



# Maine Organic Farmers and Gardeners Association

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## MOFGA Fact Sheets

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### MOFGA FACT SHEET #9

## Soil-less Mixes for Vegetable Seedling Production

by Eric Sideman, PhD

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Soil-less mixes were developed for use in containers for seedlings because field soil does not work well. Soil alone is heavy and poorly aerated. It tends to become waterlogged and sticky when wet. Then it shrinks when it dries, pulls away from the container edges and turns into a little brick, which is difficult for plant roots to penetrate. Furthermore, field soil may be a source of diseases that retard growth and kill seedlings.

An ideal soil mix will:

- \* be dense enough to hold up the seedling
- \* retain moisture
- \* be porous enough so that excess water drains and the mix remains aerated
- \* be free of weed seeds and plant pathogens
- \* have low salinity (1 to 2 mmhos)
- \* have a pH 6.5
- \* have adequate amounts of nutrients available

Most commercial mixes on the market do not meet organic standards because they contain synthetic sources of nutrients. Basically, they are mixes of peat, perlite, vermiculite, a wetting agent, lime and chemical salts of the major nutrients. Some commercial mixes do meet organic standards. They too use peat, but instead of synthetic chemicals the organic mixes rely on compost, natural rock powders and organic sources of nutrients. Johnny's Selected Seeds and Fedco both carry approved seed starting mixes. For contact information about other commercial mixes available in Maine, call the MOFGA office at (207) 568-4142.

Many growers make their own mixes. Common ingredients for the major portion of mixes include peat, sand, vermiculite, perlite, compost and lime. Below are the basic characteristics of each of these. When designing a mix, growers look at what they need from each ingredient with regard to moisture holding capacity, aeration, nutrients, etc and then determine proportions that work.

Here are the major characteristics of these ingredients:

#### Peat

- high moisture holding capacity
- low pH (compensate with limestone by adding 2 to 3% by weight at least five days before planting)
- very little to no nutrients
- Questionably renewable resource. The Canadian peat industry claims that they are harvesting peat from bogs at a rate no higher than it grows. Still, some growers will substitute coir (coconut fibers) or leaf mold. The coconut fibers have their own environmental issue since they have to be shipped long distances. And, if you use coir make sure it is pesticide free.

#### Sand

- increases density for greater support
- improves aeration
- contains no nutrients

#### Vermiculite

- good water holding capacity
- improves aeration
- neutral pH and good buffering capacity
- high cation exchange capacity (CEC)
- sterile
- contains some magnesium and potassium

#### Perlite

- greatly improves aeration
- neutral pH but no buffering capacity
- no CEC
- no nutrients
- sterile

#### Compost

- good source of plant nutrients
- good moisture holding capacity
- high CEC
- becomes waterlogged easily

Compost for a potting soil should be the best compost. It must be mature, with a proper C:N ratio, be low in salts that would

interfere with seed germination and be porous. An optimum analysis for compost, which can be obtained by sending samples to the University of Maine Soils Lab, should be:

pH: 6-6.5  
salt: 1-3 mmhos  
C:N: 15-25:1  
bulk density: 10-30 lb/ft<sup>3</sup>  
NO<sub>3</sub><sup>-</sup> (nitrate nitrogen): > 500 ppm  
NH<sub>4</sub><sup>+</sup> (ammonium nitrogen): < 100 ppm

Here are some recipes. I suggest that you try your own based on these and the information above, and try it before you do any large plantings. The advantage of commercial mixes is that they are consistent, and the disadvantage of homemade mixes is that they often are not dependably consistent.

Recipe #1:

5 gal. compost  
5 gal. black peat  
5 gal. brown peat  
5 gal. perlite  
1 cup blood meal  
1 cup greensand  
1 cup rock phosphate

Recipe #2:

5 gal. garden topsoil  
5 gal. compost  
2 gal. brown peat  
2 gal. vermiculite  
2 cups bone meal  
1/2 cup perlite  
1 cup blood meal

Recipe #3:

5 gal. brown peat  
5 gal. black peat  
5 gal. compost  
5 gal. sand  
1 cup greensand  
1 cup colloidal phosphate  
1 to 2 cups crab meal

Recipe #4:

5 gal. black peat  
5 gal. brown peat  
1.5 gal. sand  
1/2 cup lime  
1 cup blood meal  
1 cup rock phosphate  
1 cup greensand  
1.5 gal. garden soil

NOTE: All of these mixes have concentrated sources of nitrogen, e.g., blood meal or crab meal. You can substitute alfalfa meal (not pellets which mold) or soy bean meal. You can also make any of these mixes without that and provide the needed nitrogen in periodic watering with compost tea or fish emulsion.

1. When using blood meal be aware that when it first gets wet and starts to decompose, it gives off ammonia that can kill plant roots. I suggest that you wet the potting soil about a week before you plant into it and make sure it stays aerated during that week.

2. When using topsoil you may want to "sterilize" it because of potential plant pathogens. This can be done on a small scale in your home oven. Bake it at 350°F for 45 minutes or until the soil is about 180° F for 30 minutes. This should kill the pathogens and yet leave enough of the soil microbes alive.

3. Black peat is a more humified peat that is sometime referred to as peat humus. It is not often found in commercial markets, but if you look for the darkest peat with short stems it will do fine. True black peat cannot be used alone because it becomes slimy and muddy when wet. I have heard from one grower who when it became impossible to find the black peat that they just dropped it from the mix and increased the amount of compost a bit.

*About the author: Eric Sideman is MOFGA's "extension agent." You can ask him questions about your gardens or crops.*

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