

Nº2 / OCTOBER 2022

MUY AGRICULTURA

servalesa®

— SPECIAL —
BIOSTIMULANTS

SERGOMIL® L60

DISCOVER THE KEYS TO A
STAR BIOSTIMULANT

ALMONDS, OLIVES,
HORTICULTURE,
GARLIC, CITRUS

DISCOVER THE EFFECTIVE
STRATEGIES FOR EACH CROP

RENOV® SUPER 6

A COCKTAIL OF
MICRO-ORGANISMS

BIOSTIMULANTS

WOW!



RENOV[®] SUPER 6

THE POWER OF 6 STRAINS IN ONE PRODUCT

Bacillus subtilis, Bacillus pumilus, Bacillus siamensis, Bacillus amyloliquefaciens, Bacillus megaterium, Pseudomonas fluorescens



Soil regenerator

Promotes the coexistence of plants with
soil microbes

Occupation of the ecological niche and creation
of biofilm on the root



MUY AGRICULTURA

OCTOBER 22

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BIOSTIMULANTS

WOW!

THE WOW EFFECT! – WE SOUGHT, AND WE FOUND!

E The WOW! effect is created by developing an experience that combines visibility and the principle of memorability. Visible things are those which leave no-one unaffected, which leave no-one unaffected, make people talk and stand out – in short, things that make a difference. On the other hand, memorable things are those which make an impact, leave a memory, are noteworthy and occupy a space in the user's mind.

Creating an effect that is out of the ordinary implies that it is unexpected, but at the same time it must be successful and make sense. Therefore, the basis of the WOW! effect must be fuelled by a meaningful conceptualisation in which there is a reason why it is created and it is strongly conveyed in the minds of those who experience it.

Observing and analysing helps you find what makes you stand out, what sets you apart. And that is how we at Servalesa were able to see that we had some elements that made us unique, that caused a WOW! effect, the concept we needed to share, in just two words, the message that our biostimulants create and that we want to transmit – the WOW! effect

WOW! BIOSTIMULANTS LET YOURSELF BE SUR- PRISED BY SERVALESA

The WOW! effect of our biostimulants is based on the combination of everything that Servalesa creates, develops and works on.

The WOW! effect is a perfect combination of the noticeable and the memorable. This is exactly what we at Servalesa wanted to seek, and is what we ultimately found with our products.

Why WOW! biostimulants?

1. *The research and development work on our biostimulants* aims to surprise through innovation and technology to create unique products adapted to today's agricultural needs. Everything about this development is undoubtedly WOW!

2. *The art of manufacturing is also WOW!* The experience, research and know-how accumulated over more than four decades in formulating biostimulants is a differential value of Servalesa. We are aware of the importance of the quality of the formulations, traceability, thoroughness and supplier selection, and ensuring that all the processes carried out in the company are carefully integrated into a quality system. The work that our entire team does to make this happen is WOW!

3. *WOW!* means detailed knowledge of the scope of our biostimulants, and to this end we devote a large part of our resources to agronomic positioning and development of our biostimulants. The objective of the technical team in this area is to study, understand and demonstrate the effectiveness of our products in order to be able to transmit this knowledge to all corners of the world. WOW! Don't you agree?

4. *The emergence of biostimulants in the last decade has led to the recognition of their key role in today's agriculture by official bodies.*

In short – a perfect circle of features, elements, projects, etc., that aim for excellence and surprise our users.

servalesa
Especializada en agricultura

SERGOMIL L-60

ESTIMULADOR DEL CRECIMIENTO
Y DESARROLLO DE LAS PLANTAS

Solución líquida de derivados de sacarosa
y sulfato de cobre

CONTENIDO DE NUTRIENTES

Componente	Porcentaje (%)
Sulfato de cobre	0,1
Derivados de sacarosa	99,9
Agua	100

PREPARACIÓN DE LA SOLUCIÓN

Se recomienda utilizar el producto en las siguientes dosis:

Cultivo	Dosis (litros por hectárea)
Cereales	1,0
Leguminosas	1,0
Frutales	1,0
Verduras	1,0

Elaborado en España por el Centro de Estudios e Investigaciones Agrarias (CEIA) de la Universidad de Valencia. Se permite la explotación económica y científica de los resultados de esta investigación, siempre citando la fuente: CEIA (2010) SERGOMIL L-60. Valencia: CEIA.

5. *Quart de Poblet is* **WOW!** Not our own words (that would look very bad), but those of our visitors. Our new facilities are equipped with the latest technology for the research, development and manufacturing of biostimulants. In short – a true technological and industrial centre dedicated to biostimulants.

The Servalesa sales process, as well as having the usual segments of a purchasing process, such as attracting and selling, incorporates a third section that makes us different and gives us added value: the WOW! part. It is the part that our customers feel when they pass it on and are able to check out:

- WOW! biostimulants** that bring together our commitment and dedication to become a benchmark company in biostimulants. These three ranges are based on effectiveness, i.e. the ability to make the farmer say "WOW!" when applying our products. They are also based on sustainability and respect for the environment, which makes them compatible with strategies based on zero waste, integrated production, organic and biodynamic farming.



WOW! BIOSTIMULANTS

3 unique ranges

One of the keys to the WOW! factor that our biostimulants produce is that they comprise 3 unique ranges consisting of over 45 products that position Servalesa as a benchmark company in biostimulant products.



NEOESTIM

The range set to revolutionise the biostimulant sector. This group of products evolves the conventional concept of biostimulants and includes active ingredients and modes of action that make them unique.

- The products in the Neoestim range are composed of exclusive active substances developed and selected by Servalesa.
- These are products aimed at activating specific metabolic responses so that crops can overcome the various critical phases throughout their life cycle caused by different factors.
- The products included in this range are legally covered. All formulations have been registered and authorised in France or the Czech Republic, after passing a rigorous registration process where effectiveness has been demonstrated and which guarantee respect for human and animal health and the environment.



B'NATURE

The range of biostimulants based on micro-organisms. These products are unique on the market thanks to the Biological Nature seal of approval. Our technology partner is a team with more than 30 years of experience, dedicated to researching, developing and producing microorganism-based formulations in-house.

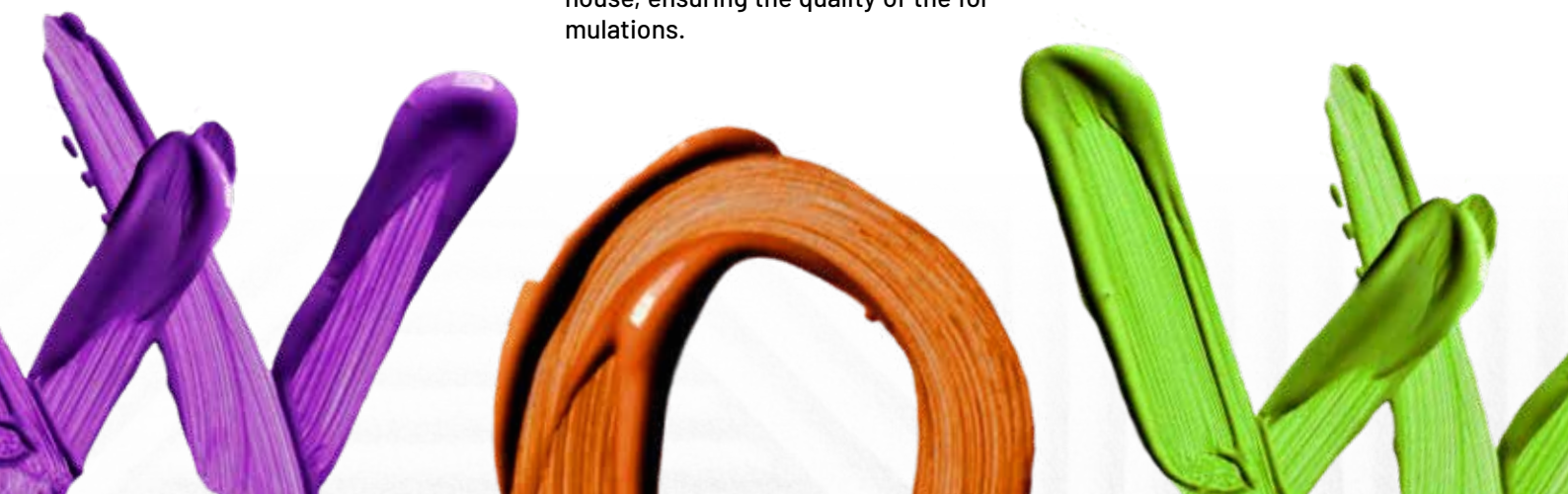
- The products in the B'Nature range are composed of micro-organisms resulting from Biológica Nature's research. We have our own strainarium with a great diversity of genera and strains of microorganisms prepared to develop different biostimulant formulations.
- They are efficiency-based products aimed at optimising fertilisation and solving soil problems based on regeneration, thanks to the multiple modes of action of micro-organisms.
- The B'Nature range has products registered in Spain, Czech Republic, Italy and at European level.
- All products are manufactured in-house, ensuring the quality of the formulations.



BIOSTIMULANTS

The Servalesa range of biostimulants are unique formulations that have contributed to the positioning of Servalesa as a benchmark company. The aim of this range is to evolve and complement conventional formulations to achieve excellence in effectiveness.

- They contribute to improved tolerance to abiotic stress.
- They optimise the use and efficiency of nutrients in plants.
- They activate crop metabolism.
- They contribute to improving the development of the plant.
- They improve crop quality and yield parameters.



INTEGRATED MODEL OF *Biosolutions*

Servalesa's work philosophy stems from the INTEGRATED BIOSOLUTIONS MODEL (I.B.M.) on which we base our R&D. One of the main activities of Servalesa's R&D department is the physiological study of crops and their needs. From these studies, unique active ingredients, based on specific modes of action, are developed and integrated into our formulations. Servalesa's R&D department is thereby fully targeted to meet the current and future needs of the field.



Protect

With the use of technology to address pests and diseases with sustainable alternatives.

- Pest management.
- Disease management.
- Foliar treatment optimisation.
(systemic and contact-based)

To nurture

Via technology based on micro and macro-elements with a high level of assimilation

- Complete phases with high nutritional demand.
- Correct deficiencies
- Optimise the nutritional balance of crops to achieve higher yields.

Stimulate

Via the use of technology designed to activate various key metabolic routes at critical moments in the crop cycle

- Abiotic stress management
- Optimisation of plant development
- Improvement of quality parameters
- Activation of metabolism

Regenerate

The soil, root and rhizosphere with microbiology-based technology developed by Biológica Nature and Symbiom.

- Biofertilisation [N_2 fixation and solubilisation of P_2O_5 and K_2O]
- Optimisation of water resources
- Regeneration of soil microbiota
- Protection of the root and rizosphere



The I.B.M. is our guide to continue offering high quality biosolutions that truly alleviate the needs of farmers, especially through the use of our biostimulants with formulations unique to the market that make us a benchmark.

Biostimulants: *A COMMITMENT TO* *diversity*

In sickness and in health

The concept of health is partial in two ways: it is incomplete and subjective. The same goes for its classic opposite: illness. We consider a healthy organism to be one that performs all its functions normally. A sick organism, on the other hand, is one mired in the aberrations of disorder.

In the face of our deep-rooted inability to establish what should be considered normal, it must be acknowledged that there are people who, despite being diagnosed as sick without remission, manage to last a lifetime while being labelled chronically ill. Perhaps the dubious convention of being healthy has less to do, as people think, with the irrefutable fact of feeling alive.

Let us therefore agree that life is a singularity, and that once the miracle of birth has occurred, the only normal – and the most certain – thing for human and plant life alike is the inconvenience of death. In the meantime, however, we must all work together to bring in the harvest.

Plant pathology: a science in its own right

Jiménez Díaz, a resolute academic and orthodox researcher, argues that the aims of plant pathology are:

- 1) To ensure that crops achieve the yields prescribed by their genetic potential within the physical constraints determined by variable environments.
- 2) To promote the efficient use of inputs needed for plant production: i.e. water, soil, fertilisers, energy, etc.
- 3) To ensure the health and wholesomeness of the harvested product.

Following the notion of disease aetiology established by Robert Heinrich Hermann Koch (1843-1910), plant pathology usually relates each disease to a single causative agent. However, as the traveller and educator José Luis Porcuna postulates, we can now incorporate knowledge of plant physiology and ecology into the diagnosis, which shows that there are more influential factors for the development of

the disease than even the threatening presence of the pathogen itself. Examples include a polluted atmosphere, or infertile soil.

Julián Marías, in his indispensable *History of Philosophy*, wins over readers with this dazzling definition of science:

“Knowledge about what things are, determined by the need to live in truth, the origin of which is astonishment.”

And the truth is that it is astonishing that, with defiant ignorance, we are reluctant to internalise that only in healthy soil can we aspire to grow healthy plants.

The black heralds

Pathogens and pests are bio-indicators. Without wishing to shock, the fact is that a lettuce does not suffer an aphid attack and become destabilised; on the contrary, it becomes destabilised and suffers an aphid at-



tack. Thus, the mere presence of *Phytophthora infestans* in a potato crop is not yet a disease per se, but a symptom of an excess (of nitrogen?) or a deficiency (of organic matter?).

For example, we cram inorganic nitrogen into an orchard in pursuit of maximum production, ignoring the existence of a food web in the soil that is busy decomposing organic matter. So, by subverting the natural nitrogen cycle, we are idling a multitude of micro-organisms. In this case, we are causing *Azotobacter* or *Azospirillum* to disappear: the soil loses biodiversity and the agro-ecosystem becomes more vulnerable. This is the ironic advice of the renowned French biologist and botanist, Francis Hallé.

“All a tree asks is to be left alone.”

However, instead of leaving it alone:

- We manipulate it genetically and impose it as a monoculture.
- We transplant it on a whim to implausible soils using senseless planting patterns.
- We water it according to opinions.
- We fertilise it by respecting absurd customs, or persuaded by even more absurd fashions.
- We systematically spray it with drugs, underestimating its immune system.

In short, we stress trees while decapitalising agro-ecosystems.

Hallé, an expert on tropical forests, warns us of one thing: whoever disturbs biorhythms is not only exposed to the consequences, but must also accept them.

Corollary: as an agro-ecosystem loses complexity, life in it paradoxically becomes more complicated.

Rubisco or evolutionary success

A variant of the idealisation of nature consists of projecting onto it attributes that are exclusive to human beings. Indeed, we tend to humanise it, albeit as an exquisite corpse. Since Descartes, we have been analysing nature with the fury of disembowellers, reducing life to the narrowness of a few formulas. Indeed, we tend to humanise it, but what we achieve is to reify it. And then it hurts less.

RuBisCO (abbreviated from ribulose-1,5-bisphosphate carboxylase/oxygenase), the CO₂-fixing enzyme, formed from 16 polypeptides and consisting of 8 active sites, the enzyme present in all photosynthetic organisms that use the Calvin cycle to fix carbon, possibly the most abundant enzyme on earth, is slow and inefficient from a human perspective: i.e. under productive criteria.

Desperately slow because each active site catalyses only 180 reactions per minute, compared to other enzymes that can catalyse thousands of reactions per second. Desper-

ately slow and bafflingly inefficient because it catalyses the addition of both CO₂ and O₂: that is, oxygen and carbon dioxide compete for active RuBisCO sites, and so when it fixes oxygen (photorespiration) it undoes what it previously did by fixing carbon dioxide (photosynthesis). Nevertheless, RuBisCO keeps its job and nature doesn't dare dismiss it. It is good for life, even if economists and engineers are not convinced. And it doesn't just serve it on a whim: plant physiologists keep discovering qualities in RuBisCO that go beyond the moulds of a curriculum. Measuring, once again, is not the same as knowing what is measured.

And so, since the time of Descartes, we have meanwhile been simplifying reality, reducing it all to its parts. But the watch has started to deconstruct the watchmaker. The apple appears to be biting back. Life does not share our haste. Plants, anchored in the ground, catch light with a frugality of 300,000 km/s.

As always, we must breach the veneer of astonishment to reach the depths of knowledge.





Biomimicry or the value of imitating life

NPK fertilisation and application of pesticides have been shortcuts to a dead end. The soil lies weary from chasing shadows, and the farmer awakens each morning decapitalised.

Biochemists unravelling metabolic pathways have come across microbiologists reanimating mycorrhizae. Suddenly, we remembered: the soil, the meeting point, the sustenance of the crops, for sustaining and nourishing them. The soil microbiota and the roots of our crops stimulate each other: a proliferation of secondary metabolites and exudates loaded with good intentions. The rhizosphere as a hugging algorithm: in life, there is always a gradient, more or less close, to greet.

We had insisted that the harvest was a result. But fruits are just names of a process. And since processes only consent to be favoured or stimulated, as soon as we force or violate them, they degenerate or abort.

Biostimulants are therefore a promising alternative: their formulations based on organic molecules and trace elements reinforce indigenous tendencies without detriment to auxiliary flora and fauna.

Biostimulants should by no means be considered a conquest, but a discovery. It was about emulating life. After all, RuBisCO has been exemplary for millennia, free of any accusations of absenteeism and punctual at work as long as any stoma remains open.

The promise of Prometheus

Seeing us all the time with *smartphones* in our hands, we must admit that we have become terribly “thumbsy”. The function creates the organ: *Homo technologicus*.

The titan Prometheus took pity on the helplessness of mankind, snatched fire from the gods of Olympus and gave it to us in the name of progress. Our first step in the technological race: fire. Then came the wheel, the bidet, and the aforementioned *smartphone*.

“Health and disease themselves, as events that happen to individuals and communities, are also ecological events, and therefore definitions of health cannot ignore this interdependence.”

and, on the face of it, legislation is being passed in favour of motives such as the one that permeates this reflection offered by Hernán San Martín almost anonymously.

We are currently witnessing a situation in which plant protection product registrations are being repealed as a matter of urgency. Markets demand healthy and safe food. “Preserve the environment” is conjugated in the imperative. Those being forced to cure problems are betraying that they didn’t know how to prevent them in the first place. We are assuming that, in order to prevent stress from degenerating into disease, the plant must be biostimulated. Producers and technicians are already talking to each other with astonishing fluency about elicitors and osmoprotectants. The rhizosphere is starting to become the geometric locus of prosperity for any crop. The agricultural sector is evolving, despite some discouraging signs, including unfair prices for some crops season after season. However, in the countryside, time is always chasing itself, twisting in cycles, every year granting us springs that promise us a beginning and keep us away from discouragement.

We have given ourselves the means: *big data*. Even so, a strong will is not enough. It takes talent to know how to get there and, above all, talent to choose where to go. We collect increasingly reliable data and one day we will finally come up with a good explanation to back it up.

We are still following the path of *Homo sapiens*.

Even if, from time to time, we declare ourselves on fire with the rhetoric of toxic love, we get a flat tyre when we least expect it, and without mobile coverage that plumber we need to fix the bidet seems ever so far away.

Pedro Pons
Head of the Technical
Department at Servalesa



BIOSTIMULANTS



Let Servalesa surprise you

Records

A NEW ERA FOR BIOSTIMULANTS

Biostimulants have always occupied a position in the market with products that when applied to the plant or soil, increase crop yield and quality by improving nutrient uptake, nutrient use efficiency and resistance to abiotic stress by exerting positive effects on crop metabolism and hormone signalling.

Although there are similarities between biostimulants and fertilisers, there has been no harmonised definition or regulation of biostimulants in Europe until the publication of Regulation (EU) 2019/1009¹, which entered into force in its entirety on 16 July 2022, repealing the previous Regulation (EC) 2003/2003², which regulated fertilisers marked “EC fertiliser”. In fact, in the repealed Regulation (EC) 2003/2003², the inclusion of biostimulants was not possible, given that it only regulated inorganic products, inhibitors and amendments, meaning that the marketing of some biostimulants at European level could only be done by obtaining the necessary registrations in each of the member states according to their national regulations, which makes for 27 different scenarios given that each member state is regulated differently.

For example, in Spain, with Royal Decree 506/2013³ and subsequent amendments, although a definition of “biostimulant” is not included, its use would be included in Group 4, entitled “Other fertilisers and special products”. This group is limited to a number of fertiliser types that are very well-specified in terms of method of production, essential components and minimum contents/other requirements. However, in the event that a product does not conform to the requirements of Group 4, the inclusion of a new type is permitted. This inclusion would entail submitting a proposal to the Directorate-General for Agricultural Production and Markets, accompanied by a technical dossier in accordance with Annex VII and having to meet a number of specified requirements (such as meeting the definition of a fertiliser product and meeting the requirements of providing nutrients to plants effectively or improving soil properties, have appropriate sampling, analysis and testing methods for the product in order to be able to verify its richness and qualities and lack of harmful effects on human health and the environment) and be evaluated by the Committee of experts which would propose the tests it deems necessary to assess its characteristics and performance. This inclusion of a new type represents a significant investment both in economic terms and in terms of time for manufacturing companies from an R&D&I point of view.

With the recent entry into force of Regulation (EU) 2019/1009¹, which allows the free movement of EU fertiliser products across the European Union, for the first time there is an agreed definition of a biostimulant and the functions it provides to crops. This Regulation includes biostimulants in the functional product group (PIC 6) and distinguishes between microbial plant biostimulants (PIC 6 (A)) and non-microbial plant biostimulants (PIC 6 (B)). It defines “**plant biostimulant**” as “**an EU fertiliser product whose function is to stimulate plant nutritional processes independently of the nutrient content of the product, with the sole objective of improving one or more of the following plant and rhizosphere characteristics: nutrient use efficiency, tolerance to abiotic stress, quality characteristics, and availability of immobilised nutrients in the soil and rhizosphere**”. In order to obtain CE marking, biostimulants under this regulatory framework must pass a demanding conformity assessment by a notified body accredited by the nationally designated notifying authority, which certifies the efficiency of the product and the fulfilment of all the requirements and functions claimed on the label, with manufacturers having to demonstrate their function through effectiveness trials. However, there are some limitations under this regulation. For example, the functions of biostimulants are fixed as being the four functions listed above, which are the only ones that can be declared on the label. Another limitation is in the list of authorised micro-organisms, which is restricted to four. In addition, technical specifications (CEN/ST) have been

published and the European Standard (EN standard) is expected to be published before 2024-2026, and the end point in the manufacturing chain for biostimulants based on animal by-products, among others, has not yet been defined.

Against this background, and given that the harmonisation of Regulation (EU) 2019/1009¹ is optional, it is currently still sometimes necessary to register biostimulants under one of the 27 national legislations of each of the EU member states. In some member states, the registration of biostimulants is subject to compliance with some of the types contained in their national legislation (for example in Spain, where they must comply with the requirements of Group 4, “Other fertilisers and special products” or, if they do not comply, there must be a proposal for modification or updating of the types included in this group or the inclusion of a new type); however in other countries the requirements are more demanding and the registration of biostimulants involves laborious preparation of documentation, including tests of effectiveness as well as health and environmental effects, and the product must undergo a thorough evaluation by the designated evaluating bodies in each of the member states (e.g. in France).

One of the advantages of obtaining registrations in a given EU Member State is that any such registered product could be sold in another Member State under Regulation (EU) 2019/515⁴ regarding mutual recognition, although there are still countries where

it is not possible to invoke this Regulation and the products therefore could not be marketed via mutual recognition.

Servalesa has always been committed to developing quality products to improve the production and quality of crops, providing solutions to farmers. Servalesa continues to work on the adaptation of biostimulants under the new Regulation (EU) 2019/1009¹, preparing all the technical documentation and effectiveness tests required for their conformity assessment. Furthermore, when there was still no harmonisation of biostimulants at European level, Servalesa was already committed to providing added value and differentiation in the market for our products, registering different products in EU countries with the backing of effectiveness tests and compliance with regulatory requirements, being subjected to exhaustive evaluations.

As an example of this, registrations have been obtained in France for the biostimulants **SERGOMIL® L60**, **QUALIFUN®**, **MAS RAIZ® +**, **TANISER®**, **SIDE-FUN®** and **PCa2 MAX®**. Other new product developments are currently under evaluation. In addition, other products have been registered in other member states such as Portugal, Greece, Hungary, Czech Republic (**PEELS** and **VENUSER® FULL**) and Romania.

(1) REGULATION (EU) 2019/1009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, dated 5 June 2019, establishing rules regarding the marketing of EU fertiliser products, amending Regulations (EC) No. 1069/2009 and (EC) No. 1107/2009 and repealing Regulation (EC) No. 2003/2003.

(2) REGULATION (EC) 2003/2003 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, dated 13 October 2003, relating to fertilisers.

(3) Royal Decree 506/2013 of 28 June on fertiliser products.

(4) REGULATION (EU) 2019/515 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, dated 19 March 2019, regarding the mutual recognition of goods lawfully marketed in another Member State and repealing Regulation (EC) No. 764/2008.

Maria Teresa Castellanos
R&D and Regulatory Department
Servalesa



Biostimulants

WITH REGISTRATION

WOW!

— *RANGE* —

Neoestim



SERGOMIL® L60

Biostimulant based on sucrose derivatives and systemic copper.

Registered in France under AMM No. 1180403



MAS RAIZ® +

Biostimulant based on GABA, glutamic acid and soluble sugars.

Registered in France under AMM No. 1180618



PCa2 Max®

Biostimulant based on silicon dioxide, vitamin B1 and algae extracts.

Registered in France under AMM No. 1210051



SIDEFUN®

Bio-stimulant based on unsaturated organic acids.

Registered in France under AMM No. 1180613



QUALIFUN®

Biostimulant based on hydrogen sulphate.

Registered in France under AMM No. 1180617



PEELS®

Biostimulant based on sorbic acid, salicylic acid and potassium.

Registered in the Czech Republic under No. 5461



VENUSER® FULL

Biostimulant based on sorbic acid, nitrogen, potassium and sulphur.

Registered in the Czech Republic under No. 5464



TANISER®

Biostimulant based on unsaturated organic acids and condensed tannins

Registered in France under AMM No. 1190699

Biostimulants

WITH REGISTRATION

WOW!

— RANGE —
B'Nature



RENOV® SUPER 6

Biostimulant based on *Bacillus subtilis*, *Bacillus pumilus*, *Bacillus siamensis*, *Bacillus amyloliquefaciens*, *Bacillus megaterium* and *Pseudomonas fluorescens*.

Registered in Italy under No. 0034775/21



FUSVER®

Biostimulant based on *Bacillus subtilis*.

Registered in Spain under No. F0004083/2030



RIZOBACTER® N

Biostimulant based on *Azotobacter chroococcum*.

Registered in Italy under No. Coming soon



RIZOBACTER® PK

Biostimulant based on *Bacillus megaterium* and *Pseudomonas fluorescens*.

Registered in Italy under No. Coming soon



RENOV® SUPER 2

Biostimulant based on *Bacillus subtilis* and *Bacillus megaterium*.

Registered in Italy under No. 0034780/21



RENOV® MICRO

Biostimulant based on *Bacillus subtilis*, *Bacillus pumilus*, *Bacillus siamensis*, *Bacillus amyloliquefaciens*, *Bacillus megaterium* and *Pseudomonas fluorescens*.

Registered in Spain under No. F0004270/2031



NOVA®

Biostimulant based on *Lysinibacillus xylanilyticus*.

Registered in Spain under No. F0004105/2030



RENOV® TRICCO

Biostimulant based on *Trichoderma harzianum*.

Registered in Italy under No. 0027559/19



NICAN®

Biostimulant based on *Bacillus mojavensis*.

Registered in the Czech Republic under No. 5462



MYCODRIP®

Biostimulant based on mycorrhizal fungi of the genus *Rhizophagus spp.*

Registered in the Czech Republic under No. 3862

The most *WOW!* product from Servalesa

With the aim of giving prominence and generating value at Servalesa, we have created a new range of products, NEOESTIM, designed to accommodate those new biostimulant products that evolve the conventional concept of biostimulants.

One of the benchmark products in this range is **SERGOMIL® L60**, a unique product with great differential value which has been present since the beginnings of Servalesa and has become one of our most representative products, our most WOW! biostimulant: **SERGOMIL® L60**.



that will be explained throughout this article.

The method of manufacture is essential to achieve a unique product such as **SERGOMIL® L60**. There are many ways to manufacture copper-based products, but at Servalesa we use the so-called "reaction mass" method to manufacture **SERGOMIL® L60**. It should be noted that we are the only company with REACH registration to manufacture formulations of this type via this process. This process is crucial in differentiating the formulation, as the cost of production and the effectiveness of the product will vary significantly.

There are many copper-based products available, but the composition and origin of the raw materials used in **SERGOMIL® L60** are undoubtedly the key to differentiation. **SERGOMIL® L60** is formulated from copper and different sucrose derivatives of natural origin produced by biological fermentation from non-genetically modified

plant substrates. On the one hand, unlike other similar synthetic substances, the natural origin of copper enhances its ability to form complexes. On the other hand, saccharide derivatives include significant concentrations of galacturonic acid and other glyco-derivatives, which are responsible for the activation and stimulation of the different metabolic pathways

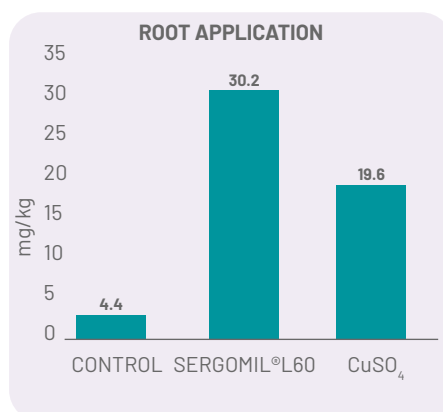
At Servalesa, we thought it would be a good idea to deepen our knowledge of how **SERGOMIL® L60** works and to this end, we carried out a study with the Zaidín Experimental Station (EEZ-CSIC) in 2022 to gain first-hand knowledge of its action method.

SERGOMIL® L60 Neoestim

SYSTEMIC COPPER

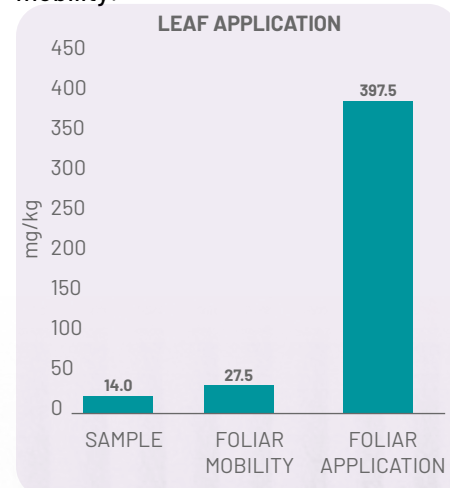
Copper is an essential cofactor of enzymes involved in major physiological processes such as photosynthesis, oxidative respiration, amino acid formation and conversion, flowering and symbiotic nitrogen fixation. It is an abundant and necessary component of chloroplasts and is actively involved in the synthesis of chlorophylls, proteins and polyphenol oxidases.

In a study carried out at the EEZ-CSIC, copper absorption was evaluated after applying **SERGOMIL® L60** during irrigation of a soybean crop, and a foliar analysis was carried out 5 days after application:



In another study, the mobility of copper was analysed after application of **SERGOMIL® L60**. This trial, conducted on tomato plants, was carried out in two applications, spaced 10 days apart, by foliar application at a dose of 2.5 mL/L. On the one hand, the first thesis was left as a sample on a plant without any treatment.

Meanwhile, on the same plant, **SERGOMIL® L60** was applied to one side of the plant, leaving the other side untreated, in order to check two parameters: foliar copper absorption and mobility:



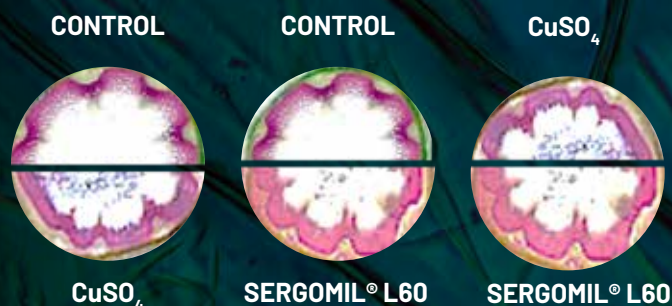
SERGOMIL® L60

Neestim

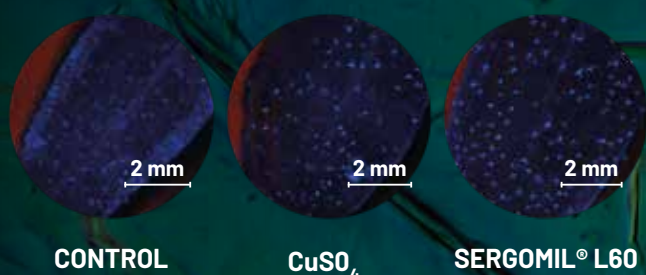
CELL WALL REINFORCEMENT

Lignin is a phenylpropanoid polymer with a complex structure that is generally deposited in secondary cell walls, especially in the xylem, providing mechanical strength and protection against external threats.

From the study carried out at EEZ-CSIC we concluded that after the application of **SERGOMIL®L60**, the synthesis and accumulation of lignin to strengthen plant tissues is significantly stimulated. In this case, this behaviour was studied by means of staining cross-sections of the floral stem of *Arabidopsis thaliana*. For this purpose, the thickness of the lignified tissue was measured in detail after each treatment.



On the other hand, the stimulation of the synthesis of callose, a polysaccharide of plant origin and an important element for the healing of mechanical wounds in plants, was also measured. After application of **SERGOMIL®L60** the amount of callose synthesised was quantified and was higher than the rest of the theses.



Pascual Bauset
Marketing Director
Servalesa

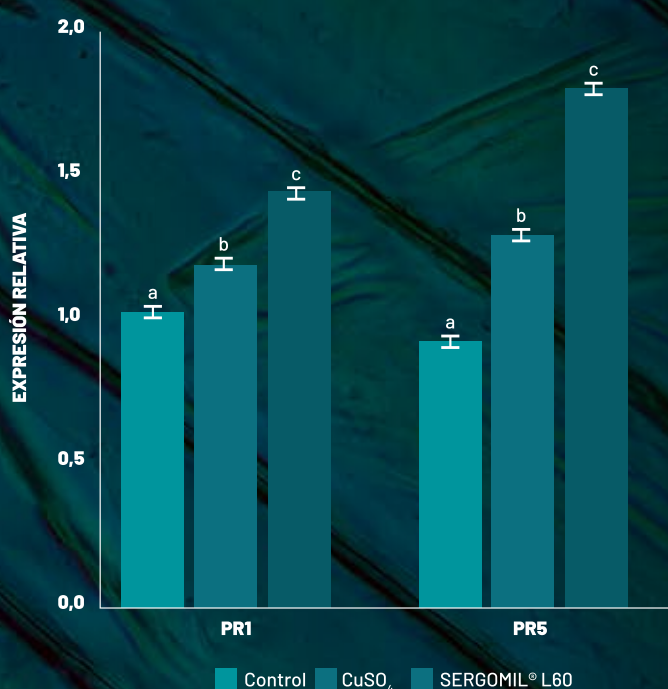


SERGOMIL® L60

Neestim

PR PROTEIN STIMULATION

One of the fundamental aspects we emphasised in the EEZ-CSIC study was linked to the analysis of gene induction (copper transporters, superoxide dismutase coding, lignin synthesis, pathogenesis response protein coding and sucrose synthesis). Although it is difficult to summarise all the results of the study in one article, it is worth highlighting the results of the analysis of the expression of genes encoding proteins linked to the response to pathogenesis, PR1 and PR5 (these are signalling proteins that respond to stress situations, via the phytohormone salicylic acid).



SERGOMIL®L60, 6 hours after application, produced a rapid response in increasing the expression of PR1 and PR5 genes.

In order to carry out this study, we based ourselves on the experience and real positioning of the product in different areas to provide an answer and explanation of its mode of action. It was proven that our formulation was the thesis that performed best during the study, highlighting the application and use of **SERGOMIL®L60**. These studies confirmed the mode of action of **SERGOMIL®L60**, a product that has a place in numerous management strategies for a multitude of crops. This is the benchmark biostimulant in our catalogue – the most WOW! product of its type!

Biostimulants

AS A KEY TOOL FOR

almonds

Over the last few years, the use of biostimulants in crop management has been increasing exponentially and this can be attributed to several reasons:

DIRECT BENEFITS

Biostimulants have a positive influence on the different stages of crop development (growth, flowering, fruiting, fattening, etc.)

INDIRECT BENEFITS

They have an impact on the generation of inducers that control different processes (hormonal, enzymatic, defence, metabolic pathways, etc.)

MITIGATES ABIOTIC STRESS

This versatility of functions, together with the increased knowledge and modernisation of crops, as well as the reduction of synthetic substances used in agriculture (increasingly evident), mean that we can already speak of a "golden age" of biostimulation. This time of splendour is supported by the interesting results of the use of tools of this type, with the correct usage and form, on the various crops.

One of the extensive crops in which the use of biostimulants has been developed most by Servalesa has been almond trees. The almond tree is a fairly demanding crop, subjected to continuous stress throughout its cycle.

Classifying according to the origin of the stress, two groups are thus made (although most of the time they interfere with each other or can be a consequence of each other) and the tools created for each of the situations are proposed:

a) Stress due to endogenous factors

As a result of the plant's own physiological processes.

b) Stress due to exogenous factors

Caused by biotic and abiotic elements affecting the plant.

Servalesa has developed a series of biostimulant solutions that help to mitigate each of these difficult situations to a large extent.

In the case of the so-called endogenous or group A factors, and referring to the crop that concerns us in this article, the most notable products for the different stages of the almond tree are:



Sprouting-Blooming

The almond tree carries out these processes with the reserves it has from the previous year. This puts a great strain on the plant, as it faces critical phases with hardly any exogenous aids. Tools such as **DESES-3®**, **BETASER®**, **BIOCROP® EXTRA** or **FOLSER®** reduce the stress generated in these phases and the energy expenditure derived from it, thus facilitating and optimising these processes.

Set

Ensuring the maximum amount of set flower is of fundamental importance if a large harvest is sought. For this, apart from the work of the pollinating insects and some micronutrients such as boron and molybdenum, there are compounds that favour pollen optimisation and viability, the emission and elongation of the pollen tube, etc.

FOLSER® greatly supports these processes. Once the fruit has set, another important aspect to take into account is its grip. Products such as **SERGO-MAX®**, which increases the mobility of the sap, help more fruit to become viable (as long as the plant is nutritionally balanced).



Fattening and hardening of the shell

Once the fruit has been picked, the next objective is to achieve the largest possible size and weight of the fruit, as well as a consistent shell. During this process, the **FOLSER®** tool helps at the beginning of fattening, where there is intense cell multiplication. After this process, amino acid based products with a good, balanced aminogram such as **SERVAPTON®** promote the formation and enlargement of the pericarps and endocarps in which the seed or kernel will later be lodged. To get the maximum yield from this seed, we have the help (in addition to the extremely well recognised effects of potassium) of biostimulants such as **SERVAL® NK**, which increases growth and accumulation of reserves, and **FEEDSER®** a biostimulant which, due to its composition, favours fruit fattening and hardening, even in unfavourable conditions such as abiotic stress.

As for those of exogenous origin, or what we have called group b):

Abiotic stress

These include those produced by the effects of cold, heat, intense radiation, high salinity, etc. In such cases, the most immediate effects observed are dehydration (frost or heat stress) and sudden stomatal closures that hinder the assimilation of certain nutrients, causing great stress in the plants and inhibiting key metabolic processes in the development of the crop.

Servalesa proposes a series of products (**DESES-3®**, **BETASER®** or **FEEDSER®**) that mitigate these adverse effects to a large extent, acting at the cellular level (increasing osmotic pressure, favouring the entry of solutes into the cell); or ensuring that stomatal closure is not so abrupt in stressful situations; or favouring metabolic processes affected in complicated situations.

Critical moments in the cycle.

At this point, it is interesting to note that, in addition to the biostimulant and nutritional effects of the product strategies outlined below, there is also a very important action to minimise damage and the development of problems.

Mitigation of these critical situations is achieved:

- Directly, with compounds that prevent the undesired development of critical factors.
- Indirectly:
 - By generating induced and acquired systemic resistance.
 - By thickening the cell wall.
 - By creating synergies with active ingredients, favouring their distribution within the plant and counteracting the "stop" effects that all active ingredients produce in the plant.

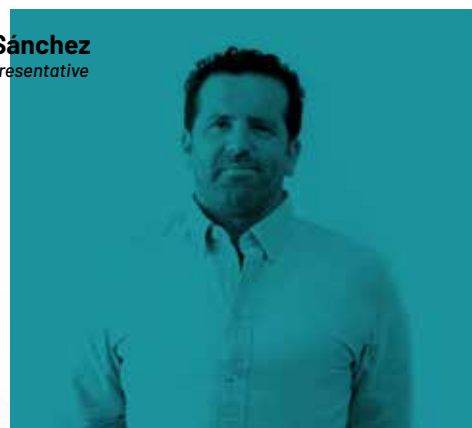
As part of these strategies to help minimise the damage caused by common almond tree diseases such as **Monilia**, **Fusiccocus**, **Cribado**, **Mancha ocre**, **Antracnosis**, **Xanthomonas** or **Agrobacterium** the biostimulant products used with proven positive effects are **SERGOMIL® L60**, **QUALIFUN®** and **SIDEFUN®**, which complement conventional plant health strategies.

Finally, and as a final point to bear in mind, it is worth highlighting Servalesa's commitment to help improve the development of almond tree cultivation with proposals for protocols with minimum impact on nature, given that most of its benchmarks are classified as "Zero Waste" and are even certified as "Organic".



Jose Manuel Sánchez

Servalesa Sales Representative
Central Spain



RENOV® SUPER 6

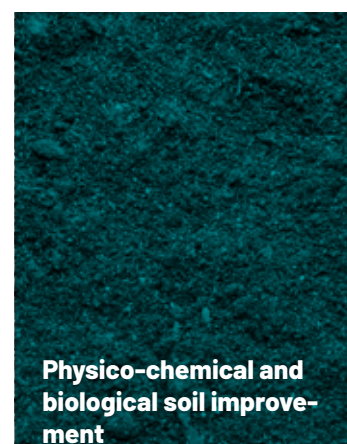
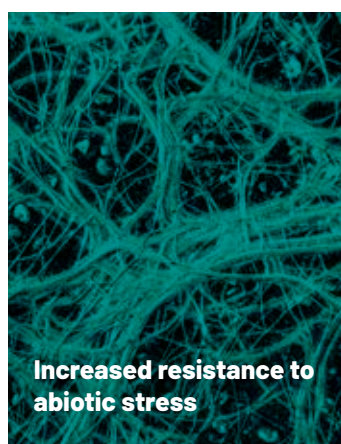
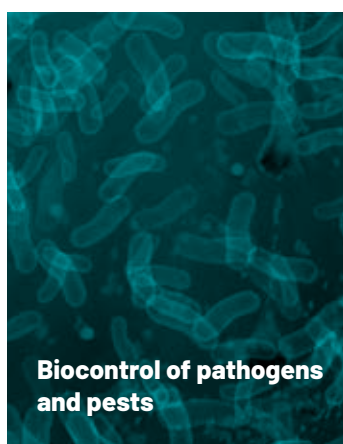
A COCKTAIL OF MICRO-ORGANISMS

The use of agricultural inputs based on microorganisms is a clear alternative to the use of synthetic fertilisers and phytosanitary products.

In nature, plant growth promoting rhizobacteria (PGPR), like beneficial fungi, develop mainly in the rhizospheric soil, the area surrounding the root system of the plant. It is a space where the best environmental conditions for the growth of micro-organisms are found: nutrients from root exudates,

cellular remains of the plant and higher humidity than in the rest of the soil.

In the symbiotic plant-micro-organism relationship, the plant is favoured by the positive effects of fungi and PGR-FA, such as:



Certain micro-organisms have the ability to fix atmospheric N_2 and make it available to the plant. Others, thanks to the production of organic acids and enzymes, solubilise P and K, leaving these elements available to the plant. Some produce siderophores, Fe complexing molecules, which not only prevent Fe from being blocked in the soil, but also facilitate its absorption by the roots. They also have a growth promoting effect on the plant, thanks to the release of phytohormones such as auxins, gibberellins or cytokinins.

Balanced soils, with a variety of micro-organism species, can control a multitude of pathogens and pests, keeping their populations at levels that do not harm crops. Bio-control mechanisms depend on the type of bacteria or fungus. They can range from the production of compounds that inhibit pathogen growth (antibiosis) through the activation of plant defence systems (induced systemic resistance) due to competition for the ecological niche and nutrients, or, as is the case with *Trichoderma spp.*, through direct predation on pathogenic fungi.

The edaphic microbial flora favours water uptake (in the case of mycorrhizae), increases resistance to salt and osmotic stress conditions and also acts as a barrier to the entry of pollutants into the plant.

Micro-organisms are responsible for soil fertility, improve soil texture and structure (formation of stable aggregates and increased soil porosity), decompose and humify organic debris, releasing elements that can be assimilated by the plant and degrade pollutants that reach the soil (bioremediation).



While no single micro-organism is capable of producing all of these effects, most species exhibit to a greater or lesser degree several of the above-mentioned properties. Since each soil and environmental conditions are different, the ideal when applying micro-organisms to our crops is to do so in consortia with as many species as possible. The likelihood of micro-organisms establishing in any type of soil is thereby increased, and through the synergistic effect between them the greatest number of beneficial effects is achieved.

At BIOLÓGICA NATURE, we have our own collection of strains with different properties which are very useful for the improvement of our crops. One of our products, **RENOV® SUPER 6**, is formulated with a consortium of strains with the following properties:

- *Bacillus subtilis*: biostimulant and resistance inducer.
- *B. amyloliquefaciens*: biostimulant, resistance inducer and produces various enzymes with antagonistic effect on other organisms.
- *B. siamensis*: biostimulant and siderophore production.
- *B. megaterium* and K solubiliser, with rapid growth, which enables it to establish itself rapidly in the rhizosphere.
- *B. pumilus*: biostimulant, siderophore producer and some N fixation.
- *Pseudomonas fluorescens*: produces siderophores, solubilises K and has a strong antagonistic effect.

Due to the combination of properties of the strains it incorporates, the product has clear benefits for the plant and the soil:

- Regeneration of soils with a deficient microbiota.
- It favours the development of soil microbial flora and improves its physico-chemical and biological characteristics.
- Biostimulant. Promotes root and plant growth.

All this favours the nutritional and physiological conditions of the plant, which will ultimately result in higher crop production.

Finally, it should be noted that **BN-RENOV® SUPER 6** is approved for use in organic farming and is suitable for all types of soils and crops.



Francisco Soriano

Biologist

Technical Director at BIOLÓGICA NATURE



RIZOBACTER® N

USE OF MICRO-ORGANISMS FOR N₂ FIXATION

Current situation

The European Commission is obliged to monitor and declare **Nitrate Vulnerable Zones (NVZ)**. According to official data from the MITERD (the Spanish Ministry for Ecological Transition and the Demographic Challenge), over the last ten years (2011-2021) the ZVNs have had to be extended by almost 4 million hectares due to the increase in water pollution by nitrates, and they now account for a total of **24% of the total area of Spain**. With the new legislation on nitrate water pollution, the MITERD estimates that this area will increase by 50%.

In January, the Spanish government approved a new Royal Decree to tackle this problem, which for example lowers the threshold for declar-

ing a groundwater body to be affected by nitrate pollution to 37.5 mg/l, from 50 mg/l previously. The aim is to be able to **take action before it reaches 50 mg/l**, which would be unfit for human consumption.

In addition, a publication by the MITERD (the Spanish Ministry for Ecolog-

ical Transition and the Demographic Challenge) draws public attention to the areas of Spain with water that has a concentration of nitrates higher than that mentioned above, or is even eutrophicated. It is therefore indirectly revealed that this is due to the misuse of human activities, intensive livestock farming and agriculture.

Eutrophication is a phenomenon that occurs in aquatic ecosystems where there is an excess of inorganic nutrients that favour uncontrolled algal blooms and can deplete the water of oxygen (causing anoxia), which in turn causes the death of fish and other organisms.



Biological alternative to inorganic fertilisation

Nitrogen is the element that plants require more than any other element and its availability is essential for the proper development of the plant. The atmosphere contains 78% nitrogen as an inert gas, which is not available to plants. In high-production agriculture, we need to convert unavailable atmospheric nitrogen into plant-available forms (either NH_3 , NH_4^+ or NO_3^-) so that we can produce large amounts of protein.

Nitrogen for crops can be obtained in three main ways:

- 1) Application of synthetic fertilisers with high production costs (urea, nitrates, anhydrous ammonia, etc.)
- (2) Application of animal manure, fertilisers and animal waste, which degrade into assimilable sources of nitrogen.
- 3) The specific use of free-living (non-symbiotic) nitrogen-fixing bacteria.

Nitrogen-fixing bacteria are single-celled organisms that are, in essence and literally, miniature urea factories. The conversion of atmospheric nitrogen in the plant to available forms is carried out by a specific and unique mechanism possessed by the **enzyme nitrogenase**.



nitrosomonas or nitrosococcus rapidly transform these forms of nitrogen into nitrates through the process of nitrification. Nitrate is very mobile in the soil and is easily leached. Alternatively, in the case of urea, only 50% of the urea applied is used by the plant. Nitrate is also known to be readily absorbed by plants and, in moderation, is a good source of nitrogen for protein production. However, nitrogen as nitrate is so readily absorbed by the plant that it can also easily overload the plant's ability to metabolise the compound into protein. High levels of nitrates in leaves and plant tissues produce succulent and soft-tissue plants that are much more prone to pest and disease attack and even poisonous to animals (including humans). Nitrate is also a known carcinogenic agent.

Most of us are familiar with the nitrogen fixation performed by the bacterium of the genus *Rhizobium* in leguminous crops. Their colonies, formed within the nodules, appear as visible white lumps on the roots of legumes.

Other free-living (non-symbiotic) bacteria can fix nitrogen equally well in leguminous crops as in other crop species.

Free-living, soil-dwelling bacteria (such as *Azotobacter* and *Pseudomonas* spp.), in the rhizosphere, consuming the sugar exudates that the plant releases through its roots, using this energy source as fuel to carry out the conversion of gaseous nitrogen not available to the plant into available nitrogen (amines and ammoniacal nitrogen).

Nitrogen-fixing bacteria use the **carbon exuded** by the plant in its roots as a rich source of high-calorific energy; **these exudates are used as a fuel to power the biological reaction**. The plant controls the amount of energy with which the bacteria carry out the nitrogen fixation process, so the

amount of nitrogen that is fixed is indirectly controlled by the plant. This is why this plant-available nitrogen can be considered much more efficient, since depending on environmental conditions, the crop may require different needs. For example, in a drought year such as 2022, the units of inorganic nitrogen applied to the crop were too high in relation to the plant's ability to assimilate it, drastically reducing yields. However, with the use of atmospheric nitrogen-fixing bacteria such as the *Azotobacter chroococcum* (strain BNT-09-Ac) contained in Servalesa's product **RIZOBACTER® N**, we can provide the plant with the biological activity necessary for this nitrogen assimilation, as it is the plant itself that regulates the process of releasing carbon and other exudations that serve as food and energy for the bacteria in the process of biological nitrogen fixation.

Solid nitrogen fertilisers such as urea or animal manures have their nitrogen in the form of ammonium or amine. However, once they are applied to the soil, **native bacteria such as ni-**

In contrast, nitrogen supplied by nitrogen-fixing bacteria is delivered directly to the plant in the form of amine or ammonium.

Bacteria excrete nitrogen as urea, in the same way as it is found in animal urine. In essence, the bacteria are a miniature urea biofactory. It is metabolically inexpensive for the plant, which in turn transforms this type of nitrogen provided by the bacteria into amino acids and proteins. The end result is healthy, efficient and resistant plants.



RIZOBACTER® N

NITROGEN FIXER

*Biofertiliser based on
Azotobacter chroococcum*



Fixes N₂ (atmospheric nitrogen)

Induces production of metabolically active substances (plant enzymes and hormones)

It promotes plant growth and improves grain quality, helping to increase yield and quality. The ACC deaminase enzyme makes the plant better equipped to protect itself under stressful conditions

BARLEY TEST (CARAT)

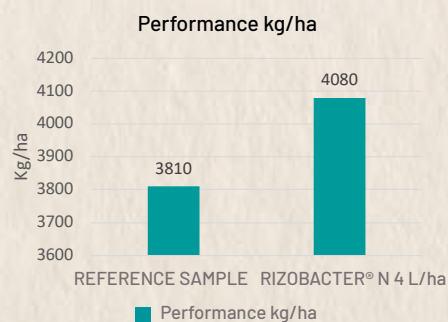
Objective: To evaluate the yield in barley crop

Application:

REFERENCE SAMPLE: 140 UF of N (250 €/ha)

THESIS A: 115 UF de N + 4 L/ha of RIZOBACTER® N (225 €/ha)

Application stage: BBCH12. 2nd leaf unfolded



The application of **RIZOBACTER® N** resulted in a 7.08% increase in yield.

WHEAT TEST (PHILO)

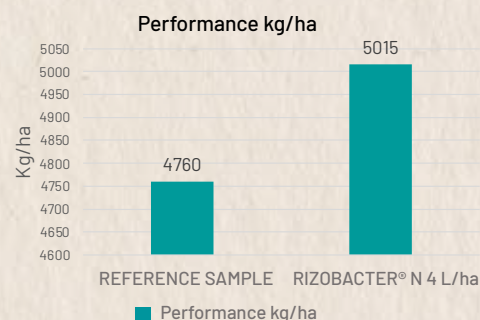
Objective: Yield assessment in wheat cultivation

Application:

THESIS A: 140 UF of N (250 €/ha)

REFERENCE SAMPLE: 115 UF of N + 4 L/ha de BN RIZOBACTER® N (225 €/ha)

Application stage: BBCH12. 2nd sheet unfolded



The application of **RIZOBACTER® N** resulted in a 5,35 % increase in yield.

OILSEED RAPE TEST (LG CARLTON)

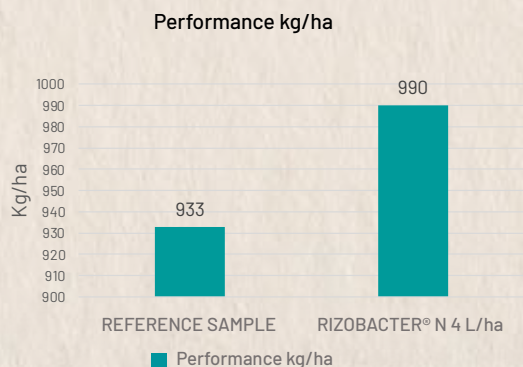
Objective: Yield assessment in oilseed rape cultivation

Application:

THESIS A: 85 UF de N + 3 L/ha of BN RIZOBACTER® N 3 L/ha (225 €/ha)

REFERENCE SAMPLE: 106 UF of N (250 €/ha)

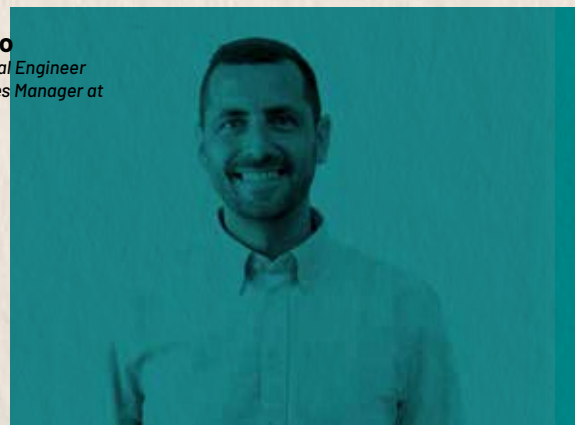
Application stage: Rosette (next to narrowleaf herbicide)



The application of **RIZOBACTER® N** resulted in a 6,10 % increase in yield.

Jonatan Mateo

Technical Agricultural Engineer
Southeast Zone Sales Manager at
Servalesa





MYCODRIP® HIGH CONCENTRATION OF MYCORRHIZAE

Mycorrhizae are a key component of the soil microbiota. They are beneficial fungi that form symbiosis with approximately 95% of plants.

These fungi have the ability to colonise plant roots and explore the soil functioning as extensions of the root system, absorbing water, nutrients and protecting against disease. The use of mycorrhizae in agriculture by technicians and farmers is becoming increasingly common and there are numerous solutions on the market.

In this context, Servalesa presents **MYCODRIP®** as a plant solution based on mycorrhizae of the genus *Rhizoglosum* which aims to create mycorrhizal symbiosis between plant roots and beneficial fungi in the soil.

MYCODRIP® is a strictly technological product that contains a high concentration of selected strains of mycorrhizal fungi produced *in vitro* in sterile conditions, with dried freshwater microalgae in an inert diatomaceous earth substrate. This meticulous manufacturing process allows us to obtain a minimum standby concentration of *Rhizophagus irregularis* of 4000 spores/gram in **MYCODRIP®**.

One of the most outstanding features of **MYCODRIP®** is the high concentration of spores and their ability to resist in the soil and produce a higher rate of symbiosis with the root, unlike other similar products on the market based on propagules.

The mycorrhizal fungi have been extracted and isolated from soils with high salinity and alkaline pH to ensure adaptability, resistance and effectiveness of the spores in soils with extreme conditions. It is important to highlight the exhaustive checks carried out in order to ensure that the spore size does not exceed 70 microns in any case, so that the product is compatible with the filters of most irrigation systems.

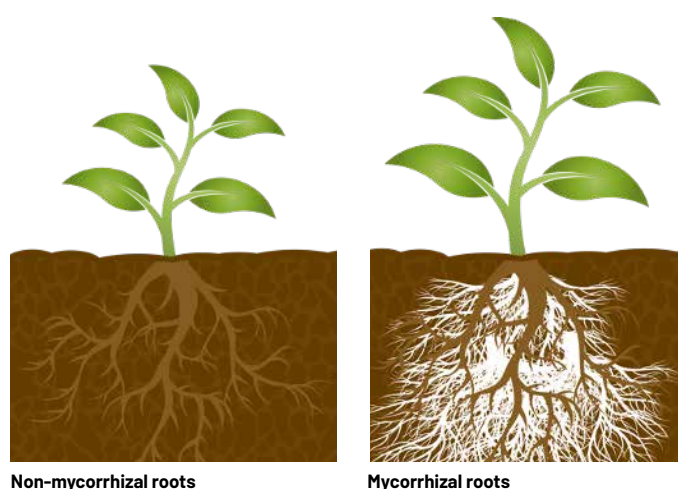
The application of mycorrhizae is beneficial for a multitude of crops when optimal root mycorrhisation is achieved. A mycorrhizal plant has the ability to take up and absorb more water and nutrients, especially phosphorus and potassium. These nutrients can be multiplied significantly, optimising soil fertility, contributing to the development of management strategies for more efficient use of water and nutrient inputs, and resulting in stronger plants with greater resilience to abiotic stresses. The extension of mycorrhizal roots (filaments) also holds soil particles together, which reduces erosion. Furthermore, the improvement of soil structure by mycorrhizae leads to better water penetration and improved drainage, and also stabilises the soil.

MYCORRHIZAL SYMBIOSIS

Mycorrhizae connect to plant roots and expand the root system, supplying water and nutrients.

The fungus grows partly in the root, but mainly in the soil, where it is able to reach the areas furthest away from the root (up to several tens of centimetres, in some cases several metres). Therefore, it can absorb nutrients that are inaccessible to those roots that are able to reach the depletion zone.

[Depletion zone: indicated in white in the "Mycorrhizal Roots" diagram]

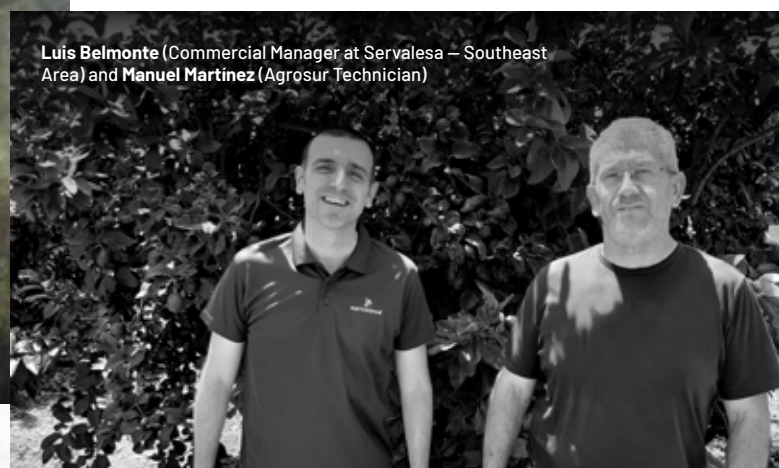
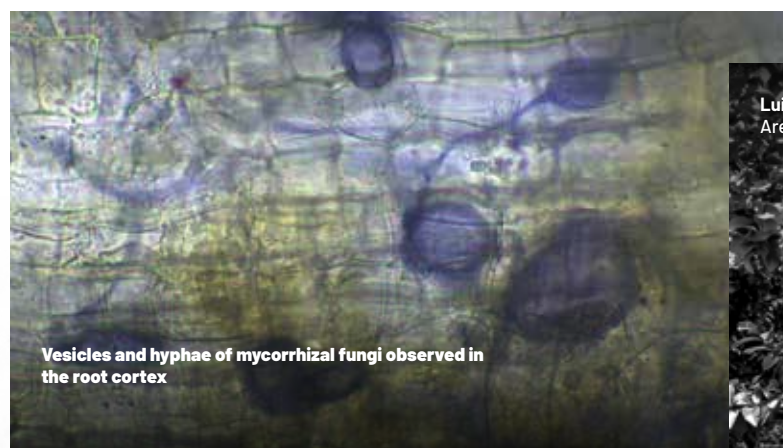


MYCODRIP® EXPERIENCES

Servalesa has carried out several trials on citrus fruit to evaluate the effectiveness of the product. For this purpose, root samples were extracted and sent to the laboratory. There, the mycorrhization rate was determined using the differential staining technique and observed under the microscope for quantification. As a result, full mycorrhization rates were confirmed 60 days after application on citrus trees.

LUÍS ÁNGEL BELMONTE

Technical Agricultural Engineer
Southeast Zone Sales Manager at
Servalesa





Biostimulants key to *The olive grove*

1

At the cellular level

Hardening the cell wall and increasing lignification and cell thickening strengthens the natural physical barriers of the crop.

2

At the nutritional level

Better-nourished plants can be achieved even in situations of extreme stress. As a result, these plants will be healthier and stronger in the face of any external attacks that may affect them.

3

At the defensive system level

We stimulate, activate, strengthen and alert the plants' internal defence system, training and alerting it. As a result, the defence system is better able to respond to this external interference, so that the plant defends itself by its own means.

Spain accounts for 35% of olive oil production worldwide and 44% at the European level. The country has 2,733,620 ha of olive groves (including olive groves for oil mills and table olives), of which only 852,227 ha are irrigated, with 68.8% of these groves (equivalent to 1,881,393 ha) being rain-fed. A large part of the irrigated olive grove is under deficit or maintenance irrigation **deficit or maintenance irrigation**. This, together with the large amount of land under rain-fed cultivation, reflects the exposure of the crop to climatic conditions, especially the increasingly frequent droughts and high temperatures.

For all these reasons, a strategy for working with the crop is needed to help combat the water and heat stress they suffer. For this reason, the use of biostimulants in olive groves plays a fundamental role in many aspects: alleviating the effects of stress in the plantations, helping in each of the cultivation phases, maintaining stable production over time and avoiding crop variability or reducing or alleviating sawtooths (which are becoming increasingly pronounced, mainly due to the water and heat stress suffered by the crops).

Similarly, European agricultural production is currently in a phase of constant change in which many active substances are being phased out. They previously helped to combat numerous pests and diseases. The focus today is on much more sustainable, efficient and environmentally friendly cultivation and production for end consumers. To cope with all this change successfully, the use of biostimulants is also necessary, as they help us to strengthen our plants in three main ways:



For all these reasons, the use of biostimulants brings us numerous benefits in any crop and, specifically, in olive cultivation, helping to achieve a more sustainable, efficient, environmentally friendly and, of course, **profitable crop for the farmer**. Biostimulants are used to mitigate the effects of water deficit, increased temperatures and critical moments. More stable harvests are thereby obtained over time, combating alternating crops and maintaining levels of profitability for the farmer, even in extreme growing conditions as we have seen in recent years, especially in 2022, during which olive growing has been suffering very severely from the inclement weather.

Going into more detail on the use of biostimulants in olive groves, at Servalesa we have numerous tools that provide a multitude of benefits: helping the farmer to achieve a more productive, less stressed, better nourished and healthier crop; making more sustainable and efficient techniques compatible, in line with the new agriculture within the current context in which we find ourselves.

The following are some of the main biostimulants used in olive cultivation:

SERGOMIL® ECO: an ideal companion for foliar treatments in the olive grove



SERGOMIL® ECO

It is a biostimulant included in the Servalesa Neostimulants range due to its unique formulation. It is based on a liquid formulation composed of sucrose derivatives and complexed copper. **SERGOMIL®**

ECO is one of the most complete biostimulants, given that it acts in three ways or on three levels of action: **the cellular level, the nutritional level and the defensive system level**.

To demonstrate this, Servalesa recently commissioned a study from the Zaidín Experimental Station (CSIC) which has confirmed the mode of action of **SERGOMIL® ECO**. It is based on the ability to increase copper levels inside the plant (promoting the synthesis of key enzymes), optimising the photosynthesis process and reducing the severity of pathogen attacks. However, one of the most important characteristics of the mode of action of **SERGOMIL® ECO** is its ability to activate the metabolic pathways associated with lignin synthesis, reinforcing the cell wall of plant structures and thus improving their firmness. Finally, it is worth mentioning the part of the study that tested the ability of **SERGOMIL® ECO** to activate the synthesis of PR proteins dependent on the salicylic acid pathway.

SERGOMIL® ECO is a multi-day product and has the greatest systemic activity of any product in its category, both via the roots and foliage. This makes it the ideal companion in olive grove treatments, enhancing the translocation of all the elements with which it is incorporated. In addition, it avoids the stopping effect of conventional copper, which makes it ideal for spring treatments, as well as for foliar treatments in late summer or early autumn where you are seeking crop protection but do not want to encourage crop halting.

FOLSER® increased fruit set and leaf mass

marine plant extracts, a balance of nutrients and growth factors developed by Servalesa. **FOLSER®** helps to optimise flowering and improve fruit set, as well as optimising the vigour and vegetative development of the plant.

The action method of **FOLSER®** is based on its capacity to stimulate and participate directly in the formation of new molecular units in the plant (amino acids, phytohormones, etc.), especially at the time of maximum demand, which coincides with flowering and subsequent fruit set. **FOLSER®** helps the formation of the plant's reproductive organs and the accumulation of auxins in the flower. This accumulation helps to optimise pollen tube elongation and therefore improve fruit set.

The application of **FOLSER®** increases fruit set, especially in springs with irregular or adverse bioclimatic conditions and in cultivars with a low leaf mass index.

It is a cutting-edge biostimulant with an exclusive formulation composed of a vitamin extract,



FOLSER®

VERDEZIN® OLIVO optimal nutrition for olive groves



**VERDEZIN®
OLIVO**

VERDEZIN® OLIVO has several distinguishing features compared to other products on the market. Firstly, the raw materials that make up the formulation are of high quality, thus achieving optimal assimilation of all its elements by the plant.

The particular stand-out trait that makes **VERDEZIN® OLIVO** a unique product on the market is the components that co-formulate or complement these raw materials, improving the formulation in three ways:

- Dispersing co-formulants that improve the solubility of fractions that are more difficult to dissolve.
- Stabilising and complexing agents of natural origin.
- Biostimulant agents.

The formulation of **VERDEZIN® OLIVO** contains organic dispersants that make it easier to put in a solution or suspension without lumps forming. This is essential when working with a highly concentrated deficiency corrector. The main purpose of a mixture of micro and secondary elements is to make it soluble, because only soluble elements are as-

This consists of a powder formulation containing a mixture of essential cations in order to avoid the anomalies that occur when these cations are not present in the sap in sufficient concentrations, leading to deficiencies in the biosynthesis of chlorophyll, polysaccharides, polyphenols, hormones and vitamins.

VERDEZIN® OLIVO incorporates microele-

ments that when dissolved are complexed with natural complexing agents of low molecular weight to improve their absorption, both via foliar application and fertigation, as well improving systemic activity

This fact, together with the presence of surfactants, makes **VERDEZIN® OLIVO** a highly effective product in terms of nutritional element correction.

Its declared contents are as follows:

Water-soluble magnesium oxide (MgO)	10.0%
Water-soluble sulphur trioxide (SO ₃)	9.0%
Water-soluble boron (B) as sodium salt	8.0%
Water-soluble iron (Fe) chelated by EDTA	1.0%
Total water-soluble zinc (Zn), as sulphate	7.5%

simulated by the plant. Contributing to dispersion and avoiding crowding is essential.

On the other hand, **VERDEZIN® OLIVO** is manufactured by adding two organic acids to the formulation that complement and stabilise the minerals when they are put into solution. These organic acids are always of plant origin (never synthetic) and belong to the group of what, from the point of view of plant physiology, are called phytosiderophores.

Phytosiderophores are organic compounds released by the plant to supplement nutrients (mainly iron, but also others) and absorb them. What the formulation of **VERDEZIN® OLIVO** purports to do is – in a way – to imitate nature in this respect. Again, it attempts to encourage absorption without resorting to

high concentrations.

In addition, **VERDEZIN® OLIVO** contains a small amount in the form of glutamic acid. This essential amino acid is the precursor of other elicitor-like compounds such as GABA. Glutamic acid is one of the 20 amino acids that form part of the structure of proteins and is the most abundant of them all in the plant kingdom. In turn, it is the starting point for the synthesis of the rest of the amino acids within the plant, although there are other synthesis pathways not dependent on glutamic acid.

The role of glutamic acid within plants is varied, allowing it to act in different physiological and metabolic mechanisms. The formation of glutamic acid is the entry point of nitrogen into organic compounds. Therefore, with foliar application of this compound, there is the possibility of improving nitrogen assimilation in plants, which can be reflected in higher yields.



SERGOMAX promotes sap flow and a balance between the aerial and root parts.

atives of saccharides and molecular complexes of various metals (Cu, Mn and Zn). **SERGOMAX®** is intended to activate sap flow (after winter rest or after stressful incidents causing a vegetative standstill) and regenerates conductive vessels (xylem and phloem) while also achieving homogeneous growth and development of the different phases of the cycle.

The Mode of action of **SERGOMAX®** is based on its capacity to bio-activate and induce metabolic processes in the plant to promote a strong flow of sap, generating a balance between the aerial and root parts. It also stimulates the synthesis of regenerative and antioxidant substances (such as polyphenols, phytoalexins and different types of proteins).

SERGOMAX® is a state-of-the-art biostimulant, with an exclusive formulation based on bioactivating molecules, deriv-



SERGOMAX®



FEEDSER®

FEEDSER helps to improve fruit fattening, even in times of stress due to high temperatures and maximum water stress.

influenced by adverse climatic factors and water shortage in the crops. A specific biostimulant has been developed to help in the process of optimal development of the olive fruit, **FEEDSER®**. This is a cutting-edge biostimulant with an exclusive formulation composed of a concentrate of glycine-betaine, calcium, potassium and growth factors developed by Servalesa.

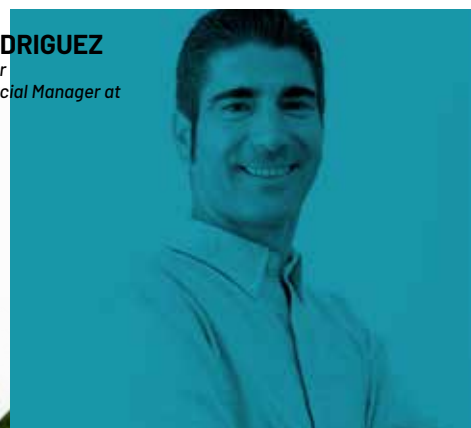
The action method of **FEEDSER®** is based on its exclusive formulation that provides the necessary elements to meet the demands of the crop in the key phase of growth, fattening and accumulation of fatty acids in the olive.

Potassium: increases tissue turgor and consistency, which predisposes the plant to cope with stressful episodes. It is also a key element in the process of accumulation of sugars, fatty acids and amino acids metabolised in photosynthesis in sink organs.

Calcium: important element for quality improvement by strengthening the cell wall structure. Calcium also plays a role in regulating the stomata of the crop and protects the plant against abiotic stress phenomena.

Glycine-betaine: a substance with an osmoprotective and osmoregulatory effect aimed at extending the opening of stomata at times when the crop is under stress due to high temperatures. This achieves a greater accumulation of active plant time during this critical period and thus helps to improve fattening and accumulation of fatty acids in the fruit.

ABRAHAM RODRIGUEZ
Agricultural Engineer
South Zone Commercial Manager at
Servalesa



Vegetable crops

4 key moments, 8 biostimulants

Modern agriculture presents us with the great challenge of satisfying a growing demand in terms of quality and quantity of fruit and vegetables. We are growing as global consumers (7.9 billion people in the world) and according to the latest UN estimates, there will be more than 8.5 billion by 2025. As well as growing in quantity, our demand is also growing in quality. We are becoming more and more

demanding in terms of organoleptic characteristics, exemption from phytosanitary products, etc.

In this context, biostimulant products are of vital importance. These are products of diverse origin (natural, microbial, etc.) that act on the physiological and biochemical processes of plants through different routes, improving vigour (of the aerial part and/

or root system), productivity and harvest quality and providing the crop with the necessary tools to face diseases and physiopathologies very effectively.

Servalesa, a leading company in the biostimulant market, offers today's agronomy the widest variety of products in this segment (in terms of origin, function, etc.), providing farmers and technicians with

in-depth knowledge of their uses and applications.

We at Servalesa, throughout our extensive experience, have developed protocols that provide tools with biostimulant power for each phenological stage of various crops with indisputable effectiveness.



Detail of root system of a melon crop treated with the Servalesa protocol

 **MAS RAIZ[®]+**  **BN RENOV[®] TRICCO**

2 Vegetative development:

Once we have achieved effective crop establishment, it is essential to continue with biostimulation. We must obtain adult plants with adequate size and vigour, both in the aerial part and in the root system. These crops will find it easier to cope with all kinds of abiotic stresses (climatic, osmotic, sanitary, nutritional, etc.) and to support the maximum number of fruits, which will be the basis for maximum potential productivity and profitability of the crop.

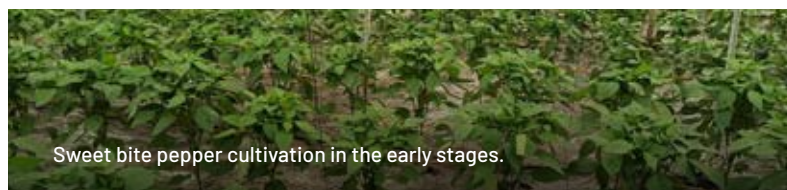
At this stage of horticultural crops, we at Servalesa recommend that you continue adding beneficial microorganisms to the rhizosphere with **BN RENOV[®] MICRO** as a basis for biostimulation processes.

 **BN RENOV[®] MICRO**

1 Rooting and initiation:

It is essential to start biostimulation of horticultural crops from the moment of transplanting. The seedlings have to endure great stress as a result of adapting to the new conditions in the cultivation plot. New conditions in terms of environmental, telluric, nutritional and pest and disease pressure.

To make it much easier to adapt to the new environment, Servalesa provides farmers with **MAS RAIZ[®]+** and **BN RENOV[®] TRICCO** products with biostimulant registration that focus on promoting optimal development of the root system.



Sweet bite pepper cultivation in the early stages.

The interaction of these microorganisms with the root system provides us with innumerable benefits: they provide plants with a greater quantity of essential macro and microelements (nitrogen, phosphorus, potassium, iron, etc.) and they occupy an ecological niche in our soils that can be used by pathogenic fungi and nematodes, thus creating competition for space and nutrients, and they also provide many beneficial substances as a result of their metabolism, among many other benefits.

In addition, it is essential to ensure optimal formation of the vegetative organs of plants, stems, leaves, shoots, etc. and this is facilitated with **SERVAPTON[®]**. This is our organically-sourced biostimulant that provides the highest concentration of essential amino acids that are decisive in the majority of plant metabolism processes.

 **SERVAPTON[®]**

3 *Flowering, fruit set and fruit mooring*

During agronomic management of horticultural crops, it is essential to promote the right conditions for an optimal balance between the vegetative and generative abilities of the plants. In order to achieve this desired balance, biostimulation of the metabolic processes involved in the formation of flower organs, fruit set and fruit seating or fruit mooring is essential.

We need a viable and reproductively functional flower that is the basis for fruits with an adequate quantity and quality of seed (plant organs essential in the production of phytohormones and natural compounds necessary for the optimum development of quality fruits) and based on an aerial part with adequate size and vigour to bring them to fruition.

In this respect we lay the foundations with our biostimulants **FOLSER®** and **FOSFASER®**.

FOLSER® is a biostimulant with a unique composition developed by Servalesa containing B5 vitamins, marine plant extracts and other essential compounds. With this product we conduct bioactivation of the processes for optimal flower development and fruit set, as well as promoting balanced vegetative growth.



Close-up of balanced Sweet Bite and courgette plants
Vegetatively / generatively.



In addition, with **FOSFASER®** we can supply basic nutritional elements (phosphorus, potassium and magnesium) which are rapidly assimilated and consumed by plants to a large extent during the aforementioned metabolic processes.



Our sales representative in the Almería area and the coast of Granada and Almería, Fran Perez, with crops of sweet bite peppers, beef tomatoes and Dutch cucumbers.

4 *Fruit filling and ripening*

The final processes are fruit filling (fattening) and ripening. These are energy-intensive metabolic processes that make fruits the main sink for plants. Furthermore, most horticultural crops have an indeterminate growth cycle, i.e. all processes occur simultaneously in one cultivar. This makes the use of biostimulants essential.

We at Servalesa, with **FEEDSER®** AND **BETASER®**, can provide plants with essential nutrients complexed for easy assimilation (potassium and calcium) and we provide compounds that allow them to overcome stress situations such as glycine betaine, marine plant extracts and other specific growth factors.



FRANCISCO JOAQUÍN PÉREZ
Technical Agricultural Engineer
Servalesa Sales Representative
Almería and Granada Coast Area



Biostimulants for the improvement of citrus peel

Our WOW! biostimulants are able to achieve magnificent results thanks to the research process and the technology with which they are equipped. At Servalesa, aware of the importance of transforming the real and current problems of agriculture into sustainable and innovative solutions, we identified the need to offer a solution for improving the quality and preservation of citrus peel.

The preservation and protection of the peel can have a direct effect on the final value and profitability of the crop for the farmer, and with this in mind, we began research and development of a strategy combining our **SERGOMIL® ECO** and **PEELS®** biostimulants.

But before doing so, we would like to analyse the context of this need for improvement and conservation of the peel, since this is not created by the interests of the farmer, but by the interests of the marketing companies and, therefore, of the end user who determines consumption trends. Marketing companies aim to supply supermarket chains with products that meet consumer expectations and needs based on consumer trends. And it is precisely these trends that are a fundamental aspect influ-

encing the entire supply chain, as they push all actors involved to continuously adapt. Innova Market Insights, in its presentation of the main trends in the food industry for the year 2022, states:

Returning to citriculture, there is a clear need to be able to produce fruit on the basis of sustainable and healthy standards that also have an adequate

"Personal health and sustainability have proven to be strong drivers of consumer choice"

"Personal and social values are becoming increasingly important as they become intertwined with purchasing decisions"

shelf life to guarantee their commercialisation in the different markets of interest. The challenge is to carry this out on the basis of agronomic practices that result in zero-waste harvests and that influence the numerous aspects surrounding the crop (pre-harvest), and the subsequent treatment and conservation (post-harvest). And all of this is compounded by the restriction and/or prohibition of the use of some tools such as phytosanitary

products which, until recently, allowed this task to be completed successfully.

In order to meet this challenge, Servalesa proposes to introduce the use of biostimulants as complements to conventional tools in zero-waste management strategies, thus enhancing the stimulation-protection binomial. Biostimulants are based on the improvement and regulation of physiological and biological crop processes and biochemistry to optimise and improve crop yield and quality.

In the specific case of citriculture, and thanks to the study carried out by Servalesa, there is evidence to show that the combined use of the biostimulants **SERGOMIL® ECO** and **PEELS®** improves the quality of the peel of the fruit, thus reinforcing its firmness, preventing its weakening and mitigating senescence. In this way, the fruits are prepared for post-harvest life.

SERGOMIL® ECO Neorestim

SERGOMIL® ECO is one of the products with the longest history in Servalesa's catalogue and the object of continuous improvements in its formulation and effectiveness. It is a strictly technological biostimulant formulated on the basis of sucrose derivatives and complexed copper.

Servalesa, thanks to a study carried out at the Estación Experimental del Zaidín (CSIC), has confirmed the mode of action of **SERGOMIL® ECO**. It is based on the ability to increase copper levels inside the plant (by promoting the synthesis of key enzymes), optimise the photosynthesis process and reduce various physiopathologies linked to copper deficiency. However, one of the most important characteristics of the mode of action of **SERGOMIL® ECO** is its ability to activate the metabolic pathways associated with lignin synthesis, strengthening the cell wall of plant structures and thus improving fruit firmness. Finally, it is worth highlighting the conformation of the study that tested the capacity of **SERGOMIL® ECO** to activate the synthesis of PR proteins dependent on the salicylic acid pathway.

PEELS® Neorestim

PEELS® is the latest new-generation biostimulant to be added to the Servalesa catalogue. It is a unique and revolutionary formulation based on sorbic acid, salicylic acid and potassium.

The action method of **PEELS®** is based on its ability to reduce oxidative stress and mitigate abiotic stress conditions that may affect the cell wall due to excess moisture.

Demonstration trials

servalesa®

Servalesa, in collaboration with Fitogar (Spain), has carried out numerous trials with the aim of demonstrating that the application of **SERGOMIL® ECO** and **PEELS®** helps to improve fruit firmness and reduces the number of rotten fruits due to cell wall reinforcement.

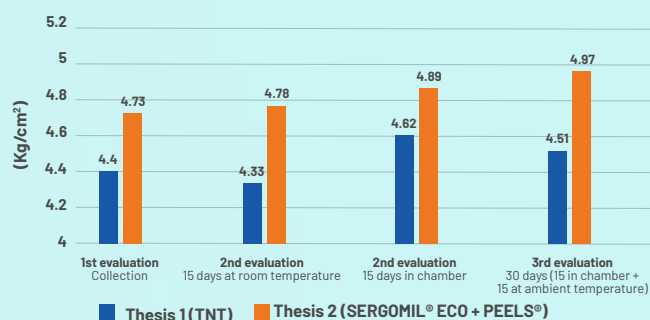
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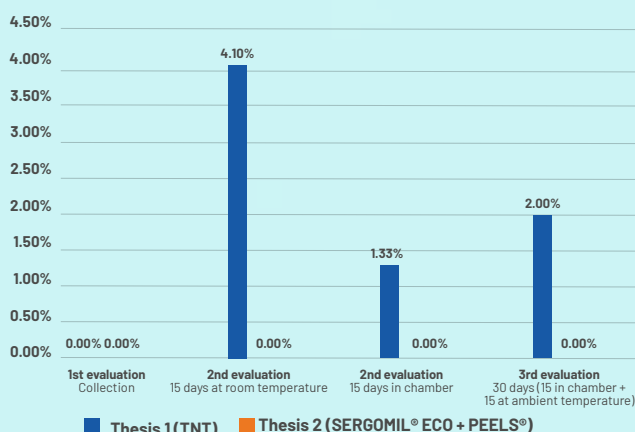
The following trial was carried out in Quart de Poblet (Valencia, Spain) with the collaboration of Fitogar on the variety Citrus Clementina – Clemenules. Five days before the harvesting date, an application of **SERGOMIL® ECO** and **PEELS®** was carried out to measure the evolution of the average firmness of a sample using a penetrometer (kg/cm²) and the evolution of rottenness stored under different conditions.

EVOLUTION AND COMPARATIVE STRENGTH

MEAN OF THE SAMPLES MEASURED AT 3 DIFFERENT TIMES (Kg/cm²)



EVOLUTION OF TOTAL SPOILED FRUIT (%) FROM EACH SAMPLE AT DIFFERENT EVALUATION TIMES



The proposed strategy succeeded in increasing the average firmness of the treated fruit and decreasing the number of rotten fruit.

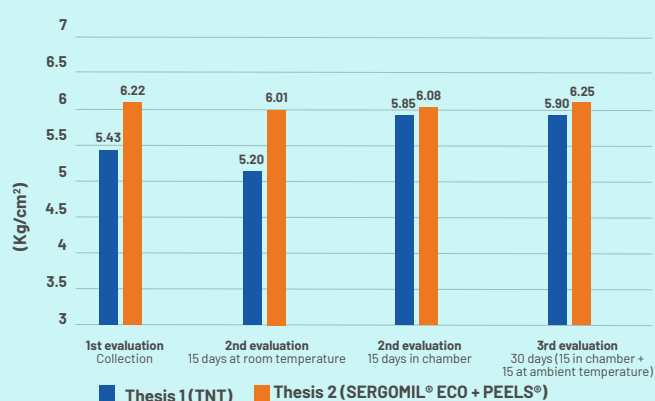
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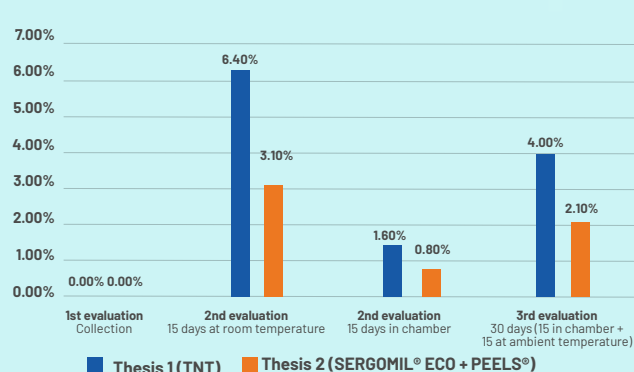
The following trial was carried out in Llíria (Valencia) with the collaboration of Fitogar on the variety Citrus Clementina – Clemenules by means of two applications starting from the colour change with **SERGOMIL® ECO** and **PEELS®**. The evolution of the average firmness of a sample was measured using a penetrometer (kg/cm²) and the evolution of rotten fruit stored under different conditions.

EVOLUTION AND COMPARATIVE STRENGTH

MEAN OF THE SAMPLES MEASURED AT 3 DIFFERENT TIMES (Kg/cm²)



EVOLUTION OF TOTAL SPOILED FRUIT (%) FROM EACH SAMPLE AT DIFFERENT EVALUATION TIMES



The proposed strategy succeeded in increasing the average firmness of the treated fruit and decreasing the number of rotten fruit.

Garlic and biostimulants

The perfect tandem

Demand for garlic and its cultivation counts. Spain is the country with the highest production of this crop in the European Union, accounting for 67% of the total. However, China remains the world's leading producer.

In Spain, the area under garlic cultivation in 2022 was 25,520 ha, with Castille-La Mancha leading the way with 21,000 ha.

tion, reducing costs, without compromising quality.

The application of biostimulants in garlic cultivation mainly aims at the following objectives: adequate germination of the clove, tolerance to abiotic stress, efficient nutrient assimilation and increased production and quality.

It has been verified by various trials that the application of biostimulant formulations (such as **MAS RAIZ**® + and **PRE-SEM**®) on clove seed improves germination rate, promotes rooting and optimises root-soil interaction.

a solvent method of increasing the plant's tolerance to abiotic stress, as some of them contain metabolites in their composition that have a proven osmoregulatory and osmoprotective action, which allows the crop to minimise the adverse consequences and maintain its photosynthetic rate. Servalesa offers the following biostimulants: **FOLSER**®, **BETASER**® and **DESES-3**®.

As for the fattening and maturation phase (bulbification), through the appropriate application of biostimulants such as **FEEDSER**® and **NEKAMIL**® **STAR**, the hormonal activity is consol-



Garlic (*Allium sativum*) is a monocotyledonous herbaceous plant of the lily family, which requires well-drained soils and whose use is centred on its bulb (the garlic head), which is formed by cloves joined at the base around the stem and covered by a series of membranes, called tunics, of different shades of white or purple.

In Spain, the most common garlic varieties are purple garlic from Las Pedroñeras, white spring garlic, violet spring garlic and white garlic.

In the current context, with the rising price of inorganic fertilisers, the reduction of nitrogen fertilisers in vulnerable areas and the elimination of active ingredients for pest and disease control, Servalesa's range of biostimulants offers a promising alternative to some of these restrictions. From sowing to harvesting, biostimulants can be used to increase produc-

In addition, among the products considered as biostimulants, there are those that induce the expression of genes encoding proteins linked to the plant's response to stress events. Our flagship Servalesa product, **SERGO-MIL**® **L60**, is an example.

Likewise, the use of biostimulants increases the efficiency of nutrient assimilation by providing the plant with precursor substances and trace elements involved in different key enzyme complexes in reactions characteristic of the main metabolic pathways. **QUALIFUN**® would be a good example.

Although garlic is considered to be a somewhat hardy plant, late frosts, for example, can depauperate it by altering its physiological functions or certain metabolic processes, thereby compromising the growth, development and yield of the crop. The use of biostimulants in such situations is

idated, the sink effect is enhanced and the translocation of photoassimilates to the bulb is maximised.

Finally, it should be noted that the frequent use of biostimulants is in line with the strategy of the European Green Pact in its "from farm to fork" pillar, which in particular promotes the reduction of the use of chemical pesticides for the preservation of the environment and, in general, the production of healthier and safer food for people.

LUÍS MARCOS NUÑO
Agricultural engineer
Central Spain

IMPORTANCE OF *glycine betaine*

Osmotic adjustment, the accumulation of solutes inside the cells, is a process that allows the water potential to fall without simultaneously lowering cell turgor. Maintenance of turgor ensures cell elongation and facilitates higher stomatal conductances at lower water potentials. The solutes referred to are the so-called compatible solutes. These include the amino acid proline, the alcoholic sugars sorbitol and mannitol, and of course glycine betaine.

Glycine betaine (N,N,N,N,-trimethylglycine) is considered an amphoteric quaternary amine, which shows electroneutrality at physiological pH. It is also a water-soluble species with physico-chemical characteristics that enable it to interact with hydrophilic and hydrophobic domains of macromolecules such as enzymes and protein complexes.

Two main pathways related to glycine betaine biosynthesis in plants are recognised. The precursors of these pathways are choline and glycine. In higher plants, glycine betaine is synthesised in the chloroplast: choline is converted to betaine aldehyde by choline monooxygenase (CMO). Subsequently, aldehyde dehydrogenase (BADH) generates glycine betaine. Although it has already been mentioned that other pathways are known to be involved in its biosynthesis, the choline pathway has been identified in all plant species that accumulate glycine betaine.

Glycine betaine therefore plays a key role as a compatible solute in plants under different types of environmental stress. At the cellular level, it prevents the phenomena of plasmolysis and hyperturgence by regulating the osmotic potential of the cells, i.e. it helps to control the outflow and inflow of water

into the cytoplasm (osmoregulatory effect) and also promotes the fluidity of the cell membrane and promotes greater resistance to mechanical stress in situations of abiotic stress (osmoprotective effect).

In stressful situations caused by low temperatures, glycine betaine lowers the crystallisation point of water inside plant cells, which lowers the freezing temperature and thus prevents tissue rupture and plant death. Various studies have concluded that glycine betaine protects the thylakoids against freezing, maintaining the stability of the chloroplasts.

Other studies show that glycine betaine acts to protect the protein structure of the photosynthetic complex, in particular photosystem II, where it is involved in repairing damage caused by reactive oxygen species (ROS). In addition, glycine betaine appears to restrict ROS-induced K⁺ ion outflow by preserving membrane integrity or by a channel-blocking function.

The process of glycine betaine biosynthesis involves an energy cost for the plant, so exogenous application is recommended under certain circumstances.

Glycine betaine is therefore a molecule with great agronomic potential. Aware of this, Servalesa has three biostimulants with glycine betaine on the market:

BETASER® Bioestimulantes

Based on glycine betaine and algae extracts Improves crop performance under stress conditions (drought, heat, cold, excessive solar radiation) by reducing cell turgor loss and increasing photosynthetic rate. Increases biomass production without compromising quality parameters.

FEEDSER® Bioestimulantes

Formulated based on glycine betaine with complexed calcium and chloride-free potassium, which contributes to osmotic regulation in the event of abiotic stress. It optimises ripening, boosts the translocation of photoassimilates and thus promotes fruit fattening and grain filling.

DESES-3® Bioestimulantes

Formulated with a high concentration of glycine betaine and proline, including selected growth factors. Suitable for overcoming abiotic stress situations and mitigating yield and/or quality losses of crops.

LUÍS MARCOS NUÑO
Agricultural engineer
Central Spain



NATURAL Movement

After years of study and development, Servalesa is proud to present **ELIREX® IP** to the market. This molluscicide solution, unique on the market, represents a natural move towards efficiency, high technology and sustainability. **ELIREX® IP** is the exclusive high-performance molluscicide for sustainable control of snails and slugs based on 2.42% ferric phosphate in granular form. Although there are other solutions on the market, as mentioned above **ELIREX® IP** is unique, and part of the key to its uniqueness is its proven and tested effectiveness.

Furthermore, its formidable differential value comes from numerous factors that will be expanded upon below. Firstly – the unique and innovative technology of the product. On the one hand, **COLZACTIVE®** technology deals with the selection and manufacture of the bait, designing it to be attractive and delicious to snails and slugs to the extent that they cannot stop eating it, with organoleptic characteristics that cause the pests to detect it instantly and head straight to it while ignoring the crops – the whole purpose of the product. In short, **COLZACTIVE®** is attractiveness and palatability, two qualities that are essential to achieve the desired effectiveness. On the other hand, the **IP Max®** technology is responsible for the selection and manufacture of the active substance, ferric phosphate. **IP Max®** is a ferric phosphate par excellence with optimal quality and effectiveness, the action of which is maximised to guarantee the effectiveness of the product.

By combining the properties of **COLZACTIVE®** with those of **IP MAX** in one granule, the action method of **ELIREX® IP** is infallible. **ELIREX® IP** is able to quickly attract snails and slugs so that when they ingest the granule,

the calcium metabolism is disturbed and the digestion process is blocked. In this way, the individual pests die of starvation and lack of appetite leaving almost no trace, as they often hide at the moment of ingestion to finish their life processes.

phenomena, keeping the crop protected from adverse factors such as rain.

Finally, we must discuss the granulometry of **ELIREX® IP**, also unique on the market with 110,000 granules/kg, which guarantees a higher number of baits per m². This offers a formidable advantage by increasing the number of granules on the surface and therefore the possibility that the pest will encounter the bait, thus culminating in the excellent effectiveness of **ELIREX® IP**.



ELIREX® IP is listed in the Registry of Plant Protection Products under No. ES-01169

***ELIREX® IP** is a zero-waste product that targets application strategies in conventional agriculture.*

Secondly, alongside these two technologies (**COLZACTIVE®** and **IP Max®**), we must include the so-called DE SANGOSSE PROCESS. This is another of the key points in the effectiveness and differentiation of **ELIREX® IP**, and it is a wet manufacturing process that provides a consistent, highly durable and homogeneous granule. It is thereby also possible to apply the product mechanically at exact doses and distribute it homogeneously over the whole plot. In addition, the **SANGOSSE PROCESS** results in a very resistant granule that can withstand weathering

With the combination of all the components that make up the differential value of **ELIREX® IP**, you can rest assured that snails and slugs will no longer be at ease on your plots once it is applied. Even so, it should be noted that the application will not be fully successful (nor will the product be highly effective) without knowing the biology of the pest in order to act in advance as per the recommendations of the specialists. To this end, Servalesa has a technical team specialised in monitoring and detection that will provide advice on the control of snails and slugs, advising and training technicians and farmers with the aim of reducing the damage caused by this dangerous pest to crops.

SPECIALISTS IN MONITORING

Snails and slugs

Nowadays, counting and trapping of certain pests is widespread. An example of this is the carpocapsa (*Cydia pomonella*), which is monitored by means of pheromone traps in order to obtain the flight curve and to determine when the threshold is exceeded and the corresponding treatment should be applied. The same technique is used for many other pests, but not for snails and slugs, although they are in no way a delicate pest and their **damage can be very detrimental to the harvest**.

Traditionally, this pest has been treated once the problem has appeared, i.e. when the farmer has seen that the snails were damaging the crop. A very clear example is found in woody crops,

where the farmer applies a treatment upon seeing snails on the tree. Unfortunately, at this point, the application will be ineffective, as the snail will not come down the tree to eat the pesticide given that there is plenty of food in the tree canopy. It is therefore essential to know the best time to apply it, as with many other pests.

To determine the optimal application time, the cycle of snails and slugs must first be understood. It is mainly active in spring and autumn when temperatures are between 13-18 °C and relative humidity is 75%. During the winter and summer there is a standstill in their activity. Egg-laying takes place after the winter and summer stopover. In

the case of slugs, they lay two clutches, one at the beginning of winter and the other at the beginning of summer. In contrast, snails lay only one clutch, although in warm climates they may extend their laying period. For this reason, the optimal time of application is considered to be right at the end of standstill, just at the moment when snails and slugs start their activity. The aim of the application is not only to prevent the snail or slug from damaging the crop, but also to break the biological cycle of the pest and lower the population numbers.

LIFE CYCLE
OF SNAILSLIFE CYCLE
OF SLUGS

As a sustainable solution Servalesa offers **ELIREX® IP**; this molluscicide is unique on the market and when coupled with expert advice to determine the optimum application time, will be the key to effective pest control. For this purpose, the Servalesa team are experts in sampling snails and slugs by means of traps. The traps recreate ideal conditions for snails and slugs, providing the necessary humidity and darkness. During the night, snails take refuge under the trap and therefore sampling should be done in the early morning hours (no more than 2 hours after sunrise). The snails and slugs in the traps are counted, and if the threshold is exceeded, depending on the variety, an application with the corresponding product should be made.

IRIS GARCÍA

Agricultural Engineer
Commercial Delegate of Servalesa
Northwest area



ECO ATTITUDE

Our way of seeing and conceiving agriculture, Servalesa's ECOACTITUD, is always present in all our movements. For this reason, in this second issue of our magazine, we wanted to dedicate a space to it, and what better way to do it than with two representatives from the most important organic product certifying bodies?

We spoke with Juan José Vicente Montero, Head of the Consumables Area at **CAAE, the Andalusian Organic Farming Committee**. A very interesting point of view on organic farming today and the future of organic farming.



Tell us in general about organic farming. Your vision, how you see the future... Can you give us any relevant data or facts?

It is safe to say that organic farming is all the rage in Europe. Through the European Green Pact, the EU aims to reduce the effects of climate change through a series of global measures.

To achieve this goal, the Farm to Fork Strategy was presented in May 2020 as an initiative to evolve the current

food system towards a sustainable model that ensures the availability of healthy and affordable food for both the current European population and future generations.

The Useful Agricultural Area (UAA) in Spain is more than 23 million hectares and the area devoted to organic production in 2020 reached 2,437,891 hectares, which represents 10% of the UAA. This means that there are still more than 3,300,000 hectares to be converted to organic production to reach the target of 5,750,000 hectares (25% UAA) by 2030.

The framework established by the European Green Pact and the "Farm to Fork" strategy allows no going back

and its implementation is a reality throughout the EU. Therefore, the development and growth of organic farming is unstoppable as it has been in recent years, and this also offers great opportunities for the input sector.

What do you see as the role of agricultural inputs in organic farming? What are the implications of the UNE standard?

It must be taken into account that many fertilisers and phytosanitary products will be needed to nourish and combat crop pests and diseases across the almost 6 million hectares of organic production that are expected to exist in Spain by 2030.

In 2021, of the total number of serious non-compliance issues detected by CAAE in the audits carried out on organic farmers, 55% were related to the detection of substances not permitted in organic farming, and after the study that has to be carried out in each case, in most cases it was concluded that the cause was the use of non-permitted inputs that farmers applied by mistake or due to lack of information, with substantial economic repercussions due to the sanctions derived and the impossibility of marketing the product with the organic production seal.

The existence of an official endorsement such as the UNE standard for inputs

Find out more on
our website
dedicated to ECOACTITUD



Juan José Vicente Montero

Manager of the
Inputs Department at the CAAE



to be used in organic production helps to avoid these problems and makes it possible to delimit the responsibilities of each part of the chain.

CAA E, as a benchmark entity in the organic sector at national and international level, has been firmly committed from the outset to UNE certification for inputs, being the first entity to achieve accreditation of these standards by ENAC in 2020.

This commitment by CAA E has been massively supported by the sector of input manufacturers such as SERVALESA, which has been committed from the start to UNE certification for its products, understand-

ing that this certification is necessary and the only one that allows companies to offer their products to organic farmers in any Autonomous Region or EU country without having to have multiple certifications depending on the territory where the customers are located.

What is your opinion on Servalesa's ECOACTITUD and our commitment to organic farming?

Servalesa has been committed to the organic sector since the beginning of regulated organic production in Europe, and has also opted for CAA E certification of its products since 2001, the year in which the first private CAA E standard

for certification of inputs for organic agriculture was drawn up.

For the organic primary sector it is very important for input companies such as SERVALESA to focus their R&D&I on the development of effective products that are compatible with organic production – moreover, this is a safe bet given that many fertiliser and phytosanitary products will be needed to nourish and combat pests and crop diseases in the almost 6 million hectares of organic production that are expected to exist in Spain by 2030, which is the target set to comply with the “Farm to Fork” strategy.

I think that the ECOACTITUD

campaign is a great success and highlights the value of a controlled and guaranteed certification for inputs, such as the UNE Standards for inputs for organic plant production, which is also the biggest commitment of CAA E, so we share the goal of providing organic farmers with access to inputs that are indisputably beneficial when used in organic production.



ECO ATTITUDE

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We spoke to Francisco Javier Carmona, Technical Manager for Inputs at **SOHISCERT**. A very interesting point of view on organic farming today and the future of organic farming.



Tell us in general about organic farming. Your vision, how you see the future... Can you give us any relevant data or facts?

Organic Production is a system of agricultural management and food production combining the best environmental practices and preservation of natural resources and biodiversity, as well as animal welfare standards and production based on natural substances and processes.

It began its journey in 1991 with a total of 396 operators (farmers, livestock farmers and agri-food industries) and a registered agricultural area of some 4,235 hectares (*) experiencing a significant and continuous period of growth that reached 47,783 operators and 2,437,981 hectares in 2020 (*), accounting for 10% of the UAA, making Spain the country with the third-largest organic area in the world.

These producers provide a dual response, on the one hand, to a growing consumer demand and, on the other hand, to a public good that contributes to environmental protection, animal welfare and rural development.

As such, Organic Agriculture is currently important and ambitious and will continue to be so in future, as the European Union has established a target of converting 25% of the agricultural surface area to organic production.

*source MAPA

What do you see as the role of agricultural inputs in organic farming? What are the implications of the UNE standard?

It should be noted that the Organic Production Regulation restricts the use of external means, limited to natural or derived substances and low solubility mineral fertilisers, in case of need or in the absence of

appropriate management practices and methods. The list of permitted products is set out in Regulation R(EU) 2021/1165.

The boom in organic production has led to a considerable increase in the registered area subjected to organic farming and therefore in the demand for fertilisers and plant protection products suitable for this production system.

This, together with the detection of residues of unauthorised products in organic production and the increase in products certified by increasing numbers of certification bodies, each applying their own evaluation criteria, are the reasons behind the creation of the

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**Francisco Javier
Carmona**

Technical Director of Inputs
at SOHISCERT



UNE standards for the certification of Inputs in Organic Plant Production.

The main objective of the UNE standards is the harmonisation of criteria to be met by inputs to be used in organic farming. There is a set of rules establishing the requirements for the production, packaging, labelling and marketing of fertiliser and plant protection products (through standards UNE 142500:2017 and UNE 315500:2017), and the minimum requirements to be met by certification schemes (through standard UNE 66500:2017).

SOHISCERT, with more than 20 years of experience in certification for Organic Production, has been applying the criteria established under the UNE standards for the certification of inputs since 2020, certification for which it has received from the Spanish National Accreditation Entity, ENAC.

What is your opinion on Servalesa's ECOACTITUD and our commitment to organic farming?

Since SOHISCERT established the application of UNE standards for the certification of inputs in our roadmap, SERVALESA has shown its commitment to

their application, implementing them internally in its Quality System and passing the certification audits carried out at its facilities to obtain the SHC mark for UNE Inputs.

As a manufacturer of inputs, I consider the commitment taken on to be vital to the application of the requirements established in the UNE standards, allowing us to offer consumers of inputs greater guarantees and transparency. But this accredited certification must go hand-in-hand with a communication campaign that allows consumers to understand the strengths and benefits of this certi-

fication compared to private certification. In this way, SERVALESA, with its ECOACTITUD campaign, acquires this additional commitment, which is fundamental to the success of the implementation of the standard and, of course, to differentiation in an increasingly competitive market.

servalesa®



TECHNOLOGY BASED ON **SYSTEMIC COPPER** AND **SACCHARIDE DERIVATIVES** FOR **CELL WALL STRENGTHENING** AND **METABOLISM ACTIVATION** AT CRITICAL TIMES OF THE PLANTS LIFECYCLE AND PROMOTING PLANT GROWTH AND DEVELOPMENT

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