

Disease Problems. Pine bark removed from trees infected with *Phytophthora cinnamomi*, the causal agent of the littleleaf disease, may pose a serious problem. Occasionally the *Phytophthora* has been identified in mixes containing pine bark, presumably removed from infected trees which are very often sawmilled.

Another fungus disease occurring very often in pine bark mixes several months after potting has been *Rhizoctonia* root rot. The association of this fungus with older bark supports the observations of Hoitink regarding the disappearance of the protective chemicals as the bark ages.

We have demonstrated a definite improvement in survival and growth of cuttings rooted in a bark mixture containing four ounces of Banrot 40 WP per cubic yard.

Another problem with bark is waterlogging, which leads to root rot caused by lack of air. This occurs when excessive fines are used, or when shavings, wood chips, or slivers incorporated with the bark have decomposed with a reduction in air space.

LITERATURE CITED

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COMPOSTING AND USE OF HARDWOOD BARK MEDIA FOR CONTAINER GROWING

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In our container growing operation we have tried various soilless media. Since cost was the biggest factor to be considered, we had to search for the most available raw material that could be used. We have no source of peat moss or softwood bark within 400 miles. Hardwood bark is available about 100 miles distant. Information based on research work done by Dr. Jack Gartner at the University of Illinois led us to decide this would be our most practical medium. Due to the tannic acid content and heat build up, raw bark must go through a composting period before it can be used as a growing medium. We purchase raw hardwood bark from the Mead Paper Company in

Chillicothe, Ohio, and do the composting at our nursery. They also have available composted bark.

The already composted hardwood bark delivered to our nursery is \$20.50 per cubic yard in 55 cubic yard loads. To this we add coarse sand and Kenlite (expanded shale) at a 3-1-1 ratio by volume, giving us a total cost of \$24.00 per cubic yard of potting medium that is ready to use.

When composting the bark ourselves, we have had excellent results in using a manure spreader manufactured by the New Idea Company. This spreader is powered in a stationary position by the power take-off of a tractor, and the mixing is accomplished by weighted beaters throwing the mixture into the air onto our stock pile. The bark, sand, and shale are in separate piles on a black top surface. The raw materials are dumped into the spreader with a Bobcat skid-steer loader. Fertilizer is mixed in a small concrete mixer at the following ratio per cubic yard: Seven pounds ammonium nitrate, 3 pounds superphosphate, 1 pound iron sulfate, and 1 pound elemental sulfur. Our spreader holds 3½ cubic yards of mix. We dump one loader bucket of bark, one of shale, then another bucket of bark. On top of this we evenly spread 42 lbs of our fertilizer mix. One bucket of sand and one bucket of bark are then dumped into the spreader. This load is then run through and piled on the black top. Two men can mix a 55 cubic yard load of raw bark in about 5½ hours.

Our potting medium thus consists of 3 parts hardwood bark, 1 part coarse sand and 1 part expanded shale. Per cubic yard of mix we add 7 lbs. ammonium nitrate, 3 lbs. superphosphate, 1 lb. iron sulfate, and 1 lb. elemental sulfur.

During the composting period the bark should be piled approximately 8 feet high and kept in a moist condition. The pile should be turned in 2 weeks and remain for a minimum of 60 days. Before using the medium it should be tested for soluble salts with a solubridge. After potting, drench the containers with water to leach out excess salts.

The following is our cost, including labor expense, for composting hardwood bark:

55 cubic yards raw bark, delivered	\$ 442.55
27 tons sand	108.00
15 tons Kenlite (expanded shale)	481.50
600 lbs ammonium nitrate	45.00
250 lbs superphosphate	12.00
75 lbs iron sulfate	13.00
75 lbs elemental sulfur	12.00
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Total	\$1,114.00

After shrinkage of the bark this mix will provide approxi-

mately 65 cubic yards of potting medium, at a cost of \$17.25 per cubic yard, or about \$7.00 per cubic yard less than buying the bark already composted.

PINE BARK MEDIA IN CONTAINER GROWING AT WIGHT NURSERIES

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The growing medium for plant production in a container nursery must be considered with utmost care. Many leaders in the industry feel that the growing medium is the single most important element in a container growing operation. Many of the production problems faced by nurseries today are directly affected by the growing medium used. Some of these problems are: root and stem diseases, fertilizer deficiencies or buildups, and moisture retention.

The importance of a good growing medium has been recognized at Wight Nurseries. Several changes have been made since our original mix of two parts peat moss and one part sand. Today we use a mixture of three parts pine bark, one part sand and one part shale for all plants. For years growing media using peat moss, or peat moss and sand, were the most widely accepted. Other soil media were evaluated only when the increasing cost of peat and the spiraling freight cost of transporting high quality German peat made its cost prohibitive. It was in this way that pine bark became the principal ingredient in the growing medium at Wight Nurseries. Since pine bark is organic matter, it needed to be carefully analyzed.

Many important characteristics of pine bark make it an ideal growing medium. Its physical make up is well suited for plant production. Pine bark can be obtained at a reasonable cost and in large quantities in our area. Bark is also a renewable resource. Pine bark can be milled and screened to produce a consistent material, and it also has a slow decomposition rate. With these advantages pine bark can be used to produce a uniform standard mix.

The pine bark used at Wight Nurseries is contracted through a local fertilizer company. To insure a high quality consistent material, all our bark comes from one sawmill. No sawdust or wood chips are allowed in the bark. All bark must be stored on concrete slabs at the sawmill and at the fertilizer