

Growing Media & Soil Amendment

(A Horticultural Curriculum)

Student Handouts

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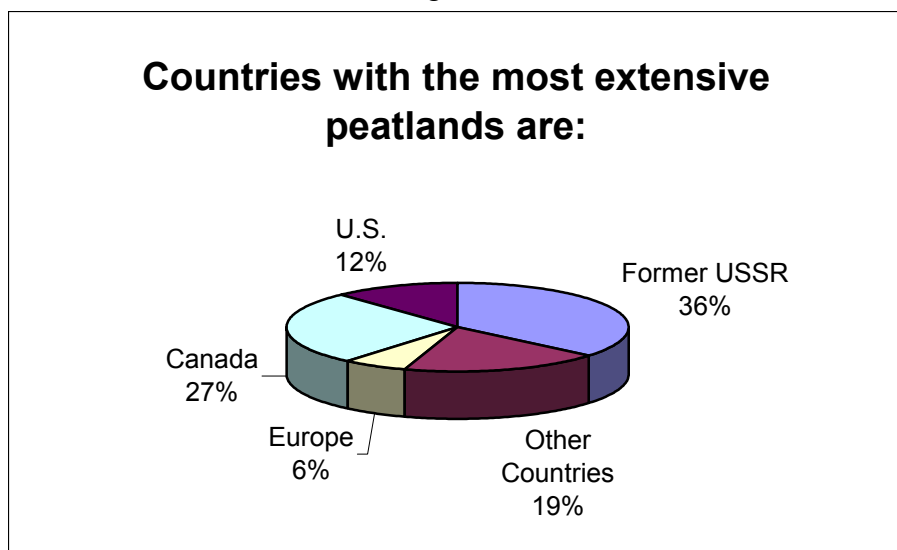
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Terms and Definitions

Peat moss plays an important role in all aspects of horticulture-plant propagation, floriculture, vegetable and nursery stock production, and home gardening. Many terms related to peat moss sound similar, but have very different meanings. Proper use of the following terms will eliminate confusion and misunderstanding about this valuable resource.

peat	The largely organic residues of plants, incompletely decomposed through lack of oxygen.
peat moss or moss peat	Partially decayed mosses including:
sphagnum peat	Peat that is composed mainly of partially decomposed <i>Sphagnum</i> moss species. Commonly called peat moss or sphagnum peat moss. This is the most important type of peat for horticultural use.
hypnum peat	Peat that is composed mainly of stems and leaves from various <i>Hypnum</i> moss species.
peat humus	Peat that is fully decomposed so that none of the original plants can be identified.
sphagnum moss	A group of mosses that grow in bogs. In horticulture, sphagnum moss refers to the live portion of the plant that is available packaged in whole pieces, dried or fresh. It is often confused with sphagnum peat moss. Sphagnum moss is most often used to line wire hanging baskets and other types of containers. It is not used as a soil amendment.
wetland	A broad term that is used to describe areas which are waterlogged all or most of the time.
peatland	A specific type of wetland on which extensive organic material has accumulated. These areas with peat-forming vegetation growing on peat have an undrained layer of peat at least 12-18 inches deep. Peatlands are found in all parts of the world except deserts and arctic regions. The most extensive areas are located in the northern hemisphere. It is estimated that there are about 1 billion acres of peatland in the world or about 4.5% of the total land area. However, only a specific type of peatland has peat that is suitable for horticultural purposes. Canada and Europe are the largest sources of peat used in horticulture. 90% of the horticultural peat moss used in the U.S. comes from Canada. See Figure 1 on next page.

Figure 1



The former USSR	371	million acres
Canada	272	million acres
United States	124	million acres
Europe	65	million acres

bog	Peatland with the water table at or near the surface. The types of plants growing in a bog tend to be limited in diversity because of the acid, nutrient-poor environment. Plants found growing in a bog obtain nutrients primarily from rainfall.
fen	Peatland with the water table usually at or just above the surface. Plants obtain nutrients from soil and groundwater.
reclamation	Ways of using peatlands after they have been harvested. Reclaimed peatlands are commonly changed into natural areas and wildlife habitats that are ecologically different from the original site, converted into forestry plantations, or developed as agricultural cropland.
restoration	Reestablishment of a harvested site as a peatland with characteristics nearly identical to pre-harvesting conditions.

Characteristics and Qualities of Sphagnum Peat Moss

Sphagnum peat moss has many uses in horticulture because of its excellent physical and chemical properties. It can be used as a seed-starting medium, mixed into potting mixes added to compost, and incorporated into the soil as a beneficial amendment that binds sandy soil, loosens clay soil, and reduces leaching of nutrients. Peat moss is a natural, organic soil conditioner, with a unique structure that provides a good balance of air and water around plant roots for healthy plant growth.

Important Properties of Sphagnum Peat

pH

pH is a measure of the soil's acidity or alkalinity. Peat has a pH of 3.5-4.5, described on the pH scale as very acid. It can be used as a soil amendment to lower the pH of the soil, and is especially good when growing acid-loving plants such as azaleas, rhododendrons, and blueberries. The pH of soil mixes containing peat can be easily adjusted using lime for plants that require a pH that is closer to neutral (7.0).

Organic Matter

Organic matter is an important part of healthy soil. Peat contains more than 95% organic matter (and less than 2% ash) making it a beneficial amendment that improves soil structure and the activity of soil microorganisms.

Cation Exchange Capacity

The cation exchange capacity (C.E.C.) indicates a soil's ability to adsorb and hold nutrients until they are needed by plants. Sphagnum peat has an excellent cation exchange capacity value of 110 to 130. Sandy soils have a C.E.C. of 2 to 4, while clay soils have a C.E.C. of 4 to 60, indicating a poor ability to adsorb and hold nutrients.

Pore Volume

Pore volume indicates a soil's ability to hold water and air. Sphagnum peat has a pore volume of more than 96%, which makes it an excellent material for potting mixes and soil improvement. Fine sand has about 45% total porosity, while a clay loam has about 60%.

Nitrogen Content

Peat contains 0.5% to 2.5% total nitrogen. However, the nitrogen held in peat is not quickly released so it is not always available for plants to use. Additional nitrogen fertilizer may be needed for healthy plant growth.

Practical Benefits of Using Sphagnum Peat Moss

Adds organic matter. Sphagnum peat is high in organic matter, which can be used to improve the structure of soil.

Holds moisture. Sphagnum peat can hold up to 20 times its dry weight in moisture. The water is released slowly to plants as needed, resulting in less frequent watering needed.

Aerates heavy soils. Sphagnum peat helps loosen and aerate clay soils to allow for proper root growth and development.

Binds sandy soils. Sphagnum peat adds body to light, sandy soil to help it retain water and nutrients.

Holds fertilizer and prevents leaching. Sphagnum peat stores nutrients and reduces leaching of nutrients that are easily lost.

Protects soil. Sphagnum peat protects the soil from hardening and reduces the potential for erosion due to wind and heavy rain.

Decomposes slowly. Sphagnum peat decomposes slowly over several years compared to other types of organic matter such as compost, that decompose within one year.

Sustainable resource. Sphagnum peat is a living resource that accumulates in the natural environment by as much as $\frac{1}{8}$ inch to $\frac{1}{4}$ inch every year under favorable conditions. Responsible peatland management and harvesting is key to maintaining an inexhaustible source of peat.

Using Peat

Well-prepared soil is the key; to growing plants successfully. The ideal soil for most plants is rich in organic material, well drained yet able to hold moisture and air, and slightly acidic with a pH of 6.0 to 7.0. Sphagnum peat moss is an excellent way to improve any soil and adds plant assurance for healthy growth.

Indoor Uses

Sphagnum peat is an important component of potting mixes. It is often used alone or in combination with other materials such as vermiculite or perlite. Sphagnum peat is lightweight and easy to handle. It provides favorable conditions for good root growth, and is low in weed seeds and disease-producing organisms. There are many soil "recipes" for container-grown plants that use sphagnum peat as the main ingredient in the potting mix.

Cornell Peat-Lite mixes are commonly used for germinating seeds and container-growing annuals and other bedding plants. Peat-Lite mixes are composed of 1 part sphagnum peat moss and 1 part vermiculite or perlite. Limestone is added to raise the pH, along with fertilizer to increase the amount of nutrients.

Outdoor Uses

General soil improvement

Add a 2 to 3 inch layer of sphagnum peat moss and work it into the top 6 to 8 inches of the soil with a spade or rototiller.

Flower and vegetable gardens, new lawns

When creating new garden beds add 2 inches of peat moss into the top 6 to 8 inches of soil and dig or rototill into the existing soil.

Healthy grass roots need 6 to 8 inches of good soil for healthy growth. Without it, grass plants can't develop a healthy, adequate root system. A soil that's high in organic matter is ideal for growing grass.

When seeding or sodding, always properly prepare the soil first to ensure a healthy lawn. Dig or rototill 2 inches of peat moss into the top 6 inches of soil. When seeding, lightly top dress with a ¼-inch layer of peat moss over the grass seeds. When sodding, fill in the small areas between rolls of sod with peat moss for more even seams.

Existing gardens (flower & vegetable)

Hand dig peat moss into existing flower or vegetable beds, taking care not to disturb plant roots. Annually, dig 1 inch of peat moss into the top 6 inches of soil to condition the area for transplants.

Existing lawns

Add sphagnum peat moss to reduce disease problems, thatch, and the amount of water your lawn requires. Top dress with a thin layer (¼ to ½ inch of peat moss) to the top of the lawn, gradually conditioning the soil. Use a leaf rake to spread the peat moss.

Bare spots can be caused by disease, animal urine, soil compaction, thatch, and buried construction debris. Again, use peat moss to help repair the damage. Dig 2 inches of peat moss into the top 6 inches of the affected area. Spread seed and cover lightly with a ¼ inch layer of peat moss.

Trees and Shrubs

For plants such as azaleas, rhododendrons and conifers that require a more acidic soil, mix one part peat with one part soil removed from the planting hole. Mulch around the base with a 50/50 soil and peat blend.

However, experts disagree whether the planting hole for trees and shrubs should be amended. Some feel that amending the soil helps the root system become established faster and better. Others think it creates an artificial environment that discourages roots from growing into the surrounding soil, especially if it is less than ideal. The decision to amend or not is a personal preference that depends on the plants you are growing and the specific type of soil in your area.

If you prefer to amend the soil, use 1 part peat with two parts of soil that has been removed from the planting hole. After backfilling the hole and watering, add the remaining peat/soil mix making a ridge encircling the plant like a saucer to hold water. Avoid backfilling above the bark line.

In Compost

Peat moss helps produce better compost by speeding up the composting process, reducing odors, and controlling air and water in the pile. Peat slowly decomposes, ensuring longer-term organic matter in the soil. Peat also balances the nutrient-rich but faster-decomposing compost and helps reduce compost's tendency to compact.

When making a compost pile, use a 1 inch layer of peat to every 4 inches of compostable materials. To help cut down on odors, put a 2 inch layer of peat on top of the pile.

When adding compost to the garden, mix in equal parts peat and compost for better plant growth.

Environmental Issues

Throughout the world in recent years, attention has been directed to the use of wetlands, including peatlands, and the effects of peat harvesting on the environment. There are several environmental issues that are being examined by conservationists, researchers, and industry experts on a widespread global basis, and on a regional or site-specific basis.

Canada is a leader in conservation efforts and environmental research that will help protect its valuable peat resources. Among the issues are that are of concern and the situation in Canada are:

Issue: Loss of natural resources

Peat is a sustainable resource. Each year more than 50 million tons of peat are estimated to accumulate in the natural environment in Canada, while only 700,000 to 800,000 tons of peat are currently used every year.

Issue: Loss of wildlife habitat

Many birds and wildlife species use wetlands because of the open water and variety of plants. Bogs usually have small amounts of open water, only a few types of plants, and limited cover for waterfowl and bird nesting. Recent research has shown that the use of bog ponds by birds was related to the availability of open water. Waterfowl used the bogs primarily for staging and migration, with only limited brood-rearing.

Issue: Loss of vegetation and rare plant species

Limited plant species are able to grow in peatland compared to other soils. Several species of plants that grow on a typical peatland bog such as pitcher plants (*Sarracenia* spp.) and sundews (*Drosera* spp.) are not commonly found in mineral soils. These plants capture insects to provide nutrients not available from the nutrient-poor peatland soil, and are considered unusual and unique in some areas. Many of these species however, are widely distributed throughout Canada's wetland regions.

Issue: Release of carbon gases due to peatland development

Release of carbon gases into the atmosphere is a possible cause of global warming, also called the greenhouse effect. Draining a peatland accelerates the decomposition process and results in the carbon that is stored in the peat to be released to the atmosphere as carbon dioxide. However, the development of peatlands for horticultural peat production does not have a significant impact on the global carbon cycle.

Issue: Poor quality and increased amounts of runoff water from developed peatlands

The drainage ditches used to harvest peat provide the opportunity for rainfall to be lost. However, the reduced water level in the peatland because of the drainage system actually allows for more water storage. As a result, there isn't as much runoff from developed peatlands as there is from natural, undisturbed peatlands.

When plant growth on the surface of the bog is removed, the exposed peat particles can be carried into the drainage system and leave the peatland to settle in other areas. Sedimentation ponds are now being installed at many new horticultural peat developments as a means of controlling this situation.

Reclamation and Restoration of Harvested Bogs

According to Canadian industry sources, less than 4,000 acres of peatland of the total 272,000,000 acre resource in Canada have been fully harvested and few peatlands are at the end of their production life.

Options for peatland reclamation include:

- returning the site into a functioning wetland
- development of an agricultural cropland or forestry plantation on the site

Environmentalists, scientists, government officials, and industry executives are working together to develop policies and guidelines that will ensure proper management of peatlands for both harvesting and conservation.