KEVIN HANDRECK'S POTTING MIX REPORT

During October, 2012, we bought from garden centres and hardware stores 30 bags of potting mixes, 10 from each of NSW, Victoria and SA. Of these, 15 bags were labelled as conforming to the Premium grading of the Australian Standard for Potting mixes, 8 bags were Regular grade and 7 were non-Standard mixes.

VOLUME OF MIX

The method of the Australian Standard was used for this test. This involves pouring the mix from the bag straight into a drum calibrated in litre increments. The surface of the mix in the drum is levelled off but the mix is not tamped down. The Standard states that the actual volume shall be not less than the nominal volume.

results summary

Only 10 of the 30 bags tested conformed to the Standard. Of the other 20, most contained more than 90% of nominal volume. The worst mix in this regard was an Attunga mix from Victoria, whose bag contained only 73% of the required volume.

PRICE

Prices ranged from 12 to 68 cents per litre. The most expensive were the Premium mixes (average 38.5 cents per litre). Regular mixes averaged 23.5 cents per litre and non-Standard mixes 17.9 cents per litre.

WETTABILITY

All Australian potting mixes are produced from organic materials such as pine bark, sawdust, other wood residues and green organics composts. A few of the more expensive ones may contain coir fibre dust ('cocopeat') or natural peat. As the organic materials are broken down by microbial activity, the mix can become water-repellent. Manufacturers of Standard mixes generally overcome water-repellency by adding a wetting agent to the mix. The Australian Standard uses a method for determining wettability that involves measuring the time it takes for 10mL of water to soak into a sample of dried mix. For Premium mixes the water must all soak in within 120 seconds and for Regular mixes within 300 seconds.

results summary

The majority of the mixes conformed to the Standard. However, some were extremely difficult to wet. The worst were several of the non-Standard mixes. If these mixes had dried out in pots, it would have been necessary to dunk the pots in water for hours to rewet the mix. The fact that seven of the Premium and Regular graded mixes did not conform to the Standard suggests that monitoring by some manufacturers and by SAI is inadequate.

AIR-FILLED POROSITY

The air-filled porosity of a potting mix is defined as the percentage of its total volume that is air space immediately after the mix has drained after being saturated with water. The Standard requires that the air-filled porosity should be at least 13%. With lower porosities, there is a danger that when frequently watered, the mix will contain too little oxygen for good root growth.

results summary

Most mixes conformed to the Standard, but six had lower air-filled porosities. A Green Gardener mix from NSW had such a high air-filled porosity that its ability to hold water would have been quite low.

pH

The pH of a potting mix is a key property. If it is too low (too acidic) plants can suffer deficiencies of nutrients such as calcium or from toxicities of nutrients such as manganese. If it is too high (too alkaline) some plants are unable to take up enough iron and other trace elements for adequate growth. The optimum range for potting mixes is 5.3 to 6.5, but for most home garden situations a pH up to 7 can be tolerated by most plants. This is because most of the fertilisers used will tend to acidify the mix (lower its pH), so an initially somewhat high pH will usually soon be lowered into the optimum range.

results summary

Most of the mixes had acceptable pH values. Of the rest, four had slightly high pH values and three had low values. The worst was a Green Gardener mix from NSW, at pH 3.7!

GROWTH TESTS

The Australian Standard lists another dozen tests. These mainly determine the concentrations of nutrients in the mix that are available to plants. One determines the rate of use of soluble

nitrogen as microbes decompose the organic materials in the mix. These tests need to be carried out in a laboratory. They are therefore expensive and so were not done for this assessment. As a substitute for the laboratory tests, I grew 'Sweet Bite' tomato plants in the mixes, both as they came from their bags, and with controlled-release fertiliser (Nutricote Magenta: 140 day release time; 14-6.1-11.6 NPK) added at either a low rate (3g/L) or a high rate (6g/L).

NO ADDED FERTILISER

Premium mixes: the Standard requires that Premium mixes must contain sufficient levels of all plant nutrients to give good initial (a month or two) plant growth without any extra fertiliser. Thirteen of the 15 Premium mixes assessed lived up to this requirement. Tomato plants in the other two, both Miracle Gro, did not grow at all. They soon started to yellow and die. The tomato plants were grown in a warm glasshouse, with carefully scheduled watering. Under these circumstances, the effect of the low air-filled porosity of several of these mixes did not adversely affect growth.

Regular mixes: the Standard requires that Regular mixes contain adequate levels of all trace elements and secondary elements, but there is no requirement for the major nutrients nitrogen, phosphorus and potassium. This means that gardeners need to add fertiliser to these mixes at potting. We were surprised that half of the Regular mixes assessed grew excellent tomato plants without added fertiliser. Clearly, some available nitrogen, phosphorus and potassium had been included in these mixes. Tomato growth in the other four Regular mixes was poor, as expected.

Non-Standard mixes: plant growth ranged from nil to very poor in these non-standard potting mixes.

WITH ADDED FERTILISER

Premium mixes: adding 3g/L of Nutricote to each of the 13 mixes that had given good tomato growth without added fertiliser did not increase the growth rate or amount during the several weeks of the growing trial. There were already enough nutrients in these mixes to sustain good growth. However, when 6g/L Nutricote was added, growth in several mixes decreased. Testing showed that this reduction in growth was due to excessively high salinity in the mix caused by the extra fertiliser.

Regular mixes: in the four mixes that had already given good tomato growth without added fertiliser, adding 3g/L Nutricote did not increase growth. At 6g/L, plants in one mix had reduced growth due to high salinity. In three of the other four Regular mixes, adding 3g/L Nutricote gave a modest increase in growth, but 6g/L gave good growth. Extra fertiliser did not improve growth in the Green Gardener mix, probably because its extremely low pH (3.7) was preventing plant growth.

Non-Standard mixes: of the seven mixes in this group, in only one (Brunnings All purpose) did adding fertiliser give adequate growth. In another (Amgrow Resource Gardener) 6g/L Nutricote gave modest growth, but no amount of fertiliser produced more than slight growth in the other five mixes. In fact the plants in these mixes were generally tiny, with mottled yellowing of their leaves. There is clearly something wrong with these mixes. Comprehensive analysis would have been needed to pinpoint the cause(s).

THE BOTTOM LINE

Most of the Premium mixes performed well. The bad performance of the two Miracle Gro mixes leads us to conclude that the manufacturer of this mix does not have an adequate in-house testing protocol. We also conclude that SAI, which is charged with supervising compliance with this Standard, is doing less than an adequate job.

After publication of the article in the March, 2013 issue of the Burkes Backyard magazine, we have interacted with the brand owners of the Miracle Gro potting mixes (Scotts Australia). They explained that there had been a temporary glitch in their systems, related to a need to rapidly re-formulate this mix to meet new government requirements in Western Australia. They have now fully applied their quality assurance systems, so the under-performance of the Miracle Gro mixes purchased in late 2012 does not apply to bags of this mix now on sale. The manufacturers of the Miracle Gro potting mix have agreed to refund the purchase price on any problematic bags of potting mix as per their general consumer policy. Consumers should contact their advice line on 1800 804219.

So, for Premium mixes, sticking to mixes produced by Amgrow (includes Envirogreen and Nu Erth), Brunnings, Debco, Grow Better, Richgro, Scotts, Swanes and Yates should ensure excellent growth without the need to apply fertiliser for a couple of months.

There are some mixes in the Regular grading group that are as good as Premium mixes. Most of the others performed well with extra fertiliser.

Most of the non-Standard mixes are cheap and nasty. You might occasionally strike one that does give adequate plant growth with a high dose of added fertiliser, but the majority of those assessed would have either given very disappointing growth or would have killed your plants.

ADDED FERTILISER?

How do you know whether or not to add fertiliser at potting? If the mix

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contains poultry manure (such as Dynamic Lifter) the results of this assessment suggest that you can hold extra fertiliser for a couple of months. For brands other than the Green Gardener, you should add 3-6g/L of a controlled-release fertiliser at potting.

RECOMMENDATIONS

Buy only Standard grade potting mixes produced by larger (often national) companies. Premium mixes from these companies should give excellent plant growth, but obviously at a premium price. If your budget does not stretch to a Premium mix, the combination of a Regular mix and a small addition of controlled-release fertiliser at potting should give you excellent results for a little over half the cost of a Premium mix. Be kind to your plants: do not expose them to non-Standard mixes!

For Kevin's detailed results chart, see the following pages.

Potting mixes assessment, 2012

	Wettability (sec)	Air-filled porosity (%)	pH
Requirements of Standard mixes	≤120 Premium; ≤300 Regular	≥13	5.3-6.5

Colour coding	Excellent; meets Standard	Satisfactory	Unsatisfactory

New South Wales

Brand	Volume in bags (% nominal)	Cost (cents/L, nominal volume)	Wettability (sec)	Air-filled porosity (%)	pH	Tomato growth without fertiliser	Tomato growth with 3 g/L fertiliser	Tomato growth with 6 g/L fertiliser
Premium Standard mixes								
Debco Terracotta and Tub	108	68	5	17.3	5.7	Good	Good	Reduced
Amgrow Shrub 'n' Tub	92	43	210	12.8	7.2	Good	Good	Reduced
Swanes	95	36	105	16.2	6.3	Good	Good	Reduced
Richgro	98	32	23	14.4	7.0	Good	Good	Good
Scotts Osmocote Multi-purpose	94	32	170	22.3	6.4	Good	Good	Good
Regular Standard mixes								
Yates, with Dynamic Lifter	105	30	85	19.1	6.9	Good	Good	Good
Hortico, All purpose	106	24	140	24.2	6.0	Poor	Fair	Good
The Green Gardener	110	12	70	38.9	3.7	Poor	Slight	Slight
Non-Standard mixes								
Brunnings All purpose	108	24	90	20.6	5.8	Poor	Fair	Good
Richgro All purpose	92	15	65	14.4	7.4	Poor	Slight*	Slight*

* All plants pale

Victoria

Brand	Volume in bags (% nominal)	Cost (cents/L nominal volume)	Wettability (sec)	Air-filled porosity (%)	pH	Tomato growth without fertiliser	Tomato growth with 3 g/L fertiliser	Tomato growth with 6 g/L fertiliser
Premium Standard mixes								
Scotts Osmocote Professional	98	44	75	13.2	6.0	Good	Good	Reduced
Grow Better Terracotta and Tub	88	43	510	11.3	5.8	Good	Good	Reduced
Debco Green Wizard	98	40	35	17.8	5.2	Good	Good	Good
Miracle Gro Organic choice	88	38	200	12.5	6.8	Nil	Slight~	Slight~
Yates, Waterwise	103	38	325	10.5	6.2	Good	Good	Good
Regular Standard mix								
Grange Home gardener	94	32	70	7.9	6.4	Poor	Fair	Good
Non-Standard mixes								
Attunga Big value mix	73	23	810	11.0	5.6	Poor	Slight	Slight
Amgrow Resource gardener	100	20	750	14.1	5.5	Poor	Slight	Fair
Richgro All purpose	92	15	300	14.7	7.4	Poor	Slight*	Slight*
Brunnings Organic nursery grade	107	14	18	22.8	6.3	Nil	Slight~	Slight~

* All plants pale

~ All plants mottled and yellowing

South Australia

Brand	Volume in bags (% nominal)	Cost (cents/L, nominal volume)	Wettability (sec)	Air-filled porosity (%)	pH	Tomato growth without fertiliser	Tomato growth with 3 g/L fertiliser	Tomato growth with 6 g/L fertiliser
Premium Standard mixes								
Scotts Osmocote Professional	94	44	27	15.3	5.8	Good	Good	Reduced
Miracle Gro Organic choice	94	40	135	18.4	6.7	Nil	Slight~	Slight~
Richgrow Premium	100	32	35	13.2	6.1	Good	Good	Good
Nu-Erth	89	27	85	9.0	7.0	Good	Good	Reduced
Brunnings Growing mix	90	21	23	14.0	5.2	Good	Good	Good
Regular Standard mixes								
Yates Citrus and fruit	102	30	20	22.5	6.4	Good	Good	Good
Hortico All purpose	98	24	77	13.4	6.4	Good	Good	Good
Gard&Grow General purpose	96	23	40	18.1	6.6	Poor	Fair	Good
Envirogreen (Big W)	93	13	12	22.9	6.8	Good	Good	Reduced
Non-Standard mix								
Brunnings Ezywetter	94	14	120	14.0	7.7	Poor	Slight*	Slight*

* All plants pale

~ All plants mottled and yellowing