Evaluating anaerobically digested dairy fiber as a substitute for peat in soilless potting media

POSTER · JANUARY 2015

2 AUTHORS, INCLUDING:

Jack Lamont
McGill University
6 PUBLICATIONS **0** CITATIONS

SEE PROFILE

Evaluating anaerobically digested dairy fiber as a substitute for peat in soilless potting media

John R. Lamont, George C. Elliott

Dept. Plant Science & Landscape Architecture, UCONN, Storrs, CT 06269 *john.lamont@uconn.edu*

OBJECTIVES

1. To evaluate ADDF as a substitute peat in soilless potting media mixes.
2. To evaluate nutrient availability in ADDF over time.

INTRODUCTION

- Concerns about the sustainability of harvesting sphagnum peat have prompted a search for sustainable, local alternatives in soilless potting mixes.
- Anaerobically digested dairy fiber (ADDF), a residual of methane extraction from dairy manure, has physical properties similar to peat and shows promise as a substitute for peat in potting mixes.
- If ADDF were proven as a high quality media component, it would be a value-added product supporting profitable dairy operations. Demand for ADDF for growing media would be an added incentive for dairy farmers to invest in anaerobic manure digestion.

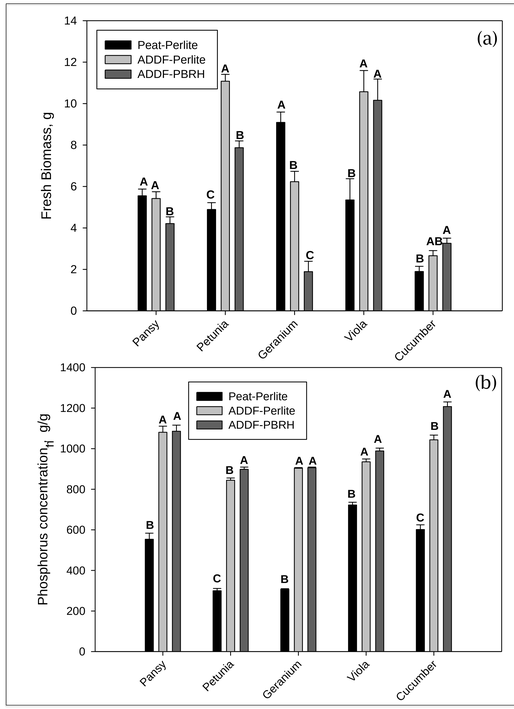

Figure 1. Mean fresh biomass (a) and leaf tissue phosphorus concentration (b) for bedding plant species grown in media With and without ADDF. Means with different letters are significantly different within species. Tukey's HSD test was used for means separation at a=0.05.

METHODS AND MATERIALS

Bedding Plants and Vegetables: Pansy, viola, petunia, geranium and cucumber were grown from seed. Potting mixes evaluated were peat-ADDF-perlite and peat-ADDF-PBRH (parboiled rice hulls) each in a 2:2:1 ratio. Ground gypsum as added to both ADDF-containing mixes at 4g L^{-1}. Saturated media extracts (SME) analyzed for each mix. Viola plugs and cucumber seeds were planted in #3 CowPots®. Petunia and seed geranium were grown in square plastic 3". Pansys were grown in square plastic 3" pots. Plants were initially irrigated overhead. Established plants were irrigated in flood and drain trays with a constant liquid feed at 100 mg L^{-1} N from Plantex 19-2-19. Greenhouse conditions varied with season and crop.

Garden Chrysanthemums: SPM were formulated with a 2:2:1 ratio of the following; peat:ADDF:perlite, peat:ADDF:PBRH, coir:ADDF:perlite, coir:ADDF:PBRH. All were amended with ground gypsum at 4 g L^{-1}. Fafard 1-P (peat: perlite) was included as a commercial control mix. Rooted cuttings were transplanted into 8" and grown, unpinched, outdoors with natural season lighting. Plants were initially overhead irrigated and then drip irrigated with constant liquid feed at 100 mg L^{-1} N from Plantex 19-2-19. Fresh weight, volume and leaf tissue nutrients were measured mid-crop and at commercial maturity

Cyclamen: The five media used in the garden mum trail were also used in the cyclamen trial. Plugs of cyclamen 'Silver Heart White' and 'Winfall White' were transplanted into 4 inch pots, grown in a greenhouse and fertigated with a flood and drain system as in previous trials. At the end of the trial plants were evaluated based on appearance and canopy volume.

Poinsettias: Two SPM were used for this trial with a 4:1 ratio of peat-perlite amended with 4g L^{-1} dolomitic lime and a 2:2:1 ratio of peat-ADDF-perlite amended with 4g L^{-1} gypsum. Rooted poinsettia cuttings were transplanted into 6". Plants were fertigated with a flood and drain system as in previous trials. At the end of the trial, plant appearance was evaluated subjectively and growth was evaluated quantitatively based on height, fresh weight, dry weight and leaf tissue nutrient analysis.

Figure 2. Cyclamen (top) 'Silver Heart' (left) and 'Winfall' (right) and Chrysanthemum 'Hankie Yellow' grown in media with a 2:2:1 ratio of the peat:ADDF:perlite, peat:ADDF:PBRH, coir:ADDF:perlite, coir:ADDF:PBRH and Fafard 1-P, a peat-lite control mix.

RESULTS

Bedding Plants: Petunia and viola performed much better in the ADDF mixes than in the control mix. Pansies grown in ADDF-Perlite were not significantly different from the control, but those in ADDF-PBRH were smaller. Geraniums in ADDF mixes were smaller than controls, but this trial was confounded by high mortality. Cucumber grown in control mix were the same size as those grown in ADDF-perlite but somewhat smaller than those grown in ADDF-PBRH. Plants grown in ADDF mixes had higher leaf tissue phosphate concentrations upon harvest than those grown in the control mix (Figure 1).

Garden Chrysanthemums: Plants in the control mix were larger than those in ADDF mixes. However, ADDF-perlite mixes produced saleable quality plants while the PBRH-containing mixes produced smaller plants of inferior quality

Cyclamen: All peat-containing mixes produced saleable quality plants of similar size while the coir-containing mixes produced smaller plants of inferior quality (Figure 2).

Poinsettia: Plants grown in ADDF-containing media were noticeably larger and denser at maturity than those in the control mix (Figure 3).

Conclusions

- ADDF is an effective partial substitute for peat in soilless potting mixes. Although results varied with specific combinations and crops, adjusting fertilizations and irrigation practices would likely overcome the limitations that were observed.
- ADDF is a significant source of plant-available P.

Figure 3. Poinsettia grown in media with a 4:1 ratio of peat-perlite (left) and a 2:2:1 ratio of peat-ADDF-perlite (right).