

MONTHLY TIPS

BONSAI SOIL—WHAT IS IT?

Nothing can stir debate like the discussion of bonsai soil. Michel said that if you ask 10 different bonsai enthusiasts what the best bonsai soil is, you will get 10 different soil recipes. Many will agree with this statement. Having said this, it is difficult for a beginner in bonsai to know where to start.

“What should I use?” “Where should I get it?” “Is the soil important?”

These are just a few of the questions you may be asking. The following is a beginner’s guide to bonsai soil, which may help to answer these questions. It is not an exhaustive study, nor is it complete. It is not intended to be. You will need to do further research and experimentation to find out what works best for you.

I want to thank Michel, Glider, and Ryan especially for contributing (perhaps unknowingly) to the information in this article, but also to the BonsaiChat membership as a whole. It is through a community such as this that we all continue to learn and grow.

What is “Good” Bonsai Soil?

In general, whatever soil mixture works for you, in your climate and conditions, with your trees, giving you the results you want, and avoiding soil-related problems, is good bonsai soil. That is why someone from another country or part of the same country cannot tell you which soil mix is “best.” Of course you can experiment, but someone from your area who has been growing bonsai successfully for a few years will be the best source for a starting recipe.

Good soil must

- be non toxic
- retain water according to the plants needs
- stay free draining according to the plants specific needs
- allow an everlasting interchange of air and water flow
- allow roots to grow freely in it
- allow a plant to anchor itself in it
- preferably contain organic food and spore elements
- preferably have a pH-value suiting the specific plant
- preferably be cheap and readily available
- and last but not least, preferably look nice !

Soil Particle Size:

Good bonsai soil contains particles which are neither too large nor too small. The size used for a particular tree depends in part on the size of the tree and whether it is being developed or maintained.

Why does it matter? Water is retained on the surface of soil particles. The more surface area a particle has, the more moisture (and nutrients) it can hold. That’s one reason irregularly shaped particles are preferred to those with a smooth surface. Consider a particle of lava compared to a polished river pebble. It therefore follows that the larger the particle, the more moisture it can hold. Unfortunately, it isn’t as easy as that. This size-to-moisture-retention ratio tends to break down due to other factors.

As the particles get larger, fewer particles can be contained in the pot and between the roots of a bonsai. This is inefficient for root growth, as the spaces between are too large to maintain proper humidity, and the soil dries too fast. The smaller the particle, the closer together they fit, and water will tend to fill the spaces instead of air due to capillary action. Both extremes result in poor root growth and a sick, if not dead, tree.

To avoid these problems, bonsai soil is screened. This means that the particles are passed through differing sizes of metal screen to separate them by size. In general, particles bigger than 3/32 inch, (that which doesn’t pass through an ordinary window screen) and smaller than 1/8 inch are used for medium to small bonsai, and particles between 1/8 inch and 1/4 inch are used for medium to large bonsai. Particles from 1/4 inch to 3/8 inch are usually reserved for the largest trees. This is only a rough guide, however, and you will find many exceptions to this. You can purchase inexpensive soil screens at many bonsai retailers, or you can make your own from wood, window screen, and different sizes of hardware cloth.

MONTHLY TIPS (CONT'D)

Soil Components:

Beginners hear many different ingredients listed in various soil recipes. These terms can be confusing to say the least. What follows below is a list of soil components along with a discussion of each.

Decomposed rock: this is rock that has been degraded into gravel or sand by weathering or crushing. This component serves primarily to maintain the open, airy structure of soil, and to provide sharp edges which increase root ramification. The more irregular or porous it is, the more moisture it will retain as well. Another purpose is to provide some weight to the mix in order to allow the roots to better anchor the tree.

Lava: I think everyone knows what this is. Hard and highly porous, it is an excellent way to accomplish several jobs at once: water retention, root ramification, and maintenance of soil structure. I can't find this product locally, so I use other materials.

Crushed slate: I purchased 240 pounds (about three, 5-gallon buckets) at a local landscaping stone store for \$19.00. It was sold as rock mulch. Color is dark gray to dark brown to dark reddish, and is sharp and irregular.

Haydite: This is crushed slate that has been fired at about 5000 degrees. When treated like this, it expands and becomes very porous, which allows it to hold more water than the unfired slate. It actually looks (and functions) roughly similar to crushed lava rock. I use this in my in-ground growing bed.

Chicken grit: I am referring to the crushed granite type, rather than the crushed oyster shells. It is sold at feed stores in 50 pound bags (I pay about \$6.00 per bag), which are pre-sized based on the size of chickens. I use "grower" or "developer-layer" sizes. I still need to screen out some dust, but get about 90% usable material. The nice thing about granite is that it has lots of sharp edges, which cause the roots to divide more, which in turn causes more branch ramification on top.

Sand: I get 20 pound bags for about \$7.00 at a local department store, sold as "filter sand" for swimming pools. I get about 75% usable material. The grains are small, up to about 1/8 inch diameter, but with sharp edges, which is good for smaller trees, rooting, etc.

Perlite: It looks like Styrofoam, but it isn't. This is a volcanic glass which, when heated to 1600 deg F, expands and becomes very porous similar to haydite. Likewise, it retains lots of moisture. On the downside, its light weight tends to make it float up and out of the pot when watering, and the white color can be distracting on the soil surface.

Vermiculite: A mineral similar to mica which, like haydite and perlite, expands and becomes porous when heated. It also retains moisture well, but it is not as durable as perlite and it is also light in weight. On the plus side, its color is not as noticeable as perlite.

Organic components: Portion of the soil mix which was once "alive." This is used for water retention and as a source of slow-release nutrients.

Pine soil conditioner: This is partially decomposed pine bark which is small in size and easy to screen. It is the primary organic component of my soil mixes. I get about 50-75% usable material from each 2 cubic foot bag (depending on quality), which costs under \$6.00. You can get it at many garden or landscaping centers.

Composted fir or hemlock bark: Similar to pine soil conditioner. These products tend to be available (or unavailable) locally. I have no way to get fir or hemlock bark where I live, so pine soil conditioner it is.

Peat: This is organic matter which is partly decomposed under anaerobic conditions, usually obtained from bogs. I use this more with tropicals and other trees that need a lot of moisture. You can count on about 50% usable material from each bag, which will cost about \$2.00. Any garden center will have this. It will hold lots of moisture, but won't release it readily. Therefore it tends to stay wet. Once it dries out, it is very difficult to wet again. Most people only use it for species which like "wet feet."

Potting soil: There are many different brands, many based on peat, perlite, and/or vermiculite. Some drain better than others, and some contain fertilizer. Beware of what your soil contains to avoid future problems.

Clay/soil: I classified this separately as it is different in source and composition from the other components listed above. The main difference between clay and sand is the size of the particles, with clay having extremely small particles. These stick together and, when fired, become inseparable. The primary purpose of this component is water retention, and to a lesser extent (depending on what you use) for soil structure.

MONTHLY TIPS (CONT'D)

Turface MVP: This is high-fired clay used to improve turf on playing fields. It absorbs lots of moisture, which keeps the fields from staying soaked, but it also provides extended-release moisture in pots. It is fired at high temperature to help it retain its shape and size. This stuff does not dissolve. I get about 90% usable material from each 50 pound bag, which costs about \$9.00 at landscaping stores which also specialize in turf.

Akadama: Particulate clay dug in Japan which has excellent drainage properties. It is available in hard and soft fired versions through bonsai retailers. The soft akadama is just flash fired to remove organic matter, allowed to dry, then sifted and bagged. The hard akadama is fired at a certain temperature and is a hard granule. The soft holds more water than the high fired, and will break down quicker, but the high fired drains better and lasts longer. "Double-Line" brand is considered the best. Some say that it binds chemical fertilizers, making them unavailable to the plant, and that organic fertilizers are better used instead.

Kanuma: Another particulate clay from Japan which is more acidic. It is used exclusively by many azalea growers and is a good choice for all acid-loving plants. It is easily crushed to powder in the fingers, but stays together, almost gel-like, when wet.

Loam: This is soil from the ground which is composed of the ideal ratio of sand, clay, and organic components. An example is rich, fertile garden soil. Using this material involves some risk, though, as it may contain any number of pests, diseases, or chemicals.

Bonsai Soil Recipes:

In general, you want to strive for 2 parts inorganics to 1 part organics for a standard soil recipe. You may want to increase the ratio up to 80% or more inorganics for some trees like junipers. By the same token, you may want to increase up to 80% organics for some tropical species. Like I said above, you need to do what works best for you.

The following recipes work well for me in the Cincinnati area. Many members of my club also use similar materials and proportions. If I need better drainage, I just go heavier on the rock.

For conifers: 1 part rock, 1 part turface, 1 part pine soil conditioner.

For deciduous: 1 part rock, 1 part turface, 2 parts organics (usually just pine soil conditioner, but I may substitute some peat for fruiting trees).

For tropicals: 1 part rock, 1 part turface, 1 part pine soil conditioner, 2 parts peat.

Like I said above, soil mixes vary with the local climate, the tree species, and the grower's own needs, abilities, and style. I like my soil to be fast draining so I don't have to worry about sheltering my trees (as of this writing, about 60 of them) from our frequent, heavy rains. I am only able to water once per day at most, usually in the late afternoon/early evening, so the soil must retain enough water to get through the next afternoon. I find that with my water-loving trees, like willows, I cannot skip a single day or I will get major die-back. Those have to be kept in a pan of water.

Here are some other mixes contributed by various members here at BonsaiChat.

From Ryan in Ohio:

"My basic mix has been 2 parts soft akadama to 1 part high fired. This is my general soil for everything. I have found that it works great on everything from ficus and maples to pines and junipers. [I use] 2 parts kanuma to 1 part high fired akadama for azaleas, camelias and gardenias."

Also contributed by Ryan:

"Here is a soil mix by Kenji Miyata, a world famous bonsai artist from Japan that is currently working at New England Bonsai.

1 part soft akadama (increased for deciduous)

1 part high-fired akadama

1 part calcined clay (optional/ for water retention)

10% Kanuma"

From a member of Bonsaiweb, sorry, but I forgot who wrote this, or what part of the country in which these are used:

"Standard Bonsai Mix

Components should be screened to produce particles of about 1/4 inch diameter or less. Eliminate dust.

MONTHLY TIPS (CONT'D)

Haydite - 1 part
Granite or River Rock - 1 part
Turface - 1 part
Pine Bark - 1 parts

Shohin & Mame Bonsai Mix

Components should be screened to produce particles of 1/8 inch to 1/4 inch. Eliminate dust.

Haydite - 2 parts
Turface - 1 part
Pine Bark - 1 part."

From Alvaro in Mexico City:

"My basic mix is 1/3 peat, 1/3 garden soil, 1/6 tezontle sand and 1/6 tezontle gravel (tezontle being a red porous volcanic rock abundant in Mexico). This gives a very fluffy soil that retains moisture well, drains rapidly and leaves a lot of air spaces. It is not very stable as tezontle is quite soft, so after a couple of years it compacts and I have to repot. Adding a bit of peat for azaleas or some grinded bark and pine needles for conifers is easy. I think, however, that most people would think my mix is too fine grinded for their taste."

From JLDoggett in New Hampshire:

"I use commercial potting soil from miracle grow mixed with rotten (decomposed) granite which I collect locally. self-collected material should be washed well (to remove any dust or very fine particles) and sieved to size (I sieve to 1/16" and 1/8") Proportions of the mix depends on the tree. It drains fast yet remains moist, to test, I moisten it, grab a handful and squeeze it tight, it should feel damp but not soggy and poking the clump should make it fall apart... otherwise it needs more grit. The size of the grit depends on the size of the tree and pot."

From Johnegert in New Mexico:

"A classic mix for many years was 1/3 sandy loam, 1/3 fir bark humus, and 1/3 decomposed granite."

"A basic mix will be something like 1/3 sandy loam/soil, 1/3 coarser organic material, and 1/3 inorganic mineral "grit". This mix should be varied according to the needs of individual plants, generally increasing the grit for conifers and increasing the organics for deciduous or broad-leafed material."

From Michel in Belgium:

"BASIC MIX BODY

For all trees I start off with the same, simple basic mix body, altering it by adding extra's according to the tree species and preferences.

1 Part Lava: Grade 2 (5-15 mm particle size), sieved.

1 Part Split (crushed gravel), sieved

"The lava gets a sturdy and coarse structure, rich mineral content and temporary storing of moist in the granules' cavities. Split even enhances that coarse structure, ensuring for immediate draining, rich silicate presence, and it decreases pores size in between too coarse lava granules. This is mixed to get the basic body of my bonsai soil mixes, and stored for future use.

"It's the additions, measured in the same volume parts, that really change our basic mix body into good bonsai soil:"

1.ADDITIONS TO 2 PARTS OF MIX BODY FOR BASIC BONSAI SOIL

½ Part Loam

½ Part sphagnum, cocos peat or bog peat

Nowadays, I only use the chopped up sphagnum; it's to ventilate the mix, getting volume and extra moist retention

½ Part pine mulch (pine soil conditioner) For soil improvement, organic content, bacteria life and spore elements

Bone meal (1 teacup to 10 liters of mix body) Very slow releasing, essential organic fertiliser

Blood meal (1 big spoonful to 10 liters of mix body) Fast releasing, essential organic fertiliser

Horn- & Hoof meal (1/2 teacup to 10 liters of mix body) Very slow releasing, essential organic fertiliser

MONTHLY TIPS (CONT'D)

"All of this is added to the mix body to get the basic bonsai soil;"

2. ADDITIONS TO 2 PARTS OF MIX BODY FOR LIMEY BONSAI SOIL

½ Part Loam

½ Part sphagnum or cocos peat. To ventilate the mix, getting volume and extra moist retention

½ Part Maerl, natural lime meal available in Europe, to enhance the lime content

Bentonite (1 liter to 10 liter of mix body) This is basically "stone meal", for structural soil improvement

Bone meal (1 teacup to 10 liters of mix body) Very slow releasing, essential organic fertiliser

Blood meal (1 big spoonful to 10 liters of mix body) Fast releasing, essential organic fertiliser

Horn- & Hoof meal (1/2 teacup to 10 liters of mix body) Very slow releasing, essential organic fertiliser

"All of this is added to the mix body to get the limey bonsai soil;"

3. ADDITIONS TO 2 PARTS OF MIX BODY FOR ACID BONSAI SOIL

2 Parts Kanuma, sieved

The best natural soil acidifier/acid soil I know of

1 Part chopped up sphagnum, cocos peat or bog peat, to ventilate the mix, getting volume and extra moist retention

1 Part Pine mulch For soil improvement, organic content, bacteria life and spore elements

Blood meal (1 teacup to 10 liters of mix body) Fast releasing, essential organic fertiliser

"All of this is added to the mix body to get the acid bonsai soil;"

Comments:

All of these soil mixes haven proven their value over some years now, and the organic meals (blood, horn & hoof, bone) allow for a first year after repotting without any extra fertiliser.

"All are used without a drainage layer; They are quite coarse and ,therefore, also very free draining; This avoids any risk of root rot in case of excessive and prolonged rainfall, but downside is the necessity for frequent waterings during hot spells."

From a-mused in Rochester, New York:

"If I'm doing a "final" potting, I use an appropriate soil from Hollow Creek Bonsai. They've got some of the very finest soil mixes you'll ever find pre-prepared. My "base" layer is almost always their "Coarse" mix. The main layer is chosen based on the tree. I typically finish the potting with a very thin layer of their "Master's Shohin Soil" for a very clean appearance. Even though most of their soils mixes contain their "Micro Plus" product, I still add an additional amount. The "Micro Plus" is a Mycorrhiza mix.

Where I tend to mix my own is for larger training/growing pots. The actual percentages used vary by species. My list of components include:

Pool filter sand ,Turface or a non-clumping, minimally-treated cat litter (that's been tested to ensure it doesn't break down into mush), Screened pine bark mulch , Sphagnum peat, Perlite, Miracle-Gro Moisture Control Potting Mix, Micro Plus (from Hollow Creek)

For percentages, I usually start with the reference table in Naka's Techniques I. Regardless of the mix I'm creating, I always put in the Micro Plus. Additionally, I do sprinkle a little on the tree's roots just prior to potting it up. So far, I've found the soils to remain appropriately moist, with the water distribution being nice and even, and still drain nicely. I'll always put a layer of 3/8" to 3/4" river rock about 1" deep in the bottom of the pot, simply to ensure drainage. The addition of the Mycorrhizae spores, from my experience, helps reduce the transplant shock by helping the tree to establish itself quicker and get a more efficient water/nutrient uptake. I'm also a firm believer in Superthrive, so that's used as well."

MONTHLY TIPS (CONT'D)

Conclusion:

As you can see, everyone has a different idea of what soil mix and components is best. Your job is to experiment and find the best mix for you. No one can tell you that one soil mix is the best, though asking someone from your area what they use will give you a head start.

Good bonsai soil has many characteristics, including being free draining yet moisture-retaining. It must have the proper particle size. There are many different components which can be used to make up a soil mix, but to a large extent you will need to choose those available locally.

If you are looking for a better soil mix, please experiment with some of the recipes above. Oh, and be sure to report your results to the rest of the Bonsaichat.org community!

[(c) Copyright 2004, - Free use of this article in its entirety is allowed by the author provided it retains this copyright notice. Do not make any edits or omissions to the contents. Corrections, additions, comments should be sent to the email address provided (adjust appropriately to turn it into a valid address).]

(Ed's Note: The above article was written by our own Scott Showalter for the online bonsai forum "BonsaiChat", www.bonsaichat.org.)

