



## Peat Moss: Nature's Growing Medium

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### Abstract

Peat moss is an essential resource that comes from the incomplete decay of sphagnum moss in acidic, waterlogged peat bogs. Its remarkable characteristics, including superiority in water retention, aeration and sterility, enable it to be used extensively for applications such as soil supplements, seed propagation and potting mixtures. The specific physical and chemical characteristics of peat moss stimulate plant growth through soil structure enhancement, maintenance of pH levels and encourage the growth of useful microbes. While these benefits have been observed, the extraction of peat moss is considered an environmental issue due to the significance of peat bogs as carbon sinks. This emphasizes the importance of balancing the environmental impact of peat moss extraction with the advantages of use of alternatives like compost and cocopeat.

**Keywords:** Peat, Soil aeration, Sphagnum moss, Water retention

### Introduction

The usage of peat moss dates back to centuries because of its high carbon content and so it the primary source of fuel in the earlier days. A lot of European and North America countries utilized dry peat to warm homes, cook meals and for lighting purposes. Horticulture application of peat moss has been noted in the early 1940s when water retentive as well as conditioning properties were discovered in the peat. Today, peat moss is widely used in gardening as soil supplements, soilless growing media, seed germination and mushroom production as well. It plays an important role in modern agriculture, as it promotes plants overall growth and development (Reinikainen *et al.*, 2012).

Peat moss is a fibrous, nutrient-rich substance. It is naturally formed over thousands of years by gradual and partial decomposition of sphagnum moss in damp, acidic conditions known as peat bogs. Peat moss is collected from deeper strata and is distinguished from live sphagnum moss, which grows on the surface of bogs. It is having specific qualities that can increase soil quality and plant health. This paper gives a brief about the history, types of peat moss and its usage as media along with the environmental concerns involved in its harvest (Figure 1).

#### Types of Peat Moss

Peat moss is mostly found in peat bogs and wetlands of the

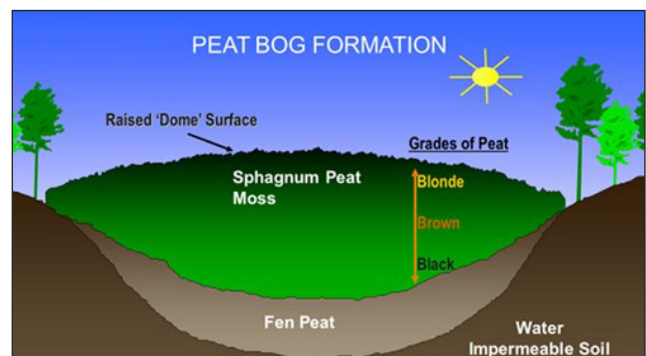


Figure 1: Cross section of a typical Sphagnum peat bog (Susan, 2016)

Northern Hemisphere, covering around 3% of the Earth's surface. Sphagnum moss represents about 90% of the plant matter in these bogs by providing peat its homogeneity and unique properties. Depending on the depth of the bog, the degree of peat moss decomposition varies. If we were to take a cross section of a peat bog from top to bottom, the lower parts of the bog contain peat that is more humified, dark brown and less fibrous; while the surface is made up of recently accumulated peat moss that is blonde in colour and fibrous in texture (Figure 2). The decomposition process results in layers of peat with varied degrees of decomposition as mentioned in the table below (Table 1).

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Table 1: Different types of peat and their characteristics

Type of Peat	Layer	Colour	pH	Density (kg m <sup>-3</sup> )	Organic Matter Content	Properties
White	Top most	Light-colored	3.0-4.5	100-160	~98%	Contains Trichoderma bacteria that reduce root infections.
Brown	Middle	Mild to dark brown	4.5-5.2	160-250	~85-90%	Superior water retention properties.
Black	Lower	Dark brown to black	5.2-6.0	250-470	~60-70%	Most degraded; excellent water retention properties.



Figure 2: Different peat moss grades (Lopez, 2017)

The Von Post scale is used to grade raw sphagnum peat moss in order to assess its degree of humification and decomposition. Based on the colour of the peat moss, the fibre content and the colour of the water squeezed from a sample, the scale goes from H<sub>1</sub> to H<sub>10</sub>, where H<sub>1</sub> represents fully un-decomposed plant material and H<sub>10</sub> represents completely decomposed plant material. Following harvest, several grades of peat moss are usually mixed to provide particular physical characteristics. This is due to the possibility that a certain Von Post grade peat moss may not be suitable for the market type. For example, when used alone as a growing medium, H<sub>1</sub>, which is blond and highly fibrous, will gradually shrink in containers. Being dark brown and excellent for gardening, H<sub>5</sub> is frequently combined because it can be heavy when used alone.

#### Peat Humification

According to the post scale, H<sub>1</sub>-H<sub>3</sub> decomposed peat is low, while H<sub>4</sub>-H<sub>6</sub> decomposed peat is strongly decomposed (Figure 3). It is only possible to use the weakly degraded peat as a substrate for plant growth. Heavily decomposed peat can be utilised to improve soil qualities as a source of organic matter. This type of peat only has a 6-14% by volume air capacity. The moisture capacity, organic matter and nitrogen content decreases with the increase in mineral content. This also lessens the beneficial impact of peat on soil characteristics. The unique physical and chemical features of peat, notably its sponge-like texture and resilience, make it an excellent medium for plant's overall growth (Pouliot *et al.*, 2015).

#### Advantages of Peat Moss

- **Soils Aeration:** This increases the air spaces in the soil thereby increasing drainage and give roots lots of oxygen to grow healthy roots and shoots.
- **Water Retention:** It can hold water up to 20 times its weight and which helps plants survive droughts and dry spells.

- **Acidic Nature:** It has pH value between 3.5 to 4.5, which is well suited for acid loving plants. Lime can be used to adjust its pH for other crops.
- **Soil Buffering Capacity:** It can buffer the pH and nutrient levels that would otherwise cause gradual changes in soil, creating a suitable environment for plant roots.
- **Sterility:** Naturally weed-seed, insect and disease free, so an ideal medium for sensitive seedlings and plants requiring optimal media conditions so that it can be used in potting and seed starting mixtures.
- **Improving Heavy Clay Soils:** Peat moss will loosen compacted soils giving better penetration by roots with associated drainage (Taskila *et al.*, 2016).



Figure 3: Raw sphagnum peat moss is graded using the Von Post scale (Lopez, 2017)

#### Comparison of Peat Moss vs. Other Growing Media

Peat moss is compared with other growing media, including:

- **Compost:** Nutrient-rich but lacking in water retention. Compost is better suited for bed enriching, whereas peat moss is better for container planting.
- **Cocopeat:** A renewable product with a neutral pH and close-to-peat water retention. While more sustainable, it may lack the sterility and buffering capacity as of peat moss.
- **Perlite and Vermiculite:** The drainage and aeration qualities of inorganic solutions perform while they do not match peat moss's ability to retain water. Inorganic solutions work best with peat moss but their effectiveness improves when used this way.

### Environmental Concerns

Peat moss mining poses great environmental issues. A peat bog acts as an active carbon sink, holding massive quantities of carbon dioxide. Its extraction hampers the functionality of carbon absorption and adds to greenhouse gases. Furthermore, the recovery of peat bogs is relatively slow, lasting even years sometimes. To address these concerns, sustainable harvesting procedures and the usage of alternatives such coconut based cocopeat, compost and pine bark are being pushed. Restoring peat bogs post-harvest is also crucial for limiting the ecological impact.

### Future Prospects

The future of peat moss in gardening will be based on its ethical use and sustainable methods. It is possible to decrease the ecological load if peat moss is combined with renewable alternatives or its quantity is reduced in potting mixes. It requires eco-friendly alternatives with similar benefits of peat moss and also measures with sustainable harvesting techniques.

### Conclusion

Because of the qualities such as water retention, aeration and sterility, peat moss is still the first preferences by gardeners in horticulture. However, the environmental impacts must be used wisely. With the implementation of sustainable substitutes and environmentally friendly practices, gardeners can maintain the advantages of peat moss without compromising on the delicate ecosystem.

Its benefits and drawbacks have been understood for informed decisions so that the plant's health is ensured and environmental sustainability is guaranteed.

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