GROUP BARCHEMICALS®

LA FORMULA PERFETTA

PROFESSIONAL LINE BARCHEMICALS
GENERAL CATALOG AGRI LINE
PRODUCTS FOR IRRIGATION

Updated Edition **2022**

BIO SICUREZZA

ECHA EUROPEAN CHEMICALS AGENCY

PMC REGISTERED PRODUCTS

This catalog cancels all previous ones and will be valid until replacement, even partial, with new versions.
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Barchemicals reserves the right to modify and update prices, depending on the variation in the prices of raw materials and the EUR / USD exchange rate.

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Biosafety in agriculture
CLEANING, SANITIZATION and MAINTENANCE of distribution plants

This Catalog is the result of over thirty years of experience of a Large Italian Group: Barchemicals Group.

Barchemicals Group represents an entirely Italian reality made up today of 3 companies that share projects, visions and values, including Safety for customers and collaborators and the protection and respect for Environmental Resources.

The companies operate in the primary water treatment sector (industrial, drinking, recreational, agricultural) both in Italy and abroad, ranging at 360 ° on every management problem, with particular regard to the sectors:

- disinfection and water treatment,
- environmental disinfection and sanitation,
- control and automation.

The Group - founded and directed by dr. Corrado Barani - is the owner of numerous patents; the resources dedicated to Research and Innovation make up the majority of investments.

Barchemicals is the parent company; produces chemical products for the treatment and conditioning of all types of water. Thirty years of experience is condensed into 5 product lines: Swimming pool, Detergent, RT line, “I Sali della Vita®” and the AGRI line.

Thanks to an innovative and efficient production system, the company designs and produces high quality and reliable chemical specialties internally.

The products - strictly "Made in Italy" meet high quality criteria and become developed through a rigid path of researches and safety tests.

The Chemical Catalog AGRI Line is aimed at the most qualified operators who work at the service of agriculture.

The constant attention to Research and Development has allowed the creation of innovative products, the products of the AGRI Line respond to the main requirements of the most important Biosecurity protocols.

The balanced formulations between the various components and the use of active ingredients normally used also in the food sector are the guarantee that these products, having carried out their detergent and disinfectant action, even in contact with the ground or in some cases directly on the plants, do not leave toxic residues for humans, animals and plants themselves, but indeed, in some cases, they can themselves become a source of essential elements for plant growth.

Linea AGRI products are particularly suitable for organic or greenhouse crops where, by preventing the formation of biofilm and fighting against the most common bacterial agents that are toxic to humans and animals, such as legionellosis, they fully comply with safety regulations in the workplace (law 81/2008).

For disinfection in the zootechnical field, for the protection of the health of operators and potentially exposed subjects, the products that are PMC certified (Medical Surgical Presidium) are highlighted.

BIOSAFETY

Barchemicals believes in Biosafety and, thanks to over thirty years of experience, introduces the fundamental and innovative concept of Biosecurity also in agriculture and livestock farming.

Biosecurity in agriculture is environmental safety, protection of land and plant species, protection of animal and human health:

- in the formulations the polluting substances for the environment are totally absent;
- all the substances used are scrupulously checked to verify their purity, to eliminate the risk of introducing dangerous substances into the environment even in small quantities (heavy metals, toxic organic substances, solvents ...) which can become very dangerous if, due to a their accumulation, they enter the food cycle;
- study and development of efficient and suitable formulations for crops that are made with biological protocol with compounds normally present in nature (fruit acids, ...).

Biosecurity is also, and above all, proposing treatments that eliminate the risk of spreading very dangerous diseases, such as legionellosis, by irrigation systems that work in sprinkling or in close contact with people (irrigation with sprinkling over the foliage, irrigation of sports facilities and fountains).

Biosecurity in agriculture also means preventing all those phenomena which, in the short or long term, can cause direct or indirect diseases to the people who work or may come into contact with this sector. Precisely for this reason, the Barchemicals Research and Development department, together with universities and private or public research institutes, finances and supports the research of new less polluting and more effective materials.

In particular, Barchemicals pays considerable attention to the development of biocides, effective even at low dosages, which are less dangerous for people's health and which do not present phenomena of acquired resistance.

Barchemicals is aware of having a very important social role as in the first 35 years of its life it gave work and dozens and dozens of people, it helped to raise many young people who spent, for more or less long periods, in its laboratories and at its offices or production departments.
Barchemicals has contributed, through the competitive stimulus of free competition, to raise the quality of water treatment systems in Italy and abroad.

Barchemicals is - and will always be - at the forefront, because the development of research and the promotion of people's health and well-being are intrinsic in its DNA and in its Core Values.
Biosecurity is the latest goal that Barchemicals is now trying to achieve for the good of all.

WHAT DOES THE COMMITMENT TO BIOSAFETY MEAN FOR BARCHEMICALS GROUP?

1. First of all, carry out the registration of products that contain the active biocidal ingredients, present in the authorized lists at European level (BPR) and at local level, if outside Europe.
2. Carry out the registration of PMC in Italy when the ministry of health requests it.
3. Avoid using unauthorized products or products lacking technical equivalence as required by the BPR.
4. Select suppliers based on strict ethical and moral criteria and based on the quality of raw materials.
5. Carry out R&D in collaboration with Universities and Research Institutes.
6. Promote conferences and continuous training of its staff and customers.
7. Promote R&D scholarships.
8. Develop new systems for water and air treatment (biomaterials, chemical-physical systems, UV, etc.)
9. Join and organize conferences and events that promote Biosafety.
10. Widen the fields of application of Biosafety, help the transfer of their skills in all sectors of water treatment: swimming pools, drinking water for human and animal use, sanitary water, industrial water, waste water, water for food use and water for washing and food processing.
11. Promote the expansion of the concept of Biosafety also in developing countries.

Castelnuovo Rangone, 01 September 2021

BARCHEMICALS GROUP
Barani dr. Corrado

GROUP BARCHEMICALS®
LA FORMULA PERFETTA

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GROUP BARCHEMICALS®
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SPECIFIC PRODUCTS FOR EVERY NEED

Functional problems of distribution systems:

- limestone, iron and manganese occlusions with well water;
- occlusion from mucilage with well and surface water;
- specific cleaning treatments with high organic loads (fertigation with biodigested).

The compatibility of products in ORGANIC crops:

- prohibition of using substances incompatible with organic protocols.

Health problems for workers and women people who may be exposed to risks:

- treatments of greenhouse crops with dangerous substances;
- risk of legionellosis with irrigation for sprinkling and nebulization for workers and potentially exposed people.

Phytotoxic substances, nutritional problems and soil depletion:

- integrate nutritional supplies with irrigation;
- avoid the presence of phytotoxic elements generally present in industrial products.

ACQUA ACID

ACQUA QUEST

ACQUACLEAN

ACQUA QUEST Fe /Mn

ACQUA POL

ACQUA OXI

ACQUA OXI PLUS

ACQUA CLOR

BIOCHLOR

CLEANING, SANITIZATION AND MAINTENANCE OF THE MICROIRRIGATION SYSTEM

WITH DRIPLINE OR WITH MICROSPRINKLER

PRODUCT SELECTION GUIDE

ACQUA ACID

It can be used with continuous, periodic or seasonal treatments.
Removes dirt caused by scale and biofilm.
Removes limescale deposits due to Ca and Mg.
Prevents the formation of deposits of Ca, Mg, Fe and Mn.
Corrects the pH if too basic well water is used.
It brings phosphorus to the soil.

ACQUA QUEST

It is used with continuous treatments.
Prevents the formation of deposits of Ca, Mg, Fe and Mn. It brings phosphorus to the soil.
It can be used in crops with ORGANIC protocols.

ACQUA POL

It is used with continuous treatments.
Prevents the formation of Ca, Mg deposits. It brings phosphorus to the soil.

ACQUA OXI

It can be used with continuous, periodic or seasonal treatments.
Removes dirt caused by scale and biofilm.
Prevents the formation of deposits of Ca, Mg, Fe and Mn. Prevents the formation of biofilms.
It can be used in crops with ORGANIC protocols.

ACQUA CLOR

It can be used with continuous, periodic or seasonal treatments.
Removes dirt caused by scale and biofilm.
Prevents the formation of deposits of Ca, Mg, Fe and Mn. Prevents the formation of biofilms.

REMOVAL OF IRON AND MANGANESE. THE SOLUTION OF THE PROBLEM

Iron and Manganese are metals commonly found in soil, and therefore also in water. They are usually in reduced form and dissolved in groundwater, but as soon as the water is pumped for irrigation, it cause oxidation.

$$2Fe^{2+}_{(aq)} + \frac{1}{2}O_2 + 5H_2O \rightarrow 2Fe(OH)_3 \downarrow + 4H^+$$

$$2Mn^{2+}_{(aq)} + \frac{1}{2}O_2 + H_2O \rightarrow MnO_2 \downarrow + 2H^+$$

The oxidation products are solid and generate serious problems of occlusion of the micro irrigation system.
The presence of Fe and Mn in bivalent form (2+) also favors the proliferation of bacteria which, taking advantage of the oxidation reactions, generate biofilm which further aggravates the clogging problems of irrigation networks.
It is established that the acceptable limits in water for micro irrigation systems are 0.3 mg / l of iron and 0.2 mg / l of manganese.
The removal of iron and manganese from the water with traditional systems involves an oxidation phase carried out in large tanks followed by filtration of the solid deposits. The traditional process is overall very expensive because it involves high costs both in equipment and in energy (the water must be pumped several times).

TWO PRODUCTS TO USE
for effective cleaning in shock treatments

ACQUA CLEAN

Removes the most stubborn encrustations due to hardness and the presence of high quantities of iron and manganese salts, ACQUA CLEAN completes the action in the shock treatment.
Also to be used in maintenance treatments.

ACQUA QUEST Fe / Mn

After the action of ACQUA QUEST Fe / Mn removes encrustations due to hardness and the presence of high quantities of iron and manganese salts.
Also to be used in maintenance treatments.

CLEANING, SANITIZATION AND MAINTENANCE OF THE GREENHOUSE MICROIRRIGATION SYSTEM

DRIPWING - NEBULIZATION

In greenhouse crops there are specific problems related to:

- possible exposure of workers and people to toxic products in closed environments;
- prevention of legionella due to the high proliferation of microorganisms at constantly high temperatures in closed environments;
- compliance with the rules contained in law 81/2008 on safety in the workplace.

PRODUCT SELECTION GUIDE

ACQUA QUEST

It is used with continuous treatments.
Prevents the formation of deposits of Ca, Mg, Fe and Mn. It brings phosphorus to the soil.
It can be used in crops with ORGANIC protocols.

ACQUA OXI

It can be used with continuous, periodic or seasonal treatments.
Removes dirt caused by scale and biofilm.
Prevents the formation of deposits of Ca, Mg, Fe and Mn.
Prevents the formation of biofilms.
It can be used in crops with ORGANIC protocols. Eliminates the danger of Legionellosis.

BIOCHLOR

Surgical Medical Unit No. 19916
Suitable for washing fruit and vegetables

CLEANING, SANITIZATION AND MAINTENANCE OF FOUNTAINS AND PLANTS FOR THE IRRIGATION OF THE PUBLIC AND SPORTS GREEN

In the management of these systems, in addition to the problems of cleaning dirt deposits and encrustations the exposure of people to the risk of legionella infection is of fundamental importance due to the high probability of spread of the bacterium in the aerosol generated by the distribution devices and, at the same time, for the easy accessibility of the systems themselves.

PRODUCT SELECTION GUIDE

ACQUA OXI

It can be used with continuous, periodic or seasonal treatments.
Removes dirt caused by scale and biofilm.
Prevents the formation of deposits of Ca, Mg, Fe and Mn. Prevents the formation of biofilms.
Eliminates the danger of Legionellosis.

ACQUA CLOR

It can be used with continuous, periodic or seasonal treatments.
Removes dirt caused by scale and biofilm.
Prevents the formation of deposits of Ca, Mg, Fe and Mn.
Prevents the formation of biofilms.
Eliminates the danger of Legionellosis.

BIOCHLOR

Medical Surgical Unit No. 19916
Eliminates the danger of Legionellosis.

CLEANING, SANITIZATION AND MAINTENANCE OF THE IRRIGATION SYSTEM ABOVE THE FOLIAGE

In overhead irrigation, specific problems arise relating to the dispersion of aerosols for systems built near inhabited areas, in these cases, especially with the use of surface irrigation water, the risk of legionella infection increases.
In the presence of well water, the problem of stains on fruit can arise.

PRODUCT SELECTION GUIDE

ACQUA OXI

It can be used with continuous, periodic or seasonal treatments.
Removes dirt caused by scale and biofilm.
Prevents the formation of deposits of Ca, Mg, Fe and Mn. Prevents the formation of biofilms.
It can be used in crops with ORGANIC protocols. Eliminates the danger of Legionellosis.

ACQUA QUEST

It is used with continuous treatments.
Prevents the formation of deposits of Ca, Mg, Fe and Mn. It brings phosphorus to the soil.
It can be used in crops with ORGANIC protocols. Prevents the formation of stains on fruit.

PREVENTION OF SPOTS ON FRUIT
IN WATERING ABOVE THE FOLIAGE

With irrigation above the foliage of orchards, especially using well water with high hardness, they can form unsightly stains on fruit.
The use of appropriate complexing agents continuously added to the irrigation water in minimal quantities carefully dosed can eliminate the inconvenience.

ACQUA QUEST

It is used with continuous treatments.
Prevents the formation of deposits of Ca, Mg, Fe and Mn. It brings phosphorus to the soil.
It can be used in crops with ORGANIC protocols. Prevents the formation of stains on fruit.

ACQUA OXI

It can be used with continuous, periodic or seasonal treatments.
Removes dirt caused by scale and biofilm.
Prevents the formation of deposits of Ca, Mg, Fe and Mn. Prevents the formation of biofilms.
Eliminates the danger of Legionellosis.

CLEANING, SANITIZATION AND MAINTENANCE OF THE PLANT IN FERTIRRIGAZONE WITH BIODIGESTATE

DRIPLINE AND TAPE HOSE

In fertigation with biodigested products there are specific problems relating to the need to use the liquid part of the by-product obtained from anaerobic digestion.

When using a micro irrigation system, the preventive elimination of the suspended solid fraction (organic in nature) is absolutely necessary.

Even after a very careful filtration (which can also be replaced by the lagooning of the sewage), an extremely high bacterial load remains, of the order of ten million units in a milliliter.

Even a modest injection in the line, of the order of 2% of filtered biodigestate, introduces a quantity of microorganisms that can seriously compromise the functionality of the irrigation system in a short time and over short distances.

ACQUA OXI PLUS

- It can be used with periodic or seasonal treatments.
- Removes the dirty caused fromencrustations and biofilms.
- Prevents the formation of deposits of Ca, Mg, Fe and Mn.
- Prevents the formation of biofilms.
- **Eliminates the danger of Legionellosis.**

Schede PRODOTTI

- ACQUA ACID
- ACQUA QUEST
- ACQUA CLEAN
- ACQUA QUEST Fe/Mn
- ACQUA POL
- ACQUA OXI
- ACQUA OXI PLUS
- ACQUA CLOR
- BIOCHLOR

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Composition	**Blend of phosphoric-based acids and organic fruit acids**
Main actions	**Prevention and removal of Ca and Mg salt deposits and Fe and Mn oxides** **Decreasing of the pH value** **It improves the quality of the soil by counteracting the negative effect due to the presence of sodium** **Addition of phosphorus to the soil**
Complementary action	**Elimination of biofilm**
Type of treatment	**Seasonal - Periodic - Continuous**
BIOSECURITY	**Formulated with certified substances, without impurities, without industrial residues, without heavy metals even in traces**

When it should be used - Analytical reference parameters (Catalog Appendix)

Parameter	Unit of measure	No risk	Medium risk	High risk
pH of the water	**number**	**<7**	**7 - 8**	**> 8**
Electrical conductivity - Salinity	**μΣ / χμ**	**<800**	**800 - 3200**	**> 3200**
Salts of Ca and Mg - Hardness	**° F**	**<15**	**15 - 25**	**> 25**
Carbonates and bicarbonates - RSC index	**number**	**<1.25**	**1.25 - 2.50**	**> 2.50**
Bicarbonates	**mg / liter**	**<150**	**150 - 300**	**> 300**
Saturation Index - IdS	**number**	**<0**		**> 0**
Iron	**mg / liter**	**<0.2**	**0.2 - 1.5**	**> 1.5**
Manganese	**mg / liter**	**<0.1**	**0.1 - 1.5**	**> 1.5**

Dosage of the product

PH correction for well water	Concentration of the product determined by the starting pH value and the desired final value	
Periodic or seasonal cleaning *	Concentration of the product	**2.0 L / m3**
	Duration of treatment	**2.0 hours each cleaning**
Continuous dosing *	Concentration of the product	**200 mL / m3**

*The values shown in the table are standard references to be defined case by case after water analysis and any laboratory tests.

Physico-chemical properties of the product

Appearance	Colorless liquid
Smell	Pungent
Solubility in water	Complete
pH of the product TQ	0 to 20 ° C
Specific weight at 25 ° C	1.24 kg / L

Packaging

Code	Description	Packaging	Pallet Quantity
010616004	**ACQUA ACID**	**FU 10 L**	**400 L**

Composition	**Fruit acids and phosphorus salts for food use**
Main actions	**Prevention of deposits of Ca and Mg salts and oxides of Fe and Mn** **Addition of phosphorus to the soil**
Type of treatment	**Continuous**
BIOSAFETY	**Formulated with certified substances, free from impurities, free from industrial residues, free from heavy metals even in traces**
SPECIFIC USES	**Cleaning treatments inside greenhouses** **Cleaning treatments for crops with ORGANIC protocols Prevention of stains** **on fruit in sprinkling irrigation**

When it should be used - Analytical reference parameters (Catalog Appendix)

Parameter	Unit of measure	No risk	Medium risk	High risk
Electrical conductivity - Salinity	**μΣ / χμ**	**<800**	**800 - 3200**	**> 3200**
Salts of Ca and Mg - Hardness	**° F**	**<15**	**15 - 25**	**> 25**
Iron	**mg / liter**	**<0.2**	**0.2 - 1.5**	**> 1.5**
Manganese	**mg / liter**	**<0.1**	**0.1 - 1.5**	**> 1.5**

CONTINUOUS dosing of the product

Concentration of the product with hardness <15 ° F	**10 mL / m3**
Concentration of the product with hardness between 15 ° F and 25 ° F	**20 mL / m3**
Concentration of the product with hardness> 25 ° F	**30 mL / m3**
Concentration of the product with presence of Fe + Mn> 0.2 mg / L	**50 mL / m3**

*The values shown in the table are standard references to be defined case by case after water analysis and any laboratory tests.

Physico-chemical properties of the product

Appearance	Slightly amber liquid
Smell	Odorless
Solubility in water	Complete
pH of the product TQ	0.9 at 20 ° C
Specific weight at 25 ° C	1.13 kg / L

Packaging

Code	Description	Packaging	Pallet Quantity
010620004	**ACQUA QUEST**	**FU 10 L**	**400 L**

Composition	**Blend of fruit acids with food grade phosphorus salts and co-formulants**
Main actions	**Removes the most stubborn encrustations in micro-irrigation networks due to the presence of very hard water rich in Fe and Mn** **Addition of phosphorus to the soil**
Type of treatment	**Shock treatments for deep cleaning and maintenance treatments**
BIOSAFETY	**Formulated with certified substances, free from impurities, free from industrial residues, free from heavy metals even in traces**
SPECIFIC USES	**Particularly suitable for hard waters rich in Fe and Mn**

When it should be used - Analytical reference parameters (Catalog Appendix)

Parameter	Unit of measure	High risk
Hardness	**° F**	**> 50**
Iron	**mg / liter**	**> 1.0**
Manganese	**mg / liter**	**> 1.0**

Dosage of the product

Shock treatments for deep cleaning *	Concentration of the product (depending on the degree of crossing)	**minimum 5.0 L / m3**	**maximum 10 L / m3**
	Duration of treatment	**Minimum 30 minutes for each cleaning ****	
	Then treat with ACQUA QUEST Fe / Mn (see product sheet)		
Continuous dosing for maintenance treatments *	The dosage must be done at the wellhead to avoid deposits of particles caused by the hardness and precipitation of Iron and Manganese. **Dose the product to bring the pH to values below 4.0**		
	Concentration of the product	**minimum 300 mL / m3**	**maximum 500 mL / m3**

*The values shown in the table are standard references to be defined case by case after water analysis and any laboratory tests.

* *rinse the lines before use if the product comes into contact with metal parts.

Physico-chemical properties of the product

Appearance	Red liquid
Smell	Pungent
Solubility in water	Complete
pH of the product TQ	0 <1 at 20 ° C
Specific weight at 25 ° C	1.13 kg / L

Packaging

Code	Description	Packaging	Pallet Quantity
010626004	**ACQUA CLEAN**	**FU 10 L**	**400 L**
010626010	**ACQUA CLEAN**	**1000 L tank**	**-**

Composition	**Blend of ANTISCALE agents derived from phosphoric acid and fruit acids**
Main actions	**Cleaning of nozzles in networks for micro irrigation even in the presence of very hard water rich in Fe and Mn** **Addition of phosphorus to the soil**
Type of treatment	**Shock treatments for deep cleaning and maintenance treatments**
BIOSAFETY	**Formulated with certified substances, free from impurities, free from industrial residues, free from heavy metals even in traces**
SPECIFIC USES	**Particularly suitable for hard waters rich in Fe and Mn**

When it should be used - Analytical reference parameters (Catalog Appendix)

Parameter	Unit of measure	High risk
Hardness	**° F**	**> 50**
Iron	**mg / liter**	**> 1.0**
Manganese	**mg / liter**	**> 1.0**

Dosage of the product

Shock treatments for deep cleaning *	Preliminarily treat with ACQUA CLEAN (see product sheet)		
	Concentration of the product (depending on the degree of encrustation)	**minimum 5.0 L / m3**	**maximum 10 L / m3**
	Duration of treatment	**Minimum 30 minutes for each cleaning**	
Continuous dosing for maintenance treatments *	The dosage must be done at the wellhead to avoid deposits of particles caused by the hardness and precipitation of Iron and Manganese.		
	Concentration of the product	**minimum 100 mL / m3**	**maximum 200 mL / m3**

*The values shown in the table are standard references to be defined case by case after water analysis and any laboratory tests.

Physico-chemical properties of the product

Appearance	Clear transparent liquid
Smell	Odorless
Solubility in water	Complete
pH of the product TQ	0 <2 at 20 ° C
Specific weight at 25 ° C	1.13 kg / L

Packaging

Code	Description	Packaging	Pallet Quantity
010621004	**ACQUA QUEST Fe/Mn**	**FU 10 L**	**400 L**
010621010	**ACQUA QUEST Fe/Mn**	**1000 L tank**	**-**

Composition	**Blend of inorganic polyphosphates and chelating organophosphates for food use**
Main actions	**Prevention of deposits of Ca and Mg salts and oxides of Fe and Mn** **Addition of phosphorus to the soil**
Type of treatment	**Continuous**
BIOSAFETY	**Formulated with certified substances, free from impurities, free from industrial residues, free from heavy metals even in traces**

When it should be used - Analytical reference parameters (Catalog Appendix)

Parameter	Unit of measure	No risk	Medium risk	High risk
Electrical conductivity - Salinity	**μΣ / χμ**	**<800**	**800 - 3200**	**> 3200**
Salts of Ca and Mg - Hardness	**° F**	**<15**	**15 - 25**	**> 25**
Iron	**mg / liter**	**<0.3**	**0.3 - 1.5**	**> 1.5**
Manganese	**mg / liter**	**<0.2**	**0.2 - 1.5**	**> 1.5**

CONTINUOUS dosing of the product

Concentration of the product with hardness <15 ° F	**10 mL / m3**
Concentration of the product with hardness between 15 ° F and 25 ° F	**20 mL / m3**
Concentration of the product with hardness> 25 ° F	**30 mL / m3**
Concentration of the product with presence of Fe + Mn> 0.2 mg / L	**+ 30 mL / m3**

* The values shown in the table are standard references to be defined case by case after water analysis and any laboratory tests.

Physico-chemical properties of the product

Appearance	Slightly amber liquid
Smell	Odorless
Solubility in water	Complete
pH of the product TQ	7.8 at 20 ° C
Specific weight at 25 ° C	1.11 kg / L

Packaging

Code	Description	Packaging	Pallet Quantity
010622004	**ACQUA POL**	**FU 10 L**	**400 L**

Composition	**Bio oxidant based on natural peroxides**
Main actions	**Prevention and removal of algae and biofilm deposits** **Disinfectant action**
Complementary action	**Prevention and removal of limescale deposits**
Type of treatment	**Seasonal - Periodic - Continuous**
BIOSAFETY	**Formulated with certified substances, free from impurities, free from industrial residues, free from heavy metals even in traces**
SPECIFIC USES	**Cleaning treatments inside greenhouses** **Cleaning treatments for crops with ORGANIC protocols** **Prevention of legionella for greenhouse crops, irrigation with sprinkling of public and sports green, in systems for fountains**

When it should be used - Analytical reference parameters (Catalog Appendix)

Parameter	Unit of measure	No risk	Medium risk	High risk
Microbiological analysis	**CFU / mL**	**<10000**	**10000 - 50000**	**> 50000**
Salts of Ca and Mg - Hardness	**° F**	**<20**	**20 - 30**	**> 30**

HIGHLIGHTS: THE SYNERGIES

The encrustations caused by calcareous deposits, iron and manganese are favored by the presence of biofilm deposits generated by microorganisms that create sites of possible aggregation of inorganic compounds.
The presence of limestone deposits in turn favors the proliferation of microorganisms that can have a protective environment in which to encapsulate and multiply. The presence of Fe2 + and Mn2 + allows some bacteria to proliferate (ferrobacteria) resulting in the development of mucilage that overlap the oxidized Fe and Mn deposits.
Water analysis and laboratory tests help to develop effective processes such as:

- in the pipes where the presence of limestone and biofilm deposits is found, the action of Acqua OXI alone allows you to remove all solid deposits with a single treatment and prevent their re-formation, at the same time carrying out a strong sanitizing action;
- in distribution systems, disinfection can be ineffective if it is not combined with a preventive descaling treatment. Acqua Oxi solves this problem by acting on two levels: it eliminates organic and inorganic deposits and sanitizes surfaces and irrigation water.

Dosage of the product

Shock treatments *	Active oxygen content range	Minimum 60 mg / L	Maximum 80 mg / L
	Concentration of the product	**300 mL / m3**	**400 mL / m3**
	Duration of treatment	**2.0 hours each cleaning**	
Continuous dosing *	Active oxygen content range	Minimum 10 mg / L	Maximum 40 mg / L
	Concentration of the product	**50 mL / m3**	**200 mL / m3**

* The values shown in the table are standard references to be defined case by case after water analysis and any laboratory tests.

Physico-chemical properties of the product

Appearance	Colorless liquid
Smell	Pungent
Solubility in water	Complete
pH of the product TQ	2.7 at 20 ° C
Specific weight at 25 ° C	1.07 kg / L

Packaging

Code	Description	Packaging	Pallet Quantity
010614004	**ACQUA OXI**	**FU 10 L**	**400 L**
010614008	**ACQUA OXI**	**1000 L tank**	

Composition	**Bio oxidant based on CONCENTRATED natural peroxides**
Main actions	**Removal of algae and biofilm deposits** **Disinfectant action**
Complementary action	**Prevention and removal of limescale deposits**
Type of treatment	**Periodic**
BIOSECURITY	**Formulated with certified substances, free from impurities, free from industrial residues, free from heavy metals even in traces**
SPECIFIC USES	**Cleaning treatments for irrigation systems that use biodigested as fertilizer**

When it should be used - Analytical reference parameters (Catalog Appendix)

Parameter	Unit of measure	No risk	Medium risk	High risk
Microbiological analysis	**CFU / mL**	**<10000**	**10000 - 50000**	**> 50000**

HIGHLIGHTS: THE TREATMENT **OF WATER WITH BIODIGESTATE**

The bacterial load of the supernatant of the biodigestate is of the order of 10000000 units of microorganisms in a mL.

The reference values for the concentration of biodigested injected online are of the order of 2%.
Even with this dilution there remains a high risk of proliferation and clogging of the micro-irrigation lines to the point of compromising the functionality of the seasonal hose before the end of the crop irrigation season.

The ACQUA OXI PLUS product is designed to perform an energetic action and ensure an adequate degree of cleaning even over long distances of drip distribution.

Dosage of the product

Periodic treatments *	Active oxygen content range	Minimum 60 mg / L	Maximum 80 mg / L
	Concentration of the product	**300 mL / m3**	**400 mL / m3**
	Duration of treatment	**2.0 hours each cleaning**	

* The values shown in the table are standard references to be defined case by case after water analysis and any laboratory tests.

Physico-chemical properties of the product

Appearance	Colorless liquid
Smell	Pungent
Solubility in water	Complete
pH of the product TQ	2.7 at 20 ° C
Specific weight at 25 ° C	1.07 kg / L

Packaging

Code	Description	Packaging	Pallet Quantity
010617006	**ACQUA OXI PLUS**	**FU 10 L**	**400 L**

Composition	**Sodium hypochlorite based oxidant**
Main actions	**Prevention and removal of algae and biofilm deposits** **Disinfectant action**
Complementary action	**Prevention and removal of limescale deposits**
Type of treatment	**Seasonal - Periodic - Continuous**
BIOSAFETY	**Formulated with certified substances, free from impurities, free from industrial residues, free from heavy metals even in traces**
SPECIFIC USES	**Prevention of legionella in fountain systems**

When it should be used - Analytical reference parameters (Catalog Appendix)

Parameter	Unit of measure	No risk	Medium risk	High risk
Microbiological analysis	**CFU / mL**	**<10000**	**10000 - 50000**	**> 50000**
Salts of Ca and Mg - Hardness	**° F**	**<20**	**20 - 30**	**> 30**

Dosage of the product

Hyperchlorination of the end of season*	Free chlorine content range	Minimum 50 mg / L	Maximum 150 mg / L
	Concentration of the product	**500 mL / m3**	**1500 mL / m3**
	Duration of treatment	**60 minutes**	
Supercloration for maximum 5 min / cycle *	Free chlorine content	50 mg / L	
	Concentration of the product	**500 mL / m3**	
Intermittent dosing for 20 minutes max / day *	Free chlorine content range	Minimum 10 mg / L	Maximum 30 mg / L
	Concentration of the product	**100 mL / m3**	**300 mL / m3**
Continuous dosing	Free chlorine content range	Minimum 1.0 mg / L	Maximum 10 mg / L
	Concentration of the product	**10 mL / m3**	**100 mL / m3**

* The values shown in the table are standard references to be defined case by case after water analysis and any laboratory tests.

Physico-chemical properties of the product

Appearance	Pale yellow liquid
Smell	Weak chlorine
Solubility in water	Complete
pH of the product TQ	> 12 to 20 ° C
Specific weight at 25 ° C	1.20 kg / L

Packaging

Code	Description	Packaging	Pallet Quantity
010618004	**ACQUA CLOR**	**FU 10 L**	**400 L**

Composition	**Concentrated disinfectant solution based on sodium hypochlorite**
Main actions	**Disinfection of water distribution systems in farms to control the contamination of gram positive and gram negative bacteria and of Legionella**
Type of treatment	**Periodic**
BIOSAFETY	**Formulated with certified substances without impurities, industrial residuals and heavy metals even in traces**
SPECIFIC USES	**Washing and disinfection of fruit and vegetables**

IN EVIDENCE:

MEDICAL SURGICAL DEVICE.
Registration of the Ministry of Health n. 19916

Reference regulations
Infection in the workplace (Legislative Decree 81/2008)
Infection of the population (2015 GUIDELINES)
DGR ER 828 12 June 2017

Dosage of the product

Disinfection of water distribution systems in the farms for the control of contamination of gram positive and gram negative bacteria and of Legionella	Dosage of the product in a quantity equal to 33.5 liters per cubic meter of water (equal to 1000 ppm of free chlorine active). Leave on for at least 15 minutes and rinse with drinking water until completely eliminated (up to residual free chlorine below 0.2 ppm)
Washing and disinfection of fruit and vegetables	Dosage of the product in a quantity equal to 10 mL of product per liter of water (equal to 300 ppm of free active chlorine). Leave to act for at least 15 minutes and rinse thoroughly with drinking water until all traces of residual free chlorine are completely eliminated

Physico-chemical properties of the product

Appearance	Pale yellow liquid
Smell	Mild chlorine
Solubility in water	Complete
pH of the product TQ	> 11.5 at 20 ° C
Specific weight at 25 ° C	1.11 kg / L

Packaging

Code	Description	Packaging	Pallet Quantity
8602020004	**BIOCHLOR**	**BO 250 ML (CONF 10 PZ)**	**650 PZ**
860202015	**BIOCHLOR**	**BO 1 L**	**300 PZ**
860202017	**BIOCHLOR**	**FU 10 L**	**400 L**

Dosing System

SMART SYSTEM AGRI

- Dosing pump for solution containing non-dissolved substances and abrasives.
- Flow rate: from 50 lt/h to a maximum of 1200 lt/h with delta pressure of 6 atm
- Viton membrane.

Code	Description
280202020	**SMART SYSTEM AGRI – 1”**

MEASUREMENT AND ANALYSIS

Code	Description
440402646	QUANTOFIX - BOX INDICATING PEROXIDES 100PPM PACKAGE. 100
440402035	QUANTOFIX - BOX INDICATING PEROXIDES 25PPM PACKAGE. 100

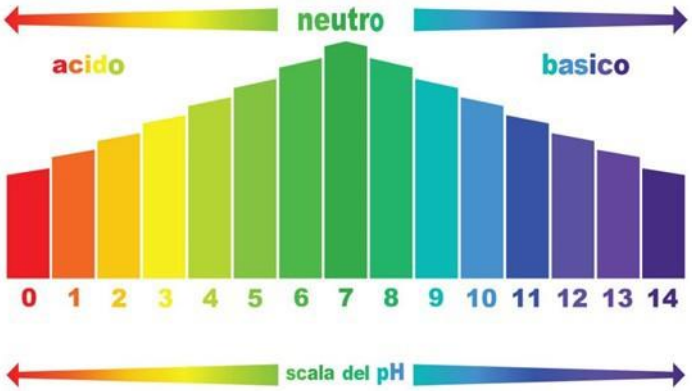
Code	Description
075002	CHLORINE/pH TABLETS POOL TESTER
076020	REPLACEMENT TABLETS DPD1- RAPID- 250 PIECE FOR POOL TESTER
076023	REPLACEMENT TABLETS DPD3- RAPID- 250 PIECE FOR POOL TESTER
076027	REPLACEMENT TABLETS RED PH- RAPID- 250 PIECE FOR POOL TESTER
076025	REPLACEMENT TABLETS DPD4- RAPID- 250 PIECE FOR POOL TESTER
0123056073	CHLORINE /pH DROPS TEST KIT
079001	OTO REPLACEMENT DROPS 15 CC
079002	REPLACEMENT RED DROPS 15 CC

Appendice

The pH of the water

In surface waters the pH is substantially neutral, while in groundwater the pH is frequently basic.

The basic pH is mainly due to bicarbonates present which can bring alkalinity even to values higher than 8.



PH values higher than 7.5 indicate the presence of bicarbonates and contribute to raising the pH of the soil solution with consequent lower availability of the essential elements for the nourishment of plants, pH values below 7.0 allow maximum use of microelements, in particular iron, which remain available in the soil.

PH risk Nozzle clogging Declineof soil conditions Less availability of nutrients	No risk	Medium risk	High risk
	<7	**7 - 8**	**> 8**

Electrical conductivity - Salinity

The water used for irrigation always contains a certain amount of dissolved salts, the concentration of which varies within rather wide limits depending on the origin. The waters coming from superficial courses (rivers, streams) and from reservoirs (natural and artificial) generally have a low content of dissolved salts; in the waters coming from more or less deep aquifers the saline content is often high.

In groundwater there are generally Na +, K +, Ca ++, Mg ++, NH4 +, HCO3-, Cl-, SO 2-, NO ions^{-},

Heavy metal ions commonly present are Fe2 +, Mn2 +, other toxic heavy metals (Pb and Cr) may be present, deriving from anthropogenic pollution phenomena.

For the waters used for irrigation it is important to evaluate the total content of dissolved salts, this quantity is defined with the TDS (Total Dissolved Solids) which is measured in ppm (parts per million or even mg / liter). The evaluation of the TDS is done quickly with the measurement of the specific conductivity EC which is normally expressed in □S / cm. [EC (□S / cm) = 1.5 TDS (mg / liter)].

EC RISK (unit of measurement µS / cm) Nozzle clogging Worsening of soil conditions Less availability of nutrients	No risk	Mediu m risk	High risk
	<800	**800 - 3200**	**> 3200**

Salts of Ca and Mg and other polyvalent metal ions - Hardness

Among the ions contained in the water some are responsible for the phenomenon of hardness, mainly the presence of bicarbonates of Ca ++ and Mg ++, due to the action of rain on calcareous soils generates the hardness of the water according to the reaction:

$CaCO_3 + CO_2 + H_2O \rightarrow Ca(HCO_3)_2$

Hardness is expressed in ° F (French degrees). To calculate the total hardness, all the bivalent positive ions are considered (for groundwater the Ca ++ and Mg ++ ions are normally considered), they transform into CaCO3 and it is considered that a French degree is equivalent to 10 mg / liter of CaCO3.

For water intended for irrigation purposes, the temporary hardness given by the bicarbonates of Ca and Mg present is important, in fact by simple heating to 50 ° the carbon dioxide is removed as a gas and the carbonates are deposited: $Ca(HCO_3)_2 \rightarrow CaCO_3 + CO_2 + H_2O$

Generally a weakly acidic pH (with values below 6.8) prevents carbonates from settling.

HAZARD hardness (Unit of measurement ° F) Nozzle clogging	No risk	Medium risk	High risk
	<15	**15 - 25**	**> 25**

Sodium Determination - SAR Index

A high concentration of sodium ions in water causes problems with soil permeability and causes infiltration problems. This happens because the sodium replaces the calcium and magnesium absorbed by the soil clay and causes the dispersion of the soil particles, generating a hard and compact soil.

The SAR index relates the negative action that sodium exerts on the soil structure with the positive ones of calcium and magnesium.

Coastal areas are the most vulnerable in this respect because the infiltration of sea water in them involves a high risk of salinity in the water that is then pumped from the wells, the overexploitation of groundwater resources which represent the predominant availability in the coastal areas cause more and more seawater intrusion.

The SAR value is defined by the equation:

$$SAR = \frac{[Na]}{\sqrt{\frac{[Ca] + [Mg]}{2}}}$$

SAR RISK (numerical index) Worsening of soil conditions Less availability of nutrients	No risk	Medium risk	High risk
	<3.0	**3.0 - 9.0**	**> 9.0**

Carbonates and bicarbonates - determination of the RSC index

High concentrations of carbonate ($CO_3^=$) and bicarbonate (HCO_3^-), for values higher than 180-240 mg / L, increase the SAR index. In fact, the carbonate and bicarbonate ions combined with calcium or magnesium precipitate in the form of calcium carbonate (CaCO3) or magnesium carbonate (MgCO3) especially when the solution concentrates in the soil in arid conditions.

The precipitation of carbonates decreases the concentration of Ca and Mg and, with the same sodium, the SAR index increases. The index used to describe the danger given by high concentrations of carbonates and bicarbonates is the Residual Sodium Carbonate (RSC)

$$RSC = \frac{\left(\frac{mg}{L} CO_3^{--}\right)}{61} + \frac{\left(\frac{mg}{L} HCO_3^{-}\right)}{30} - \frac{\left(\frac{mg}{L} Ca^{++}\right)}{20} - \frac{\left(\frac{mg}{L} Mg^{++}\right)}{12}$$

In case of a high RSC index it is recommended to correct the pH of the irrigation water up to values of 6.2

RSC RISK (numerical index) Nozzle clogging Worsening of soil conditions Less availability of nutrients	No risk	Medium risk	High risk
	<1.25	**1.25 - 2.50**	**> 2.50**

Bicarbonates

High concentrations of bicarbonate (HCO3-) increase the SAR index. As already mentioned, bicarbonate ions combined with calcium or magnesium precipitate in the form of calcium carbonate (CaCO3) or magnesium carbonate (MgCO3) especially when the solution concentrates in the soil in arid conditions.

The precipitation of carbonates decreases the concentration of Ca and Mg and, with the same sodium, the SAR index increases.

RISK of bicarbonates (a measure mg / L) Nozzle clogging Worsening of soil conditions Less availability of nutrients	No risk	Medium risk	High risk
	<150	**150 - 300**	**> 300**

Saturation Index

The saturation index value is based on the action of carbon dioxide (CO2) dissolved in water which exerts a solubilizing action on carbonates:

$$CaCO_3 + CO_2 + H_2O \rightarrow Ca(HCO_3)_2$$

Two possible cases:
water supersaturated with CO_2 (IdS <0): the calcium carbonate is kept in solution;
CO2 undersaturated water (IdS> 0): encrusting water with a tendency to form deposits and encrustations.
Langelier's method is used for calculating the saturation index: Ids = pH - pHs
where pHs = (9.3 + A + B) - (C + D)
A = index corresponding to the total solid substances
B = index corresponding to the water temperature C
= index corresponding to temporary hardness
D = index corresponding to the methyl-orange alkalinity

For irrigated water it is not possible to think of modifying total solids and temperature. In case of a high saturation index, it is necessary to acidify the water to remove the CO2, thus limiting the precipitation of carbonates.

RISK IdS (Numerical Index) Nozzle clogging	No risk	Medium risk	High risk
	<0		**> 0**

Iron and Manganese

Significant quantities of Fe^{2+} and Mn^{2+} can be found in groundwater with considerable problems. Fe^{2+} yes rapidly oxidizes to Fe^{3+} and consequently precipitates as Fe hydroxide.

Plus the energy freed from the oxidation of Fe^{2+} and Mn^{2+} ions, it allows some bacteria to proliferate (ferrobacteria) resulting in the development of often colored mucilages that contribute to the clogging of the nozzles in micro-irrigation.

To eliminate the effects of iron and manganese present in irrigation water, it is possible to use specific products as an alternative to expensive aeration / sedimentation tanks where water is accumulated before being used for irrigation.

RISK Fe and Mn (unit of measure mg / L) Nozzle clogging Proliferation of ferrobacteria and line occlusion		No risk	Medium risk	High risk
	Fe	**<0.2**	**0.2 - 1.5**	**> 1.5**
	Mn	**<0.1**	**0.1 - 1.5**	**> 1.5**

Microorganisms

All the waters used in irrigation contain microorganisms of various kinds.
Surface waters (reservoirs, canals, rivers) contain a generally higher quantity of microorganisms than groundwater.

The presence of microorganisms causes clogging of the nozzles in micro-irrigation, even an accurate filtration that eliminates suspended solids can be insufficient if the quantity of microorganisms is so high as to cause new proliferation of solid organic matter in relatively short piping sections, even tens of meters , especially in cases where the water stagnates due to interruption of irrigation.
Solid deposits of microorganisms are growth points of calcareous deposits in the case of waters that have the chemical characteristics to create encrustations (groundwater)
Finally, the presence of Fe2 + causes the proliferation of ferrobacteria which use the energy released by the oxidation to Fe3 + for their growth.

The products used for the elimination of microorganisms, with the addition of anti-scaling agents, are often effective for the removal of biofilm but also to avoid the deposit of limestone, iron and manganese.

Biofilm RISK (unit of measure n ° / mL)	No risk	Mediu m risk	High risk
Nozzle clogging Proliferation of microorganisms Calcareous deposits	**<10000**	**10000 - 50000**	**> 50000**

Legionella

Legionellosis is an infectious disease caused by bacteria of the genus Legionella that can manifest itself with pneumonia, often of serious damage, or with a flu-like illness. Legionellosis has an incubation period ranging from 2 to 10 days. The average lethality rate is 10%.

Legionella infections are subjected to special surveillance by the World Health Organization (WHO), by the European Community in which the European Working Group for Legionella Infections (EWGLI) operates and by the Istituto Superiore di Sanità, which established since 1983 the National Register of Legionellosis.

Legionella is found in all natural surface waters, the risk factors are: temperature between 25 ° C and 42 ° C, stagnation in tanks and pipes (formation of biofilm), deposits in pipes, presence of sediments and organic material, presence of trace elements (Zn, Fe, Mn), presence of algae and aquatic amoebas.

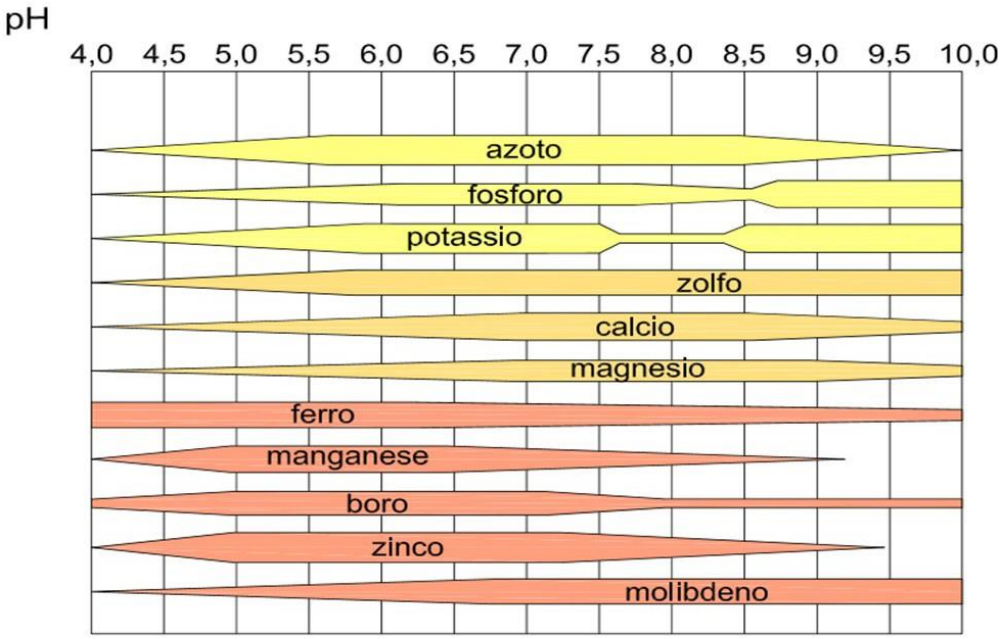
The onset of the pathology requires:

- that there is a high concentration of bacteria in the water;
- that this is dispersed in the form of an aerosol;
- that the transport mechanisms allow inhalation by susceptible people (irrigation with sprinkling, with nebulization, fountains, etc ...).

Nutritional elements for plants Presence of nutrients in dry tissue vegetable (average reference values).		Form available for plants	Concentration in dry tissue	
			mg / kg	%
Structural nutrients	Carbon	CO2		45
	Hydrogen	H2O		6.0
	Oxygen	O2 - H2O		45
Macro nutrients	Nitrogen	$NO3^-$ - $NH4^+$		1.5
	Potassium	$K.^+$		1.0
	Phosphorus	H2PO4- - $HPO4^{2-}$		0.20
Meso Nutrients	Calcium	$Approx^{2+}$		0.50
	Magnesium	Mg^{2+}		0.20
	Sulfur	$SO4^{2-}$		0.10
Micro nutrients	Iron	Fe2 + - Fe3 +	100	0.010
	Manganese	Mn^{2+}	50	0.0050
	Copper	Cu + - Cu2 +	6	0.00060
	Zinc	Zn^{2+}	20	0.0020
	Molybdenum	$MoO4^{2-}$	0.1	0.000010
	Boron	H3BO3	20	0.0020
	Chlorine	Cl-	100	0.010

Availability of nutrients as a function of pH

In treatments to adapt the characteristics of irrigation water, it is important to correct the pH. The pH of the soil is also important for micronutrients: for all micronutrients in cationic form (copper, zinc, manganese, iron) the higher solubility (hence their availability) is at low pH values (higher acidity).



Nutritional elements for plants

The “limit values” of the water used for irrigation are shown in the table below. They are reference limit values and concern the toxicological aspects for plants, they are differentiated between greenhouse cultivation and open field cultivation. They are indicative values and represent an adequate tool for a preliminary assessment.

LIMIT VALUES		Unit of measure	Limits for greenhouse crops	Limits for open field crops
Meso nutrients	Calcium (Ca)	ppm (mg / liter)	<150	
	Magnesium (Mg)	ppm (mg / liter)	<35	
	Sulphates (SO4--)	ppm (mg / liter) of sulfur (S)	<50	<300
Micro nutrients	Iron (Fe) (heavy metal)	ppm (mg / liter)	<1.0	<3.0
	Manganese (Mn) (heavy metal)	ppm (mg / liter)	<0.6	<2.0
	Copper (Cu) (heavy metal)	ppm (mg / liter)	<0.3	<1.0
	Zinc (Zn) (heavy metal)	ppm (mg / liter)	<0.3	<3.0
	Molybdenum (Mo) (heavy metal)	ppm (mg / liter)	<0.05	<0.05
	Boron (B)	ppm (mg / liter)	<0.3	<2.0
	Chlorides (Cl-)	ppm (mg / liter)	<50	<200
	Sodium (Na)	ppm (mg / liter)	<50	<150
Cadmium (Cd) (heavy metal)		ppm (mg / liter)	<0.01	<0.01
Chromium (Cr) (heavy metal)		ppm (mg / liter)	<0.1	<0.1
Nickel (Ni) (heavy metal)		ppm (mg / liter)	<0.2	<0.2
Lead (Pb) (heavy metal)		ppm (mg / liter)	<5.0	<5.0
Mercury (Hg) (heavy metal)		ppm (mg / liter)	<0.002	<0.002
Fluorides (F-)		ppm (mg / liter)	<1.0	<1.0
Surfactants		ppm (mg / liter)	<0.5	<0.5
Suspended soli		ppm (mg / liter)	<30	<30

Nutritional elements for plants

For micronutrients it is important to consider the deficiency but also the possible concentration of toxicity. As an indication, the average concentrations of micronutrients (in mg / kg) in tissues of mature leaves taken from different plant species are reported. It should be noted that Boron has a narrow range of toxicity.

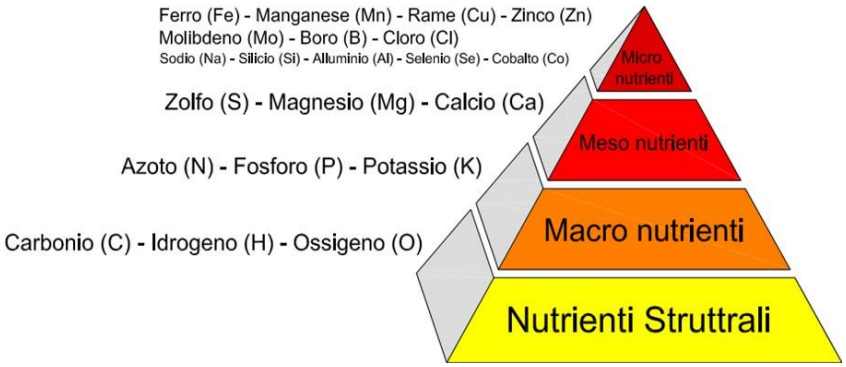
		Concentrations in ppm		
		Lacking	Sufficient (normal)	Excessive or toxic
Micro nutrients	Iron	<50	100 - 500	> 500
	Manganese	<15 - 25	20 - 300	> 300 - 500
	Copper	<2 - 5	5 - 30	> 20 - 100
	Zinc	<10 - 20	20 - 150	> 100 - 400
	Molybdenum	<0.03 - 0.15	0.1 - 0.2	> 100
	Boron	<5 - 30	10 - 200	> 50 - 200
	Chlorine	<100	100 - 500	> 500 - 1000

The prevalent use of chemical fertilizers over organic or organ-mineral ones and the abandonment of organic amendments can lead to the removal of micronutrients that are usually not included in fertilization plans.

Based on the chemical analysis of the water used for irrigation, the formulation of the products has the fundamental objectives of:

- pursue a high efficacy in correcting the chemical and microbiological characteristics of the water;
- ensure biological safety (absence of toxic elements for plants, animals and humans);
- bring useful microelements to stimulate correct plant growth.

In the products for cleaning and maintenance of micro-irrigation systems it is therefore possible to add micronutrient substances in the quantities required by the agronomist according to the nutritional needs of the cultivated crops (see product sheets).



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