AGRO
NANOTECHNOLOGY IN AGRICULTURE

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INNOVATIVE SOLUTIONS FOR AGRICULTURE

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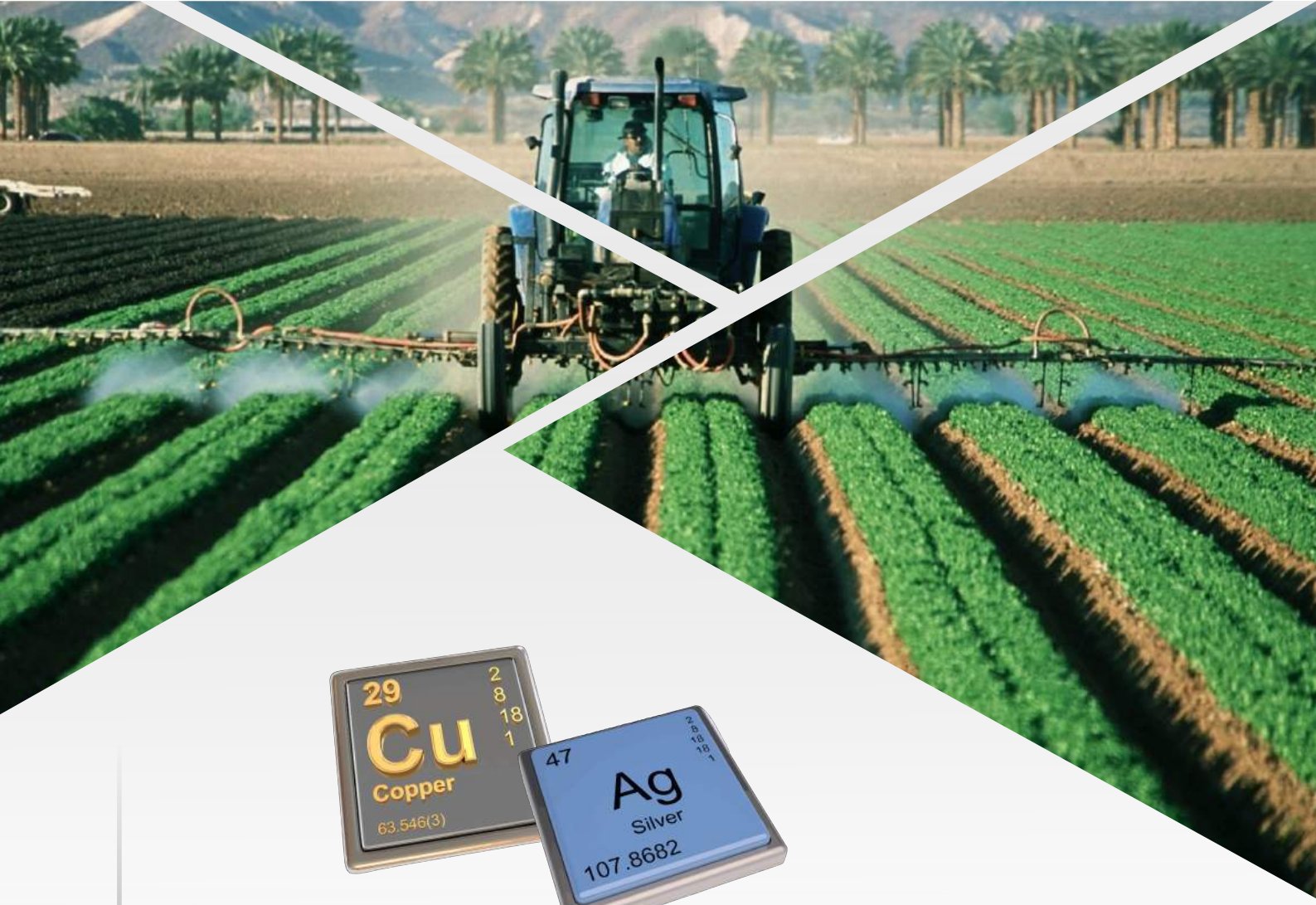
WE CREATE BEST PRODUCTS

INSPIRED BY NATURE

THANKS TO OUR EXPERIENCE

AND NOVEL TECHNOLOGIES



NANOMATERIALS ARE NEW GENERATION SUBSTANCES WHOSE PROPERTIES DIFFER RADICALLY FROM THOSE OBSERVED IN THE MACRO SCALE (SCALE EFFECT). DEPENDING ON THE SHAPE OR SIZE OF THE PARTICLES, IT IS POSSIBLE TO OBTAIN DIFFERENT PROPERTIES. THANKS TO THIS, NANOMATERIALS AROUSE GREAT INTEREST OF RESEARCHERS AND BECOME THE CORE OF DEVELOPMENT OF ALL BRANCHES OF SCIENCE AND INDUSTRY.

DESPITE INTENSIVE RESEARCH, MANY PROPERTIES OF NANOMATERIALS ARE A MYSTERY. HOWEVER, THIS DOES NOT PREVENT THEIR IMPLEMENTATION FOR USE IN OTHER INDUSTRIES DUE TO ITS EXCELLENT PERFORMANCE IN EXTREMELY LOW CONCENTRATIONS.

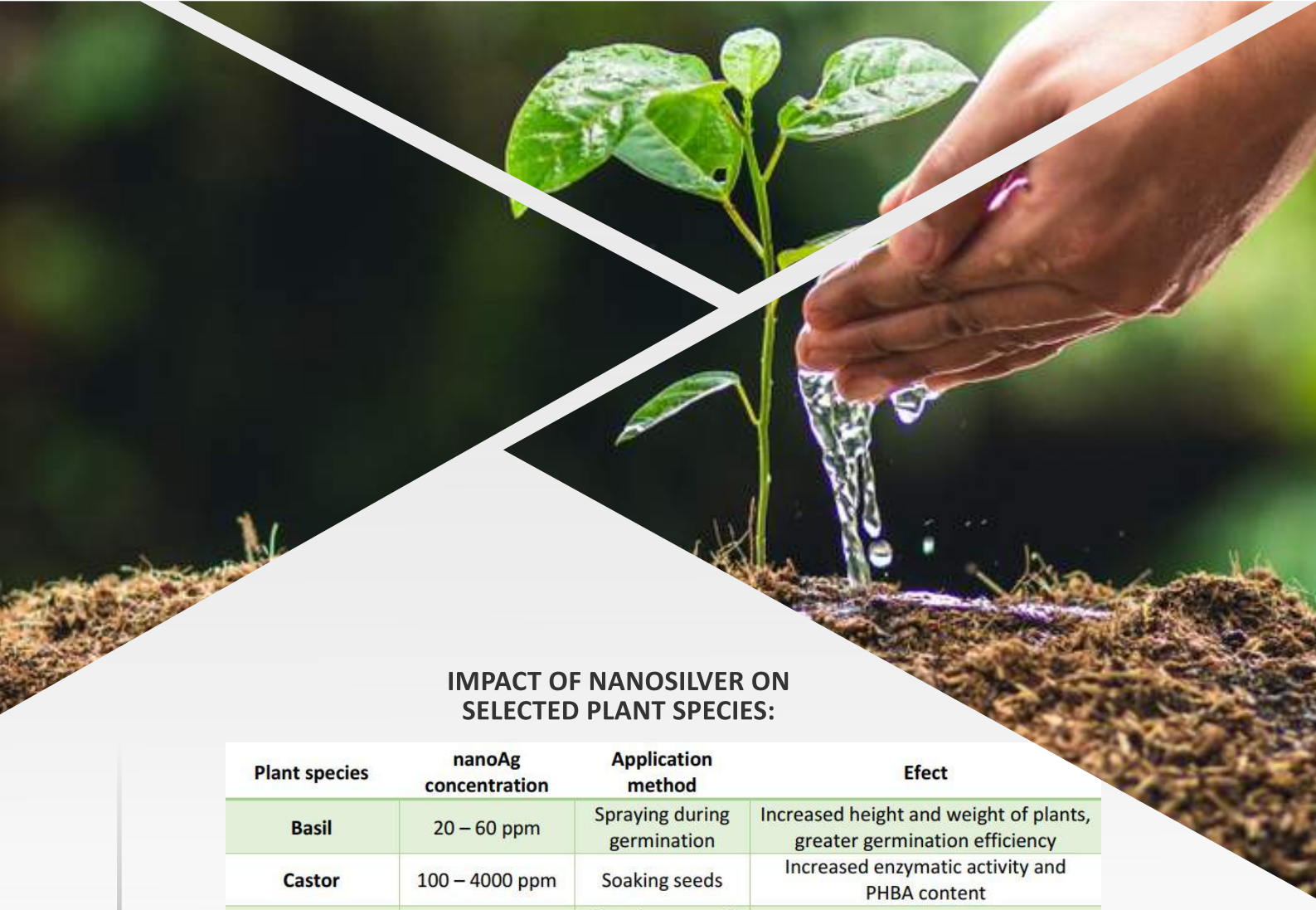
THE COMPANY ITP-SYSTEM HAS DEVELOPED PROPRIETARY METHODS FOR THE PREPARATION OF NANOPREPARATIONS WHOSE PROPERTIES ALLOW THEIR USE IN AGRICULTURE. THE EFFECTS OF THE PREPARATIONS, MAINLY BASED ON SILVER, COPPER AND SILICON, HAVE BEEN DESCRIBED IN DETAIL IN SCIENTIFIC PAPERS. THEY ALLOW YOU TO INCREASE YIELDS AND PROTECT CROPS AGAINST MICROBIAL ATTACK (BACTERIA, MILDEW).

SILVER IS A METAL KNOWN TO MANKIND SINCE THE DAWN OF TIME. THE BIOCIDAL PROPERTIES OF THIS METAL HAVE ALREADY BEEN OBSERVED IN ANTIQUITY. FOR THIS REASON, SILVER COINS WERE THROWN INTO WINE CONTAINERS TO PROTECT THEM FROM SPOILAGE. THE PROGRESS OF NANOTECHNOLOGY HAS REDUCED THE SIZE OF SILVER CRYSTALS TO THE NANO SCALE. THANKS TO THIS, THEIR ANTIMICROBIAL PROPERTIES HAVE BEEN IMPROOVED, AND THE PREPARATION ITSELF BECAME USABLE IN THE FORM OF SPRAYING (NANOSILVER, UNLIKE SILVER IN THE MACRO FORM, CAN BE SUSPENDED IN WATER - FORMS THE SO-CALLED COLLOID).

NANOSILVER IS A NON-IONIC SUBSTANCE, WHICH MEANS IT HAS NO ELECTRIC CHARGE. AS A RESULT, IT IS COMPATIBLE WITH A WIDE RANGE OF CHEMICALS (IONIC SILVER THAT HAS AN ELECTRIC CHARGE, IS EASILY PRECIPITATED, E.G. WITH VERY COMMON CHLORIDE IONS). IN ADDITION, IN CONTRAST TO SILVER SALT (CHEAPEST IONIC FORM) IT IS NOT SENSITIVE TO LIGHT AND EASILY PENETRATES DEEP INTO CELLS AND TISSUES. THE SPHERICAL SHAPE OF THE MOLECULES ALLOWS THEIR DEEP PENETRATION AND EASY MIGRATION, AND THUS INCREASES THE ACTIVITY OF THE PREPARATION.

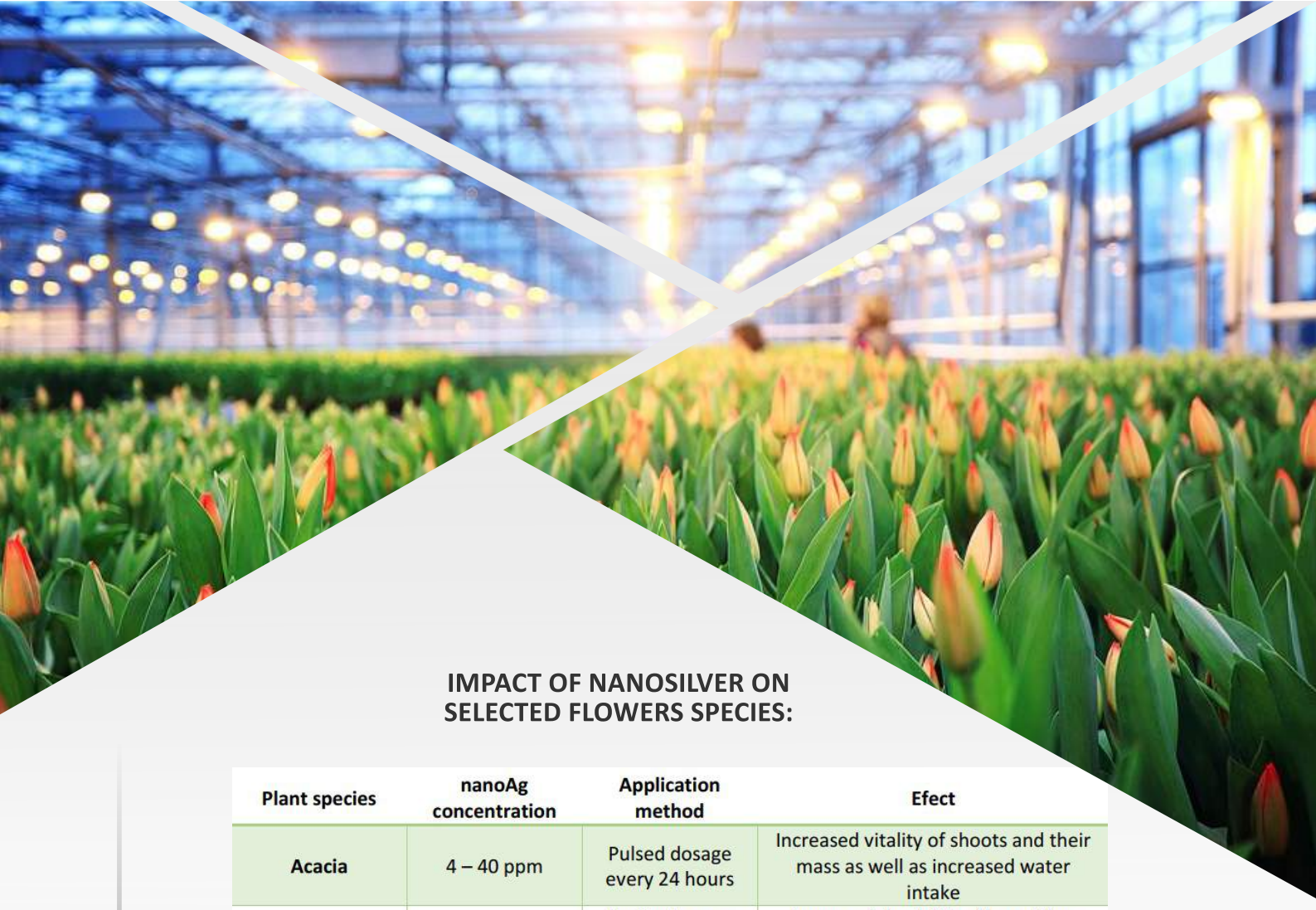
NANOSILVER HAS STRONG ANTIBACTERIAL, ANTIFUNGAL, ANTIVIRAL AND ANTIPROTOZOAL PROPERTIES. THIS HAS BEEN PROVEN IN MANY RESEARCH WORKS AND CAUSED A RAPID INCREASE IN NANOSILVER CONSUMPTION.

IN ADDITION TO BIOCIDAL PROPERTIES, SILVER INTENSIFIES THE GROWTH OF PLANTS, INCREASES THEIR BIOMASS, ROOT LENGTH OR NUMBER OF LEAVES, INCREASES THE QUALITY OF FRUIT, INCREASES THE CONTENT OF CHLOROPHYLL, CAROTENOIDS AND FLAVONOIDS IN CELLS.



IMPACT OF NANOSILVER ON SELECTED PLANT SPECIES:

Plant species	nanoAg concentration	Application method	Efect
Basil	20 – 60 ppm	Spraying during germination	Increased height and weight of plants, greater germination efficiency
Castor	100 – 4000 ppm	Soaking seeds	Increased enzymatic activity and PHBA content
Cucumber	500 – 3000 ppm	Spraying every 7 days for 14 weeks	Increased plant growth, increased fruit, weight and length
Fodder beet	0.5 – 15 ppm	Addition to water	Increased root length, increased carotenoid content
Hibiscus	N/A	Additive to growth regulators (BA and IAA)	Increased number and length of roots
Lentil	10 – 40 ppm	Seed spraying	Increased length of roots, shoots and increased dry weight and germination efficiency
Mustard	25 – 400 ppm	Addition to water	Increased root length, chlorophyll content and photosynthesis efficiency
Pearl millet	20 – 50 ppm	Soaking seeds for 2h	Increased germination efficiency, length of shoots and roots
Geranium	20 – 80 ppm	Spraying	Increased germination efficiency, length of shoots and roots
Potato	2 – 20 ppm	Addition to water	Increased amount of flavonoids, phenols, increased growth
Saffron	20 – 60 ppm	Soaking seeds	Increased number of inflorescences, increased amount of seeds
Rose	50 – 150 ppm	Addition to water	Reduced leakage of phenolic compounds, reduced bacterial contamination
Tomato	0.05 – 2.5 ppm	Soaking seeds	Increased root length, increased germination efficiency
Cabbage	50 – 75 ppm	Leafs spraying	Increased dry weight, increased size, increased wet weight



IMPACT OF NANOSILVER ON SELECTED FLOWERS SPECIES:

Plant species	nanoAg concentration	Application method	Efect
Acacia	4 – 40 ppm	Pulsed dosage every 24 hours	Increased vitality of shoots and their mass as well as increased water intake
Alstromeria	15 – 25 ppm	Dosing to vase water	Increased durability after cutting, increased chlorophyll content
Aspidistra	10 – 40 ppm	Dosing to vase water	Increased durability after cutting, increased chlorophyll content
Carnation	2 – 4 ppm	Pulsed dosage every 48 hours	Increased durability after cutting, increased content of anthocyanins
Chrysanthemum	5 – 20 ppm	Pulsed dosage every 24 hours	Increased durability after cutting, increasing flower resistance to bacterial colonization
Freesia	5 – 15 ppm	Dosing to vase water	Increased durability after cutting, increased number of open flowers
Gerbera	5 – 10 ppm	Dosing to vase water	Increased durability after cutting, increased wet weight
Gladiolus	10 – 50 ppm	Pulsed dosage every 24 hours	Increased durability after cutting, greater water intake, increased flower resistance to bacterial colonization
Lily	5 – 30 ppm	Dosing to vase water	Increased durability after cutting, greater water intake, increased flower resistance to bacterial colonization
Rose	1 – 5 ppm	Dosing to vase water	Increased durability after cutting, increased wet weight, increased flower resistance to bacterial colonization
Tuberose	15 – 45 ppm	Dosing to vase water	Increased durability after cutting, increased chlorophyll content
Tulip	10 – 40 ppm	Dosing to vase water	Increased wet weight, increased chlorophyll content

NanoAg AGRO

IN RESPONSE TO THE GROWING DEMAND FOR MODERN AND NONTOXIC PLANT PROTECTION PRODUCTS, THE COMPANY ITP-SYSTEM DEVELOPED THE NanoAg AGRO PRODUCT. IT IS A WATERBORNE MIXTURE OF HYDROGEN PEROXIDE (25%) AND COLLOIDAL NANOSILVER (320 PPM). THE PRODUCT SHOULD BE USED IN THE FORM OF A 1-2% SOLUTION WHEN SPRAYING A PREVIOUSLY MOISTENED SOIL LAYER. A 2% SOLUTION SHOULD BE USED TO DISINFECT THE EQUIPMENT. PREPARATION OF FRUIT BEFORE HARVESTING SHOULD BE DONE WITH THE USE OF 0.05-1% SOLUTION.

IT IS POSSIBLE FOR THE USERS TO PREPARE THE WORKING SOLUTION BY THEMSELVES. TO DO THIS, COMBINE 80 g OF A SILVER COLLOID OF 4000 PPM WITH 500 g OF PERHYDROL (50%) AND 500 g OF DEMINERALISED WATER. THE RESULTING SOLUTION SHOULD BE DILUTED TO THE DESIRED CONCENTRATION.

HYDROGEN PEROXIDE, WHICH IS THE MAIN COMPONENT OF THE PREPARATION, DECOMPOSES TO WATER AND ACTIVE OXYGEN IN THE ENVIRONMENT. OXYGEN CAUSES IMMEDIATE DAMAGE (OXIDATION) OF PATHOGENS, DESTROYING THEIR KEY BIOLOGICAL STRUCTURES. THANKS TO THIS, IT PRODUCES AN IMMEDIATE EFFECT, WHICH IS PROLONGATED BY SILVER NANOPARTICLES, WHICH IN CONTRAST TO HYDROGEN PEROXIDE DO NOT DECOMPOSE.

BOTH COMPONENTS ACT IN A NON-SPECIFIC BIOCIDE, WHEREBY THE SPECTRUM OF PRODUCT ACTIVITY IS BROAD AND INCLUDES BACTERIA, FUNGI AND VIRUSES.

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COLLOIDAL NANOSILICA IS A SUSPENSION CONTAINING AGGREGATES OF ACTIVE SILICA PARTICLES. NUMEROUS STUDIES INDICATE EXCELLENT PROPERTIES OF STIMULATING THE GROWTH AND VITAL ACTIVITY OF PLANTS UNDER THE INFLUENCE OF NANOSILICA. THE RESEARCH CLEARLY INDICATES THAT THE SEEDS OF BROAD BEAN, HAWTHORN, TOMATO, LENTILS, PEAS, WHEAT OR RICE TREATED WITH A NANOSILICA SOLUTION (UP TO 5%) GERMINATE MORE EFFICIENTLY, FORM LONGER ROOTS AND GROW STRONGER. THEY ARE ALSO MORE RESISTANT TO SALT STRESS (RESULTING F.EX. FROM PERIODS OF DROUGHT). SPRAYING CORN FIELDS (15 kg / ha) INCREASES YIELD AND PLANT GROWTH. THE USE OF SILICA IN CROP STIMULATION IS CURRENTLY HEAVILY RESEARCHED AND BRINGS A LOT OF EVIDENCES OF EFFECTIVENESS.

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NANOCOPPER IN THE FORM OF AQUEOUS COLLOID IS USED AS A POWERFUL AGENT AGAINST BACTERIA AND FUNGI, WHICH IS CONFIRMED BY NUMEROUS SCIENTIFIC REPORTS. THE AGENT IS PERFECTLY APPLICABLE ESPECIALLY AS AN SUPPLEMENT ADDITIVE TO SILVER COLLOIDS. THE USE OF SUCH A COMBINATION (NANOSILVER WITH NANOCOPPER) REDUCES THE DEFENSE ABILITY OF MICROORGANISMS, DUE TO DIFFERENT ACTIVITIES OF THESE METALS. THIS ALLOWS TO INCREASE THE EFFECTIVENESS OF THE PRODUCTS USED WITHOUT A RADICAL CHANGE IN THE COMPOSITION OF THE PREPARATIONS.

THE WATER COLLOIDS OFFERED BY THE ITP-SYSTEM ARE CHARACTERIZED BY MUTUAL COMPATIBILITY, THANKS TO WHICH THE COLLOIDS OF SILVER, COPPER AND SILICA CAN BE COMBINED WITHOUT LOSING THEIR ACTIVITY.

AGRO WET

AGRO WET IS AN INNOVATIVE WETTING AGENT WITH AN EXTRAORDINARY DISTRIBUTION EFFECT. THE ADDITION OF A SMALL CONCENTRATION (0.1% IN THE SPRAY LIQUID) ALLOWS REDUCING THE SURFACE TENSION OF THE WATER. THE LOWER SURFACE TENSION OF THE WATER, CAUSE THE SMALLER CONTACT ANGLE BETWEEN THE SPRAY LIQUID AND THE PLANT SURFACE. THANKS TO THIS, IT IS POSSIBLE TO EFFECTIVELY, EVENLY AND ECONOMICALLY DISTRIBUTE ACTIVE SUBSTANCES EVEN IN HARD TO REACH PLACES.

THE AGRO WET PRODUCT GUARANTEES A VERY GOOD WETTING EFFECT, UNIFORM AND RAPID SPREADING OF THE SPRAY LIQUID AND ITS PENETRATION INTO PLANT CELLS. IN ADDITION, IT ENSURES THAT THE ACTIVE SUBSTANCE IS SUPPLIED TO HARD-TO-REACH PLACES, RESULTING IN GREATER PROTECTION AGAINST PESTS. THE PRODUCT IS STABLE IN FORMULATIONS AT pH = 6 - 8.

DUE TO THE LOW SURFACE TENSION AND RAPID SPREADING, AGRO WET IS PRIMARILY SUITABLE AS A CARRIER FOR FUNGICIDES, HERBICIDES, INSECTICIDES AND OTHER PLANT PROTECTION PRODUCTS. DUE TO ITS NON-IONIC NATURE, AGRO-WET CAN BE USED WITHOUT INTERFERENCE WITH OTHER COMPONENTS. AGRO WET CAN ALSO BE USED AS AN ADDITIVE TO SPRAYING, ENSURING OPTIMAL DISTRIBUTION OF THE SPRAY LIQUID, WHICH ALLOWS REDUCING THE AMOUNT OF WATER USED, UP TO 40%. THE BEST EFFECTS ARE OBTAINED IN THE pH RANGE 5 – 8 AND USING WITHIN 36 HOURS FROM THE MOMENT OF MIXING WITH THE SPRAY LIQUID.

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