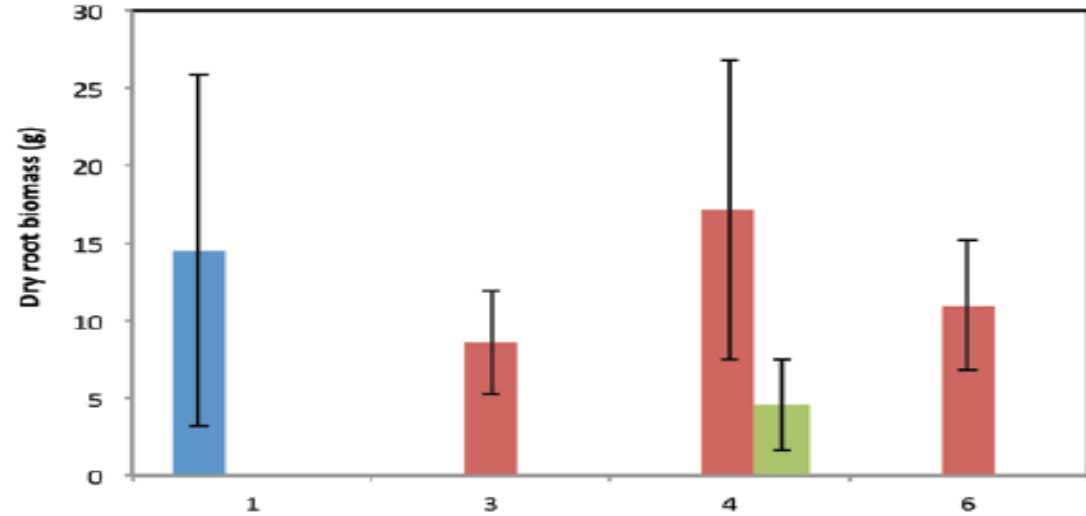




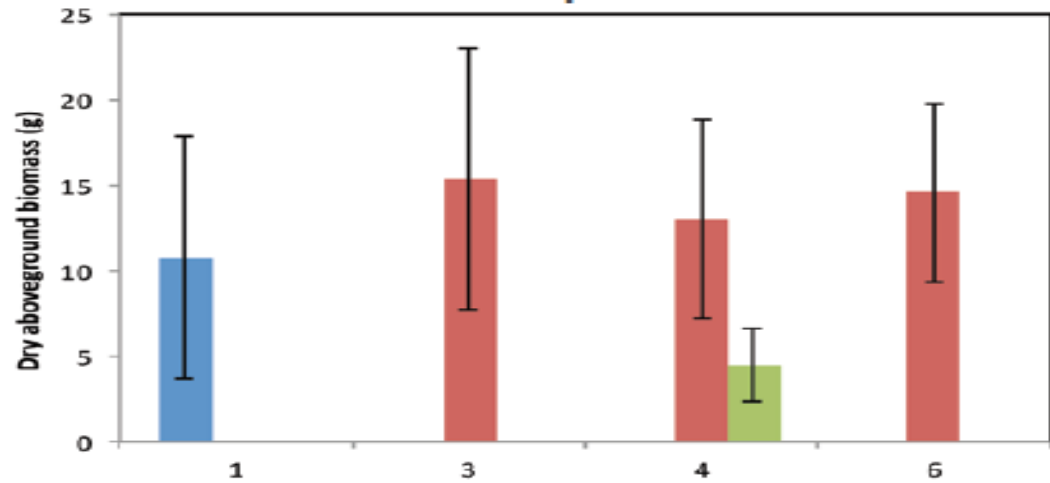
Calamagrostis



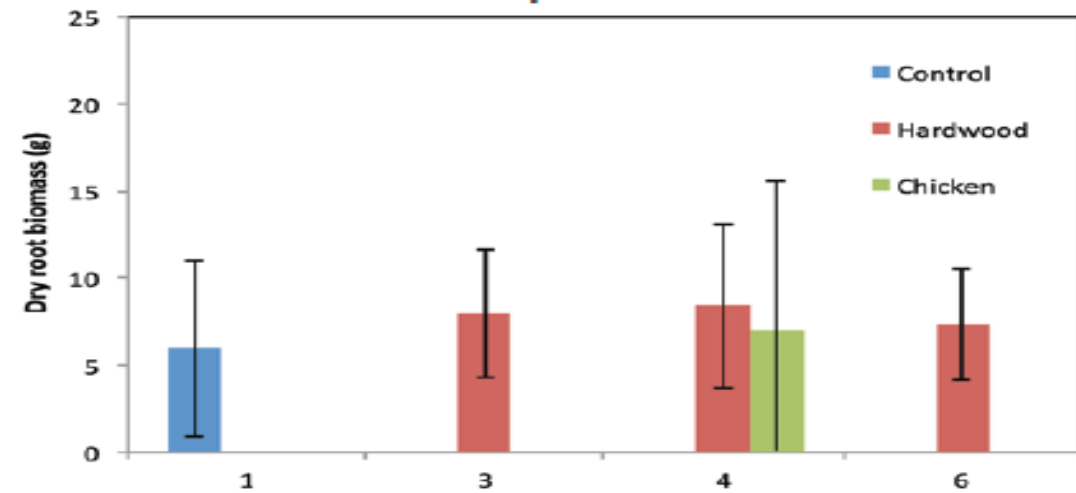
Calamagrostis



Spirea



Spirea

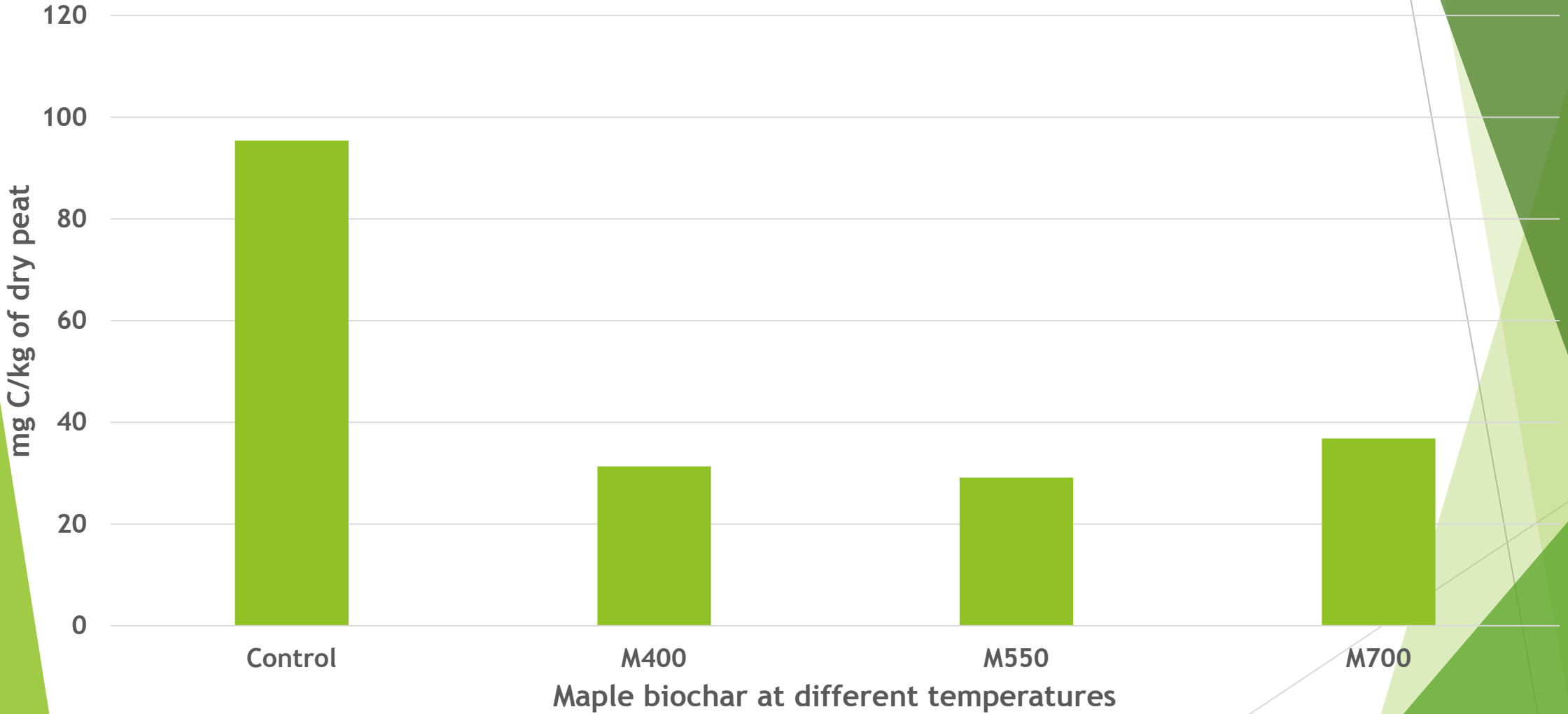


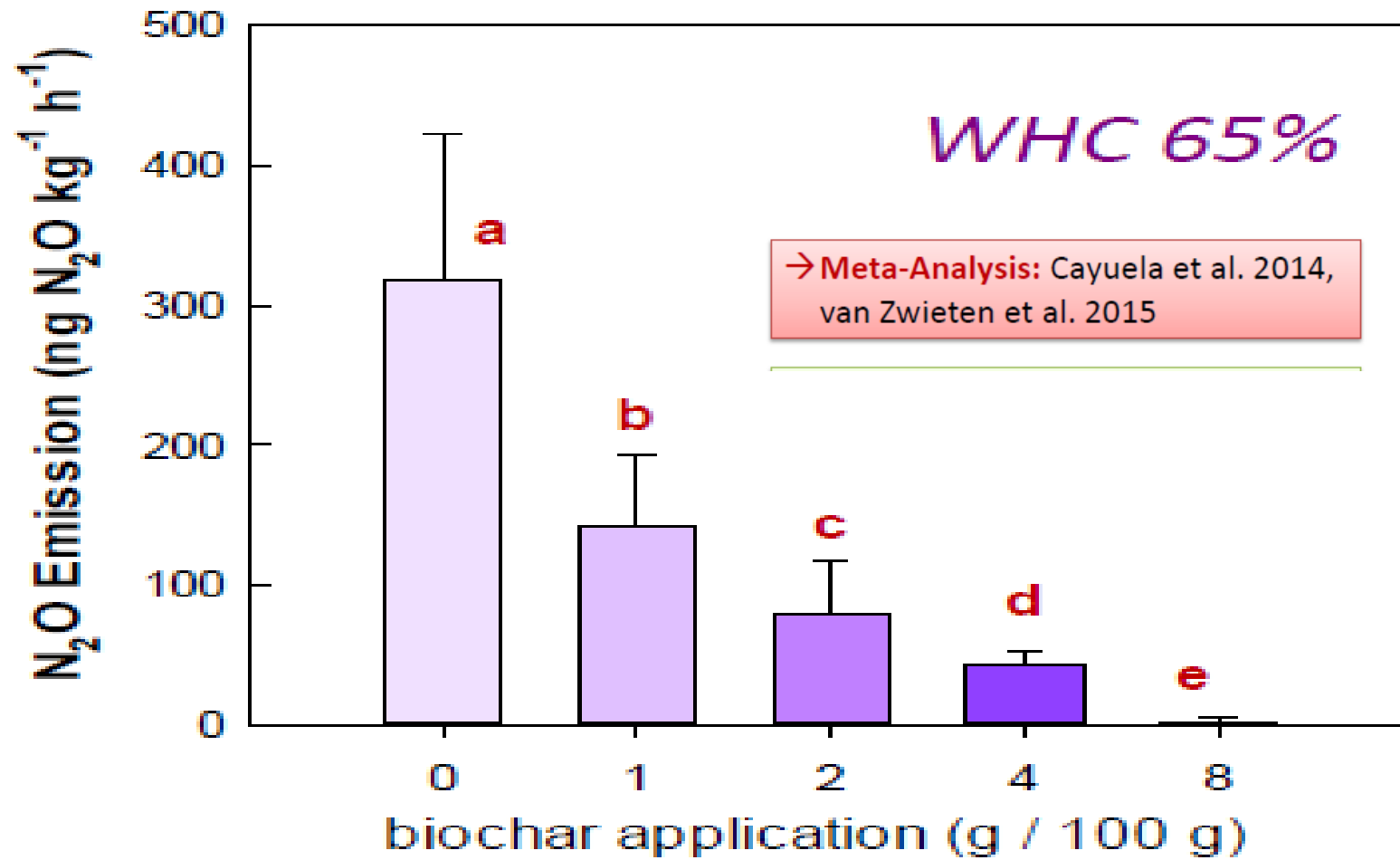
1=Peat Control, 3=Peat +14% Biochar 4= Peat+ 28% Biochar 6= 25%Biochar+25% Perlite

Use of Biochar in Green Roof

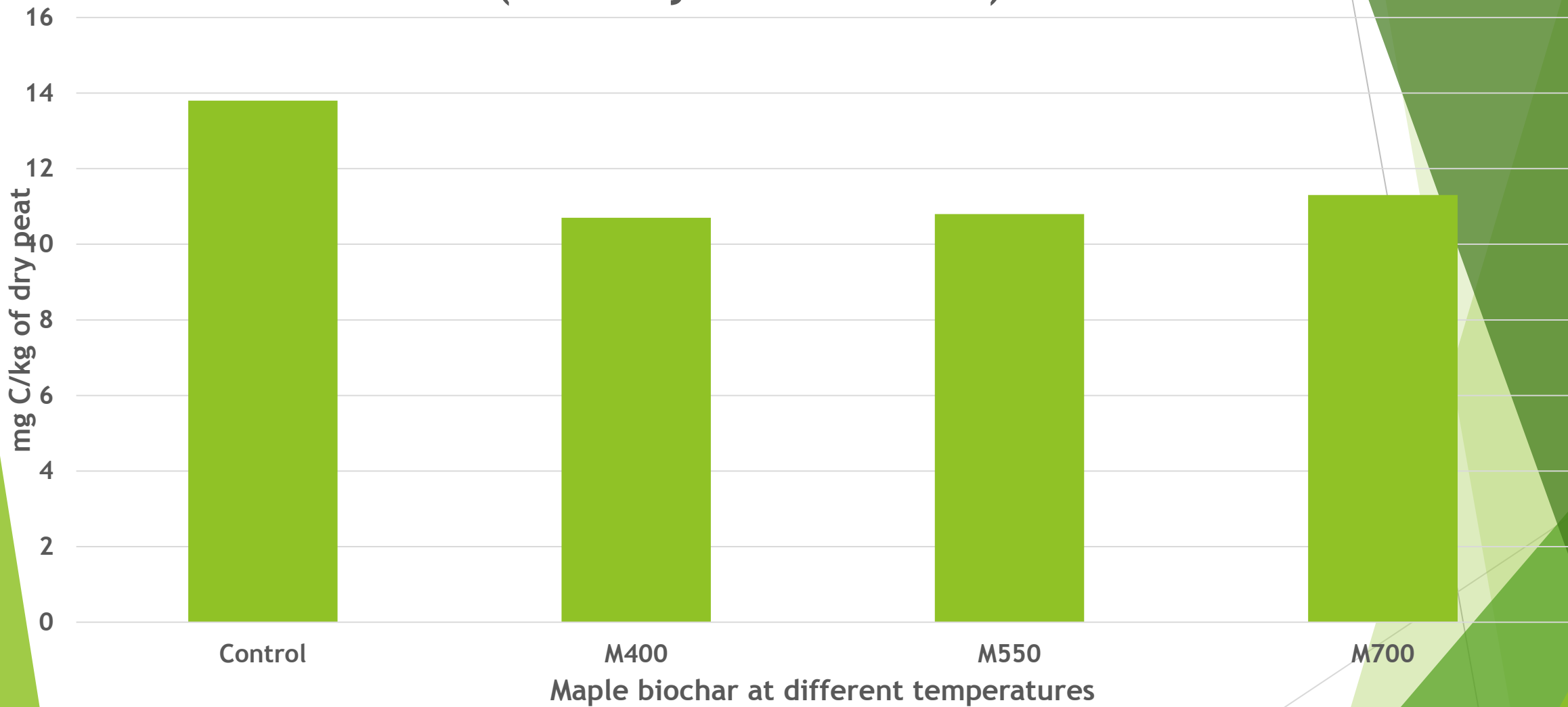
- Reduced the quantity of run-off
- Improved the quality of run-off
- Need to take into account variable properties of biochar
- Improved the water retention
- Decrease in total N in run-off
- Decrease in total Phosphate in run-off
- Decrease in total NO₃ in run-off

The effect of addition of maple biochars to peat at 15% on Nitrous Oxide emission (Potency 300 to 400 times Carbon dioxide)

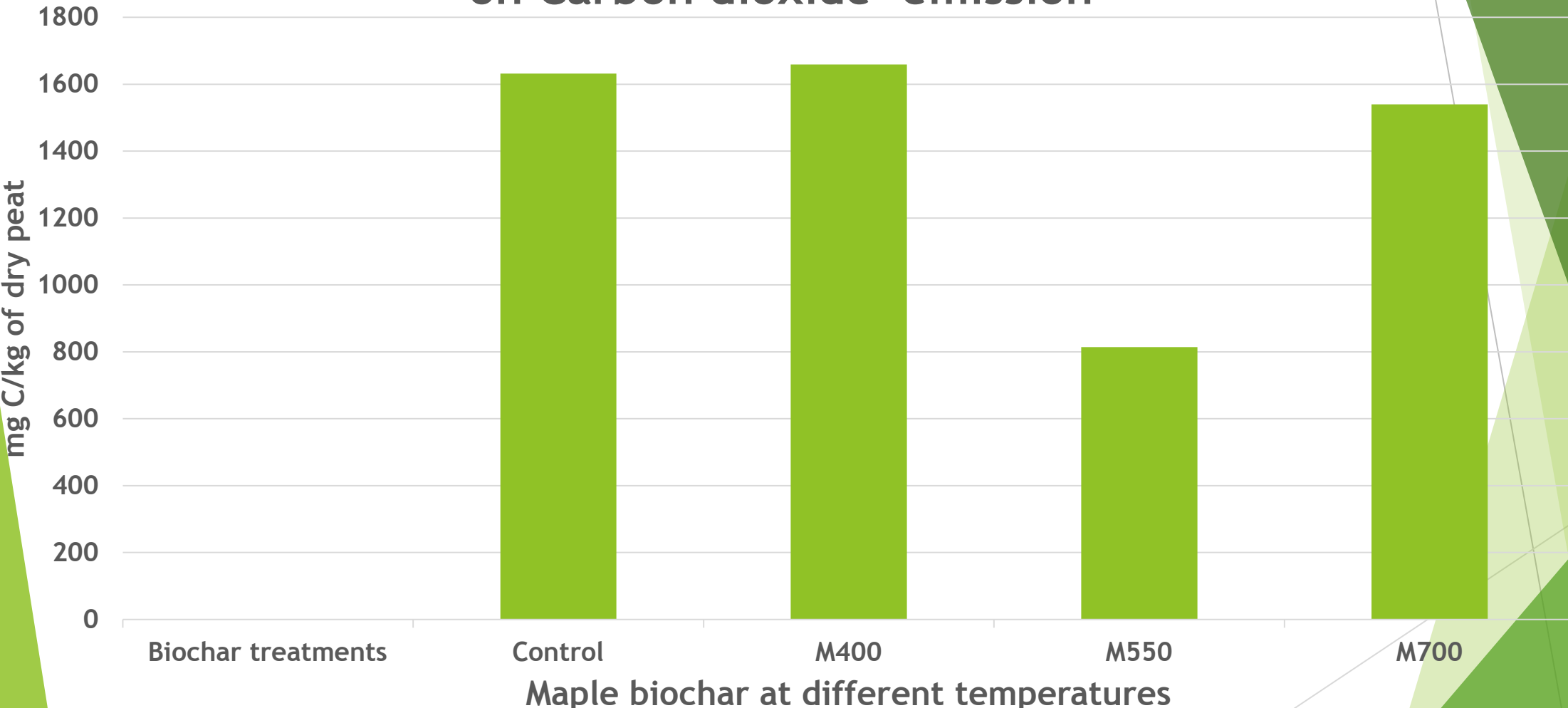




The effect of addition of maple biochars to peat on Methane emission(Potency 20 times CO2)



The effect of addition of maple biochars to peat at 15% on Carbon dioxide emission



Biochar treatments

Control

M400

M550

M700

Maple biochar at different temperatures

Conclusion

- ▶ Change to biochar at Nursery level will not occur unless there is financial incentive from government (Carbon Credits) or market incentive.
- ▶ Financial incentives may include the proximity of Biochar, therefore reduction in transport costs
- ▶ Financial returns for carbon sequestration if nurserymen or pyrolyser group together

NOT ALL BIOCHARS ARE MADE EQUAL !!

**POTENTIAL TO PRODUCE PLANTS WITH LOWER
CARBON FOOTPRINT**

“CLIMATE SAVING” GROWING MEDIA

THANK YOU FOR YOUR ATTENTION!