

# GROWERTALKS

## Features

8/31/2026

## Homegrown Substrates: Renewable Resources

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The United States produces an abundance of organic biomass materials annually, many of which have been used as substrates for 75 years. Organic components are the predominate materials (on a volume basis) used in soilless substrates across the global horticultural production industry. This is true, in part, due to the number of different biomass types and their geographical distribution, ability to be successfully processed into adequate sizes and shapes, low cost, and they can be easily disposed of (i.e. repurposed or composted) after use.

**Figure 1: Domestic production of organic biomass, including forestry and agronomic residuals (substrate feedstocks), are estimated to be 1.1 to 1.5 billion tons annually.**

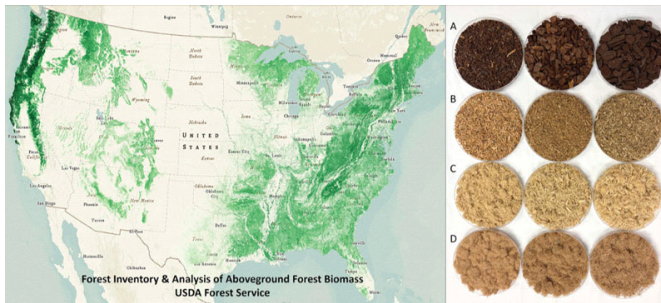
Many organic materials can be OMRI-listed—an independent product review that determines whether the material complies with organic standards, including the USDA National Organic Program (NOP). An OMRI-listed product is not officially “certified” organic, but it does certify that the product is organic in origin and can be used for NOP certification in fully organic production systems.

The U.S. Department of Energy's 2023 Billion-Ton Report (Figure 1) assessed the production potential and availability of renewable organic biomass and carbon resources across the United States. Released in 2024, the report estimates that the U.S. could produce approximately 1.1 to 1.5 billion dry tons of biomass annually—about three times current production—while continuing to meet projected demands for food, feed, fiber, conventional forest products and exports. This report evaluated roughly 60 resource types across the nation, including agricultural residues, forestry resources, wastes, energy crops, algae and other emerging resources. While purposefully created to support the bioenergy industry, this report has been beneficial to substrate researchers and manufacturers who've been assessing current and future supplies of various organic biomass materials that are or could be used as components in growing media.

### **A focus on domestic production**

Among the various reasons that have driven research over the past several decades to identify and develop new organic substrates was the introduction of the Biomass Crop Assistance Program (BCAP), which was included in

the Food, Conservation & Energy Act of 2008 (the 2008 Farm Bill). The rationale of BCAP was to accelerate development of a domestic biomass-to-energy industry by providing federal financial assistance for the production of dedicated biomass crops. The intent was the use of these homegrown materials to reduce our dependence on foreign energy, which is seemingly as noncontroversial as drinking clean water or eating apple pie. So far so good, right?



Well, not exactly. The blood pressure of the nursery, landscaping, mulch and growing-media industries reached dangerous levels early in 2010 when it became apparent that BCAP could inadvertently subsidize materials that had already established commercial markets, particularly hardwood and softwood bark, wood chips, sawdust and other forest byproducts. Federal subsidies would have tipped the economic

balance, thereby depriving the horticultural industry of access to materials for which there were not adequate volumes of acceptable substitutes. Ultimately, the USDA modified the rules to protect existing higher-value uses of biomass such as bark and wood products, but the years-long pending threat of BCAP had already spurred nationwide research on sourcing and utilizing other domestic biomass materials as substrates.

**Figure 2: Distribution of U.S. forestry biomass inventories supports domestic (A) bark and (B to D) wood fiber substrate production.**

(Photo on left taken by Hawk Boyes.)

The U.S. is fortunate to have vast forests covering much of the country, conveniently overlapping with predominate horticulture production regions (Figure 2). Forest products (bark, sawdust, wood fiber, etc.) are critical resources used in substrates and our dependence on them will continue to increase in the future.

Domestic production of engineered wood fiber substrates in the past 12 years has increased substantially with producers, including Scotts (Georgia and Texas), Profile Products (North Carolina and Georgia), TimberFiber (Texas), P.R. Russell (New Hampshire) and Complete Resource Management (Georgia), as well as several other smaller operations producing “in-house” wood substrates. New wood fiber producers are being planned in Pennsylvania, California, Virginia, North Carolina and Oregon. An example company that also utilizes forest-derived materials is Pittmoss (Pennsylvania), which uses lignocellulosic biomass (derived from recycled newspapers and cardboard) that’s fiberized and granulated to engineer substrate products.

### The products

Bark substrate producers in the U.S. are predominately located in the Southeast, Pacific Northwest and to a lesser extent in the Northeast—all regions with existing forestry industries. The exact number of bark suppliers (and their locations) is currently unavailable, but a good guesstimate is between 60 to 70 nationwide. As one example, North Carolina alone has seven major suppliers—likely similar in several southern states and in Oregon.

Growers seeking bark suppliers (for bulk sales, not retail products) in their region can search by state or consult with organizations like the Mulch & Soil Council (MSC), a national nonprofit trade association representing manufacturers and producers of horticultural mulch, soil, compost and related products (Figure 3). With approximately 140 member companies, the MSC supports the industry by promoting product quality, credibility and consistency in addition to offering a product certification program to its members.

The “biochar boom” of the past decade has sparked interest as a possible substrate component. The American Biochar Institute (Figure 3) estimates there are about 150 to 200 U.S. biochar-producing companies/facilities, not including small/farm-scale producers—a significant increase over the past five years. Their 2025 U.S. Biochar Market Report (published in July 2026) provided an update of the U.S. biochar industry, drawing on 444 survey responses from 41 states across producers, equipment manufacturers, distributors, carbon-market participants and end users. It found that the industry is scaling rapidly with U.S. production estimated at about 151,000 metric tons in 2025, a 32% increase from 2023.

Overall, the report portrays biochar as moving from a fragmented emerging sector toward a more industrial-scale industry, while emphasizing that further use of biochar (in substrates) will depend on lower prices, consistent grades (particle sizes) and tangible functional benefits (beyond carbon credits and sequestration). Several biochar companies are targeting the horticulture industry and some substrate companies are sourcing or making biochar as part of their substrate product offerings.



Compost products have been a stable ingredient in substrates for over a century and their use is projected to increase substantially in the future. There are many online directories of compost suppliers, as well as resources on the production and use of compost, including The U.S. Composting Council, which is the national trade association for the U.S. composting and organics recycling industry that works to expand compost production and use, improve industry practices, and promote the environmental and soil-health benefits of recycling organic materials (Figure 3).

Figure 3: National organizations that support the production, technical training, education and certification of organic substrates and materials used in horticulture.

The U.S. composting industry produced approximately 6.0 million tons of finished compost in 2023, with an estimated 3,000 to 5,000 composting facilities nationwide. The industry has grown significantly, with the number of active facilities increasing 55% and total tonnage processed increasing 83% between 2016 and 2021. Despite this growth, demand for compost is estimated to be roughly 10 times greater than current supply, highlighting substantial opportunities for further expansion.

Other domestic organic materials with current or potential use as substrate components include shell and husk byproducts from the food industry, including peanut hulls (which have been used in substrates for 50 years) with estimated annual availability of 0.8 to 1.0 million tons; rice hulls (ex. PBH from Riceland Foods) with an estimated annual availability of about 1.5 million tons—though a lot is burned for energy; and tree nut shells, including almonds, pistachios, walnuts, pecans, hazelnuts and macadamias with an estimated 5 million tons produced annually. (Research is being conducted to verify potential allergen effects of using some of these products.)

Lastly, the domestic production of use of agronomic residuals (i.e. straw for mushroom production), bioenergy and industrial crops (hemp fiber/hurd, miscanthus) is on the rise. **GT**

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