

Getting the most out of your strawberry soil test report

- Be certain your soil pH is in the optimal range.
- Add a nitrogen (N) source at the recommended rate and time.
- Add a phosphorus (P) or potassium (K) source only if soil test levels are low.

General Information

When planted and managed properly many cultivars can be successfully grown in New York State. Choose a site with full sun and good drainage. Begin improving the soil the year before planting especially if the pH needs adjusting. Plant in early spring in soil where no strawberries, brambles or crops in the tomato family have been grown for several years.

The most commonly grown strawberries are June-bearing strawberries which fruit in June and July. The less common day-neutral strawberry plants fruit from June to October. Details on their specific fertilization needs are at the end of this document.

Soil pH in the 6.0 to 7.0 range is ideal, 6.2 is optimal for strawberries.

When soil pH is outside this optimal range and low, lime can be mixed in to raise soil pH. Sulfur is used to lower soil pH.

The recommended rate of material should be mixed into the upper 6 to 8 inches of soil. To avoid harming plant roots and to provide the necessary time for the material to adjust the pH throughout the root zone, it is best to mix liming or acidifying material into the soil one year before planting if possible.

When a large amount of material is recommended, such as 20 pounds of lime per 100 square feet, apply half in the spring and the other half in the fall before planting.

Wood ashes are not used as an amendment to improve soil physical properties. However, they can be used to raise soil pH in place of lime, just double the recommended liming amount. Avoid applying both lime and wood ashes which can raise the soil pH beyond the optimum range of 6.0-7.0. When using wood ashes as a lime substitute, be sure to incorporate them into the upper 6 to 8 inches of soil in advance of seeding or

transplanting. Do not apply more than 10 lbs. of wood ashes per 100 square feet to avoid raising the pH above the optimum range.

Promote plant health, increase yield, and save money with proper fertilizer applications.

Nutrients required by strawberry plants in the highest quantity are nitrogen (N), potassium (K) and phosphorus (P). Other essential nutrients are usually available in adequate quantities when the pH is in the optimal range. There is no benefit to applying more fertilizer than plants require. In fact, over application of nutrients may be harmful to plant growth and the environment.

Fertilizer Sources

Organic matter is added to the soil to improve soil properties by increasing the water and nutrient holding capacity, improving aeration and drainage, feeding microorganisms and providing some nutrients. Common organic matter sources include composted manure, peat moss, plant-based compost and plant and animal by-products.

Animal manures and plant-based compost (yard waste, grass clippings, food waste) are readily available and popular amendments and fertilizers commonly considered as **natural organic**.

Nutrient content of composted products will vary depending on the source (plant or animal), moisture content, how it was stored and how long it was composted. Weed seeds, a high salt content and pathogens might be a problem with fresh manure or other organic materials if they are not fully composted. Knowing the nutrient and salt content of your compost or manure pile would add precision to application rates for a given site. However, this would require testing every time one of the above variables changes, making this impractical and cost prohibitive for the average gardener.

The nutrient analysis of commercially available manure and compost is found on the bag. Keep in mind these products may also have a high salt content and only 5 to 20% of the nitrogen will be available to the plants during the first year of application.

Only mix in manure or other materials that are fully composted. Fully composted manure has aged for at least 6 to 9 months. Incorporate into the upper 4 to 6 inches of soil before and to minimize runoff.

More about organic matter

Annually replenishing organic matter to improve soil health is a common practice. Sandy soils with an organic matter content of 2-2½% and clayey soils with 3-5% organic matter will perform fine. **Organic matter levels twice this amount could lead to nutrient imbalances.**

Too much of a good thing? *If a regular soil test indicates nutrient levels exceed crop needs, limit compost applications to promote healthy soil for plant success.*

Inorganic fertilizers are compounds that are chemically synthesized from basic raw materials, isolated from naturally occurring sources or mined materials that provide nutrients. They are less expensive and have a higher nutrient content. They are water-soluble and are quickly available to plants, easy to apply and especially useful in cool weather.

Care should be taken however, when using *water-soluble fertilizer* sources because they are made of salts that can burn plants. Also if over applied and watered in excessively they can leach beyond the root zone and end up in the ground water which impacts water quality negatively.

The nutrient content (fertilizer analysis) is required to be listed on every bag of commercially available fertilizer. The first number indicates the *percent* of nitrogen (N), the second number is the *percent* of phosphate (P_2O_5) a source of phosphorus, and the third number is the *percent* of potash (K_2O) a source of potassium. They are simply referred to as N-P-K. A 50 lb. bag of 5-10-5 contains 2½ lbs. of N, 5 lbs. of P_2O_5 and 2½ lbs. of K_2O . The rest of the material is made up of other inert material, such as sand or clay granules to help spread the fertilizer.

When nitrogen (N), phosphorus (P) and potassium (K) are all needed, a *complete fertilizer* that contains all 3 nutrients, for example: 10-10-10, 5-10-5, or 5-10-10, can be used.

Timing and Fertilizer Rates

Pre-plant fertilizer practices:

Nitrogen (N) is *not applied* before planting. Strawberry plants should be fertilized six weeks after planting with 4 ounces (oz.) of nitrogen for every 100 feet of row. Repeat this application in early September. See **Table C** for nitrogen fertilizer sources and more details.

Phosphorus (P) is important in early root development and improves the quality of fruits.

Phosphorus does not move much in the soil. It is best to incorporate P before planting. Mix fertilizer into the upper 4 to 6 inches of the soil where root growth is most active.

If only P is needed, use **Table A** to help determine the amount of phosphorus fertilizer to apply. If the planting is already established, select a water-soluble fertilizer with a high percentage of P and apply according to label directions.

Be careful: animal manures, fresh and composted, often contain high levels of P. Regularly adding manure to gardens can raise soil P to excessive levels.

Table A: Soil test levels and pre-plant phosphorus (P) recommendations for strawberry plants					
Soil test report levels	Ounces of phosphate (P₂O₅) to apply per 100 sq. ft. prior to planting	Some fertilizer sources that contain phosphorus (P) (notice the concentration differs for each so the amount to apply differs)			
		Inorganic fertilizers		Organic fertilizers	
		Super-phosphate 0-20-0	Triple Super-phosphate 0-46-0	Bone Meal 1-15-0 also contains N	Rock phosphate 0-3-0
		20% P₂O₅	46% P₂O₅	15% P₂O₅	3% P₂O₅
		Quickly available	Quickly available	Slowly available	Slowly available
		Amount of product to apply per 100 square feet			
Very low	3¼ oz.	1 lb.	7 oz.	1½ lbs.	6¾ lbs.
Low	2.0 oz.	10 oz.	4⅓ oz.	13 oz.	4 lbs.
Medium	1 oz.	5 oz.	2¼ oz.	6½ oz.	2 lbs.
High	0	0	0	0	0

Note: Strawberries tend to have a low demand for P related to other crops. Once the strawberry planting is established it rarely will benefit from additional phosphorus.

Potassium (K) increases water efficiency, improves stress tolerance and the quality of fruit.

Pre-plant incorporation of K is the most effective way to get enough K into the soil system when soil test indicates a less than optimum level. Surface applications are of limited value for a short-term crop like strawberry plants.

When only potassium is needed note the soil test level and select a potassium fertilizer source and apply at the recommended rate. Keep in mind that wood ashes contain potassium (3-7% K₂O) and if used supplemental K will not likely be needed.

Table B lists potassium recommendations and application rates. Use the bolded higher rate if the soil is sandy (coarse-textured). Lower rates apply to fine-textured soils with more clay.

Table B: Soil test levels and pre-plant potassium (K) recommendations for strawberry plants

Soil test report levels	Ounces of Potash (K ₂ O) to apply per 100 sq. ft. prior to planting	Some fertilizer sources that contain potassium (K) (notice the concentration differs for each so the amount to apply differs)		
		Inorganic fertilizers	Organic fertilizers	
		Potash 0-0-60	Kelp 1-0-2 also contains N	Greensand
		60% K ₂ O Quickly available	2% K ₂ O Quickly available	7% K ₂ O Very slowly available
Very low	2 - 3¼ oz.	3 oz. - 5½ oz.	6¼ lbs. - 10 lbs.	1¾ lbs. - 3 lbs.
Low	1½ - 2½ oz.	2½ oz. - 4 oz.	4½ lbs. - 7¾ lbs.	1⅓ lbs. - 2¼ lbs.
Medium	1 - 1½ oz.	1½ oz. - 2½ oz.	3 lbs. - 4½ lbs.	1 lb. - 1⅓ lbs.
High	0	0	0	0

Note:

Once the strawberry planting is established it rarely will benefit from additional potassium.

Use the **bolded higher rate** if the soil is sandy (coarse-textured). Lower rates apply to fine-textured soils with more clay.

Fertilizing Established Strawberry Plantings:

Nitrogen (N)

The nitrogen content of a soil sample does not necessarily reflect the future availability of nitrogen because unlike phosphorus and potassium, the nitrogen level will fluctuate depending on biological activity and soil conditions. Nitrogen is one of the most important nutrients for plant growth and is needed in relatively large amounts by all plants so a standard nitrogen recommendation is routinely provided for fruit plantings.

In the planting year, strawberry plants should be fertilized six weeks after planting with 4 ounces (oz.) of nitrogen for every 100 feet of row. Repeat this application in early

September. Only apply the recommended rate of nitrogen because excessive fertilizer application rates may be harmful to plant growth and the environment.

In the years after the planting year, strawberry plants should be fertilized immediately after fruiting with 9 oz. of nitrogen per 100 feet of row and then again in early September with 4 oz. of nitrogen. See **Table C** for nitrogen sources and recommended application rates.

Table C: Nitrogen(N) sources and <u>approximate</u> application rates for strawberry plantings				
Common nitrogen fertilizers	Fertilizer analysis	Amount of this fertilizer needed to apply (N) per 100 feet of row to supply		Other considerations
		9 oz. (July)	4 oz. (September)	
Urea (synthetic)	46-0-0	1¼ lbs.	½ lb.	Inexpensive, concentrated, may be difficult to apply
Calcium nitrate (inorganic)	15-0-0	3¾ lbs.	1½ lbs.	Can help raise pH
Ammonium sulfate* (inorganic)	21-0-0	2½ lbs.	1 lb.	Acidifying, can help lower pH, can use for acid loving crops
Ammonium nitrate (inorganic)	34-0-0	1½ lbs.	¾ lb.	Provides both quick and slow nitrogen release
Blood Meal (natural organic)	12-0-0	4½ lbs.	2 lbs.	Commonly available, slightly acidifying
Corn Gluten (natural organic)	10-0-0	5½ lbs.	2½ lbs.	Expensive
Cotton Seed Meal (natural organic)	6-2-1	9 lbs.	4 lbs.	Acidifying, can help lower pH, also contains phosphorus and potassium
Sodium Nitrate (natural organic)	16-0-0	3½ lbs.	1½ lbs.	Avoid high rates

*This is an acidifying fertilizer which lowers soil pH. Do not exceed recommended rate.

Fertilizing Day-Neutral Strawberry plants

Day-neutral strawberries produce fruit from June to October and are fertilized differently from June-bearing strawberries. Day-neutral strawberry plants benefit from receiving small amounts of fertilizer applied more often. In the planting year apply 4-9 ounces of nitrogen per 100 linear feet of row each month from June through September. See Table C which provides the amount of fertilizer to apply when using different nitrogen sources.

Be very careful to side-dress the fertilizer and avoid contact with the leaves, especially when they are damp and the weather is hot. Instead of monthly applications, you can use annual applications of slow release fertilizer that deliver the same amount of nitrogen.

Fertilizer application tips for established strawberry plantings:

Do not work fertilizer into the soil. It may damage roots.

Side dressing refers to the addition of fertilizer during the growing season. Apply the side dress fertilizer 2 to 4 inches from the growing plant to avoid contact with green plant tissue, lightly rake into the soil and then water it in to move fertilizer through soil to where roots are growing.

[For more gardening information visit Cornell Garden-Based Learning website:](http://gardening.cals.cornell.edu/garden-guidance)

<http://gardening.cals.cornell.edu/garden-guidance>

[For more information on growing fruit:](http://gardening.cals.cornell.edu/garden-guidance/foodgarden/#Growing%20Fruit)

<http://gardening.cals.cornell.edu/garden-guidance/foodgarden/#Growing%20Fruit>

[For more information on growing strawberries:](https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/f/575/files/2015/12/5strawberries-21dju94.pdf)

<https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/f/575/files/2015/12/5strawberries-21dju94.pdf>