Seeds – introduction and selection

Introduction

Part of the fun of growing your own vegetables is choosing from the thousands of varieties (also called cultivars) available from seed companies, seed saver exchanges, and fellow gardeners. Try to select those varieties that are adapted to your location. Look for cultivars with disease resistance, especially if specific diseases have been a problem. Pay attention to the cultivars that are grown successfully by neighbors and recommended by your extension agent.

Learning Objectives

- Become familiar with the types and quality variance of vegetable seeds.
- Learn how to read seed packages and check for relevant information.
- Learn how to choose varieties that are best for your situation and need.
- Understand the difference between F₁ lines, improved varieties, and local seeds.
- Learn how to handle seeds.
- Learn how to properly store seeds.

Learning Outcome

Female extension agents will have an overview of the characteristics and traits they should consider when purchasing seed for their gardens. They will learn how to save and store seed from one season to the next properly.

Materials

- vegetable seed packages (different varieties and brands, coated and uncoated, treated and untreated, including seed available at local bazaars)
- flipchart or blackboard for drawing and writing
- chalk or markers
- paper
- tweezers

Lecture Notes and Lesson Plan

Distribute seed packages among the group and let the group describe them to you.

- What information can be gathered from the package?
- Are all packages similar?
- What do they have in common?
- Is the label clear to the women or in a foreign language only?
- Where were the seed produced?

Choose one package and point out the brand, the vegetable type, the name of the variety, its origin, and the packaging date (if available). Check the integrity of the package and the expiration date, noting that storage conditions are important to preserve seed viability.
Introduce the concept of **seed viability**. The seeds we are handling are alive, which means they are capable of germinating. We buy seeds or we save them from our previous crops, because we want to plant them and have new plants. Seeds can be stored for some time, some for years. Some are very tough. Seeds have evolved to preserve the genetics of plants until conditions are favorable for a new generation.

Ask the class what germination is and how it occurs. Ask them to describe what their experience of germination is.

**Germination** is the process by which seeds become plants. It is a delicate process, and is very vulnerable to sudden and drastic changes in environmental conditions. Germination requires water. Once initiated, it cannot be reversed. Once a seed has broken what is called “dormancy,” and it is germinating, the process can only go forward. If the seed gets dry again, it will die.

Draw pictures to help explain the process of germination of a **dicotyledon** plant. Explain what **cotyledons** (“seed leaves”) are and describe the other parts of a seedling. Introduce the concept of “true leaves.”

Go back to the package and proceed pointing out other information available. Ask the class to discuss what **viability** and **purity** are. Provide definitions and examples. Both are expressed as percentage. For many audiences this is a novel concept.

- **Viability** is the ability of the seed to germinate. It cannot be checked by visual inspection. Viability is measured by germination tests performed by the seed company and reported on the label as a percentage (%).
- **Purity** means two different things:
  1. The seed is “true to type” and free from genetic contamination.
  2. The seed is free from unwanted materials such as plant residues, dirt, stones, weed seeds, etc. It may be listed on the seed packet as a percentage: the weight of the desired seed in the packet compared to the total weight of the packet contents.

Open some packages and pour seed samples on paper for the class to check. Good seed should look uniform in size and color, and clean. It should not clump (indication of poor preparation or storage), and it should not be moldy. Uniformity in size and color, unbroken surface, and well-formed, full seeds are indicators of high **seed quality**.

Both purity and viability should be high. They may also contribute to the final price of seeds. Vegetable seeds generally lose much of their viability in two-three years, faster if they are not stored properly.
That is why it is important to know when the seed was produced and packaged.

**Hybrid vs. open-pollinated cultivars**

Open more packages of seeds and invite the class to describe what they see. Can they recognize seeds?

**Hybrids** result from the cross breeding of two distinct, inbred open-pollinated cultivars. The seed harvested from this intentional cross is called a F\textsubscript{1} (first filial) hybrid. Hybrids tend to be vigorous, uniform, productive, and many have some disease and/or insect resistance. Hybrids may be bred to be more widely adapted to environmental stresses such as heat, cold, disease or drought. They often have more uniform characteristics than non-hybrids, making crops more predictable in quality. Sometimes hybrids can be made to produce earlier or higher yields, have higher germination rates or more cold tolerance.

Producing hybrid seed is labor intensive, requiring the **emasculaton** of each flower. This accounts, in part, for the often higher price. Also, hybrid seed does not “come true.” This means that seed saved and planted next year will produce dissimilar plants that express a wide range of parental characteristics. Therefore, hybrid seed must be purchased each year. Finally, most hybrid cultivars are bred to meet the needs of commercial producers. Traits important to the large-scale farmer, such as compact plant growth, concentrated harvest, firm fruits with thick skin, may not suit the home gardener.

If it is labeled "heirloom," "open pollinated" or has no special markings, then it is most likely an open-pollinated or standard variety. Most lettuce, bean and pea varieties for home gardeners are open-pollinated, while most cabbages, broccoli, tomato, cucumbers, squash, corn, melons and Brussels sprouts are hybrids. Standard or open pollinated varieties are more or less stable in their characteristics. They remain fairly consistent, producing seed that will grow into plants like their parent plants, though somewhat less uniform than hybrids.

Standard varieties either self-pollinate or are pollinated by wind or insects. Standard, open pollinated varieties produce viable seed that home gardeners can dependably collect and save. Sometimes, due to genetic mutations, offspring of open pollinated plants can be significantly different than their parents. Commercial growers often term these plants "rogues," and cull them from their fields.

**Make sure to clearly distinguish and define hybrids, selected, improved, and open pollinated varieties.** Farmers and gardeners everywhere save seeds from their crops. Often seeds are kept from hybrid plants as well, causing much confusion and dismay (not to mention outright failure). Make sure the class understands the differences between open pollinated and hybrid cultivars and when it is possible to save and plant seed.

**Selecting seeds**

Facilitate a discussion on how to choose seed and varieties. What other characteristics are important? Discuss the following:

- Market or personal preference
- Final use
- Adaptability to our growing condition (including if it is for protected or outdoor production)
- Resistance trait(s) to specific diseases or conditions (drought, heat etc.)
- Curiosity and search for novel species or varieties to introduce and test.
Note: In the case of **resistance and adaptability** traits, refer to the package again to verify if any information is available. Sometimes the information can be found in the company catalog, or through an internet search.

**Treated Seeds**

- Why are some seeds pink, red or green?
- Is there any indication on the label?
- Have they been treated?
- What is the treatment about and what product has been used?

Note: Though we promote organic practices, this discussion will not address whether a seed is organic. You could mention what makes seeds “organic” since they may see the word on seed packets. Without getting into a lot of detail because of the variation between international certifying authorities, you could simply say that seeds that carry the organic label were harvested from plants grown according to specific organic farming standards.

The class should learn how to recognize treated seeds and how to handle them properly since the use of fungicides is not always reported on the seed package, due to poor labeling. Some seeds are treated with fungicides to prevent disease organisms in the soil from infecting and injuring the seed. It is a common practice to soak seeds in water overnight for a more speedy and uniform germination (E.g., okra or parsley). If they are treated, the fungicide will leak out during the soaking and the resulting water will be rich in fungicides. **Instruct the class to avoid direct skin contact with treated seeds or with the water in the example.** (Additionally, be careful with children in the household, since colorful seeds are a big attraction but can have dangerous chemicals on them).

Some seeds are coated and can look very different from the uncoated version. Tomato seeds can appear like little green balls for instance. The seed is encapsulated in a coating of nutrients, rhizobia, polymers for water retention, bio-stimulants and fungicides (or various combinations). This increases the weight of the seed (fewer seeds per unit compared to uncoated seed) and its cost. **Explain what relevance it might have for the audience. For example, in Kabul seed stores are relatively poor in terms of vegetable varieties and choices, and coated seed are entering the market as a novelty.**

**Using and storing seeds**

What do we do if we do not use all the seed at one time and there is seed left? This is important, since urban gardens are generally small, and we promote the use of a large variety of vegetables, herbs and flowers. Additionally we would like to avoid the recurrent problem of using too much seed. Unfortunately, local stores and markets seldom offer small size packages. At bazaars (markets or shops) it is possible to purchase small amount of seed, but the quality is often low and little is known about the seeds.

More often one has to buy a large amount of seed for each variety. Good seed is expensive and price is certainly a factor to be considered. Buying collectively and dividing among a group provides a more efficient use of seed and monetary resources.

When we do have seeds left, what is the best way to store them or the newly produced seeds at the end of the season? **Explain** that the seed needs to be kept dry (or dried thoroughly, on a shaded and...
ventilated surface), packaged with indication of variety and date of collection, and suitably stored in an air tight container (glass jar, plastic box) kept in a dark, dry and cool place. When removing seeds from cold storage, leave containers closed while the seeds reach room temperature, to avoid condensation. (More on Seed Saving & Storage on Fact Sheet xx)

Summary

- The class has now been exposed to a variety of seeds and should be aware that when purchasing seed there are different aspects to be considered.
- The class discussed reputable sources and general information available on seeds. Besides store, brand, and origin of the seed, and seed quality indicators such as germination rate, purity and expiration date, we should seek all available information on length of growth cycle, height, spacing, determinate or indeterminate in the case of tomato, hybrid or OP, etc. Although such details are not always indicated on the package, the vendor might know from experience and customer reports and be able to provide further information.

Follow-up Activities

- Ask the women to collect 20 Afghanis from each student for collective purchase of seeds for their gardens and to write a list of the varieties desired. This promotes the idea of working as a group and aims at demonstrating the advantages of buying inputs together and of sharing them.
- A group of women may accompany the instructor to the seed store to become more comfortable with the purchasing process. They will get exposed to agricultural input stores, will know their location, what else they can find there, what questions to ask. They will establish a direct contact with the vendor and hopefully begin to develop a trusted relationship.

Assessment Questions

1) What is seed viability?
2) What do you need to consider when buying seeds?
3) What are F1 seeds?
4) In what case can you produce your own seeds (or starting material) for the next season?
5) If you do not use all the seed you have, how do you store it until next season?

Glossary

A cotyledon is a significant part of the embryo within the seed of a plant. Upon germination, the cotyledon usually becomes the embryonic first leaves (“seed leaves”) of a seedling and drop off as the plant grows.

Emasculaton: The removal of the anthers (part of the stamen where pollen is produced) of a flower in order to prevent self-pollination or the undesirable pollination of neighboring plants.

F1 hybrid (Filial 1 hybrid) - the first filial generation of offspring of distinctly different parental types. F1 hybrids are used in genetics and selective breeding. The offspring of distinctly different parental types produce a new, uniform phenotype with a combination of characteristics from the parents.

Germination: beginning of growth of a plant from its seed.

Purity means two different things:
• The seed is “true to type” and free from genetic contamination.
• The seed is free from unwanted materials such as plant residues, dirt, stones, weed seeds, etc. It may be listed on the seed packet as a percentage: the weight of the desired seed in the packet compared to the total weight of the packet contents. Good seed should look uniform in size and color, and clean. It should not clump (indication of poor preparation or storage), it should not be moldy.

Seed quality is determined by uniformity in size and color, unbroken surface and well formed, full seeds.

Seed viability - the ability of the seed to germinate and grow. It cannot be checked by visual inspection. Viability is measured by germination tests performed by the seed company and reported on the label as a percentage (%).

True Leaves: As the seedling grows, the cotyledons will wither and what are called the first "true" leaves will form. They look different than the cotyledon leaves and more like the actual plant they will become. This is when your seedling begins actively photosynthesizing.

Resources/Web sites

University of Maryland’s Home and Garden Information Center

Oregon State Extension
http://extension.oregonstate.edu/gardening/how-are-hybrid-and-open-pollinated-vegetables-different

Cotyledon & True Leaves on Transplants (video from University of Illinois)
https://www.youtube.com/watch?v=c697KAgqSFI

Parts of this factsheet are adapted from University of Maryland Extension, Home and Garden Information Center-
http://extension.umd.edu/hgic

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