

THE USE OF SAWDUST IN POTTING MIXES

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Because the price of peat, especially the imported sphagnum type, has risen dramatically over the past few years there has been an increasing interest in the use of substitutes. One of the most widely available substitutes in New South Wales that could be used is sawdust. This has many of the desirable properties of peat. There are however several major drawbacks in the use of sawdust.

The first is that after an initial lag phase the sawdust absorbs a large amount of nitrogen from the potting mix. The rate of absorption depends on the temperature and the type of sawdust (Table 1).

Another problem is that many kinds of sawdust contain large amounts of substances (mainly phenols) which can inhibit the growth of plants (Table 1). Since most of the hardwood sawdust that is available locally is composed of two or more species it can be seen that the nitrogen uptake and the amount of toxic compounds in them will vary widely.

Although softwood sawdust is likely to be more uniform, much of it has been treated with preservatives, such as borax. Thus using them can be risky.

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Table 1. Properties of some commonly available sawdusts in New South Wales.

	Relative conc. of toxins ¹	Relative rate of nitrogen uptake ²
Black Butt (<i>Eucalyptus pilularis</i>)	8.2	1.0
New England Black Butt (<i>Eucalyptus andrewsii</i>)	6.5	1.2
Tallow Wood (<i>Eucalyptus microcorys</i>)	6.1	1.1
Mess mate (<i>Eucalyptus radiata</i>)	4.5	1.2
Brush Box (<i>Tristania conferta</i>)	1.5	1.4
Sydney Blue Gum (<i>Eucalyptus saligna</i>)	1.3	1.4
Hemlock (<i>Tsuga</i> sp.)	1.0	1.0

¹ Estimated by light absorption at a 280 nm wavelength of an alkaline extract.

² Uptake of ammonium nitrate over a six week period at 20°C with a complete range of nutrients added.

Satisfying the Nitrogen Demand. This may be done in several ways.

(a) *Slow Release fertilizers.* The main difficulty in using slow release fertilizers is that the rate of release of nitrogen and the requirements of the sawdust often do not coincide. The inhibitors in the sawdust are also not removed. The use of controlled release fertilizers can be quite expensive in view of the high rates required.

Satisfactory results have been obtained, however, with growing citrus in large containers in a hardwood sawdust based potting mix. Urea-formaldehyde is added at the rate of 7 kg per cubic meter. A liquid fertilizer containing 200 ppm nitrogen is also used. Sulphur coated urea (Gold-N (R)) at the rate of 4 kg per cubic meter may be substituted for the urea-formaldehyde if the mix is not to be steam sterilized. Other fertilizers (e.g. superphosphate and dolomite) must also be used with the sawdust.

These mixes are not suitable for plants in small containers, especially not seedlings. However sawdust with added controlled release fertilizers may be used to substitute for about 50% of the peat, when growing indoor plants in medium-sized containers, i.e. about 1 litre in volume.

(b) *Liquid Fertilizer.* It is impractical to use liquid fertilizer to satisfy the entire nitrogen demand of the sawdust because of:

- (i) the wide variation in uptake by the sawdust with time and
- (ii) in most nurseries there will be batches of plants in potting mixes of different ages leading to an impossible management situation.

However they are an essential part of using sawdust treated by other methods.

(c) *Treating the Sawdust With Chemicals.* Several chemical processes have been developed to treat sawdust, thus making it suitable for use in potting mixes. One involves adding ammonia to the sawdust. It is then neutralized with phosphoric acid. Another involves "boiling" the sawdust in acid, then neutralizing it with lime.

However both operations require extensive capital equipment and their economics is questionable.

A simpler and less expensive system is to treat the sawdust with urea. Microorganisms in the sawdust quickly break the urea down to carbon dioxide and ammonia which then chemically combines with the sawdust. The potting mix then requires little or no N as it decomposes and toxic compounds are solubilized and readily washed out.

Treatment of sawdust. The hardwood sawdust is moistened and urea is added at the rate of 2.6 kg/cubic m. For satisfactory mixing in of the urea it first must be dissolved in water. For our purposes we have found that when mixing about 30 gallons imp. (135 litres) of sawdust in a cement mixer, dissolving the required amount of urea in 2 gallons imp. (9 litres) is satisfactory. More water may have be added however. If the sawdust is air dry (~ 14% moisture) add a total of approximately 180 litres of water per cubic metre to achieve a 100% moisture content, i.e. half the weight of the wetted sawdust should be water. For freshly milled sawdust (~ 50% moisture) add about 100 litres water per cubic metre. If water runs out of the bottom of the pile too much has been added.

This mixture is left for a minimum of 3 weeks under a plastic cover before being leached. The sawdust will turn black as the urea turns to ammonia. If there is a strong odor of ammonia from the treated sawdust too much urea has been used, and it should be left to air for a few weeks.

Mixing. A 50/50 mixture of sawdust and medium sand is used. To each cubic metre of mix the following is added:

Superphosphate	1.5 kg/cu m	
Dolomite	9.0 kg/cu m	(use less for plants that
Potassium sulphate	500 gms/cu m	require an acid media)
Copper sulphate	100 gms/cu m	
Zinc sulphate	30 gms/cu m	
Manganese	30 gms/cu m	
Ferrous sulphate	60 gms/cu m	
Boric acid	1 gm/cu m	
Ammonium molybdate	1 gm/cu m	

Liquid Fertilizer. For this mixture a liquid fertilizer should be used 2-3 times a week. It consists of:

Potassium nitrate	0.25 kg/1,000 l water
Ammonium nitrate	0.50 kg/1,000 l water

Use less for fertilizer-sensitive plants and during winter. If the pH of the mix falls too low calcium nitrate at 1.0 kg/1,000 l water may be substituted for the ammonium nitrate.

Suitability. This mix has been used to grow successfully a wide range of exotic and native plants in large containers (5 litres). It should be noted however, that it is not suitable for plants that are particularly sensitive to fertilizers.