



Sydney Environmental & Soil Laboratory

Specialists in Soil Chemistry, Agronomy
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Specifying Landscaping Soils

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Question:

A landscape architect client of mine asked recently: Can you tell us how we should be specifying soils for landscape use? We have seen many approaches to this but there does not seem to be any set procedure.

Answer:

The client was quite correct of course. There is no set method for specifying soils in the landscape and I have seen many methods used and many mistakes made. If I see another soil specification for P sensitive native plants where mushroom compost is a specific requirement I think I will retire and get a job in a supermarket!

The methods used could be categorised as follows-

1. Proprietary products. Due to close previous relationships with a given landscape supply yard, and reasonable success with the soil mixes they produce, many architects will simply specify the brand name of that company. Words such as "Supply 'Killimfast' soil mix at 100mm to finished grades, will be used. This method is not satisfactory as it unfairly favours one company over another in the tender process and leads to cosy relationships with the supplier. It is also not based on objective understanding of the mix properties. Unsuitable replacements from other companies might result, for example a mix with high P levels for native plants.

2. AS 2223/ AS 3743 hybrids. These two Australian Standards apply to soils and potting mixes respectively. The AS 2223 "Garden Soils for Domestic Use" can be applied to landscape soils but is of limited usefulness in describing soils for specific uses and is inadequate for the landscape industry in my opinion. It differentiates mainly between coarse (sandy) and fine (clayey) textured soil and between general purpose and premium grade soils based on organic matter content. AS 3743 "Potting Mixes" relates to artificial growing media and can be applied to container and planter box mixes for landscaping. Its main usefulness is in describing mixes on the basis of properties rather than components, and in specifying mixes for narrow uses such as for P sensitive natives and acid loving plants.

3. Formula Specifications. The most common approach would be to specify a formula based on generic names such as "topsoil" "mushroom compost", "sand", "composted pine bark fines" etc. This method allows a greater degree of specificity such as in a 90 sand/10 topsoil mix for turf but its weak point again is in not allowing a specification of the properties we are trying to achieve. The best example of this might be where a very fine sand is mixed with a clay soil for turf use and subsequently compacts, or where the words "Organic matter" are interpreted as meaning "mushroom compost" and all the P sensitive Grevilleas die of P toxicity and water logging.

As you might interpret, this part of the landscape industry, as precise as it is in other areas, places our new plant material in a parlous state. I do not propose to write a new standard for landscape soils in this article but you should be aware that a new committee at Standards Australia will be convened soon on the subject so help is coming. What I would like to do now is dictate my own view on what you should do now.

An essential difficulty is that, in providing a precise scientific definition of the properties required, such as a particle size distribution together with a whole lot of chemical test properties, the landscape architect will probably not understand what he is doing, not being a specialist, and the landscape supplier will almost certainly not understand how to make a mix to the specification without and interpreter.

An interesting and bold approach was made to this problem by the architect posing the question for this article. He had a bet each way, specifying both the soil properties and the mix components. While his properties were wrong as were his formulae (mushroom compost for P sensitive natives), the methods solved the problem of interpretation. I have developed this technique a little further. to specify some important soil properties but then to give also some example mixes based on generic products (not brand names) which might fulfil the requirements. Such examples are not to be strictly adhered to in the tender process.

The following is an example. A mix is to be specified for a planter box for P sensitive native plants and for a turf underlay. The planter mix has a weight restriction of 1500kg/cubic metre. The turf underlay is to prevent compaction of a heavily used turf. The following specifications could be given-

Mix A, Native Planter Boxes. A mix is to be formulated for growing P sensitive native plants in a light to medium weight planter box application. The tendered mix shall be submitted for testing at a competent testing authority. It shall be accepted for tender where the following properties are achieved-

Saturated Density < 1500kg/m. To be measured fully compacted at 10kpa (as described in AS 3743) fully saturated

Chemical Properties to be those described in AS 3743 1993 for "Low phosphorus, Premium Grades mixes".

Example formula. Mix A The following is an example only and is not a mandatory requirement.

By volume the following products

- 40% graded horticultural ashes
- 20% composted pine bark fines
- 20% decomposed granite or red loam soil.
- 20% coarse peat moss such as Australian Peat.

by weight the following fertilisers-

- 1.5 kg iron sulphate
- 2 kg dolomitic limestone
- 500g ammonium nitrate
- 300 grams trace element mix
- 4 kg of Nutricote "purple", no P formulation.

Note that there is no point in restating all the properties described in AS 3743 but if they were to be stated, or some other chemical criteria were to be stated, then the test method must be specified. Note also that a description of the application of the mix is given so that there can be no misunderstanding where liability for fault may occur.

Mix B. Turf Underlay. A mix is to be formulated as an underlay for heavily used turf to allow free drainage and compaction resistance as well as proving some water holding ability due to an organic matter content. The mix shall be submitted for testing at a competent testing authority. It shall be accepted for tender where the following properties are achieved-

- Coarse Texture (AS 2223 definition).
- Premium quality (AS 2223 definition).
- pH 5.5 to 6.5
- EC 1:5 dS/m < 2.0
- Nutrient content conforming to the following criteria
- Exchangeable potassium content > 10%
- Exchangeable Ca/Mg ratio 3:1 up to 6:1

N as nitrate >50 mg/kg dry weight

Phosphorus in Bray No 1 extract 20-50 mg/kg dry weight.

Example Formula, Mix B. The following formula should be used as guide only to achieving the above properties. Adherence to the formula is not a mandatory requirement.

By Volume the following components-

Medium sand showing 60% 0.5-2mm size range	80%
Loam textured soil	10%

Composted organics meeting Draft AS CS/37 requirements for mature product.

10%

By weight the following fertilisers-

Superphosphate	500grams/cubic metre
Potassium nitrate	500 " " "
Dolomitic limestone	as needed.

Note that another Australian Standard is referred to, AS CS/37 which is currently in draft form for comment. It describes the properties of organic matters. A note could be attached to the above example formula suggesting that fertiliser can be omitted if the organic matter is nutrient rich such as composted manures.

This article describes very briefly what I believe is a more systematic method of specifying soil mixes for landscape use. There are specialised areas such as greens construction where an approach such as that of McIntyre and Jakobsen (1992 and 1993) is to be highly recommended. With some of the test procedures and criteria alluded to above, specialist soil consultants knowledge might be required. This might come at some cost but what cost failure to perform in the new landscape?

Anyone wanting further information about this subject should contact Simon Leake on (02) 980 6554 or write to him at Sydney Environmental & Soil Laboratory Pty Ltd's new postal address - P O Box 357 PENNANT HILLS NSW 2120

References:

Gerke, R.J., Tynan, A.E., (1980), A Method of Design of Filter Materials for Sub-surface Drainage, Aust. Road Res. Board, Internal Report AIR 317-2

McIntyre, D.K., Jakobsen, B., (1992), Sub-soil Drainage - The Lateral Movement of Water in Soils, Turf Craft Australia, May/June Issue

McIntyre, G.K., Jakobsen, B., (1993), The Perched Water Table and Its Use in Sportsturf, Turf Craft Australia, Issue No 31, March

Standards Association of Australia, (1978), AS 2223-1978 Garden Soils for Domestic Use,

Standards Australia, (1993), AS 3743-1993 Potting Mixes

Standards Australia, (1994 November), CS/037-0060-201 Composts, Mulches and Other Soil Conditioners - 2nd Committee Draft for Standard

PS As of Nov 1996 an interim standard for soil mixes does exist and is called AS 4419(Int) "Soils for Landscaping and Garden Use" has been developed. It is available from Standards Australia and is a distinct improvement on AS 2223.