

Compost Induced Disease Suppression

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Introduction

Pot experiments were conducted to determine suppressive effect of compost against major soil-borne pathogens. The contribution of compost biological attributes to disease suppression was determined comparing gamma sterilized compost with non-sterile compost.

Material and Methods

The pea variety Santana, subterranean clover and summer vetch were grown in autoclaved sand, sand amended with 20% v/v gamma sterilized and non-sterilized Yard Waste compost. At sowing pots were inoculated with *Fusarium avenaceum*, *F. oxysporum*, *F. solani* and *Phoma medicaginis* at 2×10^4 spores g^{-1} substrate. Plants were harvested after 28 days and the level of damage on external and internal tissue was assessed on a 0-8 scale. A disease index (DI) was calculated based on the score means, and fresh weight was measured.

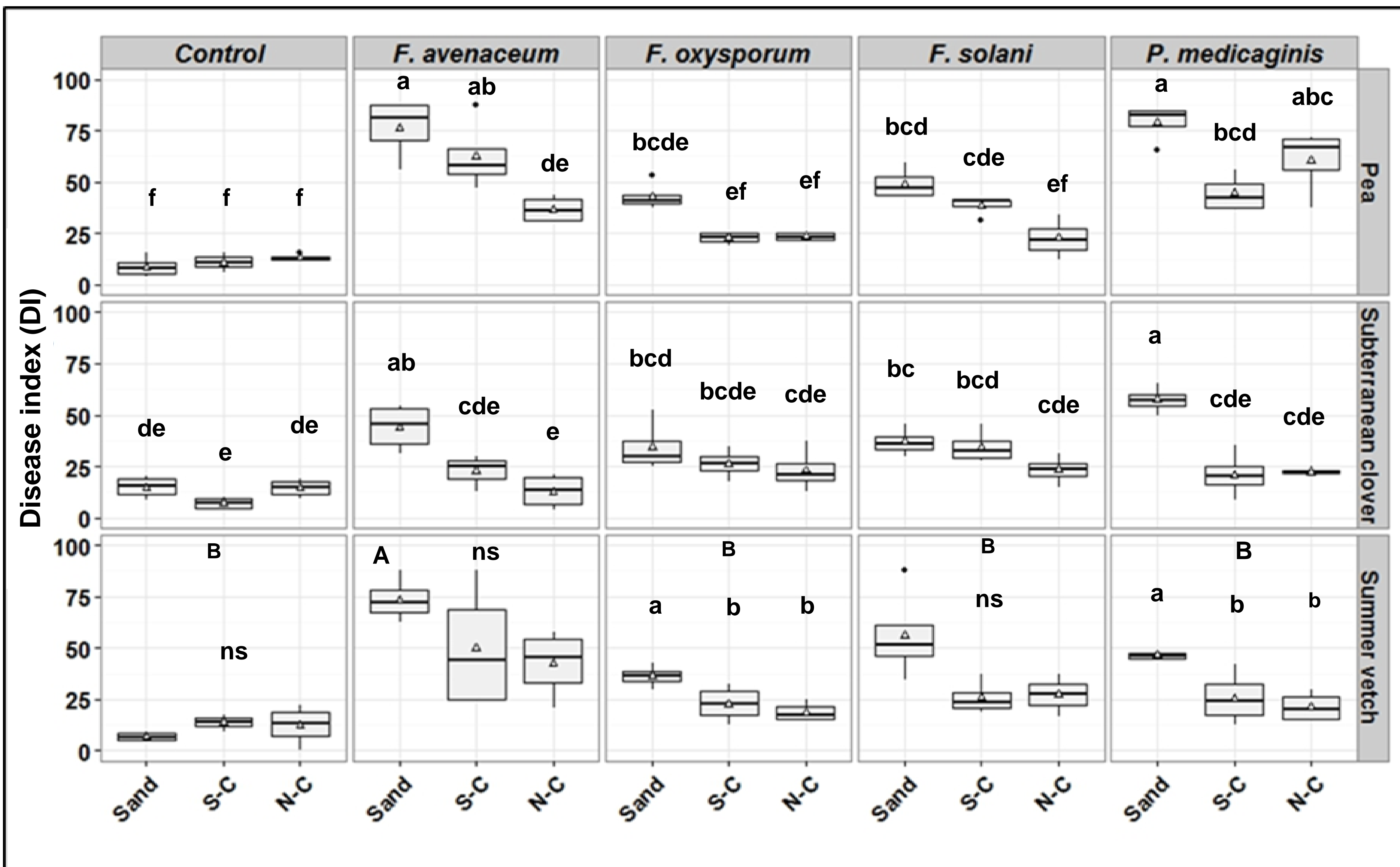


Figure 1. Disease index (0 – healthy, 100 – dead plant) of the three species inoculated with *F. avenaceum*, *F. oxysporum*, *F. solani* and *P. medicaginis* grown in sand, sand amended with gamma sterilized (S-C) and non-sterilized (N-C) compost. Different letters within plant species are indicating significant differences in DI, $P < 0.05$ (Tukey's HSD test).

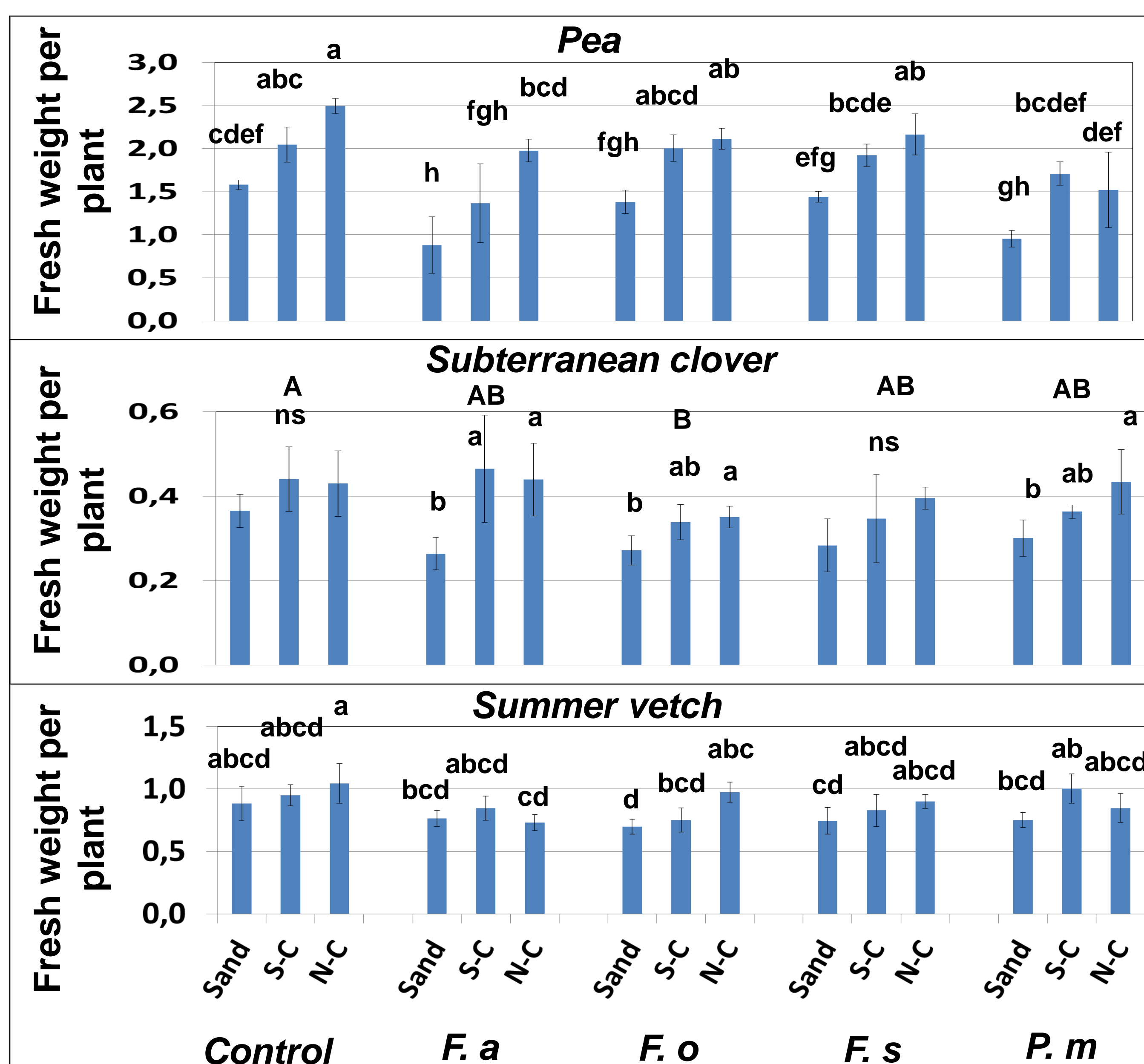


Figure 2. Fresh weights in sand, sand amended with gamma sterilized (S-C) and non-sterilized (N-C) compost of three species inoculated with *F. avenaceum* (Fa), *F. oxysporum* (Fo), *F. solani* (Fs), and *P. medicaginis* (Pm) grown. Different small letters indicate significant differences between compost and pathogen treatments, $P < 0.05$ (Tukey's HSD test). Different capital letters: significant difference between pathogens. Error bars: ± 1 SD.

Results

DI in non-sterilized compost was constantly lower compared to sand and sterilized compost, with exception of pea - *P. medicaginis* pathosystem, where sterilized compost had the lowest DI. Variation in DI was often high leading at times to non-significant effects of composts (Fig. 1).

Pea and vetch were similar in susceptibility except that vetch was less affected by *P. medicaginis*. Subterranean clover was least affected by all pathogens with highest DI for *P. medicaginis* (Fig. 1).

In all treatments, DI corresponded with the plant fresh weights. In pea non-sterilized composts significantly increased fresh weights of plants in all treatments compared to unamended sand. In subterranean clover and summer vetch compost effects were rare (Fig. 2).

Discussion

Compost effects were pathogen specific. Thus, the higher biomass of peas with *F. avenaceum* in non-sterilized compost and lower DI suggest that disease suppression is mainly biological in origin. In contrast, with *P. medicaginis* a lower DI was measured in sterilized compost, and in the treatment with *F. oxysporum* both compost types were effective in reducing DI, suggesting disease suppression is achieved due to combination of abiotic and biological characteristics of compost.