

Wood Substrates in Food & Cannabis Production

Some of the past and current uses of wood materials in the production of container-grown food and cannabis systems.

by DR. BRIAN E. JACKSON

Container-grown consumables are one of the main reasons for the tremendous growth within production horticulture in the past decade. No longer reserved for just woody ornamentals, herbaceous perennials, bedding plants and floral crops, today a more diverse palette of crops is being grown in containers (soiless substrates) than ever before. Consumables, of course, include vegetables, herbs, microgreens, leafy greens and soft fruit, but this group also includes cannabis.

With many new crops being grown in containers, the effort to better understand the growing practices to maximize production economics and efficiencies is at an all-time high. Public and private agencies across the globe are working to maximize the potential of indoor and outdoor production of consumables and new specialty crops in containers.

LOOKING AT THE MARKET

There are many driving forces behind the efforts to grow more edible and consumable crops in containers. In the case of greens and vegetables, some of the factors driving the increased controlled environment production include the rise of peri-urban agriculture, transportation cost and limitations, food safety concerns, and consumer demand for locally sourced goods.

For soft/small fruit production, the driving forces behind container production include water availability and irrigation management, poor soils that have restricted field production, the ability to produce fruit sooner and longer in the growing seasons, proximity to consumers/market, lessened pest and disease pressures, and



Figure 1. A variety of organic and inorganic substrate materials can be successfully used in container-grown cannabis production.

reduced threat of early season freezes when grown in covered culture.

For cannabis, the interest or necessity for container production stems from security issues, maximized and predictable yields, better management of pests and diseases, and production and harvests unaffected by weather, etc.

Recent predictions were outlined in a research report published in 2019 by Wageningen University (the Netherlands) research scientist Chris Blok on the global demand and usage of soiless substrates. Findings from this report suggest that by the year 2050, global substrate demand will likely double! Organic materials (Figure 1)—including peat moss, bark products, composts, and coconut coir and fiber—will continue to be in great demand, but projections are that some of these traditional mainstay materials will likely be limited in their availability due to harvesting constraints, reduced licensing agreements and threatening use restrictions. More empha-

sis and demand may be placed on wood products to play even larger roles in the future of container crop production.

WOOD SUBSTRATE OPTIONS

Currently, there are several wood products offered by companies across the U.S. These wood substrate materials can be purchased in compressed bales (large and small), similar to how peat and coconut coir are packaged (Figure 2A) or they may be purchased as loose (uncompressed) materials.

Some product offerings in Europe (likely soon here in the U.S.) include wood:peat compressed blocks, as well as wood fiber slabs and bags for greenhouse vegetable and soft fruit production (Figure 2B).

For loose-filled container production, the wood products are blended with peat or bark materials to formulate desired/specific mixes suitable for whatever crop is to be grown (Figures 2C and 2D).

The formulation of mixes (component type, size and percentage) varies based on container size, longevity of crop to be grown, irrigation delivery method, etc. Growers should consult with their growing media supplier(s) and inquire which product offerings are available and which products may be most suitable for their production system.

USING WOOD IN FOOD PRODUCTION

Much has been published on the use of wood products in crop production, but most research has been conducted on ornamental/floral crops. That being said, there's been a decent amount of scientific research conducted on food crops in various production systems grown in wood-based or wood-containing growing mixes.

A close look at past literature indicates



Figure 2. Commercial wood substrate components are available in compressed bales (A), slabs and bags (B), or as loose material and can be blended with peat moss (C) or pine bark (D) to create complete substrates.



Figure 3. Wood materials have been evaluated in research trials to grow numerous fruit and vegetable crops over the past decade.

that numerous vegetable crops have been studied, including greenhouse-grown cucumbers, tomatoes, peppers, cabbage, squash, eggplant and fruit crops like strawberries, blueberries, figs and melons. From these published research trials, most reported successful results of the crops tested as long as the wood substrate materials used were non-toxic and capable of supplying adequate water, air and nutrients to the plants.

Some previous works have also reported successful re-cropping of greenhouse crops in wood fiber slabs and troughs, meaning they didn't decompose or lose their structure to support long-term usage. Another advantage noted was the lack of any end-of-life or disposal issues from using wood slabs, with most being composted or repurposed in some way.

Current collaborative partnerships between North Carolina State University scientists and members of the growing media industry in North America and Europe are working together to study fruit production (specifically strawberries) in wood fiber-based bags and troughs (Figure 3A), as well as other specialty crops and cropping systems. Fruit yield and quality (size, grade, color, taste, etc.) have so far proven to be similar to plants grown in peat-based (non-wood) mixes.

Other trials have evaluated and quantified the root growth and development of various vegetable crops, with emphasis on ways to improve the speed of early rooting of grafted transplants and seed-propagated transplants (Figures 3B to 3D).

Aside from research trials aimed at better understanding the potential of wood products in food cropping systems, it's worth noting that millions of vegetable transplants and young plants are already being grown commercially in substrates containing wood products. Several greenhouse growers across the country who produce vegetable and herb plants for box stores and garden centers have been using wood products in their mixes in place of perlite.

The use of wood substrates has proven to be successful, although challenges often occur, particularly with irrigation and pH management. Growers have reported a learning curve, oftentimes steep, when adopting new mixes with wood materials. Much is still to be learned with regards to best management practices with these materials.

USING WOOD FOR CANNABIS

The other developing area of interest for the Horticultural Substrates Laboratory at NC State is root zone research of cannabis. For almost two years, trials have been conducted to assess some general parameters of substrate selection, use and management in containerized greenhouse cannabis production. Among the trials conducted, we've evaluated 20 commercial mixes, substrate pH effects on rooting and early vegetative growth, effects of substrate



Figure 4. Recent evaluations at NC State University have shown wood products in substrates to be successful in cannabis production.

composition, and substrate physical properties (Figures 4A to 4D). More information and detailed data will be published in the near future to summarize some of the findings from these various trials.

In short, it can be said that there's no "magic bullet" or "super soil" that's specific to cannabis for maximized or optimal growth and yield. As was suspected, cannabis grows with ease and quickness in any well-managed and structured substrate. Peat and coconut coir are the two most used products, usually with the addition of perlite. These, and other materials including wood fiber, have been shown to be acceptable, and sometimes exceptional, container substrate options as well. As is true with growing any other container crop, the use of wood materials is only successful if they're non-toxic, of the right structure for air and water delivery, and don't decompose at a rate faster than the cropping cycle. 🌱

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