ch.8

PLANT LIFE 101

ONE OF THE MOST rewarding things about our job is helping people build a connection with the food they eat. That connection begins with an improved understanding of plant life.

We all learn a little about botany in junior high or high school, usually from a few pages of a general science textbook. Unfortunately, much like algebra, history, and state capitals, if you don't use this information in your everyday life, you tend to forget it.

So, even though this isn't a textbook, let's take a quick quiz, to jog your memory a little bit. The quiz has five questions and they are all multiple choice. Don't spend too much time on this—just take your best guess. Then put down your #2 pencil and turn the page to see how you did.

Question 1: Which part of a plant do you eat?

A. The flower.
B. The leaf.
C. The stem.
D. The root.

OPPOSITE: Young pumpkins forming from the base of female flowers

Question 2: What is a vegetable?

A. Anything that isn't an animal or a mineral.
B. Anything that grows on a plant and isn't a fruit.
C. Any edible plant product that doesn't grow on a tree.
D. Whatever you want it to be.

Question 3: Why do plants produce flowers?

A. To get energy from the sun.
B. To reproduce.
C. To scare away animals that want to eat the plant.
D. Who cares? I want a vegetable garden, not a flower garden.

Question 4: What is an annual plant?

A. A plant that grows from seed to harvest in one season and dies at the end of the season.
B. A plant that is planted once but grows back to be harvested every year thereafter.
C. A plant that lives in England.
D. A plant that is extinct.

Question 5:
Where do edible crop plants come from?

A. They are derived from wild plants all over the world.
B. Greenhouses.
C. Nobody knows.
D. China.

ANSWERS TO THE QUIZ

1. Which part of a plant do you eat?

The answer is:

All of the above.

Depending on the plant, you may eat the root, the stem, the leaves, the leaf stems, the flowers, the seeds, or the fruit. You may even eat something exotic like a tuber or a rhizome.

Here are some common food crops and their most commonly eaten parts:

Asparagus: Shoot
Broccoli: Flower bud
Carrot: Root
Celery: Leaf stem
Corn: Seed
Lettuce: Leaf
Kohlrabi: Stem
Onion: Bulb
Potato: Tuber (OK, maybe tubers aren't so exotic after all)
Tomato: Fruit

We tend to eat the parts of plants that are most flavorful or that contain the highest concentration of nutrients. Different plants put their flavor compounds and nutrients in different places, depending on their survival and reproductive strategies. This is important to understand, because it means the crops in your garden will require different types of care, depending largely on which part of the plant you plan to eat.

If you're going to grow vegetables, though, remember that just because one part of a plant is edible, that doesn't mean the whole plant is! Certain plants are entirely edible, but others have parts (like tomato leaves and rhubarb leaves) that can make you sick. Before haphazardly trying to eat everything in your garden, make sure you know what you are putting in your mouth!

2. What is a vegetable?

The answer is:

D. Whatever you want it to be.

There's no scientific definition of a vegetable and no consistency to how people use the word. When people say "vegetable," they usually mean edible plant products other than sweet-tasting fruits. A vegetable can be a stem, a root, a leaf, a flower, or any other part of a plant (see the answer to the next question for more).

And yes, some fruits are commonly considered to be vegetables. Tomatoes are the classic example, probably because they were officially designated as vegetables by the United States Supreme Court in the 1893 *Nix v. Hedden* decision (botanically speaking, tomatoes are fruits). Other fruits, like zucchini, squash, cucumbers, and eggplants, are also considered vegetables for the same basic reason—they're not sweet.

We only mention this here because we want you to think of your crops in terms of their unique attributes and needs, rather than as members of a generic category. Green beans, potatoes, and asparagus may all be "vegetables," but their life cycles and nutrient requirements are as different as their appearance and flavor. If you decide to try your hand at growing raspberries, strawberries, figs, or apples, you'll find that the same concept applies to "fruit" as well. Every crop is different, and getting to know your plants is one of the best things about gardening.

By the way, if you're curious about that Supreme Court case, Nix and Hedden were at odds because there was an import tax on vegetables at the time, but not on fruit. Nix wanted tomatoes to be fruit, so he wouldn't have to pay tax when he imported them. But Hedden was in charge of collecting import taxes for New York, and he wanted tomatoes to be vegetables so he could tax them. Hedden won.

3. Why do plants produce flowers?

The answer is:

B. They allow plants to reproduce.

We'd love it if our vegetable plants had flowers that could keep away raccoons, deer, and crows, but unfortunately, a plant's flowers typically have only one function: to help it reproduce. Getting energy from the sun is a leaf's job, and scaring off hungry animals is a gardener's job.

It's true that you'll harvest many of the crops in your garden before they ever produce flowers, but producing a flower is the goal that every plant has in mind. The more you understand about a plant's life cycle, the better prepared you'll be to help it along and recognize signs of stress.

So let's take a quick look at a plant's life cycle. You may spend one or two hours a week working in your garden, but your plants are there 24/7, and here's what they're up to when you're not around:

Germinating/Sprouting

A plant's life begins when a seed is placed in a moist environment and it sprouts (germinates). If you buy transplants, this will already have happened, and if you grow starts indoors, it will happen in your house or greenhouse. When you direct-seed, your plants will begin to sprout a few days or a few weeks after you plant your seeds in the garden.

ABOVE: Vegetable flowers come in a variety of shapes and sizes.

Growing Roots

After a seed sprouts, it starts sending roots into the soil below it. Roots help anchor the plant in the

soil, absorb water and nutrients from the soil, and store water and nutrients for the plant to use later (or, in many cases, for you to eat later). A plant's roots will continue to grow throughout its life.

Growing Stems and Leaves

As a plant sends roots downward, it also sends a shoot upward through the soil. This shoot becomes the stem of the plant. Once that stem breaks the surface of the soil and is exposed to sunlight, leaves begin to grow on it. The leaves provide the plant with the energy it needs to grow, and the stem provides support and a pathway for water and nutrients to travel between the roots and the leaves.

Flowering

When a plant thinks it has grown large enough, stored up enough energy, and gotten all of the nutrients it needs from the soil, it starts its reproductive cycle, which means it starts producing flowers. Some plants produce only one flower and some produce hundreds, but the purpose is always the same: seeds.

Since flowering is its only real goal, a plant can start producing flowers too early if it gets stressed. Any number of things, including high heat, poor soil, and lack of water, can cause a plant to "bolt," or produce flowers early. Basically the plant is saying, "I'm stressed out and unhealthy and I believe I might be dying! I need to reproduce as soon as possible so the world will be blessed with my offspring!"

As we'll discuss later, if you see this happen to one of your plants, usually the best thing to do is cut your losses and harvest what you can. Once the process starts, it can be very difficult to keep under control.

Fruiting

When a plant flowers at the right time, it distributes pollen to other flowers (using birds, bees, bats, the wind, or even you!) and collects pollen on its own flowers. Through a series of events we'd describe in detail if this were a botany book, the pollen fertilizes an ovary at the base of the flower and forms a seed. The ovary begins to ripen, drawing in as much food and water as it can to support the seed. This ripened ovary is what we call a fruit, and if you haven't harvested the plant's leaves, stems, roots, or other structures of the plant, the fruit is what you will eat. If the plant were growing in the wild, the fruit would drop to the ground or be eaten by wildlife, and its seeds would start the whole process over again.

4. What is an annual plant?

The answer is:

A. A plant that grows from seed to harvest in one season and dies at the end of the season.

There are a few main categories that plants fall into based on their life cycle, and we discuss those categories below. It is important to understand the distinctions between these types, so you know whether you will need to replant a crop every spring or it will come back on its own. The majority of plants discussed in this book are grown as annuals and will be reseeded or replanted each growing season.

Annual Plants

Annuals are plants that complete their entire life cycle in a single growing season (usually from spring or summer to fall). The plant will germinate from a seed, set roots, grow its stem and leaves, flower, and set fruit in the course of a few

BOLTING

***Bolting* refers to the appearance of an undesired flower stalk on your vegetable plant. It commonly occurs in leaf crops (such as lettuce, kale, cilantro, and cabbage) and root crops (such as beets, carrots, or radishes). Bolting can result from a lack of water, excessive heat, lack of fertilizer, or any other stress on the plant. Once the flowering process is triggered, energy is diverted to the flower stalks and away from leaf or root production, decreasing your crop yield.**

Overly mature crops will inevitably flower and set seeds, but minimizing stress will help delay the flowering process and ensure healthy leaf and root growth.

Fruiting crops (such as tomatoes, beans and peppers) must flower in order to produce fruits, but excessive stress induces early flowering, which results in minimal plant growth, low yields, and poor tasting fruits.

months. Most vegetable crops are grown as annuals. This means that much of your garden space will be cleared out each winter and replanted the following year.

Perennial Plants

Perennials have a more permanent foundation and grow back for at least several years after they are planted. Some vegetable crops are perennials (asparagus, rhubarb), as are most berries (strawberries, raspberries, blueberries). In the landscape, lawns, woody shrubs, and trees are all perennials. Since they need to be planted in areas where they can live for multiple seasons, we recommend setting aside separate spaces for your perennial crops.

Biennial Plants

Some crops that are grown as annuals are, botanically speaking, actually biennials. This means that, if allowed to live a full life cycle, the plant would germinate, set roots, and grow its stem and leaves the first season, live quietly through the winter, and then flower and set fruit the following season. Examples of biennial plants in your garden are beets, carrots, turnips, and parsley. However, even though these crops are technically biennials, we will treat them as annuals. Most gardeners speak of them as annuals, and the only time their biennial nature is relevant is if they are being grown for seed.

Self-Seeding or Volunteer Plants

Some annual plants (including many garden flowers) will reappear in your garden every year even if you haven't reseeded or replanted them. These are commonly called "volunteers" because they seem to sign up for garden duty on their own initiative. Some volunteer plants are a great joy to see each spring (sunflowers, borage), but others can end up becoming rampant weeds. Over time, you will learn to identify your most common garden volunteers, and you can weed them out at your discretion.

5. Where do edible crop plants come from?

The answer is:

All of the above.

They are derived from wild plants all over the world (including China and sometimes nobody-knows-exactly-where), and today many are grown in greenhouses.

The plants we eat have come from all corners of the globe. Over countless generations, humans have grown and cultivated plants to produce food. Nearly all of the plants you will put in your food garden are "cultivated varieties," meaning that people have long grown them on farms and in gardens. They are different from wild varieties, which tend to grow on their own in the prairies and woodlands surrounding our farms and cities.

The plants that are our food sources are variations on their wild counterparts. The differences between the two are similar to those between domesticated dogs and wolves. If you released your poodle into the backcountry of Yellowstone, it would have a hard time surviving. It has been bred to be dependent on and compatible with people, and its good looks and great personality may have cost it the ability to hunt a buffalo in the wild. The same is true of your garden plants. They have been bred for generations for compatibility with people (to taste great and grow quickly), and they have long been encouraged to do just one thing, produce food. The plants put all their energy into food production, and this comes at a cost: They are less resilient to the ravages of foul weather, parasites, and predators than their wild cousins are.

We also grow plants in our gardens that evolved in climates much different from ours. After all, many popular garden crops (tomatoes, peppers, eggplant, for example) are derived from tropical plants. Because they evolved in very hot areas, they have virtually zero tolerance for cold weather. Which means added challenges when we try to grow them in places like northern Minnesota and Michigan.

Since we have induced these plants to make certain sacrifices (larger fruit on smaller plants, more food in a shorter amount of time, etc.), they need our support in their quest to supply us with an abundant harvest. Much like the support team for a cyclist in the Tour de France, you will be there to fill the plant's water bottle, provide it with snacks, and give it pep talks as it works its way through the growing season.

As you will learn in the course of your first few growing seasons, each crop has its own personality. It grows best when planted at a certain time of year, it may need to be trained on a trellis, it may need some of its branches pruned late in the year. Getting to know the character traits and history of your favorite crops and providing them with the support they need will enable you to garden successfully right from the start!