

RIZOLINE

Each nodule works

- **More than 600 000 ha** of legumes are treated with Rizoline
- **More than 1000 agricompanies** have used the inoculant
- **+0,25 t/ha** is an average additional yield on legumes
- **10 years** of effective presence on the market



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WHAT ARE INOCULANTS?



Inoculants are a group of biological preparations based on nitrogen-fixing nodule symbiotic bacteria for inoculation of legume seeds. These bacteria, developing in the root zone, enter into symbiosis with plants and form nodules on the roots. As a result, atmospheric nitrogen is fixed and plants can use it for their own needs and enrich the soil for next crops.



Bacterial strains in the BTU-Center inoculant are selected using the proprietary technology of the company's biotechnologists with 40 years of experience.



All strains are tested for basic qualities: virulence or ability to penetrate plant roots and form productive nodules with them; competitiveness - activity in the formation of symbiosis compared to local strains of microorganisms; nitrogen-fixing activity.



Such careful selection makes it possible to maintain the appropriate concentration of microorganisms not only at the time of the product release from the factory, but also to ensure a high titer on seeds directly in the field.



THE MOST EFFECTIVE STRAIN BANK

BTU-Center has its own bank of microbial strains for various legumes — peas, beans, chickpeas, lentils and others. Therefore, we can make special forms of inoculants for each niche crop. As a result, farmers receive effective inoculants with a high concentration of active nitrogen-fixing bacteria.

For soybeans: *Bradyrhizobium japonicum*

For peas: *Rhizobium leguminosarum* *bv.* *pisum*

For chickpeas: *Mesorhizobium ciceri*

For beans: *Rhizobium leguminosarum* *bv.* *phaseoli*

For viki: *Rhizobium leguminosarum* *bv.* *viciae*

For alfalfa: *Sinorhizobium* *sp.*, etc.

UNIQUE PROPOSITION FROM BTU-CENTER

For pre-sowing inoculation of seeds of soy, pea and other legumes



The biopreparation is based on liquid form of the biological inoculant, which is used on the day of sowing. A concentrate of viable cells of nodule bacteria consists: *Bradyrhizobium japonicum*, *Rhizobium leguminosarum* (bv. *phaseoli*, *bv.viciae*), *Mesorhizobium ciceri*, *Sinorhizobium sp.*; bacteria biologically active metabolites (vitamins, heteroauxin, gibberellins, etc.).

Titer: $>2 \times 10^9$ CFU/ml

Rate of application: 2-3 l/t; 0,2-0,3 l/ha;

Application methods: pre-sowing inoculation of seeds of soy, pea and other legumes, row fertilization when sowing;

Shelf life: 6 months at 4 °C - 10 °C or 3 months at 10 °C - 15 °C.



EFFECT FROM APPLICATION



INTENSIFIES

the process of nodulation



FIXES

the atmospheric nitrogen (in symbiosis with legumes) and transforms it into accessible for plants form



INCREASES

the yield of soybeans, peas and other legumes up to 15%

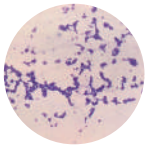


PROVIDES

plants with growth-stimulating substances (vitamins, phytohormones)

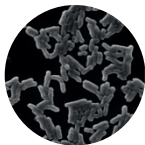


THE FUNCTIONS OF MICROORGANISMS IN RIZOLINE



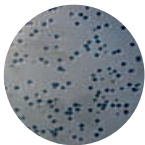
Bradyrhizobium japonicum

Type of nodule bacteria, saprophytic nitrogen-fixing symbiont of soy. One of the most economically important types of bacteria



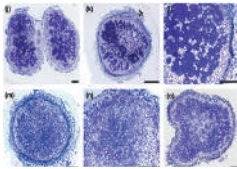
Mesorhizobium ciceri

Nitrogen-fixing motile bacteria from the genus *Mesorhizobium* were isolated from chickpea *Cicer arietinum* tubers in Spain. *Rhizobium ciceri* was moved to *Mesorhizobium ciceri*



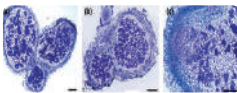
Sinorhizobium meliloti

A bacterium that binds atmospheric nitrogen. It forms a symbiotic relationship with legumes from the genera Medicago, Melilotus and Trigonella. The most famous representative of the genus is alfalfa (*M. sativa*)



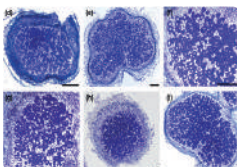
Rhizobium leguminosarum
bv. phaseoli

Biovar phaseoli inoculates varieties of bean



Rhizobium
leguminosarum

A bacterium that lives in a mutually symbiotic relationship with legumes and has the ability to remove free nitrogen from the air. It has three biovars – *viciae*, *trifolii*, *phaseoli* - which differ in host specificity

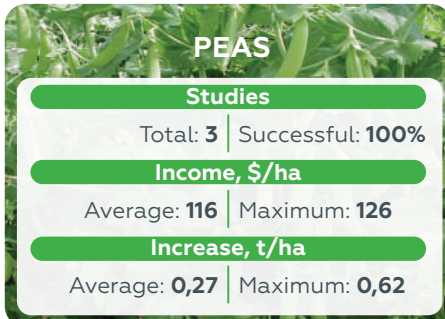


Rhizobium
leguminosarum *bv. viciae*

Biovar viciae inoculates legumes from the genus *Viciae* - (lathyrus, vetch, peas, lentils)

RIZOLINE.

STATISTICS OF RESULTS ON DIFFERENT CROPS

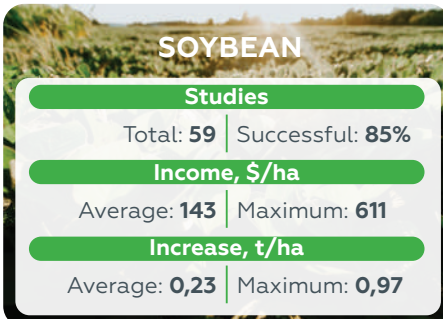


PEAS

Studies
Total: **3** | Successful: **100%**

Income, \$/ha
Average: **116** | Maximum: **126**

Increase, t/ha
Average: **0,27** | Maximum: **0,62**

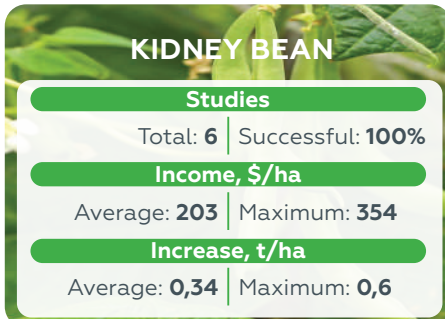


SOYBEAN

Studies
Total: **59** | Successful: **85%**

Income, \$/ha
Average: **143** | Maximum: **611**

Increase, t/ha
Average: **0,23** | Maximum: **0,97**

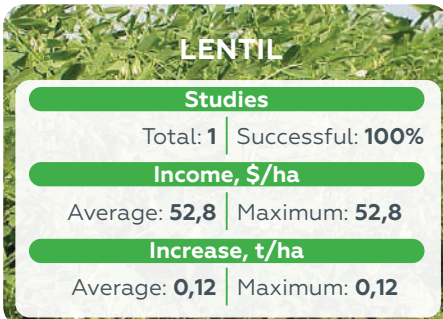


KIDNEY BEAN

Studies
Total: **6** | Successful: **100%**

Income, \$/ha
Average: **203** | Maximum: **354**

Increase, t/ha
Average: **0,34** | Maximum: **0,6**

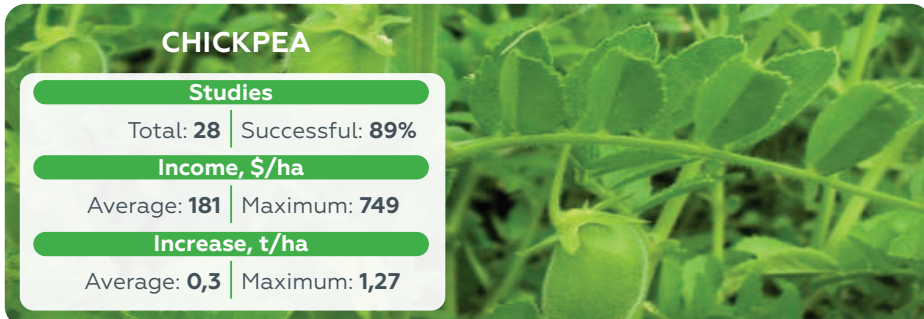


LENTIL

Studies
Total: **1** | Successful: **100%**

Income, \$/ha
Average: **52,8** | Maximum: **52,8**

Increase, t/ha
Average: **0,12** | Maximum: **0,12**



CHICKPEA

Studies
Total: **28** | Successful: **89%**

Income, \$/ha
Average: **181** | Maximum: **749**

Increase, t/ha
Average: **0,3** | Maximum: **1,27**

TRIAL #1 ON SOYA WITH PROTECTOR

Location: Ukraine,
Khmelnyskyi Agro Research Center, 2017-2019

Crop: soybeans, Siverka variety

Fore crop: oats

Soil: chernozem slightly podzolic
medium loamy, low humus

Humus content: 2.8-3.3%, pH – 5.8-6.2

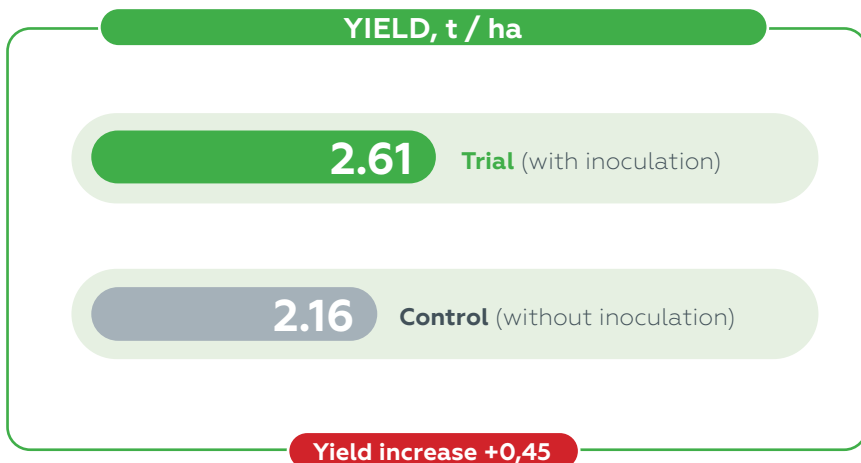
**Seed treatment on the day of sowing +
Chemical protectants**



Trial scheme

Control: no inoculation

Trial: Rizoline 2 l/t + biological protector Rizosave 2 l/t



TRIAL #2 ON SOYA WITH PROTECTOR

Location: Ukraine,
Skvyra Agro Research Center, 2018

Crop: soybean, Legend variety

Soil: typical medium-loamy chernozem

Humus content: 3.05%, pH - 5.9

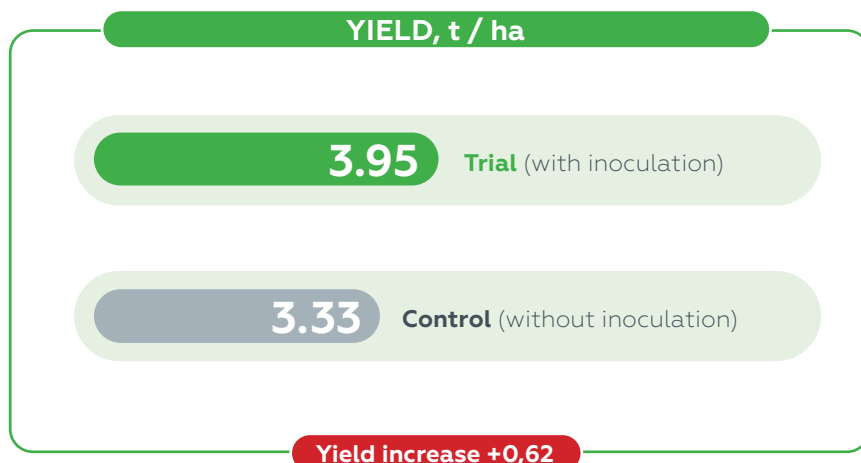


**Seed treatment on the day of sowing +
chemical protector**

Trial scheme

Control: no inoculation

Trial: Rizoline 2 l/t + biological protector Rizosave 1 l/t



TRIAL #3 ON SOYA, COMPARISON WITH ANALOGUE

Location: Ukraine,
Khmelnyskyi region, 2018

Crop: soybean, Muravia variety

Fore crop: soybean

Soil: podzolised black soil

Trial scheme

Control: analogue inoculant,
sowing on May, 13

Trial: Rizoline 2 l/t + Rizosave 2 l/t +
chemical protectant, sowing on May, 7

+0,23
t/ha



YIELD, t / ha

3.38 Trial (with Rizoline)

3.15 Control (with analog inoculant)

Yield increase +0,23

TRIAL #4 ON SOYA, COMPARISON WITH ANALOGUE

Location: Ukraine,
Vinnitsia region, 2021

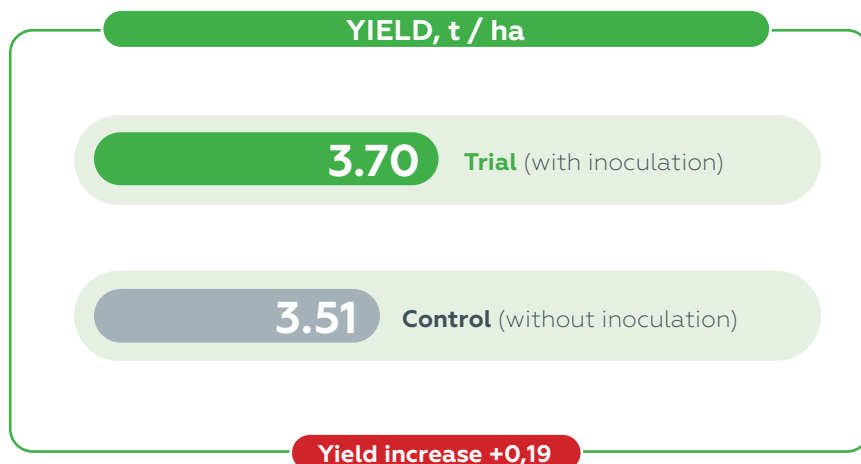
Crop: soybean,
EC Mentor 1-Reproduction variety

Fore crop: corn

Trial scheme:

Control: analogue inoculant

Trial: Rizoline 2 l/t + Rizosave 1 l/t



TRIAL #5 WITH TMTD ON SOYA, COMPARISON WITH ANALOGUE

Location: Ukraine,
Poltava region, 2018

Crop: soybean, Coffu variety

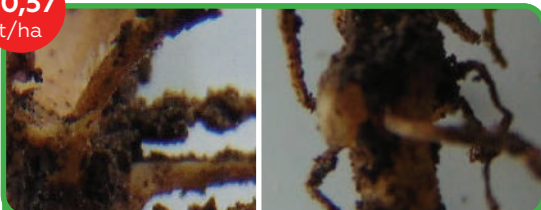
Soil: black podzolised soil

Trial scheme

Control: analogue inoculant +
TMTD 3 l/t + Carlet 0.4 l/t +
Nanovit molybdenum 1 l/t

Trial: Rizoline + Rizosave +
TMTD 3 l/t + Carlet 0.4 l/t +
Nanovit molybdenum 1 l/t

+0,57
t/ha



Nodules formation during the development phase first cotyledon leaf



YIELD, t / ha

3.50 Trial (with inoculation)

2.93 Control (without inoculation)

Yield increase +0,57

TRIAL #6 ON SOYA

Location: Kazakhstan

Crop: soybean,
Akmola-Phoenix Plus LLP 2018

Trial scheme

Control: no inoculation

Trial: Rizoline 2 l/t + biological protector



PLANT HEIGHT, CM

55 Trial (with inoculation)

30 Control (without inoculation)

NUMBER OF PODS PER PLANT, PCS

33 Trial (with inoculation)

21 Control (without inoculation)

YIELD, KG/HA

6.7 Trial (with inoculation)

5.4 Control (without inoculation)

Yield increase +0,13 (+24%)

TRIAL #7 ON CHICKPEA

Location: Vermenton, France, 2019

Crop: chickpea

Seeding rate: 43 seeds/m²

Fore crop: winter oats

+0,57
t/ha



Trial scheme:

Control: no inoculation

Trial: Rizoline 3 l/t + Rizosave 1.5 l/t

YIELD, t / ha

1.0

Trial (with inoculation)


0.9


Control (without inoculation)

Yield increase +0,1



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