PRACTICE ABSTRACT

DIVINFOOD
Co-constructing interactive short and mid-tier food chains to value agrobioDIVersity IN healthy plant-based FOOD

Dry bean seed production by and for small-scale farmers

Problem

Dry beans (*Phaseolus Vulgaris L.*), and legumes in general, are relatively disregarded despite their role in nutrition. This neglected potential constrains their integration into cropping systems, thus preventing the exploitation of an abundantly available agrobiodiversity and its related knowledge.

Solution

To value bean landraces, and climbing ones in particular, seed multiplication through small plots at farm level can be key to spread diffusion of high-quality bean seeds and to increase bean production and consumption. Provision of technical support may further foster their adoption. A simple protocol can guide farmers to produce their own high quality seeds.

Applicability box

Theme
Seed production and multiplication
Reference conditions
Preference for light soils with neutral pH
Temperature: >2°C soil temperature at sowing; very sensitive to heat > 30°C
Application time
Spring (sowing) to summer (harvest)
Equipment
Threshing machine, aerated storage, humidity tester; irrigation necessary at flowering and with young pods (critical stage of plant development)
Best in
Small scale farming

Benefits

Beans, and pulses more generally, are an excellent source of plant proteins. In addition, they are rich in resistant starch, fiber, minerals, and B-vitamins, while they contain almost no sodium or fat. Hence, dietary consumption of pulses is associated with a reduced risk of obesity, weight loss, and improved satiety.
Legumes (including beans) are also good in crop rotations due to their nitrogen fixation capacity, contributing to soil fertility and reducing environmental impacts derived from industrial fertilizers.
Climbing bean varieties are generally more tolerant to the legume diseases (especially root diseases) and have a high yield potential; up to 4-5 t/ha versus 3 t/ha for bush beans under optimal conditions.
Plant residues are also useful by-products: in animal feed as a source of proteins when fresh, while dried they can be used as soil mulch. Be careful though, because fungal diseases can be preserved in bean mulch.

Figure1: plastic nets staking
D. Mukankubana, CRBA

Figure2: wood staking
D. Mukankubana, CRBA

Fig 3: Maïze&Bean intercropping
J.F Tedesco, MPMC sas

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Practice Abstract

Practical recommendation

1. Select Site and Seeds

The optimum plant growth temperature is 25°C. Vegetative zero (the temperature below which plant growth stops) is 10°C. Germination starts from 12°C (minimum soil temperature) and it is very important to choose the right period for bean planting to avoid loss at germination stage.

Beans are particularly sensitive to wet soil, as excessive water may limit yields in several ways, such as nitrogen fixation reduction, chlorosis and reduction in crop growth. Insolation is a key factor in the successful growth of climbing beans: it is recommended to choose locations/sites that receive at least 6 to 8 hours of direct sunlight per day. The quality of the seeds used to multiply is very important, one must ensure a high germination rate (min. 85%), purity, cleanness, dryness (humidity rate <12%), freedom from diseases and no damage.

2. Staking, stakes length and staking period

Climbing plants need stakes, put at sowing time or at young age, allowing the plants to grow vertically, making growing and harvest easier. The optimum stake size is 2.5 m in height. In fact, very high stakes can lead to a delay in the flowering date, thus late maturing. Using wood or plastic nets (Fig.1&2) is a bean staking system commonly used (with optimum results) but requires a high labor cost. One of the options for reducing this cost is crops association (Fig. 3): beans intercropping with maize is the most widely used. Sunflowers can also be used (sunflower varieties having small leaves are recommended to reduce shade; they should be at least 2 m of height and preferably without branches, and have the same maturing period as the climbing bean variety). Note that farmers can adapt the technology with other species available.

3. Isolation distance recommended in bean seed multiplication

The isolation distances between two common bean varieties are not restrictive: to conserve variety purity, minimum distances are required to avoid hybridization, according to the type of bean.

Between 2 bush bean varieties (*Phaseolus Vulgaris):* 5 to 10 m. Between 2 climbing bean varieties (*Phaseolus Vulgaris*): 50 m. Between 1 bush variety and 1 climbing bean variety: 10 m

4. Crop rotation and disease management

To prevent varietal mixing and disease propagation, it is better to return beans to the same field only after two growing seasons. Three main diseases are transmitted by seeds: halo blight (bacteria disease), BCMV (Bean Common mosaic Virus) and anthracnose (fungal disease). Periodic field visits (before flowering and at physiological maturing) are very important in terms of disease control. It is recommended to use disease-free seeds and resistant varieties and to adjust the planting date (for BCMV) to minimize exposure to virus-spreading aphids.

5. Harvest and post-harvest

One of the challenges of climbing bean harvesting is that it cannot be mechanized until now. Bean seeds must be well dried and unbroken during threshing and sorting. Dry pods in case they are wet:. Proceed to conducting a humidity test before storage aiming at reaching 12% humidity. Protect seeds from rain, insects, animals and dirt in cool and dry storage. For the germination test: a minimum of 85 % germination rate is expected. .

Further information

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About this practice abstract and DIVINFOOD

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DIVINFOOD - Co-constructing interactive short and mid-tier food chains to value agrobioDIVersity IN healthy plant-based FOOD, is running **from March 2022** to **Feb 2027.**

The overall goal of DIVINFOOD (a multi-actor, participatory project) is to facilitate the use and increase the value of Neglected and Underutilised Crops (NUCs) in food chains to foster healthier diets and more sustainable food systems.

Project website: www.divinfood.eu

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