

# Soils and Fertilizers



**Answers to  
review questions**

**1. Explain why good soil structure is important to gardeners.**

- Permeability (*p. 40*)
- Water-holding capacity (*p. 40*)
- Drainage (*p. 40*)
- Root penetration (*p. 40*)
- Soil aeration (*p. 40*)

**2. Mark each of the following statements as True (T) or False (F).\***

*F* Clay loam soil is unable to hold enough water for good plant growth (*p. 39*).

*T* Clay loam soil remains cool and wet late into the spring (*p. 39*).

*T* Clay loam soil stays warm late into the fall.

*T* Clay loam soil needs drainage improvement (*p. 39*).

*T* Clay loam soil takes more lime to correct an acidity problem than would a sandy loam.

**3. A client has cold, wet soil. List two problems that are likely to occur in his garden.**

- The soil temperature will be slow to warm up in the spring (*p. 41*).
- The gardener will have to delay tilling and planting (*p. 41*).
- Many plants don't grow well with "wet feet" (*p. 41*).
- Some plants are susceptible to root diseases in wet soil (*p. 41*).

**What could you recommend to help alleviate these problems?**

- Divert runoff (*p. 42*).
- Avoid plants that don't like wet conditions (*p. 42*).
- Use raised beds (*pp. 42, 145*).
- Install drainage (*p. 42*).

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\*You may need to use other chapters, additional reference materials, or your own experience to answer this question fully.

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4. **A house was built on a parcel of land that previously was covered with brush. The land was cleared, and the debris and much of the topsoil were removed from the site. List two soil problems the homeowner is likely to have in this situation.\***
- Compaction of existing soil (*p. 40*)
  - Loss of topsoil
  - Poor soil structure (*p. 40*)
  - Fill material

**What could you recommend to help with these problems?**

- Till deeply.
- Select good fill material.
- Incorporate fill material if possible.
- Plant something to rebuild soil structure and encourage development of biological activity. Grass often works well for this purpose even in areas intended for landscaping and gardens. Use annual grass in these areas.

5. **Soil abounds with life. Why is this life important in a practical way to gardeners?**
- Soil organisms break down the remains of plants and other organisms, thereby releasing nutrients and reducing the need for added fertilizer. This process also creates beneficial organic matter (*p. 42*).
  - Rhizobia bacteria infect legume roots and convert atmospheric nitrogen to a form plants can use (*p. 43*).
  - Earthworms mix soil and create macropore channels (*p. 43*).
  - Mycorrhizae infect plant roots and increase their ability to take up plant nutrients (*p. 43*).
6. **Why should you add organic matter to your garden soil?**
- It improves drainage in fine-textured (clayey) soils (*pp. 41, 54–55*).
  - It improves water-holding capacity in coarse-textured (sandy) soils (*pp. 41, 54–55*).
  - It reduces the amount of fertilizer needed (*pp. 41, 54–55*).

7. **A gardener mulches her vegetable garden with straw just after planting some young transplants. A short time later, she observes that the leaves of the plants are turning yellow. What is one possible nutrient-related cause of the yellowing? How would you advise her to correct the problem?**

The straw has a high ratio of carbon to nitrogen (C:N). As soil organisms break down the straw, they remove nitrogen from the soil solution. The plant yellowing is a response to nitrogen deficiency. Adding a soluble source of nitrogen should help correct the problem. Removing the straw also might be a good idea to prevent slug damage (*pp. 54–55*).

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8. Mark each of the following statements as True (T) or False (F). For true statements, indicate whether the statement identifies an advantage or a disadvantage of using an organic fertilizer.

F Nutrients in most organic fertilizers are quickly available to plants.

T Most organic fertilizers improve the long-term nutrient-holding capacity of soils. **Advantage** (p. 48)

T Using organic fertilizers usually involves recycling materials that otherwise would be discarded. **Advantage** (p. 47)

F Using organic fertilizers increases the risk of nitrogen leaching into the groundwater.

T Organic fertilizers usually have a low nutrient content. **Disadvantage** (p. 47)

9. A fertilizer label reads 18-46-0. What does this mean?

The material in the package contains 18% nitrogen, 46% phosphate, and 0% potassium. This material is diammonium phosphate (p. 48).

10. What are the best methods for determining how much fertilizer to use on a garden?

- Soil tests (p. 52)
- Extension publications (pp. 52–53)

11. If an Extension publication (e.g., EC 1503) recommends applying 2 pounds of 16-20-0 fertilizer per 100 square feet, how many pounds of fertilizer would you put on a 20' x 15' garden?

6 pounds [The garden is 300 square feet (20' x 15'). 2 lb per 100 square feet x 3 = 6 lb] (p. 53)

12. How much fresh cow manure could you use as a substitute for the fertilizer in #11?

Six 5-gallon buckets [one 5-gallon bucket of fresh cow manure per 50 square feet of garden] (p. 49)

What precautions would you take when using manure?

- Do not use manure around root crops or low-growing crops such as lettuce or strawberries (p. 50).
- Never use dog, cat, or pig manure (p. 50).
- Cook food grown in manured gardens. At the very least, wash and peel raw produce (p. 50).

13. List the three ways that soil pH affects plants.

- It affects the availability of plant nutrients (p. 57).
- It affects the availability of toxic metals (p. 57).
- It affects the activity of soil microorganisms, which in turn affect nutrient cycling and disease risk (p. 57).

14. What is the “ideal” soil pH range for a vegetable garden?

5.5 to 7.5 (p. 57)

15. What happens when soil pH is higher or lower than the ideal range?

Plants may suffer from nutrient deficiency or metal toxicity (p. 57).

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**16. How can a gardener increase soil pH? How can he/she decrease it?**

- To *increase* soil pH, add lime or wood ashes (*pp. 57–58*).
- To *decrease* soil pH, add elemental sulfur, ammonium sulfate, or urea (*p. 58*).

**17. What is the effect of rototilling garden soil when it is too wet? (Mark the one best answer.)**

(a) It destroys soil structure (*pp. 40, 131*).

**18. Which of the following would help a compost pile that is not heating? (Mark all correct answers.)**

(b) Add a material with a low C:N ratio (*pp. 55, 108*).

(d) Turn the pile more frequently (*pp. 55, 108*).

(e) Keep the pile moist (*pp. 55, 108*).