



This is a section from the

2020/2021

Mid-Atlantic

Commercial Vegetable

Production Recommendations

The recommendations are **NOT** for home gardener use.

The **full manual**, containing recommendations specific to New Jersey, can be found on the Rutgers NJAES website in the Publications section: <http://njaes.rutgers.edu/pubs/publication.asp?pid=E001>.

This manual will be revised biennially. In January 2021, a **critical update** with important updates to the 2020/2021 manual will be communicated through local Extension Agents and Vegetable Specialists.

The **label** is a legally-binding contract between the user and the manufacturer. The user must follow all rates and restrictions as per label directions. The use of any pesticide inconsistent with the label directions is a violation of Federal law.

Cooperating Agencies: Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and County Boards of Chosen Freeholders. Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.

G. Resources and Records

1. Resources

1.1 Vegetable Seed Sizes

Table G-1. Vegetable Seed Sizes

Use this table to estimate your seed requirements. Varieties and seed lots can differ in seed size. Check with your seed supplier and the label on the container for more precise information.

Crop	Seeds/Unit Weight	Crop	Seeds/Unit Weight
Asparagus	13,000-20,000/lb	Mustard	15,000-17,000/oz
Beans: baby lima	1,150-1,450/lb	Okra	450-550/oz
Beans: fordhook	440-550/lb	Onions: bulb	105,000-144,000/lb
Beans: snap	1,600-2,200/lb	Onions: bunching	180,000-200,000/lb
Beets	24,000-26,000/lb	Parsnips	7,500-12,000/oz
Broccoli	8,500-9,000/oz	Parsley	240,000-288,000/lb
Brussels sprouts	8,500-9,000/oz	Peas	1,440-2,580/lb
Cabbage	8,500-9,000/oz	Peppers	4,000-4,700/oz
Carrots	300,000-400,000/lb	Pumpkins	1,900-3,200/lb
Cauliflower	8,900-10,000/oz	Radishes	40,000-50,000/lb
Celery	60,000-72,000/oz	Rutabaga	150,000-192,000/lb
Collards	7,500-8,500/oz	Spinach	25,000-50,000/lb
Cucumbers	15,000-16,000/lb	Squash: summer	3,500-4,800/lb
Eggplants	6,000-6,500/oz	Squash: winter	1,600-4,000/lb
Endive, Escarole	22,000-26,000/oz	Sweet corn: normal, sugary enhanced	1,800-2,500/lb
Kale	7,500-8,900/oz	Sweet corn: Super sweet (Sh)	3,000-5,000/lb
Leeks	170,000-180,000/lb	Tomatoes: fresh	10,000-11,400/oz
Lettuce: head	20,000-25,000/oz	Tomatoes: processing	160,000-190,000/lb
Lettuce: leaf	25,000-31,000/oz	Watermelons: small seed	8,000-10,400/lb
Muskmelons	16,000-19,000/lb	Watermelons: large seed	3,200-4,800/lb

1.2 Plant Spacing and Populations

Table G-2: Plant Spacing and Populations

This table lists plant population size (plants per acre) at different combinations of between- and in-row spacing.

Between-Row Spacing (inch) ↓	In-Row Spacing (inch) →												
	2	4	6	8	10	12	14	16	18	24	30	36	48
7	448,046	224,023	149,349	112,011	89,609	74,674	64,006						
12	261,360	130,680	87,120	65,340	52,272	43,560	37,337	32,670	29,040	21,780	17,424	14,520	10,890
18	174,240	87,120	58,080	43,560	34,848	29,040	24,891	21,780	19,360	14,520	11,616	9,680	7,260
21	149,349	74,674	49,783	37,337	29,870	24,891	21,336	18,669	16,594	12,446	9,957	8,297	6,223
24	130,680	65,340	43,560	32,670	26,136	21,780	18,669	16,335	14,520	10,890	8,712	7,260	5,445
30	104,544	52,272	34,848	26,136	20,909	17,424	14,935	13,068	11,616	8,712	6,970	5,808	4,356
36 (3 ft)	87,120	43,560	29,040	21,780	17,424	14,520	12,446	10,890	9,680	7,260	5,808	4,840	3,630
42 (3½ ft)	74,674	37,337	24,891	18,669	14,934	12,446	10,668	9,334	8,297	6,223	4,978	4,149	3,111
48 (4 ft)	65,340	32,670	21,780	16,335	13,068	10,890	9,334	8,167	7,260	5,445	4,356	3,630	2,722
60 (5 ft)			17,424	13,068	10,454	8,712	7,467	6,534	5,808	4,356	3,485	2,904	2,178
72 (6 ft)			14,520	10,890	8,712	7,260	6,223	5,445	4,840	3,630	2,904	2,420	1,815
84 (7 ft)			12,446	9,334	7,467	6,223	5,334	4,667	4,149	3,111	2,489	2,074	1,556
96 (8 ft)			10,890	8,167	6,534	5,445	4,667	4,084	3,630	2,722	2,178	1,815	1,361

1.3 Frequently Used Weights and Measures

Table G-3: Frequently Used Weights and Measures

Frequently Used Weights and Measures and Approximate Metric Equivalents

Liquid				Dry			
Pint	Liters	Gallons	Liters	Ounces	Grams	Pounds	Kilograms
0.5	0.24	1	3.8	0.25	7.1	1	0.45
1.0	0.47	2	7.6	0.50	14.2	2	0.91
1.5	0.71	3	11.4	0.75	21.3	3	1.36
2.0	0.95	4	15.1	1.0	28.4	4	1.81
2.5	1.18	5	18.9	2.0	56.7	5	2.27
3.0	1.42	6	22.7	3.0	85.0	6	2.72
3.5	1.65	7	26.5	4.0	113.4	7	3.18
4.0	1.90	8	30.3	5.0	141.7	8	3.63
4.5	2.13	9	34.1	10.0	283.5	9	4.08
5.0	2.37	10	37.9	16.0	453.6	10	4.54

Length	Area
1 inch = 2.54 centimeters	1 acre = 0.405 hectares
1 foot = 30.48 centimeters	1 square mile = 2.59 square kilometers
1 yard = 0.914 meters	1 square yard = 0.836 square meters
1 mile = 1.61 kilometers	1 square foot = 0.0929 square meters
	1 square inch = 6.45 square centimeters

1.4 Making a Plant-Growing Mix

Many pre-mixed growing media products suitable for conventional and organic production are available commercially. A good, lightweight, disease-free, plant-growing material can also be made from a mixture of peat and vermiculite. A formula for a very simple mix for conventional production is given in Table R-4, but a preferred formulation is shown in Table R-5. If plants are to be grown in a mix longer than 8 weeks, use the formula in Table R-5. Organic growing media differ from conventional media because all components used must be allowable under organic production standards. When mixing your own formulation, it is important to verify with your certifier that the materials you are using will not compromise your certification. For more information on organic growing media including several formulations can be found in:

- Potting Media and Plant Propagation: <https://extension.psu.edu/potting-media-and-plant-propagation>
- Potting Mixes for Certified Organic Production: <https://attra.ncat.org/attra-pub/viewhtml.php?id=47>
- Organic Potting Mix Basics: <http://www.extension.org/pages/20982/organic-potting-mix-basics>

Regardless of which formula is chosen, unless good mixing procedures are used, the results will be less than optimal. For best mixing, use a horizontal-type paddle mixer that folds or blends the components, such as lime and fertilizer, evenly throughout the mix. With tilted or other types of mixers, the components tend to segregate or separate out, resulting in erratic performance of the mix.

Good procedures to follow when preparing a mix are:

1. Use a respirator to prevent inhalation of dust when mixing peat, vermiculite and additives.
2. For small quantities of mix preparation (1 cubic yard or less) place 4 to 5 inches of vermiculite in the bottom of a 5-gallon pail. Add all the additives (lime, fertilizer, etc.) to the vermiculite in the pail and mix thoroughly.
3. Fluff the recommended amount of peat. Start mixer and begin blending the peat.
4. While blending, add water according to the dampness of the peat. You will need approximately 1 gallon of water per bushel of peat in the mix.
5. While blending, slowly pour the additives, which you have already mixed thoroughly with a small amount of vermiculite, into the mixer and blend for 3 to 5 minutes.
6. Add the recommended amount of vermiculite after the other ingredients and blend for 1 minute or less, depending on the consistency of the vermiculite. It should be mixed thoroughly without breaking down.
7. Use the mix for growing your plants soon after mixing. It is not a good practice to stockpile the mix in large piles for long periods of time.
8. Read all labels of the ingredients used and heed all warnings that may be marked on the labels or bags.

Table G-4. Simple Plant-Growing Mix

This mix will only get the seedlings up. Supplemental fertilizing will be needed to grow plants to transplant size. About 3 weeks after seeding, begin liquid fertilizing the plants with a soluble fertilizer, such as a 20-20-20, at the rate of 2-3 tsp/gal water. This rate should be applied at least weekly. More frequent applications may be desirable.

Note: Lettuce and cabbage transplants have been grown successfully on this mix diluted with an equal part of sand.

Materials	One Cubic Yard (=22 Bushels)	(2 Bushels)
Shredded sphagnum peat moss	11 bu	1 bu (10 gal)
No. 2, 3, or 4 domestic or African vermiculite ¹ or horticultural grade (dust-screened)	11 bu	1 bu (10 gal)
Pulverized limestone - use <i>dolomitic</i> lime for mixes made with <i>domestic</i> vermiculite <i>or</i> - use <i>calcitic</i> lime mixes made with <i>African</i> vermiculite	10 lb <i>or</i> 6 lb	1 lb (1¼ cups) <i>or</i> 9 oz (¾ cup)
- Superphosphate (20% P ₂ O ₅) <i>or</i> - Triple superphosphate (46% P ₂ O ₅)	2½ lb <i>or</i> 1¼ lb	4 oz (½ cup) <i>or</i> 2 oz (¼ cup)
Fertilizer (5-10-10)	5 lb	8 oz (1 cup)

¹Vermiculite should be approximately pea sized and relatively free of fines and dust. Final mix should have a pH of 6.0-6.5.

Table G-5. Preferred Plant-Growing Mix

Note: Osmocote is a slow-release fertilizer. Use a formula that will release nutrients over a period of 8-9 months.

Mixes should be made just prior to seeding. Plants grown in mixes containing Osmocote must be carefully watered and the temperature must be carefully controlled prior to field planting. When using small cells, reduced Osmocote rates are suggested to control plant height.

Materials	One Cubic Yard (=22 Bushels)	(2 Bushels)
Shredded sphagnum peat moss	11 bu	1 bu (10 gal)
No. 2, 3, or 4 domestic or African vermiculite ¹ or horticultural grade (dust-screened)	11 bu	1 bu (10 gal)
Pulverized limestone - use <i>dolomitic</i> lime for mixes made with <i>domestic</i> vermiculite <i>or</i> - use <i>calcitic</i> lime mixes made with <i>African</i> vermiculite	10 lb <i>or</i> 6 lb	1 lb (1¼ cups) <i>or</i> 9 oz (¾ cup)
- Superphosphate (20% P ₂ O ₅) <i>or</i> - Triple superphosphate (46% P ₂ O ₅)	2½ lb <i>or</i> 1¼ lb	4 oz (½ cup) <i>or</i> 2 oz (¼ cup)
Sulfate or muriate of potash (50%-60% K ₂ O)	½ lb	1 oz (2 tbs)
Osmocote (18-6-12)	4 lb (tomatoes) 8 lb (eggplants) 8 lb (peppers)	6 oz (¾ cup) (tomatoes) 12 oz (1½ cups) (eggplants) 12 oz (1½ cups) (peppers)
Micronutrient mix	Use according to manufacturer recommendations	
Wetting agent (such as Aqua-Gro granular)	1½ pt	1 oz (4 tbs)

¹Vermiculite should be approximately pea-sized and relatively free of fines and dust. Final mix should have a pH of 6.0-6.5.

2. Records

2.1 Pesticide Application Record

These forms can be found online at <https://pestmanagement.rutgers.edu/pat/record-forms-2/>

PESTICIDE APPLICATION RECORD													
Location of Application				Pesticide Product Used			Mixture Recipe per Product Label				Date (M/D/Y) and Time (am/pm)		Applicator Full Name & Pesticide License Number or Unlicensed Handler Full Name
Farm Name and Address; City or Township; and County of Application	Field Name	Acres Treated	Crop Treated	Brand Name of Pesticide	EPA Registration Number	Active Ingredient(s)	Amount of Pesticide Concentrate used before mixing	Total Diluent	Total Volume Applied	Date/Time Application Completed	Date/Time Reentry Allowed		
	Sitio Aplicado	Acres Tratado	Cosech Tratado	Nombre del Pesticida	Numero de Registracion EPA	Ingrediente Acitvo	Aumente el pesticida concentrado usarlo antes mesclarlo	Candidad Usada	Total Volumen Aplicar	Fecha y Hora de la Aplicacion	Fecha y Hora de Reentrada		

PESTICIDE APPLICATION RECORD

New Jersey regulations require growers (private applicators) to maintain records of **all applications** of pesticides (both general and restricted use) for 3 years. All records should be recorded in writing as soon as possible, but no later than 24 hours. These records must be made available to the New Jersey Department of Environmental Protection and medical personnel (for emergencies) upon request.

Below is an example using a one-page format for keeping your records. This template provides English & Spanish headings; Spanish is optional. The most current version can be found on the Rutgers Pest Management Office website at <http://pestmanagement.rutgers.edu/pat/record-forms/>. You can use your own recordkeeping format as long as you include all of the information required by State regulations (NJAC 7:30-8.8 Records). If you don't include it as part of your application record, keep a separate list of handlers working under the private applicator's supervision.

The crop/field designation must be specific. *For example* - assign a number to each field, or the parts of a field planted to different crops, or the parts of a field planted to the same crop in a different growth stage. Then use this number on the application record for each application to that specific location. For all pesticides having a restricted entry interval (REI), enter the date and the hour that the application was completed, and the date and time that reentry may be allowed. When there are several pesticides in the tank mix, re-entry can only be allowed after the longest REI.

Location of Application				Pesticide Product Used			Mixture Recipe per Product Label		Date (M/D/Y) and Time (am/pm)			Applicator Full Name & Pesticide License Number or Unlicensed Handler Full Name
Farm Name and Address; City or Township; and County of Application	Field Name	Acres Treated	Crop Treated	Brand Name of Pesticide	EPA Registration Number	Active Ingredient(s)	Amount of Pesticide Concentrate used before mixing	Total Diluent	Total Volume Applied	Date/Time Application Completed	Date/Time Reentry Allowed	
		Sitio Aplicado	Acres Tratado	Cosech Tratado	Nombre del Pesticida	Numero de Registracion EPA	Ingrediente Acitvo	Aumente el pesticida concentrado usarlo antes mesclarlo	Cantidad Usada	Total Volumen Aplicar	Fecha y Hora de la Aplicacion	Fecha y Hora de Reentrada
<i>Example:</i> XYZ Farm 1234 Farm Road; Agriville; Cumberland County	G-11	8	Tomatoes	Vydate L	352-372	Oxamyl	12 qts.	400 gal	400 gal	6/15/12 9:30 a.m.	6/17/12 9:30 a.m.	John Smith C080569

