

CREATING A MOSS GARDEN

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In almost every landscape there is a shady, moist location that defies grass and the will of the landscaper. The answer to an area such as this could be in defying tradition and carpeting the problem site with a soft bed of moss. Mosses thrive in moist situations with light to heavy shade, some even do well in the worst landscape situation of all: dry shade. In general, mosses like compacted, acid soils. A few moss species even do well in full sun.

Mosses are tough, simple plants that require little maintenance once they are established. They are usually easy to propagate and readily obtained. A moss garden lends a subtle beauty to the landscape and provides the gardener with a wealth of creative opportunities in what would otherwise be a difficult landscape situation.

Before beginning a moss garden, it is important to understand how mosses differ from other plants, their life cycle and how they reproduce. It is much easier to establish a moss garden if you don't think of mosses the same way you would typical landscape plants.

WHAT IS A MOSS?

Mosses are nonvascular plants, meaning that they do not have specialized conducting tissue to transport water and nutrients throughout the plant. Mosses, therefore, do not have true leaves or roots. The leaves of mosses are typically only one cell thick, as are the root-like structures called rhizoids. The rhizoids serve only to anchor the moss plant to the substrate. Water and nutrients are absorbed throughout the plant by the individual cells. Mosses rely heavily on external capillary movement and the cohesive properties of water molecules to ensure each cell is supplied with moisture.

Mosses are not flowering plants, they produce structures called sporophytes that disperse spores. The sporophyte consists of a stem, called a setae, topped by a capsule that contains the spores. The capsule often has a cap, or calyptra, that resembles a hood. The capsule has an opening at the top that is surrounded by teeth that serve in the regulation of spore dispersal. These peristome teeth open and close in reaction to changes in humidity.

The sporophyte is embedded in the leafy plant, known as the gametophyte. The gametophytes are generally of two types of growth habit. One type is upright and "bushy", giving the appearance of a miniature forest. The other type is creeping and often resembles tiny ferns.

Because mosses are so reliant on external moisture, there is a great deal of difference in appearance between dry plants and wet plants. A dry bed of moss can seem withered and desiccated, but the addition of only a small amount of moisture can cause an astounding and rapid change in the overall appearance of the bed. Leaves quickly unfurl and become rigid. The plants go from dull to glossy, no longer resembling the "dead" material of moments ago.

LIFE CYCLE

The sexual structures of mosses are borne on the gametophyte. The sperm is produced in the antheridium and must swim to the female structure, the archegonia. Once again, external water plays a vital role in the survival of the mosses. The fertilized egg divides mitotically and begins to form the sporophyte. As the sporophyte develops, spores are produced in the capsule. The spores are produced through meiotic division, which results in haploid cells (cells containing half the complement of chromosomes). At maturity, the sporophyte begins to turn yellow and brown. The capsule dries, and

when the humidity is low enough, the peristome teeth open and release the spores.

Germinating spores form a filamentous protonema and, after some time, develop into the leafy gametophyte. The gametophyte is still haploid and is the dominant structure in the life cycle. This is distinctly different from the higher plants, where the sporophyte, or diploid phase of the life cycle is always dominant.

Most mosses are perennial and live for quite a few years. A few are annual, only appearing for a short season, usually in the spring.

Nearly all mosses have strategies for reproducing asexually. Most mosses produce small structures, either gemmae or propagules, that readily break away from the parent plant and form new plants. Bits of leaf and stem removed from the mother plant will also produce new plants in many mosses. This ability of mosses to reproduce easily by asexual division is especially fortunate for the moss gardener.

In a few species of moss, no sexual reproduction has been known to occur. Sphagnum are especially noted for this trait. These species perpetuate themselves strictly by asexual means.

IDENTIFICATION OF MOSSES

Many plants that are called "moss" are not mosses at all. Spanish moss, beloved of Southerners, is actually a flowering vascular plant related to pineapples. Deer moss or Reindeer moss, is a lichen. Lichens are two organisms, an algae and a fungus, in a symbiotic relationship, thus it is not a true plant at all. Club or Running moss is a fern relative, *Lycopodium*. Another fern ally, *Selaginella*, is often called Spike moss. Irish moss is in reality a marine algae.

True mosses belong to the division of the plant kingdom known as Bryophyta, and are often called bryophytes. Hornworts and liverworts are also bryophytes. All are nonvascular, do not flower and have a dominant gametophyte generation. Plants with vascular tissue belong to division Tracheophyta, which includes all flowering plants, the ferns and fern allies.

Mosses, at best, are very difficult to identify in the field. Very few have common names. Most require careful examination under the microscope to determine species. It is not uncommon in the lab to determine species by counting the number of cells in a peristome tooth or by looking at the banding patterns of cell walls.

Fortunately, the mosses best suited for creating moss garden here in the southeast are fairly easy to recognize and most have common names. Some, such as *Thuidium delicatulum*, Feather moss, are quite common and familiar to gardeners and naturalists.

Time and experience are your best aid in learning to identify the mosses. Most books on moss identification are technical and difficult texts. For the moss gardener not interested in tedious lab work, learning what works in the garden is more important than learning its correct botanical name.

To create a moss garden, first start with a shady moist area. While a few mosses, such as *Bryum* and *Grimmia*, will tolerate full sun, most prefer medium to heavy shade. A site where some moss is already growing is ideal.

Remove any grass or weeds by scalping the soil surface. A large area can be sprayed with weedkiller to remove unwanted vegetation. However, leave plenty of time for the herbicide to dissipate. Hand weeding is best from an environmental point of view because you can begin without waiting for the sometimes-slow effect of herbicides.

Mats of live moss are the best material for starting the moss garden. Often you can find good-sized pieces of moss already growing on your property and transfer them to your chosen site. Plant rescues are another good source of whole plant material. Some nurseries sell mosses, but they are rare indeed. Mosses can also be propagated by spores; and asexually by scattering plant pieces and propagules. Putting your favorite moss in a blender with water (some recommend beer or buttermilk), blending it for a minute or two, and then pouring it onto a prepared surface, will result in healthy plants in about five weeks.

If using mats of plants transferred from another site, first trench out the area you are going to put the moss so that it will be at the same soil level as it was at its old location. Make sure the soil is packed firmly, never plant in loose soil. Wet the soil surface and the underside of the moss mat. Place the moss in the trench so that it fits correctly and pat firmly into place. Though it pains most people, it really is a good idea to step on the mat to make sure it is firmly seated on the soil surface. Most moss that dies after transplanting does so because of air pockets between the soil and the mat. This causes the plants to stay too dry. After the moss is in place, water it thoroughly from above and keep it moist for the first week or so.

If you are placing the moss "sod" on a steep hillside or bank, it is a good idea to peg the sod with small sticks or nails to hold it in place.

Using the above method for starting a moss garden will give you an immediate effect and is easy to work around companion plants, ornamentation and rocks. If you do not have access to a large amount of moss material or it is not economical, try spacing the moss sod with gaps between the large pieces. You can then fill in the gaps gradually by using the "blender" method mentioned earlier or by allowing time for natural spore dispersal.

Once established, the only maintenance required in a moss garden is an occasional weeding...and watering in very dry periods. Any time the moss garden appears dry and stiff, just a light misting of water will change it dramatically back to a lush, soft carpet.

Take a good look around your neighborhood to see what mosses are already growing there. This will give you a good idea of what will work in your area. Most moss gardens are composed of a few common, easily obtained mosses. Among the best are:

<i>Atrichum angustatum</i>	Star Moss	dark green, upright starry appearance, produces "splash cups" on male plants
<i>Bryum bicolor</i>	Bryum	soft, yellow mats, often in cracks in pavement
<i>Dicranum scoparium</i>	Broomswept moss	large, med. green tufts, appear to be swept in one direction
<i>Ditrichum pallidum</i>	Ditrichum	common in lawns, in summer almost always with many sporophytes
<i>Hedwigia ciliata</i>	Hedwigia	grey-brown due to clear cells in leaf tips
<i>Hypnum curvifolium</i>	Plume moss	dense sheets of yellow-green
<i>Leucobryum albidum</i>	Pincushion moss	common, whitish, looks like a pincushion
<i>Polytrichum commune</i>	Hair-cap moss	largest moss in area, dark green, produces "splash cups"
<i>Thuidium delicatulum</i>	Feather moss	most common in moss gardens, looks like a small fern, in mountains covers huge areas

Sphagnum
ideal sites

Peat moss

only in very wet situations, will form large mats in

AND A FEW GOOD COMPANIONS

The best companion plants for a moss garden are small, evergreen and shade tolerant. Small ferns, dwarf hostas and ground covers such as partridgeberry fit well into the moss garden by maintaining proportion and subtlety. Here is a small sampling of vascular plants that work well in moss gardens:

Adiantum pedatum

Maidenhair fern

Asplenium platyneuron

Ebony spleenwort

Hexasyllis shuttleworthii

Wild Ginger (try "Callaway")

Hosta spp.

Hosta (try dwarf cultivars such as "Kapitan")

Houstonia caerulea

Bluets

Mitchella repens

Partridgeberry

Spiraea alpina

Dwarf spirea

Be creative! Try lichens, lycopodium, selaginella, and liverworts in your moss garden. Rocks are very effective in groups or even single stones. You can create a patchwork "quilt" look by interplanting dark with light colored mosses and mixing different textures. Find rocks and pieces of wood that have moss growing on them to add relief and interest to your garden.

The moss garden can be a fascinating addition to your landscape and a great solution to a shady problem area. It is economical to install, easy to maintain and can be a cool, restful focal point in the landscape. To the creative gardener, the possibilities are endless.