5TH INTERNATIONAL STRAWBERRY CONGRESS

ANTWERP BELGIUM 17 - 20 SEPTEMBER 2025

Book of Abstracts

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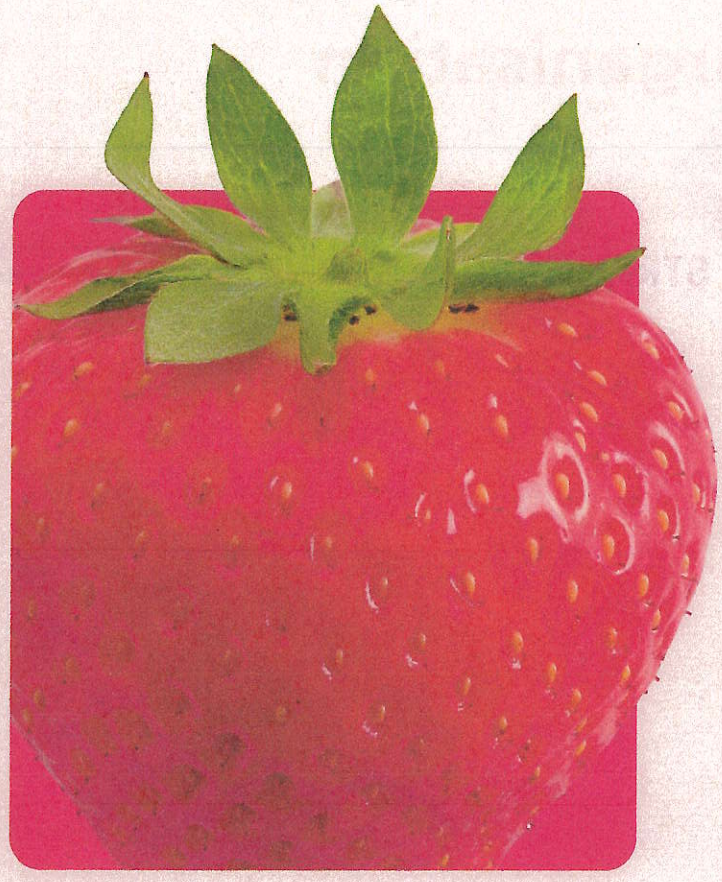

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Organic substrates for soilless strawberry cultivation from derived products: evaluation of peat alternatives available in Trentino

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Abstract

Soilless strawberry cultivation requires a growing medium with specific physicochemical characteristics, particularly porosity and exchange capacity, which determine the hygroscopic and nutritional conditions suitable for plant development. Sphagnum blonde peat of appropriate granulometry has demonstrated these conditions, becoming the preferred material for this cultivation due to its cost-effectiveness and ease of use.

In recent years, environmental pressures to reduce the use of slowly renewable natural resources on one hand, and geopolitical issues suggesting increased costs and risks for production and transportation of materials on the other, have accelerated the search for viable alternatives.

Simultaneously, these socioeconomic factors have led to the emergence of initiatives aimed at recovering and transforming products or by-products from various sources: domestic, industrial, energy, or agricultural. In Trentino, composting of domestic waste, bio-digestion of livestock effluents, chipping of tree residues for thermal energy use, and chipping of urban green management residues generate large quantities of organic materials with diverse physicochemical characteristics.

The intersection of these two economic-ecological trajectories, one internal and one external to the sector, has led to evaluating their potential applications in soilless cultivation systems. This study aims to utilize these materials to reduce peat usage through total or partial substitution, or by reusing peat for multiple production cycles. Different formulations and management methodologies were determined and tested based on preliminary assessments of the physical-hydraulic and chemical-nutritional behaviours of these materials.

Initial results suggest the potential use of some of these materials as supplements to peat previously used in a first production cycle. For example, mixing used peat with a minority proportion of digestate, combined with specific fertigation management, has enabled its reuse in a biennial production cycle with overwintering a limitation typically insurmountable due to the drastic structural deterioration of reused peat.

Organic substrates for soilless strawberry cultivation from derived products: evaluation of peat alternatives available in Trentino

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5TH INTERNATIONAL STRAWBERRY CONGRESS

FONDAZIONE EDMUND MACH dal 1874

Biodigester of Villa Agnedo (TN)

Composting Center of Faedo (TN)

Wood chip comnpany of Cimego (TN)

Introduction

The success of soilless strawberry cultivation depends on a growing medium with specific porosity and exchange capacity. For a long time, sphagnum peat has been the preferred choice due to its ideal properties and low cost.

However, increasing environmental and geopolitical pressures have highlighted the need for sustainable alternatives. Concurrently, efforts to recover and transform organic by-products from domestic and agricultural sources have created a new supply of materials. This research evaluates the potential of these materials, specifically those produced in Trentino, to be used as growing media in soilless cultivation systems.

Objectives

The primary goal of this research is to explore the use of organic by-products to reduce or eliminate peat consumption. By analyzing the physical-hydraulic and chemical-nutritional properties of these materials, we developed and tested different formulations and management strategies. Our approach seeks to achieve one of two outcomes: either the total or partial substitution of peat, or the extension of its use through multi-cycle reuse..

Materials

Substrate testing (as is or in a mixture):

BLOND SPHAGNUM PEAT "control test" (from Baltic peat bogs)

LIVESTOCK DIGESTATE (from the nearby biodigester)

URBAN COMPOST (from the provincial composting center)

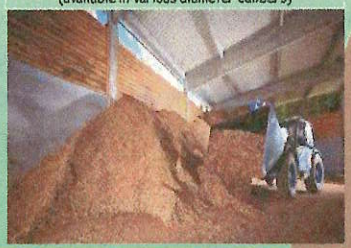
BY-PRODUCT OF HEATING WOOD CHIPS (from a company of this region)

USED BLOND SPHAGNUM PEAT (from the local farms)

Blond Sphagnum Peat (bulk in commercial bags)

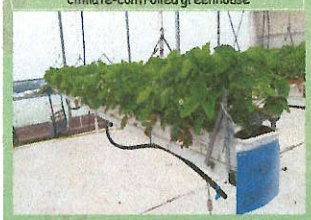
Urban compost (front) Biodigestat (behind)

By-product of heating wood chips (available in various diameter calibers)



Used blond sphagnum peat (ready to use bags)

soilless cultivation system with trays in a climate-controlled greenhouse



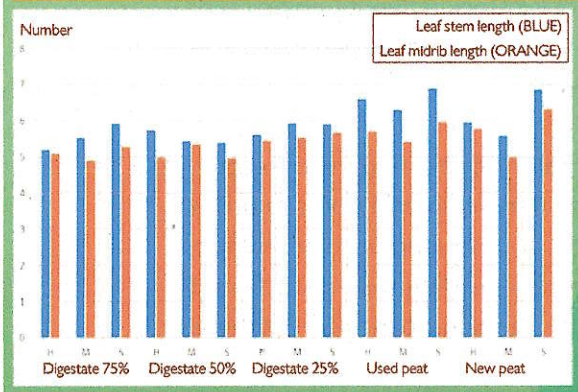
control and management of the fertigation system (six different types of treatment)

Methods

After verifying the declared values of the chemical components and the main chemical-physical characteristics, the products' behavior was initially tested as such or in equivalent binary mixtures to interpret their responses to water management, fertigation (in terms of pH and conductivity), and management (e.g., any pre-transplant treatments such as flushing, chemical-nutrient additions, etc.).The possible mixtures of the various products and their synergistic percentage ratios were then monitored, both in combination with each other and with peat, both new and reused, with the aim of, if not replacing it, at least reducing annual consumption.

Results

To determine the best way to utilize the materials, we first verified their chemical components and key properties. We then tested their response to water and nutrient management (fertigation), including the effects of pre-transplant treatments. Finally, we monitored different product mixtures, both as standalone media and in combination with new and reused peat, to assess their potential for reducing or replacing peat consumption.

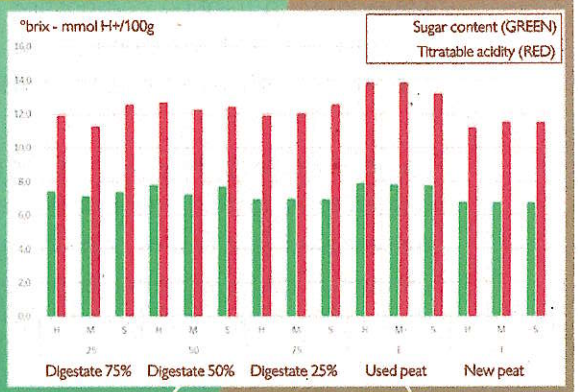


← VEGETATIVE DATA (first year, before winter)

LEGEND: (substrates)
T (standard)= new peat
E (treaty)= used peat
25/50/75= % of digestate in peat

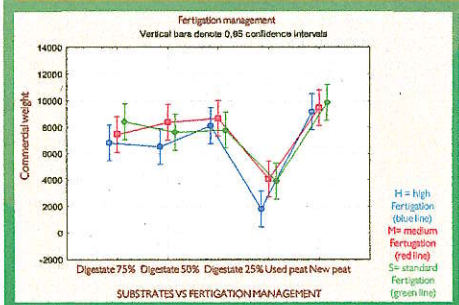
LEGEND: (treatment)
H= high increase fertigation
M= medium increase fertigation
S= standard fertigation management

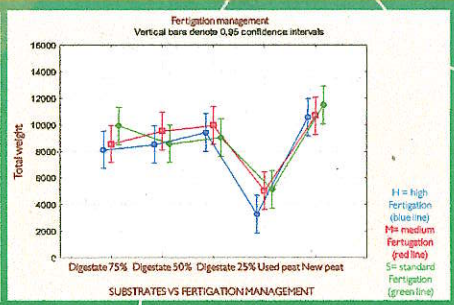
QUALITATIVE DATA → (second year, post winter)



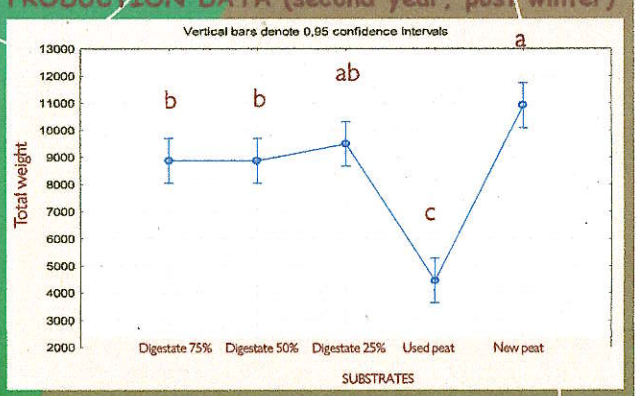
Discussions

Despite peat's superior performance, especially when compared to reused peat after overwintering, our initial findings indicate that some of the tested materials could serve as effective conditioners or partial replacements for previously used peat. Furthermore, our study highlights the importance of precise fertigation management, particularly regarding the quantity and frequency of watering, and monitoring conductivity, for successful cultivation in all types of substrates.





PRODUCTION DATA (second year, post winter)



Conclusions

Our results indicate the potential for using alternative materials to supplement peat. We successfully reused a mixture of used peat and a small proportion of digestate for a two-year production cycle, even with overwintering. This is particularly notable because the structural integrity of reused peat typically degrades to a point where it is unusable after one cycle. These findings highlight a promising strategy for reducing peat consumption.

Acknowledgements

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