



PRACTICE ABSTRACT No. 10

Seed inoculation (soybean)

PROBLEMS:

- Unfavourable conditions for rhizobia (symbiotic nitrogen-fixing bacteria) that result in decreased nodulation include (i) low soil pH, (ii) high or low temperature, (iii) insufficient soil moisture, (iv) high soil nitrogen content etc.
- Rhizobia are living organisms that may lose their viability and effectiveness to colonise plant roots under unfavourable conditions.
- Soils on which soybean has not been grown previously usually do not contain the specific strains of rhizobia, hence, it is necessary to provide them through seed inoculation.

SOLUTIONS:

- Soybean has a special role in crop rotations through its ability to fix and utilise atmospheric nitrogen from the air to support growth.
- Bacteria that form nodules in symbiosis with soybean are *Bradyrhizobium japonicum*, *Bradyrhizobium elkanii*, *Sinorhizobium fredii*, etc.



Fig. 1. Inoculated soybean seed. Photo credit: Institute of Field and Vegetable Crops, Department of Soybean

- Nitrogen fixation takes place in nodules which are globular structures located on the roots. The process of nodule formation starts during early root formation and development, with the nodules becoming fully active during the latter part of the plant's growth and development.

- Application of inoculants and biostimulants enables successful; nodulation of plants, better nitrogen fixation from the atmosphere, stimulation of plant growth, increase in biomass and nitrogen content in the plant, as well as yield and grain quality.

PRACTICAL RECOMMENDATIONS:

- Inoculation of soybean is required prior to sowing.
- It is important to use inoculated seeds on the day they are treated as because viability is reduced by exposure to light.
- It is important to handle the product in the shade since the bacteria might lose vitality if exposed to direct sunlight.



Fig. 2. IFVC Inoculant for soybean NS-Nitragin. Photo credit: Institute of Field and Vegetable Crops Novi Sad

FURTHER INFORMATION

Đorđević V, Malidža G, Vidić M, Milovac Ž and Šeremešić S (2016). Best practice manual for soya bean cultivation in the Danube region, Donau Soja, Headquarter, Vienna, Austria.

Leggett M, Diaz-Zorita M, Koivunen M, Bowman R, Pesek R, Stevenson C and Leister T. (2017). Soybean Response to Inoculation with *Bradyrhizobium japonicum* in the United States and Argentina. *Agronomy Journal* 109 (3): 1031-38.

doi.org/10.2134/agronj2016.04.0214

Marinković J, Bjelić D, Tintor B, Miladinović J, Đukić V and Đorđević V (2018). Effects of soybean co-inoculation with plant growth promoting rhizobacteria in field trial. *Romanian Biotechnological Letters* 23: 13401-08.

Omari RA, Yuan K, Anh KT, Reckling M, Halwani M, Egamberdieva D, Ohkama-Ohtsu N and Bellingrath-Kimura SD (2022). Enhanced soybean productivity by inoculation with indigenous *Bradyrhizobium* strains in agroecological conditions of Northeast Germany. *Frontiers in Plant Science* 12: 707080. doi.org/10.3389/fpls.2021.707080

Toleikiene M, Slepetyš J, Sarunaite L, Lazauskas S, Deveikyte I and Kadziuliene Z (2021). Soybean Development and Productivity in Response to Organic Management above the Northern Boundary of Soybean Distribution in Europe. *Agronomy* 11(2): 214. doi.org/10.3390/agronomy11020214

AUTHORS

Marjana VASILJEVIĆ (marjana.vasiljevic@ifvcns.ns.ac.rs), Jelena MARINKOVIĆ (jelena.marinkovic@ifvcns.ns.ac.rs), Vuk ĐORĐEVIĆ (vuk.djordjevic@ifvcns.ns.ac.rs): IFVC, Novi Sad, Serbia

ECOBREED CONSORTIUM



ABOUT ECOBREED:

ECOBREED is a 5-year (2018-2023) project funded by European Union's Horizon 2020 research and innovation programme that will improve the availability of varieties and seed suitable for organic and low-input production. Activities will focus on four crop species i.e. wheat, potato, soybean and common buckwheat, selected for their potential contribution to increasing the competitiveness of the organic sector.

FOLLOW US:

www.ecobreed.eu



@EcobreedP



@ecobreed



Funded by European Union
Horizon 2020
Grant agreement No 771367

The sole responsibility for the content of this document lies with the authors. The publication reflects the views only of the author, and the EC cannot be held responsible for any use which may be made of the information contained therein.