BRESOV - Breeding for Resilient, Efficient and Sustainable Organic Vegetable production

Geographical location:
Italy
Main geographical location (NUTS3):
Catania

Keywords:
Agricultural production system
Plant production and horticulture
Farming practice
Genetic resources
Climate and climate change

Main funding source:
Horizon 2020 (EU Research & Innovation programme)

Project type:
Research project

Project Identification:
Multi-actor project

Starting date:
2018

End date:
2022

Project status:
ongoing

Website:
BRESOV project website [1]

Title (in English):
BRESOV - Breeding for Resilient, Efficient and Sustainable Organic Vegetable production

Objective of the project (native language):
See objective in English

Objective of the project (in English):
The overall aim of the project is to improve the competitiveness of three of the most economically important vegetable crop families (Brassicaceae, Fabaceae, Solanaceae species) when grown in an organic production system; giving growers confidence that they will achieve a sustainable yield.

Description of activities (in English):
BRESOV deals with the urgent need to provide climate-resilient cultivars addressed to organic vegetable production systems. These new cultivars will benefit organic growers and the organic seed industry, providing much needed security both under current and future scenarios of climate change. This project will exploit the genetic variation of brassica, bean and tomato for enhanced productivity,
by exploiting up-to-date knowledge of genome structure and function. This work will be enhanced by the active involvement of farmers, advisory services, research institutes, breeding companies and food processors from diverse geographical/ climatic contexts in Europe and Non-EU countries.

Project coordinator

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**Partner category:** Researcher

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**Short summary for practitioners**

**Practice abstract 1**

**Short title (in English):**
Bean Seed Treatment: a simple approach without specific laboratory equipment

**Short summary for practitioners (in English):**

Organic agriculture uses organic seeds or untreated conventional seeds when no alternative exists.

In both ways, seeds can carry diseases and are better treated using a method which

- is acceptable for organic farming
- has a good success rate at disinfecting
- does not significantly reduce the germination rate.

Prior to sowing your beans, this simple method can reduce or even remove seed infections.

For this you will need: a container, hot water (55°C), cold water and a thermometer.

If you have several lots to treat at the same time, you can use a cheese cloth or a mousseline cloth.

Make sure that you have at least 4 volumes of water for 1 volume of seeds.

You can also put the seeds in individual glass bottles filled with water at the right temperature and kept in the water bath.

Ensure the water is at 50°C for the whole 10 minutes duration of the treatment.

Re-drying takes a total of 6 hours at 25°C with an air dryer (1 hour running and a ½ hour break) or can be done overnight using a regular home ventilator.

Always treat your seeds close to the date of sowing as the wetting might speed up germination and check your plants for disease symptoms: while this method is usually successful at removing pathogens, it can like all methods sometimes fail.

Part of a bean variety trial of BRESOV, this method was used on all lots including a lot infected with Xanthomonas. The seeds were successfully cultivated, beans were harvested and no symptoms of Xanthomonas were observed. Many seedborne diseases are systemic and may be unnoticeable during cultivation but manifest later in the seeds.

Therefore, if you use this method to produce seeds, you should send a sample to a seed-testing laboratory to confirm they are pathogen free.

**Short title (native**
**Short title (in English):**
How to reproduce Brassica oleracea crops in purity

**Short summary for practitioners (in English):**

B. oleracea plants are usually self-incompatible and need to cross with other genotypes to generate progenies. The self-incompatible genotypes require specific management for controlled pollination achieved by spatial isolation in the field or by the use of pollination chambers to avoid pollen contamination by pronubes. The protocol to regenerate landraces by avoiding pollen contamination is transplanting plantlets (3rd–4th leaf stage) into 10-litre pots filled with a peat/perlite substrate (1:1 in volume). Plants are usually grown in the open until they reach the flowering stage and then moved to pollination chambers either in a cold greenhouse or an open field. In some cases plants are transplanted directly into the field and we then use isolation chambers. The pollinators used are flesh flies (Sarcophaga carnaria) because they are more efficient for small pollination chambers than bumblebees or honey bees. Their larvae, about 1000–2000 bought in fishing shops each week, are developed into flies in one-litre containers filled with peat and covered by a net until the adult stage is reached. Metamorphosis occurs when the temperature is between 13°C and 28°C. Metamorphosis takes place at 8 and 18 days at 28°C and 13°C, respectively (this is very important to synchronise the availability of adult flesh flies with plant flowering). Adult flesh flies are released into the isolation chambers when the plants reach the flowering stage. During the presence of the flies in the pollination chambers we can use protein-rich commercial products to prolong the life of the flies, especially when there are few flowering plants to feed them. At the end of the flowering stage the plants are moved from the chambers to the field to complete the fruit ripening stage.
Practice abstract 3

**Short title (in English):**
Tomato: seed extraction and conservation

**Short summary for practitioners (in English):**

Harvest and clean the fruits, and slice them longitudinally. Crush the fruit sections into a mixture of pulp, seeds, and juice. Subsequently pour the mixture into a large container where it ferments for a period usually lasting three days. For acid extraction, apply an equal volume solution of hydrochloric acid (HCl) 3% obtained by diluting commercially available HCl (20%) in water at a ratio of 15 ml of commercial hydrochloric acid in 1 litre of water, and leave the resulting mixture for 12-18 hours. For optimal detachment of seeds from the placenta, temperatures of 35-40°C over a period of 12 hours allows polygalacturonases enzymed naturally present in the pulp and juice to degrade pectines.

Wash the seeds in a strainer under running water and dry them on filter paper or a paper towel at room temperature for one week, or alternatively in a ventilated oven at approx. 40°C for 24 hours.

Store the seeds in plastic or paper bags or vacuum packed in a chamber at 4°C and less than 30% of UR or in a no-frost fridge. Under these conditions, the seeds can be stored for up to 15 years.

Before sowing, disinfect the seeds by immersing them in a solution of 70% alcohol (ethanol) in a stirrer for 5 minutes (the quantity depends on the number of seeds - for fewer than 50, it is possible to use 10-15 ml ethanol). Then remove the ethanol by placing the seeds in a strainer under running water. Then immerse them in a solution obtained by diluting commercial bleach with water at a ration of 1:2. Finally, place the seeds into a stirrer once more and wash them under running water.

To enhance germination, you can use gibberellin by preparing a solution using a tablet of 5 grams of commercially available gibberellic acid in 1 litre of water.

**Short title (native language):**
See the english version

**Short summary for practitioners (native language):**

See the english version
Project partners

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Further details

**Description of the context of the project:**

With changing climatic conditions and a rapidly growing world population estimated to reach 9 billion by 2050, mankind faces the serious challenge of increasing food production by at least 70%. The vision of BRESOV is to tackle this challenge by exploring the genetic diversity of three of the economically most significant vegetable crops (broccoli, snap bean and tomato) and to improve the competitiveness of these three crops in an organic and sustainable environment. The consortium’s overall aim is to increase the plants’ tolerance to biotic and abiotic stresses and adapt the varieties to the specific requirements of organic and low-input production processes.

**Source URL:** https://ec.europa.eu/eip/agriculture/en/find-connect/projects/bresov-breeding-resilient-efficient-and

**Links**  
[2] mailto:fbranca@unict.it