PRACTICE ABSTRACT 12

How to keep your snap bean varieties?

The selection of varieties is essential for the success of any crop. A variety can be defined as plant grouping within a single botanical taxon of the lowest known rank showing characteristics that result from a given genotype, distinguished from any other plant grouping by the expression of the characteristics, and considered as a unit for propagation. To maintain a variety, it is therefore necessary to preserve its identity, the specific characteristics that define it, and differentiate it from other varieties. The use of certified seeds is advisable because seed certification is a recognized system to secure crop varieties, genetic identity, health, and purity. Note that plant diseases can be transmitted or disseminated by seeds (seed-borne diseases) such as viruses, bacteria, and fungi (**see Fig 1**).

Here, we present methods to help maintain snap bean varieties. Essentially, maintaining a variety means:

i) to maintain its genetic identity, group of characteristics that distinguish it as well as good health status (**also see Practical Abstract 1**)

ii) to preserve the seed viability, its ability to germinate in the short and medium term

Maintain the genetic identity

The common bean (Phaseolus vulgaris L.) has been considered a highly self-pollinated species. Pollination usually occurs within the flower shortly after it opens (**Fig 2**). A consequence of self-pollination is the bean varieties being constituted by homozygous lines. It is a great advantage because homozygous lines do not segregate in their progenies, that is, they maintain the characteristics in their progenies. One of the main ways of loss of genetic identity is the mechanical mixture among genotypes or lines (**Fig 3**). Besides, the outcrossing rates reported in the common bean (proportion of progeny derived from out(non-self)-pollination) are very low, but can vary according to genotypes and environments. High outcrossing rates are often considered to be caused by pollination through insects, such as thrips or different species of bees.

Practical advice

- To prevent sporadic out-pollinations, grow each variety isolated from other varieties, in separated plots.
- Identify and label the best plants in the garden. Select healthy plants that maintain the specific traits of the variety. Pay particular attention to the immature pod characteristics in the selection process: shape, size, colour, cross-section, and edibility.
- Harvest those labelled plants separately to complete drying.
- Thresh and verify if the seed traits correspond to the variety (shape, size and colour).
- Select healthy and whole seeds.
- Label the seed package including the name of the cultivar and date.

Preserve seed health and viability

Seed viability refers to the ability of the seed to germinate or produce a natural seedlings in standard growing conditions. Seed health refers to avoiding the transmission of diseases. Over time, the seeds lose their ability to germinate and die (**Fig 4**). The time in which the seeds maintain viability depends on the species, harvest management, and the storage conditions of the seeds.

The common bean reproduces by producing seeds that are considered orthodox seeds. Orthodox seeds can be dried to internal seed moisture between 12–15% water, stored at freezing temperatures, and survive. Genebanks take advantage of this characteristic to maintain bean collection in the medium (stored at ~4°C) and long-term (stored at -18°C).

Practical advice

- Thresh the pods carefully in order not to break the seeds (A rubber lined thresher is advised)
- Select healthy and non-broken seeds.
- Check that the seed is dry (between 12–15% water). Seeds with a water content below 10% are very fragile.
- Freeze dried seeds for 48 hours at -18°C to minimize weevil damage (e.g. using a domestic freezer) (**Fig 5**)
- Keep the seeds in a cool and dry place for short-term use such as for a year.
- For medium-term use, we recommended you to keep the seeds in the domestic refrigerator at 4–7°C in a hermetic recipient (e.g. glass storage jars airtight; **Fig 6**). In these conditions, the seeds can be preserved for more than 10 years.

Fig 1. Two common bean diseases transmitted by seed; bean common mosaic virus in plants (left) and anthracnose in seeds (right)

Fig 2. Common bean inflorescence

Fig 3. Mix of pod phenotypes, green & purple pods

Fig 4. Seedlings showing damage in old seeds

Fig 5. Weevil attack on bean seeds

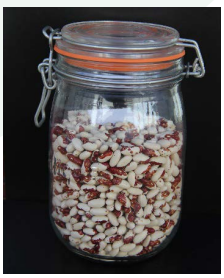

Fig 6. Glass storage jars airtight

Picture credits: SERIDA, Spain.

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THE PROJECT

BRESOV
SHAPING THE FUTURE OF ORGANIC BREEDING & FARMING

BRESOV aims to tackle the nutritional challenges of a growing world population and changing climatic conditions by enhancing productivity of different vegetable crops in an organic and sustainable farming infrastructure. BRESOV works on broccoli, snap bean and tomato as those staple vegetable crops have significant roles in meeting our global food and nutritional security goal, and under organic conditions can contribute to storing carbon, introduce nitrogen and improve organic soil quality.

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