

Horticultural

USES OF BARK AND BARK PRODUCTS

BY BRIAN E. JACKSON

This is the first article in a six-part series highlighting various horticultural uses of pine trees, pine bark and associated products, as well as data from substrate science research trials.

“One man’s trash is another man’s treasure.” An idiom we have all heard many times in reference to a product or material unwanted by some but prized by others. In many cases, bark and other tree products fall in this category. The scope of this article (and series) is to provide an overview of some of the more well-known and perhaps lesser known uses of one of nature’s most valuable and abundant resources — bark. Special emphasis will be made on pine (*Pinus* sp.) bark, but other bark species will

The nursery industry relies on bark for numerous functions, but it’s also a valuable material in other businesses.

be highlighted, as well. The function, utility and reliance that the horticultural industry has on bark materials is pretty comprehensive. Let’s take a look at some valued aspects of bark and bark products including aesthetics (ornament), soilless substrates, synthetic turf infill, landscape applications, container mulching and fuel sources.

Ornament

Peely, flaky, blocky, ridged, furrowed, stringy, smooth, warty, on and on the

Photo by Brian Jackson



Loblolly pine forest

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Figure 1: Bark interest and aesthetics of pines in nature as well as in managed landscapes is one of the prized features of this genus.



Figure 2: Overview of pine bark substrate processing operation (A), bark substrate blending onsite at a grower (B), bark use in mixes for greenhouse crops (C), bark engineered in various particle sizes to create soilless mixes (D), and examples of professional and retail consumer products containing bark (E).

adjectives could go to describe the uniqueness and beauty that tree bark can provide to a landscape, forest or specimen planting. Often the highlight

of a winter landscape or the focal point of night up-lighting, the use of trees in landscapes specifically for their bark is a long-standing tradition. Highlighting

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Figure 3: Bark from the cork oak tree is very thick as well as ornamental [A], before being harvest [B], and stockpiled at processing facilities [C]. Trees will regrow the bark to be harvested again [D] for many uses including wine stoppers [E], and processed granules for various horticultural applications [F].

various pine trees, the bark of *P. sylvestris* (Scots pine) and *P. bungeana* (lacebark pine) have stunningly colorful bark on mature trees (Fig. 1) and are used as specimens in landscapes across the globe. Not to be forgotten, the mature platy bark of our native *P. tadea* (loblolly), *P. palustris* (longleaf), and *P. elliotii* (slash pine) add incredible texture and boldness to mature landscapes. While other horticulturally prized genera may be more known for their extravagant bark displays, I argue that some members of the genus *Pinus* can rival any others.

Soilless substrates

The backbone of the horticulture container plant production industry, soilless substrates are one of the advancements that have allowed crop production to be as efficient, economical, and successful as it is today. Not exclusive to the nursery industry, bark materials are used in numerous garden soil or substrate products and applications. The nursery industry can however stake its claim as the originators of bark-based materials as the predominant, and in many cases, sole source of growing material. Dating back to the production of nursery plants in egg and coffee cans, the switch from

mineral soil to bark-based substrates was a turning point in the container production world. Fast forward to today and bark substrates remain the dominant player in outdoor container production. On the west coast, Douglas fir (*Pseudotsuga menziesii*) bark is utilized while the eastern half of the country rely on pine bark as the primary source of feedstock for substrate production. Large bark yards can be seen across the Southeast where pine trees are prevalent (Fig. 2A). These bark producers source their raw bark from lumber yards, paper mills and other forestry operations. Bark products undergo various processing, handling, aging and formulation steps to create the consistent and functional bark substrates that nursery growers rely on. Growers will often incorporate various additives to their substrates on site at the nursery (Fig. 2B) or rely on the supplier to make these additions prior to shipping. Substrates are often tested for chemical, physical and biological properties to ensure quality control (Fig. 2C). Recent advances in bark engineering (to be thoroughly discussed in future articles) allow substrate producers to create substrates of any air, water, or density parameters a grower could want

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for any container type or size, irrigation delivery method, production system, etc. (Fig. 2D).

Bark products are also heavily used in greenhouse substrates, as well as consumer soil and soilless products (Fig. 2E). Many professional substrates

for floriculture production, vegetable production and more recently Cannabis and small fruit production (blueberries, strawberries, oranges, figs, etc.) are using bark as one of the main constituents with peat moss. The bark in these mixes provides additional airspace porosity and

drainage, which is often desired to improve production management strategies and control plant growth. The aforementioned advances in bark engineering and formulation practices now allow specific bark products to be made with specific sizes and properties suitable for orchid production, woody cutting propagation or any other niche production need.

Cork products

Maybe one of the coolest and most versatile tree barks in the world, cork has many functions and attributes. The cork oak (*Quercus suber*) is a medium-sized evergreen tree native to Southwest Europe and Northwest Africa with 50% of the world's production (cork plantations) coming from Portugal alone. Cork is produced by the cork cambium in the outer bark of the tree, and is considered a natural and renewable raw material. Beginning at around 25 years of age and for as long as 200 years, cork trees have their bark harvested every 8-10 years (Fig. 3A-D). The harvested cork, as witnessed during a visit to a production facility in Espinho, Portugal, is stored as large slabs outdoors before processing into wine bottle stoppers (Fig. 3E) flooring, cork boards, fishing bobbers or a thousand other products. Waste cork from these primary industries is further processed to make cork granulates (Fig. 3F). This granulated cork can be used to make filters, insulators, clothing ma-



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Figure 4: Pine bark nuggets and mini-nuggets (A) are popular landscape mulching options (B) as are slats/panels of bark placed in planting beds for aesthetic and functional purposes (C-D).

terials (shoes, handbags, bowties, etc.). Horticulturally, these granulates have been used as an aggregate in peat-based greenhouse substrates and top-dressing materials (alternative to vermiculite) for seed germination in plug trays. There is also an organic infill product (Corkonut from GreenPlay) used in the synthetic turf industry that use cork granulate as a component in the infill.

Landscape usage

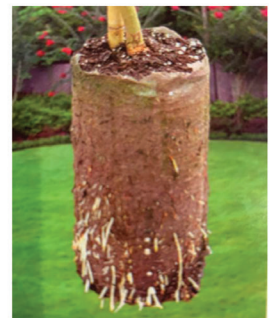
One of the most visible and traditional uses of bark is as landscape mulch materials. Mulch and bark producers make various grades or type of landscape bark-based mulches with the three most common being shredded (double or triple), mini-nuggets, and large nuggets (Fig. 4A). Available as bagged products or in bulk loads, bark mulches can be one of the most decorative options for landscaped areas in both the traditional/original brown color or dyed. Unlike

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some other mulch materials, bark products do not blow or wash away easily. Bark products degrade rather slowly and add organic matter to the soil once they do decompose (**Fig. 4B**). Some bark mulches can be applied to landscape planting beds in unique (very specific

and strategic) ways as seen in **Fig. 4C-D** where large bark planks are fitted on the ground in single layers to provide both a patchwork aesthetic look as well as providing the reliable weed control and moisture retention that mulches are known for. It's a common practice



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Figure 5: Bark used as a container surface mulch serves both aesthetic and functional purposes.

seen in Central America and Europe, but rarely here in the U.S., but one that could be considered and desirable in high-end or well-manicured landscapes and highly visual planting areas.

Other uses

Bark as a container mulch (**Fig. 5**) is a practice that has gained attention and popularity in the past several years -- container surface mulching in both plant production systems as well as post-production retail (consumer) use has increased substantially. In nursery production systems, mulching containers is used as a method of weed control as well as moisture retention. In addition to bark other materials including wood chips, rice hulls, and processed low-value trees have been used for this purpose. A lot of research has been published (and available) outlining the benefits of mulching containers as a weed control practice as well as instructions/guidelines on application methods (timing, depth, etc.). More recent and current research is aimed at quantifying the benefits of these container mulching applications on water retention (decreased substrate evaporative losses) during production and reduction of water stress (drying out) in post-production retail settings. There are wood and bark products specifically made and marketed for sale

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for these purposes, something I first witnessed in Europe where this practice has been common for many years. Lastly, use of bark nuggets as decorative container mulching is becoming more common (Fig. 5) and a practice adopted by many garden centers to enhance the aesthetic

appearance of container shrubs, trees, and indoor plants in containers.

Bark as a fuel source has been common for many decades across the country (and world). While bark can't compete with fossil fuels for burning efficiency, it has been incinerated on a large scale

since the 1970s. When burned pine bark consists of 55-66% volatile matter, 30-50% fixed carbon and 0.25-4.0% ash (depending on bark species, age, etc.). The bark ash (often referred to as bottom ash) from incinerators has been used as additives to garden soils, farmlands and potting soils for decades. Most recently, biomass subsidies authorized by the Food, Conservation, and Energy Act of 2008 (the 2008 Farm Bill) threatened to increase the price of raw bark and other forestry resources. The resulting Biomass Crop Assistance Program (BCAP) was a result of the need to meet alternative fuel usage goals that were outlined in the 2005 Renewable Fuel Standard legislation. The BCAP had the original intent of creating incentives for new clean energy biomass fuel sources including pine bark used to make mulch and substrate/soil products. The proposed \$45 subsidy per ton of woody biomass would have more than tripled the price of bark going to the horticultural market at that time. Other biomass materials also mentioned within this program included bamboo, miscanthus, switchgrass, wood sawdusts and fibers, among other forestry and agricultural biomass materials. Fortunately, due to lobbying efforts by many in the horticultural industry bark supply streams intended for horticultural use were exempted from this subsidy program.

Research on bark usage and products (substrates and many others) continues feverishly today around the globe. The reliance that many in the horticultural industry have on bark materials continues to increase as the offerings and value of the materials increase. Our usage of bark products provides an end-use or value-added use to raw materials that may otherwise have little or no purpose in the overall biomass utilization stream associated with the sustainable use of our forest resources, often referred to as cradle-to-cradle. So, while bark may be trash to some it sure does provide benefit and livelihood to many others now and well into the future. **NM**

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