Mosses are nonparasitic, primitive green plants that have fine, branched, threadlike stems with tiny leaves. They reproduce by means of wind-blown spores. Mosses typically form a thick, green mat on the soil surface. They produce their own food and do not kill grass plants but rather fill in the spaces in the lawn where grass is not growing.

A thick mat of moss can cover the ground in shadier areas, especially where turfgrass is thin. Joey Williamson, ©2014 HGIC, Clemson Extension

If mosses are present in your lawn, it indicates that conditions are not favorable for the growth of a healthy stand of grass but are favorable for the growth of mosses. The conditions that favor mosses over grass include: excessive shade, acidic soil, poor drainage, compacted soil, excessive irrigation, low soil fertility or some combination of these conditions.

While mosses can be removed mechanically or killed chemically, unless the underlying conditions are altered culturally to favor grass production, any solution that is attempted will be temporary. The conditions that are commonly associated with moss growth and their cultural controls are described below.

Algae are unicellular or multicellular, threadlike green plants that can form a dense coating or scum over the soil surface. This scum can form a tough black crust on the soil when it becomes dry, and will act as a barrier to water movement into the soil. Algal scum can be found on soils that are waterlogged and compacted, especially during sunny, warm and humid conditions.

Cultural Control

**Dense Shade:** In general, mosses can tolerate more shade than grasses can. If the mosses present in your yard are limited to shady areas, your options include:

- Planting a more shade-tolerant grass (keeping in mind that an area receiving less than four hours of full sunlight per day is too shady for grasses).
- Mowing grasses in a shady area at the top of their recommended mowing height range to encourage deep rooting and provide maximum leaf surface area to intercept the limited sunlight in order to manufacture food. For more information on recommended mowing practices, you can request HGIC 1205, *Mowing Lawns*.
- Planting a shade-tolerant groundcover rather than a grass.
- Covering the area with mulch (pine straw, bark, ground up leaves, etc.).
- Pruning some limbs, especially lower ones, from shrubs and trees to allow in more light.
- Removing some of the trees and shrubs.
- Enjoying the moss as a low-maintenance groundcover that requires little, if any, watering, no fertilizer or mowing, and stays...
green all year so long as it does not receive much traffic.

**Acidic Soil:** Mosses prefer acidic soil. With the exception of centipedegrass, most lawn grasses prefer a pH of 5.8 to 6.5. Centipede prefers a pH between 5.5 and 6.0. If the pH of your soil is lower than that recommended for your grass, you can raise the pH by adding pelletized, dolomitic limestone. The higher pH will not kill the mosses, but will favor the growth of the grass.

To determine the pH of the soil, take a soil sample to your county Cooperative Extension office. For more information on how to take soil samples, you can request HGIC 1652, *Soil Testing*.

**Poor Drainage:** While mosses will grow in well-drained soil, they grow better in wet soil than do grasses. Excessively wet soil is one of the more difficult conditions to alter. Possible solutions include:

- Altering the contour of or trenching the area to drain water away.
- Altering the elevation of the area (if the wet area is small) by adding sand or soil.
- Installing French or tile drains (if the wet area is more extensive).
- Digging a sump (a pit that receives drainage) in the low spots, backfilling with sand.

**Compacted Soil:** Soil compaction prevents a lawn from growing vigorously. It also often prevents internal drainage, providing wet conditions favorable to mosses. When the top 4 inches of soil are compacted, movement of air, water and nutrients to the grass roots is adversely affected. In addition, it is difficult for grass roots to penetrate compacted soil. These factors place stress on the grass and decrease its ability to recuperate from damage.

To determine if your soil is compacted, use a soil probe to take a few plugs of soil. This can be done with a piece of ½- to ¾-inch diameter metal pipe. The probe should easily penetrate the top 4 to 6 inches of soil. Use a smaller diameter rod to push the plug of soil out of the pipe. Examine the plugs for the fine white roots. Grasses growing in compacted soil tend to be shallow-rooted. The roots may not extend further than 1 inch into the soil when they should extend 6 or more inches.

A process known as core aeration or aerification will help alleviate soil compaction and improve growing conditions for the grass. This process involves physically removing cores of soil from the lawn, and for some lawns should be repeated annually. Aerification is not expensive and can be accomplished with a spading fork, a manual sod-coring tool or a power-driven core aerator. For more information about aerating lawns, you can request HGIC 1200, *Aerating Lawns*.

**Excessive Irrigation:** Automatic watering on a regular schedule tends to promote problems with excessive moisture, especially in shady or poorly draining areas. As both of these areas are already prone to moss problems, excess moisture just adds to the problem.

It is best to water your lawn only when it is needed. When you see signs of moisture stress such as grass with a dull, bluish-gray cast, footprinting (the presence of footprints when you walk on the lawn late in the day), and wilting or folding grass leaves, you should irrigate with ½- to 1-inch of water. This amount will moisten the soil to a depth of 4 to 6 inches. The key to proper watering of the lawn is to water infrequently but deeply. For more information on watering your lawn, you can request HGIC 1207, *Watering Lawns*.

**Low Soil Fertility:** If required nutrients are limited in your soil, lawn growth and quality may be limited, also. Those nutrients that are essential for growth can be added to the soil through fertilizer applications. In addition to providing the pH of your soil, a typical soil sample analysis will determine the levels of phosphorus, potassium, calcium, magnesium, zinc and manganese in your soil. The nitrogen requirements of the turfgrass cannot be reliably evaluated by a soil test. As a result, the soil test will not contain a nitrogen recommendation. For recommended nitrogen applications for your lawn, you can request HGIC 1201, *Fertilizing Lawns*.

**Lawn Renovation**

Once you have altered as many of the underlying conditions as possible, you can remove the moss by
hand raking or by using chemicals to kill it, such as the following products:
1) Ferrous sulfate monohydrate
   • Bonide Moss Max Lawn Granules,
   • Lilly Miller Moss Out! Lawn Granules,
   • Lilly Miller Moss Out! Spot Treater,
   • Jonathan Green Lawn Moss Control Granules,
   • Scott’s Moss Control Granules for Lawns.
2) Potassium or ammonium salts of fatty acids
   • Safer Brand Moss & Algae Killer & Surface Cleaner Ready to Spray (RTS),
   • Bayer 2-in-1 Moss & Algae Killer RTS,
   • Scott’s 3-in-1 Moss Control Ready-Spray (RTS); or Concentrate,
   • Bonide Moss Max RTS,
   • Monterey Herbicidal Soap – Kills Moss, Algae & Weeds Concentrate,
   • Ortho Moss B Gon Liquid Moss Control RTS.
3) d-Limonene
   • Lilly Miller Worry Free Moss & Algae Control Ready to Spray.

Another moss control option is the use of copper sulfate or ferrous (iron) sulfate mixed at the rate of 5 ounces in 4 gallons of water sprayed over 1000 square feet. After the moss has been killed, apply 5 to 10 pounds of ground limestone to inactivate the copper sulfate prior to reseeding with grass, which may be toxic to grass seedlings.

Other options include ground limestone (75 to 100 pounds per 1000 square feet) or hydrated lime (2 to 3 pounds per 1000 square feet in 3 gallons of water), or diluted bleach (2 to 4 ounces per gallon of water), or dishwashing detergent (2 to 4 ounces per gallon of water). Note: one ounce equals two tablespoons.

These materials kill the moss because they act as desiccants (drying agents), should be applied by over the moss-infested areas during winter through early spring (December through April) when moss is actively growing and temperatures are cool. Apply when the lawn soil is moist. To be effective, they need a 24-hour rain-free period after application. As the moss starts to die, it will turn orange-brown or golden brown. Once the moss is dead, remove it by raking.

Algae can be controlled by using sprays of the following products:
1) Potassium salts of fatty acids
   • Safer Brand Moss & Algae Killer & Surface Cleaner RTS,
   • Bayer 2-in-1 Moss & Algae Killer RTS,
   • Scott’s 3-in-1 Moss Control Ready-Spray (RTS),
   • Bonide Moss Max RTS,
   • Brandt Moss-Aside Concentrate.

Another algae control is to mix copper sulfate at the rate of 2 to 3 ounces (1½ tablespoons) in 8 gallons of water sprayed over 1000 square feet. After the algae has been killed, apply 5 to 10 pounds of ground limestone to inactivate the copper sulfate prior to reseeding with grass, which may be toxic to grass seedlings. The dead algal crust may have to be removed by raking.

If large bare areas remain after moss or algae removal that require renovation, follow the recommendations provided in HGIC 1204, Lawn Renovation.

Always read and follow all product label directions and precautions. Note: RTS means the product is ready to spray, which is a hose-end bottle.

Pesticides updated by Joey Williamson, HGIC Horticulture Extension Agent, Clemson University, 04/16. Revised by Joey Williamson, HGIC Horticulture Extension Agent, Clemson University, 09/14. Originally prepared by Janet McLeod Scott, HGIC Horticulture Extension Agent, and Bert McCarty, Turf Specialist, Clemson University. (New 01/00. Image added 11/14)

This information is supplied with the understanding that no discrimination is intended and no endorsement of brand names or registered trademarks by the Clemson University Cooperative Extension Service is implied, nor is any discrimination intended by the exclusion of products or manufacturers not named. All recommendations are for South Carolina conditions and may not apply to other areas. Use pesticides only according to the directions on the label. All recommendations for pesticide use are for South Carolina only and were legal at the time of publication, but the status of registration and use patterns are subject to change by action of state and federal regulatory agencies. Follow all directions, precautions and restrictions that are listed.