

FIELD
TESTED



Comparing Potting Mixes for Small Farms



Field Tested is a series of reports about farm tools that have been tested by Montana farmers to enhance their specialty crop production. The reports describe these farmers' findings to help others make informed decisions about their specialty crop businesses. Visit FarmLinkMontana.org/fieldtested to read more Field Tested reports. This project is administered by the Community Food & Agriculture Coalition with funding from the Montana Department of Agriculture Specialty Crop Block Grant Program.

BLACK BEAR SOUPS | MISSOULA



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Black Bear Soups Farm Snapshot

Location: Missoula, MT
Operator: Ellie Costello
Acres: 1/2 acre
Crops: Mixed Vegetables,
Flowers, and Garlic



INTRODUCTION

Ellie Costello farms part-time at a small scale. Working full time at two off-farm jobs means she must make the most of her limited time on the farm. Starting transplants indoors, rather than direct seeding is a key season extension method for her operation. To ensure that she is producing the highest quality starts, Ellie performed trials of several potting mixes and nutrient amendments, and a comparison of cell trays and soil blocking. In Ellie's words, "Though I may realize the need to spend more money on soil amendments, in the long run I hope to see cost savings due to healthy plants that produce well." Ellie hopes that this project will help her dial in her seedling practices and "help inform other small-scale productions on the best products locally available for potting soils and amendments."

BLACK BEAR SOUPS FARM

Black Bear Soups & Produce is an urban agriculture business in Missoula, MT. Black Bear is owned by Ellie Costello who grows a half-acre of mixed vegetables and flowers between two backyard market gardens in the Rattlesnake neighborhood of Missoula. Ellie farms part-time while also working full time off-farm. She has been stirring the pot since March 2015 and started Black Bear with a mission to provide local goods to local folks. Ellie has created this farm business because of a passion for providing her community with wholesome and delicious locally-sourced foods. Ellie has farmed with business partners in past seasons, but currently manages the operation by herself. Ellie grows produce and sources from other local producers to make soups. In the past, she has served at the Clark Fork and Hamilton Farmers Markets, vended at breweries, and catered events and parties. Currently, Ellie has put soups on the back-burner while she makes plans for the future of Black Bear. In 2020, Black Bear is primarily marketing bulk and decorated garlic, while soup and flower sales for events have been cancelled due to COVID-19.



Ellie observes one of Black Bear Soup's production sites

IMPROVING TRANSPLANT QUALITY

Ellie compared 4 potting soils and 4 nutrient amendments for her transplant production. For these trials, Ellie focused on products that are readily available in Western Montana and sold in quantities that are suitable for a small scale, part-time farm. Each trial was conducted on kale, cucumber, tomato and onion and the timing of each trial varied depending on the seasonality of these crops. Ellie compared

Project Supplies

- Peaco Bulk Potting Soil
- Black Gold
- Glacier Gold
- Alpacas of MT Alpaca Compost Fertilizing Potting Soil
- Missoula Soil Cycle Worm Castings
- Fish Meal, 9.6-3-0
- Bone meal, pelleted, 4-14-0
- Blood Meal, 13.6-0-0
- Hand-held 4 & 20 Soil Blockers from Johnny's Selected Seeds
- Soil Blocker Dibbles

growth of plants in each base potting mix, and each base mix combined with each amendment for a total of 50 trials.

Potting Soil Mixes

Peaco Organic Potting Mix: Of the base potting soils that Ellie tested, Peaco was her overall favorite. The Peaco product was the most affordable product tested, and proved to equal or exceed the other options in almost all trials. Sourced from Big Arm, Montana on Flathead Lake, this mix is certified organic.

The Peaco mix has hydrophobic tendencies, and must be thoroughly wetted before use, otherwise water has a tendency to bead and run off the surface of the cells. If the soil is sufficiently wet, Ellie found that it retained moisture noticeably longer than the other mixes. As a part time farmer, Ellie cannot always tend to her transplants when weather conditions change, and the Peaco moisture-retention provided better resilience to temperature increases during the day.

The Peaco mix had issues with damping off in the allium trials. Ellie experienced total loss of shallots in this mix, and thinks this is due to the moisture discussed above. Onions that survived this early threat were greener and more turgid than other trials after 6 weeks.

Alpacas of MT: This alpaca byproduct mix, performed well across trials, with one notable exception. Ellie observed kales planted in Alpaca's to be more discolored from stress than other trials. Overall, Ellie found this product to be too expensive for her purposes.

Glacier Gold: Glacier Gold (GG) potting soil can be ordered in bulk or 1.5 cu ft bags across Western Montana. While GG sells organic products, this potting mix is not organic certified. The GG mix dried out the fastest of the four trials, which is especially problematic for Ellie's farming schedule. She notes that this could be an advantage if good drainage is required in a potting mix, but will be an issue for farmers who are not



Cucumber Trials in each of the four base potting mixes. From left to right: Peaco, Alpacas of MT, Glacier Gold, and Black Gold.

always on-site with their propagation space. Ellie found the GG mix to provide a fast start to her plants, but seemed to release its nutrients quickly and plant vigor tapered off and fell behind the other trials.

Black Gold: This potting mix is available at most garden retail stores and a certified organic version is available, which Ellie used for this project. She reported the Black Gold (BG) “had consistently good performance but plants were not as healthy as in Peaco.” She observed tomatoes to be smaller in this mix, though healthy, and cucumbers were larger over the first month, but fell behind the Peaco by month two. BG also had issues with damping off in her shallot trial.

Nutrient Amendments

Ellie tested four nutrient amendments in her trials: worm castings, bone meal, fish meal, and blood meal. Ellie found differences in the performance of each as well as difference in usability. The texture of each of the materials impacted its nutrient release rate and also its ability to go airborne and cause respiratory irritation to the farmer.

Worm Castings These were Ellie’s favorite amendment to work with and she incorporated them at a ratio of 1 part castings to 3 parts potting mix. While this means a significant amount of worm castings are used, there is no risk of over applying this product and ‘burning’ the plants. Ellie noticed an increase in the size of cucumbers with castings, but did not see size differences in other crops, though found plants to be more green and less nutrient deficient in the GG and BG mixes with castings. Ellie sourced her castings from Missoula Soil Cycle, which composts kitchen waste from homes and restaurants and therefore cannot certify organic. The product is



Peaco Potting Soil Kale Trials with nutrient amendments from left to right: bone meal, fish meal, bone meal, worm castings, and none.



Nutrient trials in Alpacas of MT mix on left and Peaco on right. Note the healthier coloration of the plants in the Peaco mix.

not weed free and Ellie's plants were joined in their cells by lots of volunteer tomatoes.

Bone Meal The bone meal that Ellie used came in a pelleted form which she liked a great deal. She found it second easiest to work with, and appreciated the slow and steady release of nutrients, and low risk of going airborne. The bone meal pellets were added to the potting mix at 2 tablespoons per gallon, and Ellie notes that using pellets means that the distribution between cells is likely uneven, though she didn't observe significant inconsistency in the results. She found the bone meal produced the largest cucumbers, the most robust thick-stemmed tomatoes and the greenest, healthiest onions. While the tomatoes were not the tallest of the trials, they had the thickest stems, which improved transplanting and transportation to field sites.

Fish Meal and Blood Meal Ellie rated fish meal and blood meal the lowest in her trials. Both had a tendency to go airborne during mixing, with the blood meal especially feeling unsafe. The fish meal amended plants were healthy overall, but tended to be taller, with less sturdy stems than the bone meal. This was especially noticeable in the tomatoes, and Ellie preferred the shorter, stouter plants for transplanting.

Ellie applied fish meal at two tablespoons per gallon, and blood meal at 1-2 tablespoons per gallon. She incorporated the blood meal one week in advance to allow time for ammonia to off-gas. Despite this precautionary period, the blood meal amendment was too hot for plants at this rate and she experienced plant losses in all trials. She found the blood meal to be more effective as a field amendment at transplanting, applied at the rate of one cup per 20 square feet.

Soil Blocking

Soil blocking is a method of compressing potting mix into free-standing cubes that hold each transplant. The outside of each cube is exposed to the air, which reduces root-binding because the plants roots will 'air prune.' Many soil block users mix their own custom potting mix for blocks. Ellie tested each of the potting mixes in her trial for their ability to form blocks without any additions.

Ellie found the Peaco to hold together best as blocks, which she credits to the higher levels of peat moss in this mix. Black Gold and Alpacas of MT also performed well. The Glacier Gold mix was "a complete failure" and is not recommended for blocks. In cucumber trials Ellie noted the blocks produced larger healthier plants, most likely due to

the greater volume of soil in a block compared to a tray cell. Overall, she found soil blocks faster to transplant, as they don't need to be removed from a tray cell.

COMPARISON OF LOCALLY AVAILABLE POTTING MIXES

The table below shows Ellie's overall rating of each potting mix and nutrient combination she trialed.

Potting Blends	Crop Trials				
Potting Mix	Amendments	Kale	Cucumber	Tomato	Allium
Peaco	Bone	Better	Best	Best	Best
	Blood	NA	NA	Avoid	NA
	Fish	Best	Good	Better	Good
	Worm	Good	Better	Good	Better
Alpacas of MT	Bone	Better	Best	Best	Best
	Blood	NA	NA	Avoid	NA
	Fish	Best	Good	Better	Good
	Worm	Good	Better	Good	Better
Black Gold	Bone	Better	Best	NA	Best
	Blood	NA	NA	Avoid	NA
	Fish	Best	Good	NA	Good
	Good	Good	Better	NA	Better
Glacier Gold	Bone	Better	Best	Best	Best
	Blood	NA	NA	Avoid	NA
	Fish	Best	Good	Better	Good
	Good	Good	Better	Good	Better

Additional Resources

Montana Department of Agriculture Specialty Crop Block Grant Program: The purpose of this program is solely to enhance the competitiveness of specialty crops in Montana. Visit their website to find funding opportunities and more information. Search [Montana SCBG](#).

Field Tested Reports and Videos: Find more reports about other projects and see videos of tools in action at the [Field Tested webpage, under Resources on FarmLinkMontana.org](#)