seed programs international
VEGETABLE SEED RESOURCE

Saving vegetable seeds: Factors to consider

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The development of agriculture from prehistoric times to the present was built on the selection, collection, and replanting of seeds from superior plants. Even in a time of specialized commercial seed production, advanced plant breeding, and emerging biotechnology, farmer-saved seed may be the least expensive alternative for producing some crops. These techniques are of particular interest to subsistence farmers worldwide, where economics or logistics make it difficult to buy suitable planting seed. At the same time, a number of biological and technological factors make saving seed of many vegetables extremely challenging.

Type of plant

Seed is most easily saved from plants where the seed itself is eaten, typically grains. These seeds are generally harvested when mature and dry, and require relatively little processing prior to being replanted. Dry beans, peas, and other vegetable legumes fit this category, but most other vegetables are harvested for their fruits or vegetative parts, so special effort is required to collect and dry seed.

Biennials

A number of vegetables, including most of the root and bulb crops (carrot, beet, onion, leek), and the crucifer family (cabbage, broccoli, kale, cauliflower), are biennial plants that require two years to produce seed. These plants produce only vegetative growth the first year, and most require a period of cold weather with temperatures between 0 and 7ºC to induce seed stalks in the second year. Thus seed production is impossible in tropical areas unless the bulbs or roots are refrigerated to simulate natural chilling. Some tropical types may produce seed naturally, but saving seed is difficult.

Hybrid seed

Hybrids are produced by crossing two carefully selected parent lines to produce seed combining the best characteristics of each. Hybrids often exhibit better productivity, uniformity, vigor, and pest resistance than open pollinated varieties. However, seeds collected from these hybrids produce plants with a variety of characteristics totally unlike their hybrid parents. Saving seeds from hybrid plants is sure to result in disappointment, and is not recommended.

Open pollinated seed

Plants which are allowed to pollinate naturally, without being manipulated in any way, are referred to as open pollinated. Open pollinated varieties result from repeated selection of superior plants from within the same line until essentially identical genetically. However, within this group, we must consider **self pollination**, and **cross pollination.** Some plants, such as legumes and tomatoes, self pollinate naturally, and so seed collected from these plants will produce plants identical to the parents. Others, such as corn (maize) and vine crops (cucumber, watermelon), have their pollen spread by wind or insects (usually bees). In these varieties, if the plant is pollinated by other plants of the same variety, the resulting seed should produce plants identical to their parents and be suitable for saving, but if pollination was done by a different variety of the same species, the resulting seed will produce plants with a mixture of characteristics depending on both parents, and this will not be suitable for saving.

Open pollinated vegetables produce true-to-type seed only when fertilized by pollen of the same variety. It is easy to maintain the purity of legumes, lettuce, tomatoes, and other self-pollinated vegetables. Pollen of other vegetables is distributed by wind (beets, corn, spinach) or insects (a majority of other vegetables), so in seed production care must be taken to keep the flowers isolated from pollen of another variety of the same vegetable. Isolation distance of at least 1,500 meters between different varieties of the same species is recommended for all cross pollinated crops which are to be harvested for seed. Cross pollination can also be prevented by timing plantings so different varieties are not flowering at the same time. Vine crops are particularly prone to cross pollination, and strange types of squash and melons can be produced from seed produced where different vine crops are grown in close proximity.

Seed maturity

Fully mature seed is required for subsequent germination and growth. Pumpkins, winter squash, melons, tomatoes and some peppers contain mature seed at normal harvest maturity. On the other hand, seeds of summer squash, cucumbers, eggplant, snap beans, and green bell peppers are usually immature at the stage these vegetables are eaten. When growing these vegetables for seed it is necessary to leave the fruit on the plant well beyond normal harvest maturity. Peas and beans must be kept on the plant until pods and beans are dry.

Seed processing

Plants that produce seeds in a moist environment like a fruit often also produce chemicals in their tissues that prevent the seed from germinating while still on the plant. Thus it is essential that the seed be cleaned to remove all fruit tissue to eliminate these inhibitors. For example, the gelatinous tissue surrounding mature tomato seeds will completely

inhibit seed germination. Tomato seeds must be removed from the fruit, fermented for several days, then carefully washed and dried. Other seeds must also be washed to remove plant tissue and sugars that promote growth of molds and fungi. It is critical that all seeds be thoroughly dried at moderate temperatures and not exposed to direct sunlight.

Pest control

Seeds are an important source of food for some birds and insects. These pests often will feed on seed before it is mature and dry, so the seed and seed stalks may need to be protected until the seed is ready for harvest.

Seed-borne disease

Certain bacterial and viral diseases can be carried on seed from one year to the next. A plant may become infected late in the season and still produce a crop, but if the seed becomes infected on the plant, the disease organisms may attack the seedling after germination and kill or seriously stunt the subsequent crop. Proper sanitary practices are important to prevent transmission of certain diseases to the next generation. Seed should never be harvested and saved from plants which have symptoms of disease.

Seed Storage

Once seed has been successfully produced and processed, it must be stored properly to maintain germination and vigor. The seeds are living organisms, and their life processes must be slowed as much as possible to minimize the drain on food reserves in the seed and maintain the integrity of the seed coat. Heat and moisture are the two greatest enemies of stored seed. Heat speeds biological processes, depleting stored energy resources. Moisture activates enzymes in the dormant seed, beginning the germination process. This pre-germination activity depletes the energy reserves in the seed, and weakens or kills the seed before planting.

To maintain viability and vigor from one planting season to the next, seed must be kept cool, at least below 70º F (21º) and preferably cooler. Seed must also be protected from moisture, including high humidity. Desiccant materials can be included in the storage container to absorb atmospheric moisture. If this is done, a barrier should separate the seed from the desiccant so that the seed does not come in actual contact with the chemical. Seed is attractive to insects and rodents, so it is also important to save seed in a sealed container. A screw-top glass jar with a rubber seal can exclude both moisture and pests.

Summary

Farmer-saved seed is often considered an important component of sustainable agricultural development. Grains, which dry naturally, are grown in large blocks, and generally have large stored energy reserves, lend themselves to such a system. Vegetables encompass a wide range of plant families with a variety of growing requirements, pollination strategies, seed types and climatic adaptations. Their seeds are often small with small carbohydrate reserves, and are thus less resistant to environmental influences. While seeds of a few vegetables can be saved by the novice, it would be difficult for most gardeners in developing countries to produce, process, and store seed of the range of vegetables needed to supply adequate nutrition. Greater sustainability might be achieved by increasing productivity of gardens, allowing growers to sell some of their produce and buy good quality seed every year.

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