

Efficienza nutrizionale L'uso di microrganismi per migliorare il suolo

Tecnologia Bulhnova/Biopron



BIOSTIMOLANTI CONFERENCE
26 -27 FEBBRAIO 2025
NAPOLI
Gold Tower Lifestyle Hotel

PRESENTE DI PROBELTE...



90 ceppi
di propri microrganismi.

+ 20 anni di collaborazione con M.O. comprovata
esperienza sul campo.

7 brevetti
Soluzioni di proprietà, alla base di varie
formulazioni e soluzioni altamente efficaci.

10 ingredienti attivi
Scoperti.

+ 200 soluzioni registrate
in diversi paesi e colture.

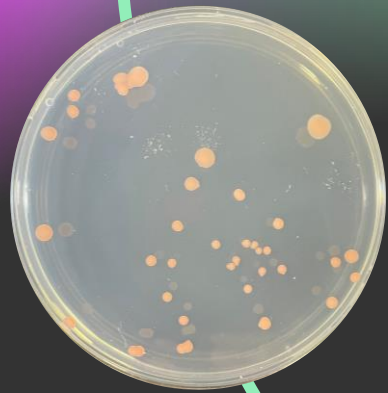
DA DOVE VENIAMO...



16.000 m²

- Impianti di produzione e centro logistico dotati delle più recenti tecnologie di automazione e tracciabilità
- Elevata capacità di produrre e servire soluzioni su misura in tempi brevi





Colonie

Processo di fermentazione industriale

L'intero processo si svolge in Probelte:
dalla moltiplicazione del ceppo fino alla fermentazione e
confezionamento finale

Controllo di qualità
del processo fermentativo



Pre-Inoculo



Inoculo 1



Inoculo 2



Fermentatore industriale

Publicaciones científicas

Aprorvate dalle università e centri di ricerca a livello internazionale

Applied Soil Ecology 46 (2010) 333–340

Contents lists available at ScienceDirect

Applied Soil Ecology

journal homepage: www.elsevier.com/locate/apsoil

Isotopic evidence of significant assimilation of atmospheric-derived nitrogen fixed by *Azospirillum brasilense* co-inoculated with phosphate-solubilising *Pantoea dispersa* in pepper seedling

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ARTICLE INFO

ABSTRACT

1. Introduction

Bacteria of the genus *Azospirillum* are free-living aerobic heterotrophs that fix nitrogen under microaerobic conditions. They belong to the group of plant growth-promoting bacteria (PGPR) and, under certain environmental conditions have a positive effect on plant growth and crop yield (Bashan et al., 1989). The stimulatory effect of *Azospirillum* on plant development has been attributed to diverse mechanisms, including the transfer of fixed nitrogen to the plant as well as the production of phytohormones, mainly indole acetic acid (IAA) and gibberellins, which modify the plant metabolism and morphology and lead to better mineral and water uptake (Bashan et al., 2004). The benefit of nitrogen fixation by *Azospirillum* in agriculture was first established by Dobereiner et al. (1976). However, although N₂ fixation was the first mechanism suggested for PGPR to promote plant growth, this contribution is still controversial. Some studies in sugar cane (Mirza et al., 2001; Oliveira et al., 2002) and rice (Rodríguez et al., 2008) have pointed to the considerable contribution of N₂ fixation to the plant N budget. On the other hand, low but critical contribution of biological nitrogen fixation (BNF) to wheat plants have been reported (Malik et al., 2002). Finally, several studies have failed to

find any significant transfer of nitrogen from BNF to the plant by *Azospirillum* (Mantelin and Touraine, 2004). N₂ fixation by *Azospirillum* is modified by several factors, including the presence of nitrogen in the growth substrate, so that, in general, the bacteria are able to fix N₂ under N-limiting conditions, whereas ammonium, glutamine, nitrate and nitrite have been shown to repress N₂ fixation (Steenbolund and Vanderleyden, 2000). However, certain diazotrophic bacterial strains of *Azospirillum* spp. and *Pantoea agglomerans* were able to fix N₂ in association with wheat, when additional inorganic nitrogen (ammonia or nitrate) was supplied to plants (Ruppel and Merbach, 1997). On the other hand, the transfer of fixed N₂ to the plant is determined by plant/soil-bacteria interactions, which are highly dependent on plant genotype and environmental conditions (Bashan, 1999; Boddley et al., 1991). According to Wood et al. (2001), the inability of the host plant to release carbon to the rhizosphere is a significant constraint in the development of associative N₂-fixing systems since this limits the transfer of newly fixed N₂ to the plants. Van Dommelen et al. (2009) have shown that inoculation of wheat plants with the *A. brasilense* mutant 7025, with its drastically reduced glutamine synthetase activity and therefore enhanced capacity to excrete ammonium, increased the plant growth promotion capacity compared with the wild-type strain at suboptimal N fertilization levels.

Since multiple factors affect N₂ fixation and therefore N transfer to plants, quantification of N transfer is necessary to assess whether the ammonium released by the bacteria is used as N

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MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

CSIC

CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

ESTUDIO DE LA EFICACIA DEL BIONUTRIENTE BIOPRRN DE TRIGO (*Triticum aestivum* L.) EN REGADÍO. CAMPAÑA SOBRE LA CALIDAD Y SOSTENIBILIDAD DEL SISTEMA S

Evaluación agronómica de los efectos sobre el ciclo del N, suelo y planta de diversos bioestimulantes a base de microorganismos presentes en el AZ-Bel y Bioprón*

INFORME CIENTÍFICO-TÉCNICO CORRESPONDIENTE AL CONVENIO PROBELTE S.A.U.

INFORME CIENTÍFICO-TÉCNICO CORRESPONDIENTE AL CONTRATO CEBAS-CSIC CON PROBELTE S.A.U. Ref. CSIC: 16/0402

Agribusiness, Ecosystems and Environment 22 (2006) 60–70

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Organic plow cultivation in the Mediterranean region: The medium-term effect of five different organic soil management practices on crop production and microbiological soil quality

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ARTICLE INFO

ABSTRACT

Keywords:

1. Introduction

Organic farming practices recommended by European regulations offer an alternative to conventional soil management, but these practices should be analyzed in greater depth to assess their effectiveness on different plants and in different local conditions. Accordingly, this study evaluates the efficacy of five different organic management strategies on an organic plum farm in Southeastern Spain. This study was conducted for a period of six years and the five different organic treatments were applied in triplicate in 250 m² plots randomly distributed in three blocks (15 plots in total); each plot had 16 plum trees. Every year crushed pruning wastes were incorporated into the soil in all the experimental plots. One replicated plot only received the aforementioned treatment (crop biomass treatment, CB). The rest of the plots also received one of the following treatments: (i) the addition of a commercial product for organic agriculture based on bacteria (Biofertilizer), composed of *Azospirillum brasilense* (bacteria fixing N) and *Pantoea dispersa* (bacteria with a capacity for solubilizing phosphates and stimulating plant growth) (biofertilizer treatment, B); (ii) the annual addition of 20t/ha of certified commercial organic compost (annual compost treatment, AC); (iii) the biennial addition of 20t/ha of certified commercial organic compost (biennial compost treatment, BC); and (iv) the sowing and subsequent incorporation of a mixture of 40% *Avena sativa* and 40% *Vicia sativa* (green manure treatment, GM). Each year the following indicators of ecosystem sustainability related to soil microbiological characteristics and carbon fixation were measured after harvest, in addition to plant yield: organic carbon (C_{org}), water soluble C, humic substances and humic acid, C microbial biomass, C respirable, ATP, dehydrogenase activity and hydrolase enzymes (alkaline phosphatase, urease and beta-glucosidase) activities. The two way ANOVA of the results indicated that all the above parameters were significantly affected ($p < 0.001$) by both, treatment and time. The interaction of treatment and time also significantly affected all these parameters, except for yield and dehydrogenase activity. Composts not only produced better results than green manure cover crops and biofertilizer treatments in terms of plant yields, but they also brought about higher increases in the soil C pool and greater improvements in soil microbiological characteristics. In the six years of the study, compost-treated soils showed higher average plum yields and higher organic carbon, humic substance and humic acid contents than the rest of treatments. The size and activity of microbial population was also greater in the compost-treated soils, reflected in the higher values found in these soils for microbial biomass, C, soil respiration, ATP, adenosine-tri-phosphatase content and dehydrogenase and hydrolase activity. Nevertheless, yields when compost was added biennially (BC) tended to be higher than in the annual compost treatment (AC) in most years as well as on average, although the differences were usually not significant. Yields in the sixth crop showed a high positive correlation with soil humic substances and humic C content ($p < 0.01$), as well as with C_{org} microbial biomass C and phosphatase and urease activity ($p < 0.05$).

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Inoculation with immobilized rhizobacteria versus olive-mill waste in the afforestation of a semiarid *halapensis* Mill

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ARTICLE INFO

ABSTRACT

1. Introduction

Recent studies about the reclamation of semiarid soils have shown the beneficial effects of the application of organic amendments on soil quality, with increase in the proliferation and development of natural populations of soil microflora, since the organic residues can be used by soil microorganisms, as substrates and as carbon and energy sources (Medina and Azcón, 2010), and also improve soil properties. This effect could be extended to the enhancement of soil enzyme activities, which are key factors contributing to soil-borne microorganism activity and soil fertility (Caravaca et al., 2005). The use of organic waste materials not only increases the organic matter and fertility of soils, but also contributes to the palliation of environmental and economic inconveniences related with waste disposal (Roldán et al., 2008). The Spanish olive-mill industry produces a huge amount of wastes that are difficult to reuse (four million tons per year). The main by-product is alperujo, which can be composted before its application to the soil in order to obtain a high-quality amendment, rich in K and partially-humified organic matter (Alburquerque et al., 2009, 2006). Such characteristics suggest that this residue could be useful for improving soil quality and in the development of afforestation programs in semiarid and degraded areas. The beneficial short-term effects of the addition of alperujo compost in horticultural and revegetation practices have been reported (Alburquerque et al., 2006; Schoebitz et al., 2010).

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CSIC

CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

CENTRO DE EDAFOLOGÍA Y BIOLOGÍA APLICADA DEL SEGURO (CEBAS)

+ 30 Publicaciones científicas su media internacionales

Microorganismi

come soluzione



- **Migliora la salute del suolo**
- **Efficienza nell'uso dei nutrienti**
- **Biocontrollo di parassiti e malattie**
- **Redditività, produzione e qualità**

Microorganismi

Obiettivo chiaro
Quale processo vogliamo
rendere più efficiente e
come lo faremo?

Applicare "nuovi" microrganismi
Che interazione avrai
con il mezzo?

Quali sono i microrganismi
più adatti in
colture arboree perenni?

RIGOR I+D

ESPERIENZA E
TEMPO SUL CAMPO

SICUREZZA

Bulhnova Biopron



BIOFERTILIZZANTI



TERRENO

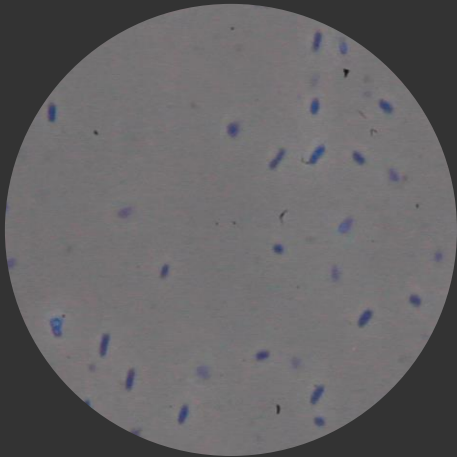
- 01 **Aumento dell'attività microbica**
- 02 **Aumento della diversità microbica**
- 03 **Migliore struttura**

COLTURE

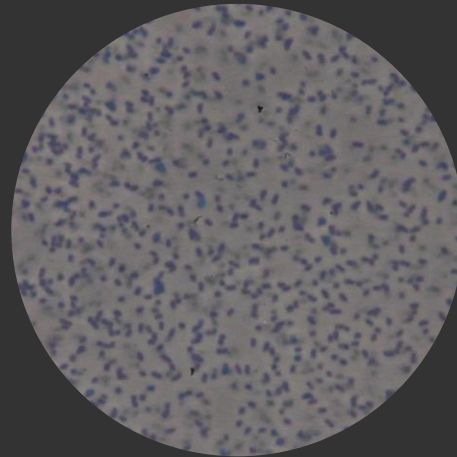
- 01 **Efficienza nutrizionale e riduzione dei costi**
- 02 **Aumento della produzione e della qualità**

Consorzio di due microrganismi con benefici sinergici

Azospirillum brasilense
ceppo M3

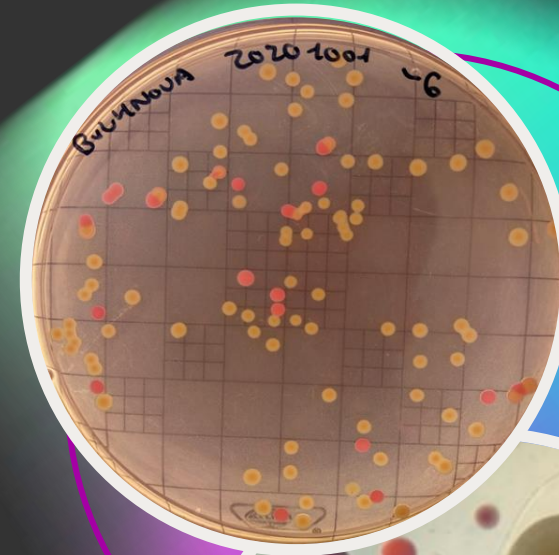


Pantoea dispersa
Ceppo C3



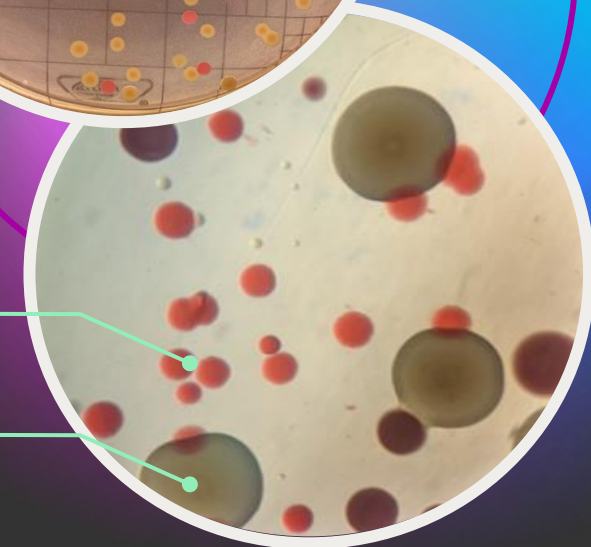
Isolato e selezionato
per un'elevata efficienza

Nessun effetto
antagonista



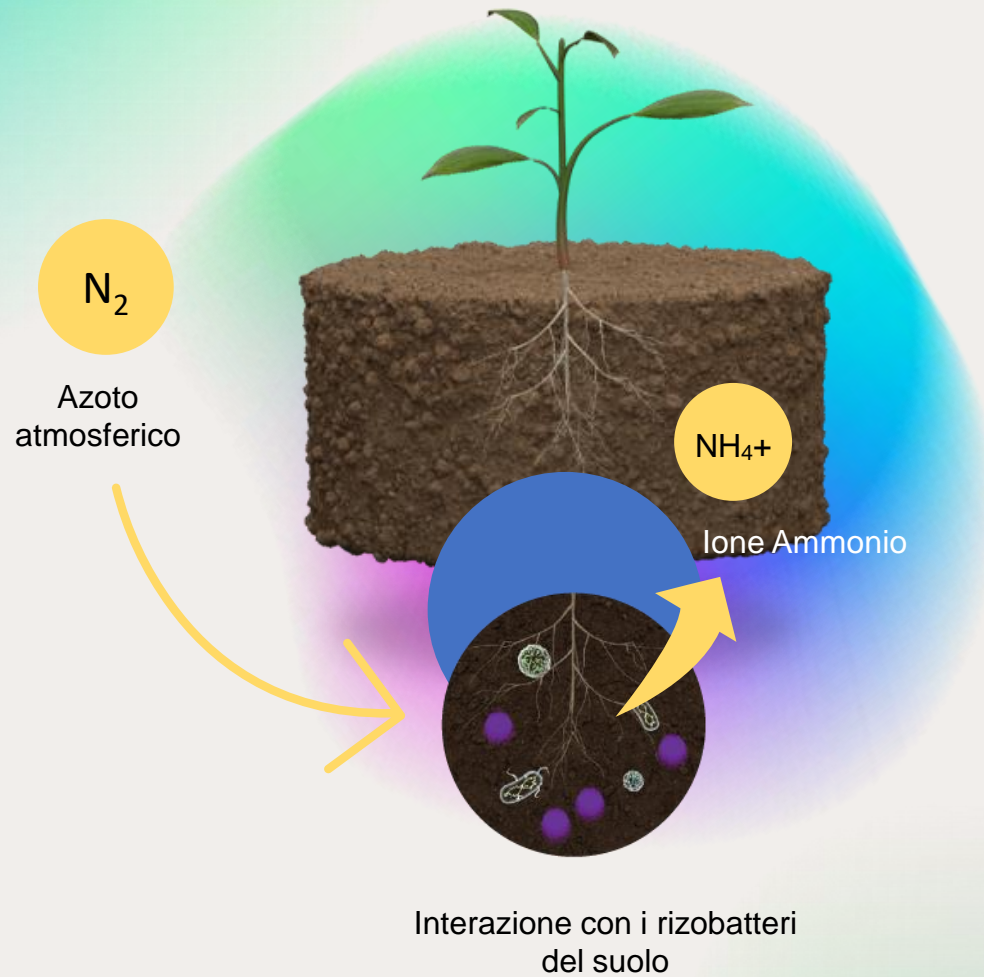
Azospirillum brasilense
ceppo M3

Pantoea dispersa
ceppo C3



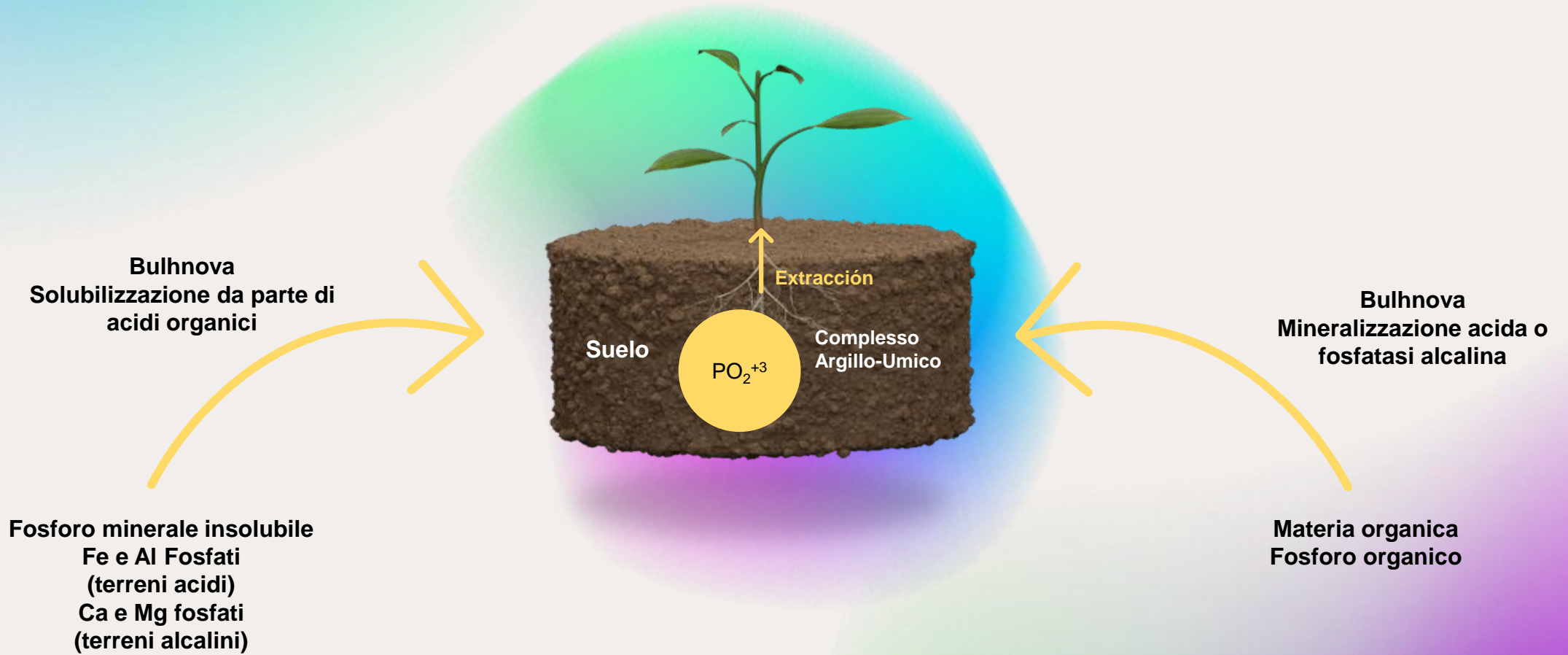
Probelte Lab

Modalità d'azione

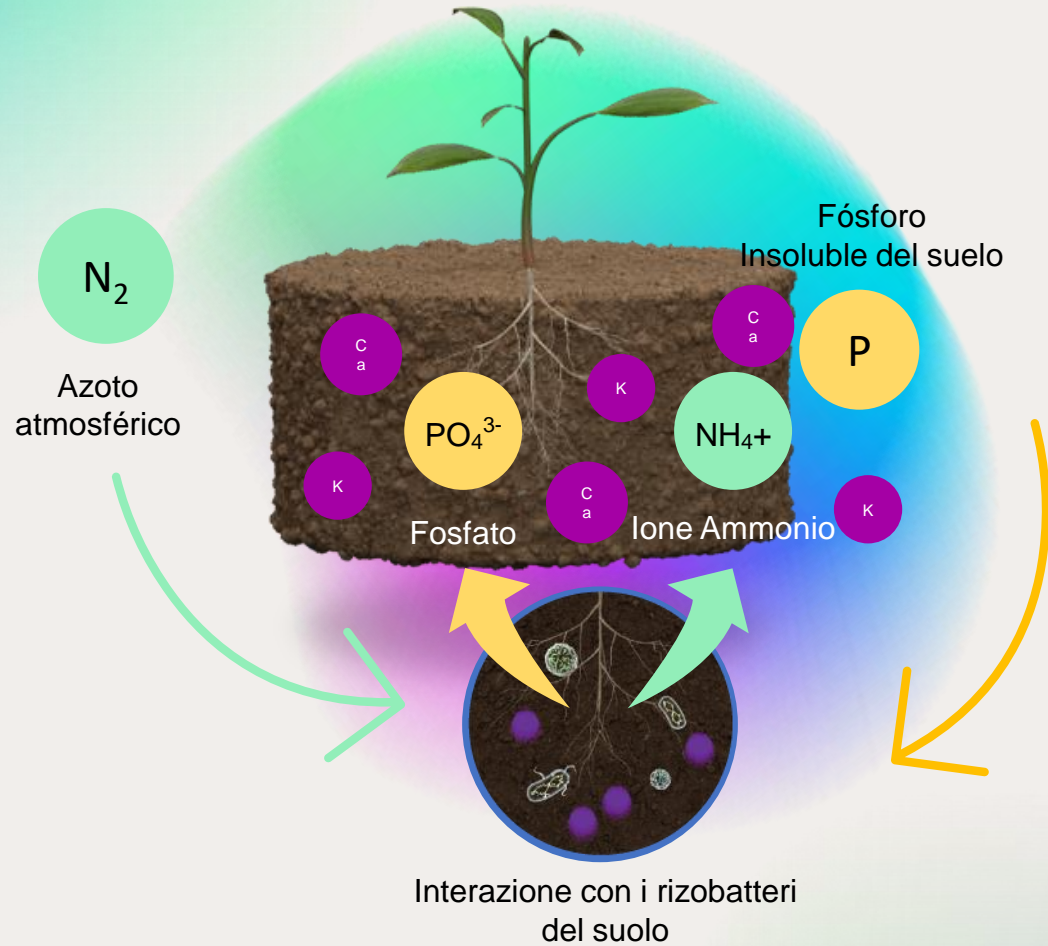


***Azospirillum brasilense* ceppo M3:**
Fissa l'azoto atmosferico
Rapido insediamento nell'ambiente radicale

MoA
Solubilizzazione del fosforo bloccato nel suolo



Modalità d'azione



***Azospirillum brasilense* ceppo M3:**
Fissa l'azoto atmosferico
Rapido insediamento nell'ambiente radicale

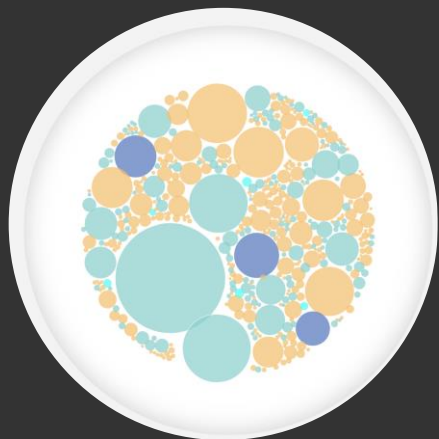
***Pantoea dispersa* ceppo C3:**
Fissa l'azoto atmosferico
Solubilizza il fosforo bloccato nel terreno
Aumenta la disponibilità di altri nutrienti come K, Ca, Zn, Mg...
Rapido insediamento nell'ambiente radicale

Migliora la fertilità del suolo



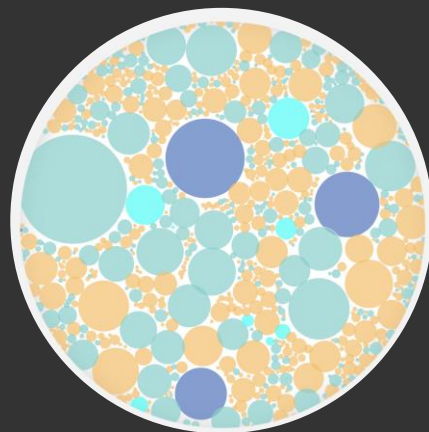
Aumenta i nutrienti assimilati dalla pianta

Risultati Mappa del microbioma



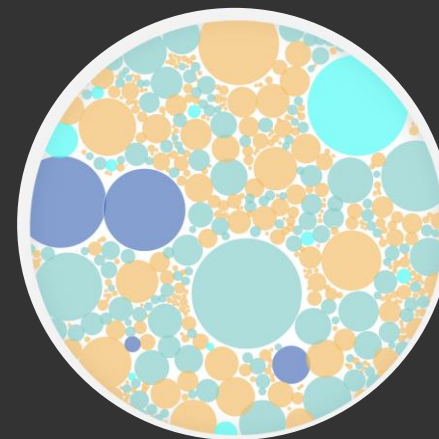
Media dei microrganismi
prima della prova Marzo

552 diverse tipologie



755 tipologie diverse

**Bulhonova - Agosto
C3 e M3 inclusi**



546 diverse tipologie

Testimone Agosto



MAGGIORE BIODIVERSITÀ, MINOR RISCHIO

Bulhnova Biopron

La tecnologia Probelte assicura soluzioni
per tutti i tipi di gestione della coltivazione



Manipolazione Bulnova e Bulnova sp

Nelle applicazioni di fertirrigazione



Orticoltura:
fertirrigazione

Miscelato con erbicidi pre e post-emergenza
per cereali, mais e estensive

Alberi da frutto: fertirrigazione

Applicazione Bulnova

Come si applica via radicale

Inizio
dell'irrigazione
50% del volume
annaffiature
regolari con
acqua



Bulnova App
Viene applicato durante il
45% dell'irrigazione
successiva

No mezclar con bactericidas o productos de
reacción fuertemente alcalina



Fine dell'irrigazione
5% del volume irriguo
Rimanere con l'acqua
(pulizia regolare dei tubi)

QUANDO APPLICARE

- Nelle colture orticole iniziare le applicazioni 7-10 giorni dopo il trapianto.
- Nelle colture arboree iniziare le applicazioni nelle prime fasi vegetative.

Ripetere le applicazioni nelle fasi di massima richiesta di nutrienti

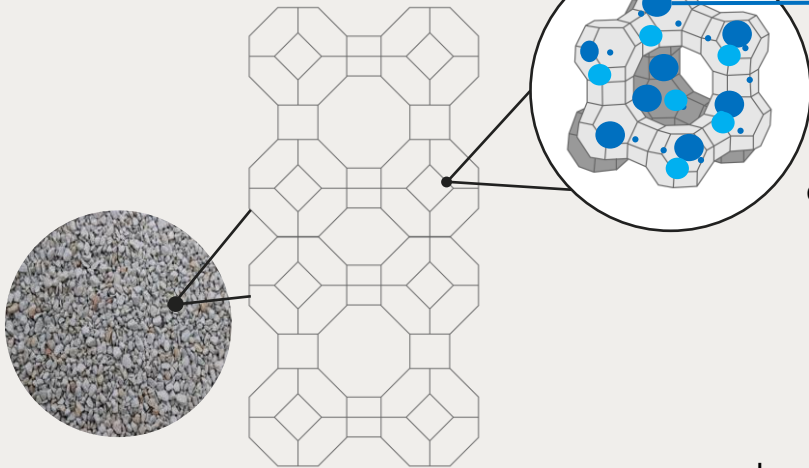
- Pre-fioritura.
- Allegagione.
- Sviluppo dei frutti.



Manipolazione del Biopron

MoA
Lento rilascio di batteri in
Bioprón

Struttura porosa
della Zeolite



I batteri di Biopron
aderiscono alla
superficie e all'interno
dei pori della zeolite.

01

Quando il Biopron entra in
contatto con il terreno, l'umidità
in esso presente agisce come
un solvente per i batteri che vi
aderiscono.

02

In primo luogo, vengono rilasciati quelli
che si trovano nelle zone più superficiali
della zeolite e progressivamente quelli nei
pori più interni.



Oliveto non
irriguo

Cereali

Vigneto non irriguo





Probelte

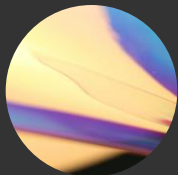
BY AGRONOVA BIOTECH

SOMMIAMO VALORE E SCIENZA
INTEGRAZIONE DI AGRONOVA BIOTECH



UN FRONTE UNITO DI SOLUZIONI

IN AGRONOVA SOMMIAMO IL
VALORE DI GRANDI AZIENDE,
SQUADRE E PERSONE PER
OFFRIRE SOLUZIONI CHE SI
ADATTANO ALLE ESIGENZE DI
OGNI COLTURA IN OGNI FASE
DEL SUO CICLO PRODUTTIVO



UN FRONTE UNITO DI SOLUZIONI

IN AGRONOVA SOMMIAMO IL VALORE DI GRANDI AZIENDE, SQUADRE E PERSONE PER OFFRIRE SOLUZIONI CHE SI ADATTANO ALLE ESIGENZE DI OGNI COLTURA IN OGNI FASE DEL SUO CICLO PRODUTTIVO



- Responsabile della salute umana sin dall'inizio.
- 25 anni di biotecnologie applicate all'agricoltura.
- Biofertilizzanti, biostimolanti e biocontrollo.



- Programmi completi di nutrizione biologica delle piante.
- Indirizzato allo sviluppo di grandi aziende agricole con servizio di laboratorio interno.
- Presenza nel continente americano.



- Impresa statunitense.
- Soluzioni biostimolanti basate sui microrganismi.



- Tecnologia proprietaria delle microalghe per soluzioni nutrizionali biotecnologiche.
- Laboratorio d'analisi ambientali e agroalimentari accreditato ENAC.



- Sviluppo di soluzioni digitali per il settore agricolo.

UN FRENTE UNIDO DE SOLUCIONES

EN AGRONOVA SUMAMOS EL VALOR DE GRANDES COMPAÑÍAS, EQUIPOS Y PERSONAS PARA OFRECER SOLUCIONES QUE SE ADAPTAN A LAS NECESIDADES DE CADA CULTIVO Y CADA ETAPA DE SU CICLO PRODUCTIVO

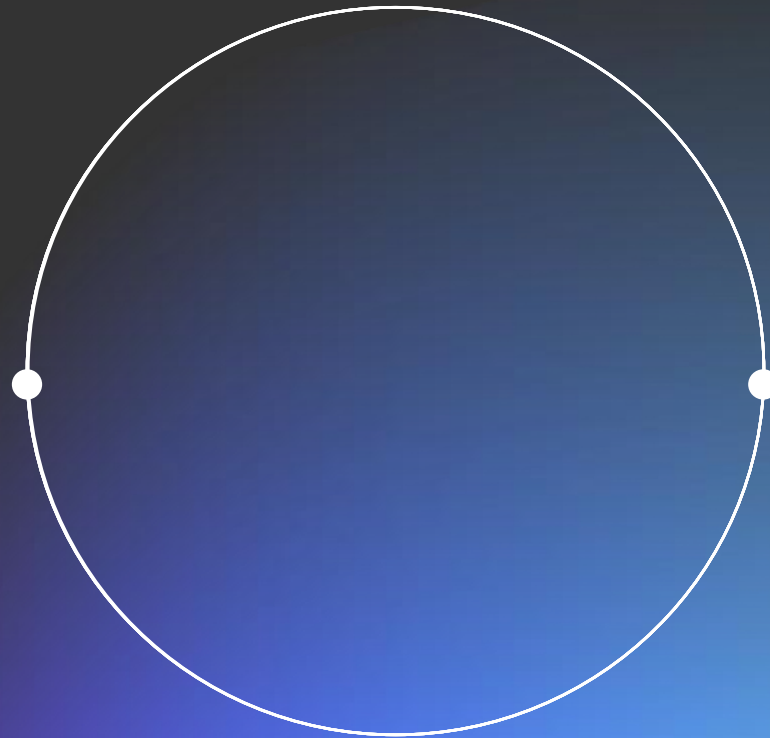


UN FRENTE UNIDO DE SOLUCIONES

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VALORE DI GRANDI AZIENDE,
SQUADRE E PERSONE PER
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ADATTANO ALLE ESIGENZE DI
OGNI COLTURA IN OGNI FASE
DEL SUO CICLO PRODUTTIVO



RISOLVIAMO



CONSIGLIAMO

CI ESPANDIAMO PER UN MAGGIORE IMPATTO

Impello
BY AGRONOVA
BIOTECH

Proin
BY AGRONOVA
BIOTECH

Probelte
BY AGRONOVA
BIOTECH

**MUNDO
ECOLÓGICO**

ARM System
Global
BY AGRONOVA
BIOTECH



+ DI 50 PAESI
PRESENZA COMMERCIALE

+ 200 DIPENDENTI CON 100 DI LORO NEI
NOSTRI STABILIMENTI

+ 300 DISTRIBUTORI
SERVITI IN TOTALE

4 LABORATORI DI RICERCA E
SVILUPPO

UN ALLEATO COMPLETO

SQUADRE UNITE IN UNA PIATTAFORMA DI
SOLUZIONI

EVOLVERE VERSO UN'ALTRA
AGRICOLTURA SOSTENIBILE ED
EFFICIENTE



AGRONOVA
BIOTECH



Grazie