# Mosses 101 for Bonsai Practitioners

What is a moss

* Mosses, also known as bryophytes, are a part of the plant kingdom that branched off before the development of the “vascular system”. Since this system – comprised of “xylem” and “phloem” transport vessels – is what gives other plants their rigidity, mosses tend to be soft and small.
* For practical purposes, there are three main types of moss:
  + Acrocarpous (“top-fruited”) – these grow upwards from a surface
  + Pleurocarpous (“side-fruited”) – these creep sideways along a surface
  + Sphagnums – these grow in bogs
* Mosses technically have “rhizoids” rather than roots. These are relatively short and don’t transport water or nutrients internally, but can draw them up by capillary action – like dangling a string in a pool.
* Mosses can propagate either sexually by releasing spores or vegetatively by deliberately releasing chunks of themselves into moving water.
* The study of mosses is called “bryology”.

How bonsai practitioners use mosses

### For display

* What goes well with tiny trees? Tiny plants! Moss can be used to suggest the presence of grass and other ground-cover plants in a bonsai display, which contributes to the bonsai’s authenticity as a scaled-down version of a full-size tree.
* Acrocarpous moss is generally agreed to look more attractive here than the shaggier pleurocarpous species.
* For bonsai shows, chunks of freshly-gathered moss are typically stapled to the soil surface with thin wire.
* For longer-term displays, or just to make your bonsai look nice, it is generally better to let the moss grow itself from spores. This is relatively easy: grab some moss off a roof or carpark, let it dry, grate it through a fine (~3mm) mesh, sprinkle the resulting dust on the soil surface (or sphagnum layer – see below), and gently tamp down. The moss should then grow out of the soil over a period of 6-12 months.

### For soil cover

* Some bonsai traditions, including the author’s own, put a layer of dead, grated sphagnum moss on top of the inorganic soil during re-pots of refined bonsai. This has several benefits:
  + It acts as a sort of biological cling-film, stopping fresh soil from flying everywhere before it has properly locked into place. Very helpful when transporting bonsai soon after re-potting.
  + It more evenly distributes pressure across the soil, which is helpful when tamping soil down during re-potting. Otherwise, downward pressure on one spot can just push soil up in another.
  + It has anti-microbial properties – sphagnum was famously used as a battlefield dressing in World War 1 - and can help suppress harmful plant diseases until the roots have recovered.
  + It acts as an extra channel for water circulation, helping trap water vapour and ensure that the soil is uniformly moist.
  + It is a perfect substrate for subsequent growth of live moss.
* This approach does have a downside: dry sphagnum – or moss in general – is “hydrophobic”: water runs off it easily due to electrostatic effects. If your pot has a sphagnum layer, you will need to be even more careful when watering to ensure that the water has made it into (and subsequently through) the soil. To save time, the author finds that spraying from close range with a plant mister will disrupt the static electricity in the sphagnum and let water through faster.
* Standard practice in the author’s tradition is to:
  1. Grate dried sphagnum through a medium (~6mm) metal mesh, e.g. a gardener’s sieve. Be careful: it’s easy to grate your fingers! The process doesn’t have to be perfect; in fact it’s good for stability and water transport to have some longer stems in the mix.
  2. Add water to the grated sphagnum (London tap water is fine) until no more is absorbed.
  3. Splodge[[1]](#footnote-1) a loose layer of sphagnum mush about 5mm thick across the soil surface.
  4. Using a tamping tool, compress the layer to about 1-2mm. This will squeeze most of the water out of it and force each sphagnum fragment to bind with surrounding fragments, whilst also giving the soil a final round of tamping. If any gaps form or become apparent, fill them in with extra splodges.
  5. Tuck the sphagnum layer in around the edge of the pot, to give a neat appearance and ensure that water doesn’t run straight over the side of the pot.
* Large blocks of dried sphagnum can be bought online. It is recommended to purchase from a specialist bonsai supplier as the blocks sold for reptile enclosures are often adulterated with hay and bark, which don’t stick to sphagnum and can create weak points in the layer. Sphagnum rapidly soaks up ambient moisture, so if the block isn’t fully dry on arrival then you may need to dry it on a radiator before putting in a properly-sealed container.

### For soil amendment

* Some bonsai – particularly azaleas – are “ericaceous” (“heather-like”): they prefer slightly acidic soil. There are several ways to achieve this, including specialist bonsai soils, most notably the specialist Japanese “kanuma” soil.
* Sphagnum acidifies its surroundings as it rots. This acidity is why peat bogs can preserve organic tissue for up to 4,000 years – it’s like pickling in vinegar! So mixing dead sphagnum in with an inorganic soil can acidify it.
* Standard practice is to chop dried sphagnum up with scissors (grated is also fine), then mix it in with the inorganic soil before re-potting the bonsai. Some experimentation may be required to find the best ratio.

## Moss propagation

* It is possible to propagate your own moss pads in reasonable quantities. This has two main advantages:
  1. You can always be sure of having the moss you need when you need it.
  2. You don’t have to worry so much about common pests hitching a ride onto your bonsai.
* However, mosses have different requirements to most plants and also grow *very* slowly, so this is generally for bryology enthusiasts only.
* Most instructions seem to boil down to: find / create a rough surface, add moss spores, and keep it wet.
* Mosses are “liminal” species: they grow in an envelope defined by surrounding airflow. If propagated in enclosed containers, they may try to keep growing upwards in search of a nonexistent stopping-point, leading to lanky unattractive foliage. This is often seen in poorly-tended terrariums; it can be prevented by trimming.
* Mosses grow best in conditions that most plants would struggle with… because they are easily outcompeted by other plants. It is *vital* to continually remove weed plants from moss pads as they appear.
* British mosses typically prefer outdoor climates – lower temperatures, greater moisture, strong wind – to indoor. That said, they are *not* typically preyed on by common indoor pest species by spider mites, simply because they’re too small to be worth sucking on.
* Industrial scale moss growth is notoriously tricky. In 2020-21, there was a world shortage of aquarium mosses due to the main supplier in Singapore dying of COVID. Most large-scale uses of sphagnum, for example in peat bog restoration projects, are supplied by a single company, BeadaMoss, because no-one else has worked out how to do this cost-effectively. Some fascinating mosses, such as the luminous Goblin’s Gold Moss (Schistostega pennata) have no suppliers at all. However, online suppliers can be found for many common hobbyist mosses.

## More information

* The [British Bryological Society](https://www.britishbryologicalsociety.org.uk/) promotes the study of mosses and liverworts[[2]](#footnote-2) in the UK. They also offer a range of technical books and other resources.
* The [Field Studies Council](https://www.field-studies-council.org/) frequently offers hands-on workshops on bryology.
* The book “Gathering Moss” (Robin Wall Kimmerer, 2021) is a wide-ranging popular introduction to mosses, their study, and their broader significance.
* The book “The Lost Rainforests of Britain” (Guy Shrubsole, 2022) is an interesting popular introduction to the “temperate rainforest” habitat that supports much of Britain’s unique moss diversity.
* The “Moss Grower’s Handbook” (Michael Fletcher, 2nd Ed 2005) is [freely available](https://www.britishbryologicalsociety.org.uk/wp-content/uploads/2020/12/Fletcher-2006-Moss-Growers-Handbook-2nd-Ed.-prep.pdf) from the BBS website.

1. Technical term. [↑](#footnote-ref-1)
2. A related group of non-vascular plants, which sadly are a pest to bonsai practitioners [↑](#footnote-ref-2)