Growing Media: What You Need to Know©

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INTRODUCTION

You don't need to know much about the growing medium you use in your nursery. All you need is a technically competent supplier. Leave it all to them, provide a bit of water, and your plants will do the rest.

I can see that you don't really believe me; I don't believe this myself, but I insist that it is important that your media supplier is technically competent. They must have an ability to produce media of consistent quality. And they must have the ability to sort out technical problems should they arise.

A technically competent supplier will be able to suggest a suitable medium for your particular plants in your particular environment. But you need to be able to assess their recommendations and you need to be able to discuss with them possible modifications, based on your past experience. In other words, choosing a growing medium for your plants must be based on a dialog with your supplier, the end result of which is a medium that will consistently perform well.

Here are some key properties that must be discussed.

PHYSICAL PROPERTIES

Getting the air-filled porosity (AFP) of your medium right for your plants in your environment and a particular time of the year is critically important. The medium must be open enough to allow good drainage, yet must hold as much plant-available water as possible. These two requirements are mutually exclusive, so every growing medium is a compromise that is based on what is most important to your situation over the growing period of your plants.

As a general rule, the AFP should be higher under low transpiration conditions than under high transpiration conditions. A good compromise is a starting point of 20% as measured by the Australian Standard method. You may choose a lower AFP for large containers and for summer in winter rain areas. You may choose a higher AFP for winter and for smaller containers.

The AFP of the medium is to be as it will be in your containers, after delivery and any damage done to the medium in your mixing/filling machinery. There is no point in a supplier delivering medium with an AFP of 20% if your machinery chews it to 15%. There is also no point in dealing with a supplier who cannot consistently deliver medium with the same or varied AFP. That means that your supplier must have grading machinery that can accurately grade the bark or other components into fractions that can be blended as needed to produce medium with the required AFP. So a key requirement you will have of your supplier is that they have excellent grading machinery that works under all weather conditions.

The other side of AFP is water-holding capacity. For summer this must be maximized, without compromising AFP. The best way of doing this is with coir fibre dust, at 15%–20% by volume. Of all the materials you can use, this is by far the best material for increasing water-holding capacity. It is better than fine bark, better than peat, and much better than water crystals.

CHEMICAL PROPERTIES

A key chemical property is medium pH. You need to agree on a starting pH for your mix. For most plants growing in soil-less media this will be 5.8 to 6.2. Only for so-called acid-loving plants should the medium have a pH in the low 5s. It should never be below 5. Your supplier will check pH before a load leaves their property. This check will typically be made within hours of the medium being produced. Inevitably the pH will change, usually rise, over the first week. Your supplier will have produced curves that show what will happen, so that the chosen lime addition rate will give the medium the required pH by the time you use it. In an ideal world this will always happen, but as this ideal may not always be reached, I strongly recommend that you always check the pH of each load soon after you receive it. If it is way out of specs you need to discuss this with your supplier before you use the medium.

Another aspect of medium pH is what will happen to it during the growing season. To know this you need to know the total alkalinity of your irrigation water. With water of low alkalinity (below 50 $mg \cdot L^{-1}$ calcium carbonate equivalent) you probably will need to build into the medium ability to buffer against pH decline. This is best done with coarse dolomite (0.5–2 mm grading) at 2 to 10 $kg \cdot m^{-3}$.

If your water has a total alkalinity of 60 to 100 $mg \cdot L^{-1}$ you probably do not need to build in buffering. If your water has a total alkalinity of 110 to about 140 $mg \cdot L^{-1}$, use of an acidifying fertiliser (high ammonium/urea) should keep pH steady. Waters of higher total alkalinity will usually need to be acidified with sulphuric acid to prevent pH rise in your medium.

Chemical properties such as calcium-magnesium balance and trace element concentrations are easily provided by technically competent suppliers.

If your irrigation water has less than 5 $mg \cdot L^{-1}$ sulphate-sulphur, you need to include a source of sulphur in the medium itself. An addition of 1–2 $kg \cdot m^{-3}$ of gypsum (preferably 1–2.5 mm grading) will do this.

You need to decide on a base level of phosphorus. For plants that are not prone to phosphorus toxicity, a base level equivalent to that provided by 0.4 $kg \cdot m^{-3}$ of single superphosphate is enough. For sensitive plants, the addition will be zero and the medium itself must not give more than about 2 $mg \cdot L^{-1}$ in a diethylenetriaminepentaacetic acid (DTPA) extract.

You also need to know the nitrogen requirements of your growing medium — i.e., the amount of soluble nitrogen that microbial activity will use each week, and which must be supplied on top of the amount needed by your plants. Technically competent suppliers know the nitrogen drawdown rate of their base media and know how to compensate for this drawdown through additions of nitrogen sources such as IBDU.

The other essential chemical property to decide upon is the type and amount of controlled-release fertiliser (CRF) to use. I don't intend to say much about this, other than to say that climate may influence the type (brand) chosen, and longevity will be determined by the length of the growing period, the likely temperatures during this growing period and the types of plants being grown. A key bit of information you need is the temperatures that might be experienced in your containers over a typical year. Several digital thermometers that record daily maximum and minimum temperatures in containers provide an essential base for choosing CRFs.

BIOLOGICAL PROPERTIES

Of course the medium supplied to you must not carry plant pathogens. You cannot easily check for their presence and your supplier probably rarely checks. If your medium is based on composted organic materials such as composted pine bark, and if the composting has been done competently, any plant pathogens in it should have been killed during composting, or at least reduced to very low levels. Evidence from practical experience throughout the industry supports a view that transmission of pathogens by suppliers is rare. It is then up to you to not contaminate the medium via sloppy hygiene.

The other important biological property you need to know about is the ability of the medium to suppress the activity of some plant pathogens. Suppression is possible only in media in which the organic components are still actively being decomposed by microbial action. A medium that is cold on delivery is usually one in which there is little microbial activity and hence little ability to suppress pathogens. On the other hand, a medium that is delivered with a temperature of 60 °C, or in fact any temperature above 40 °C, will in the short term have little suppressive activity because most of the microbes that do the suppressing will have been killed by the high temperature. If it comes to you hot, and this may be inevitable in the middle of summer, you can still use the medium if you must. Over a few weeks it will develop suppressive activity. Your hygiene must be good. But if you can store it in shallow piles for a couple of weeks, it should be suppressive by the time you use it.

The ideal situation is that the medium have a temperature at delivery in the 25 to 35 °C range. It will have gone through hot composting and will have been allowed to cure or mellow before delivery. Its nitrogen drawdown index will be in the 0.2 to 0.7 range.

FURTHER READING

Handreck, K.A., and **N.D. Black.** 2010. Growing media for ornamental plants and turf. 4th ed. Univ. New South West Press, Sydney.