Seed Saving

Understanding Seeds and Seed Dormancy

Many gardeners collect, purchase, and/or trade seeds because we believe these seeds will germinate and produce plants with predetermined values such as flowers, shade, food, aesthetics, erosion control, etc. Understanding some basic seed morphology (physical structure) and physiology (how it works: metabolism) should increase your success in germinating seeds and maximize the plant values you are seeking.

A seed contains a plant embryo, some energy containing material, and a protective coating. The seed coat varies widely across plant species, but its functions are to protect the seed from damage. Some seeds also have structures that help them disperse by wind, water, animals, birds, and insects. Think of the winged maple seed that flies like a helicopter or the foxtail that adheres all to well to animal fur and clothing.

In uncultivated ecosystems, seeds of native plants seem to “know” when to germinate. Some seeds mature further after separating from the mother plant. Once mature, they lie dormant until the right combination of aeration, moisture, temperature, and light triggers their germination. Germination is no guarantee of survival, but it is a necessary first step.

Morphological (physical) seed dormancy can be related to maturity of the seed (ex. immature embryo) or a seed coat that is impermeable to air and water. Physiological seed dormancy is more complex and research to better understand it continues. Examples of physiological seed dormancy are when germination of the plant is prevented by insolubility of the energy storage compounds, by the presence of germination inhibiting chemicals, or other interactions. Morphological and physiological factors can also interact to affect seed dormancy within a given plant species.

Stratification is one of the most commonly used methods for artificially breaking seed dormancy. In general, stratification exposes the seed to low temperatures (33 to 41 degrees F) under moist conditions for one to six months. As you probably have guessed, stratification simulates winter conditions at the soil surface. It works very well for woody species and perennial wildflowers such as penstemons. While research-based information is available for many plant species, a general method is to put seeds between layers of moist paper towel inside a partially sealed zip lock bag and place the bag in the refrigerator for two months. Make sure the paper towel stays moist but not wet and sow the seeds gently in pots or prepared soil.

Other plants have hard seed coats that physically prevent germination by simply not allowing moisture to enter the seed. For these species, a nick in the seed coat with a file or sandpaper will increase germination. Sometimes heat is also used, especially in fire-adapted species. These techniques are called scarification. Commercial producers often used sulfuric acid to scarify large quantities of seed.

Temperature is a primary factor controlling seed germination of many plants. Cool season annuals and perennials germinate best during periods of cool temperature. Conversely, warm season annuals and perennials respond to warm temperatures of summer. Putting this knowledge to work, you should always sow seeds of cool season plants in fall (spring will also work for cool season annuals). Cool season turf grasses will most successfully be sown (or sodded) in late September or October. Warm season vegetable crops, such as beans and squash, should only be direct seeded after soil temperatures have warmed up in May.

Light has an effect on seed germination of some plants. For example, some varieties of lettuce require light to germinate. Planting seed too deeply results in poor germination. Some weed seeds also respond to light. Mulching and tilling are often used to decrease germination of these species.

Saving Vegetable Seeds

Many gardeners save their vegetable seeds from year to year. The benefit is to develop and conserve plant genetic traits that are best adapted to your garden environment and climate, it saves money on the purchase of new seed, it provides you with seeds to share with friends, and helps you appreciate how our ancestors developed and grew their crops each year. Before diving in, it is necessary to understand a little bit about pollination biology.

When saving seeds, a viable population must be maintained. The individual plants of a variety or species you grow comprises your seed saving gene pool. To maintain the genetic diversity inherent in a population, it is best to grow an adequate number of individuals of a given variety. Many gardeners save seeds or a few select crops and purchase seeds for the remainder. Most importantly, only healthy, vigorous, productive plants with the characteristics (flavor, color, growing season length, etc.) you value should be saved for seed.

Pollination mechanisms for plants are normally divided into two categories: self-pollinated types and cross-pollinated types. Self-pollinating crops have perfect flowers (both male and female parts in the same flower), and they will usually pollinate themselves before opening. Even though this occurs, some pollen can be transferred inadvertently to an adjacent variety. To avoid this, you can separate varieties by a few rows of another crop.

Cross-pollinated crops are naturally crossed by either insect-borne or wind-borne pollen. Therefore, isolation distances between different varieties of the same crop are crucial to insure desired varietal purity. Insect pollinated species should be separated by at least one-quarter mile and may also include a physical barrier. The barrier can be a screen cage that excludes the pollinating insect or a natural barrier such as a forest, hills, etc. Different varieties of peppers should be separated by 500 feet to avoid cross-pollination. Melons, pumpkins, cucumbers, and squash need even more distance - at least a half-mile. Wind pollinated crops, such as corn, cannot be easily isolated using barriers and require a distance of at least one mile between varieties to maintain purity.

Biennials require more work and commitment, as they do not send up seed stalks until the second season. Biennials include beets, Brussels sprouts, cabbage, carrots, cauliflower, celery, onions, parsley, parsnips, rutabaga, Swiss chard, and turnips. In the coldest areas, it is recommended that roots be dug in the fall and stored between 32 and 45 degrees F through the winter. Most biennial vegetable crops grown in the mid-elevations of Arizona will overwinter just fine without digging and replanting.

Seeds from hybrids produce a mix of offspring, which may have different characteristics than the parents'. Seed from hybrid vine crops are often quite variable, also squashes, cucumbers, melons, and pumpkins can cross-pollinate with other genetically compatible varieties. Unless pollination has been strictly controlled, strange hybrids often result.

The most commonly saved seeds by home gardeners are heirloom tomatoes. Tomato seeds are encased in a gelatinous coating, which prevents them from sprouting inside the tomato. It is easy to save tomato seeds: squeeze the seeds from a fully ripe fruit into a bowl, add water, and let stand at room temperature for about three days. Once fermentation occurs, mold will form on the surface of the water. Add more water, stir, and then gently scrape mold and debris off the top. Repeat until only clean seed remains, and then strain, rinse, and leave the seeds at room temperature on a piece of paper until dry.

Once you master saving tomato seeds, you might want a greater challenge. Peppers, peas, and beans are also self-pollinating and would be the next step in seed saving. Corn, squash, and other cross-pollinated crops are more challenging, but you could start by growing only one variety of each in your garden and save the resulting seeds.

June 18, 2024

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