

MANISI

SILICON 5.0

manica®

MANISI

WHAT IT IS

IS A FERTILISER BASED ON SILICON AND IRON

Manisi is a micronutrient-based fertilizer and biofortifier that provides silicon through foliar and root applications.

Manisi contains **colloidal silicon** (200 g of SiO_2), an active form of silicon that is readily absorbed by plants, as well as **iron** (23 g/L) and **zinc** (5 g/L). Zinc promotes **chlorophyll production, enhance photosynthesis** and improves the distribution of assimilates within the plant. The colloidal silicon in Manisi is not sensitive to the pH of the solution, since the product is already stabilized at a sub-acidic pH; therefore, there is no need to further acidify the mixture.

When Manisi is applied via drip irrigation zinc works synergistically with silicon, **promoting root development** and contributing to the **repair of damaged epigeal tissues** when used as a foliar treatment.

The **iron** complex with HDTA and DTPA allows for rapid assimilation of the micronutrient, through the roots and the leaves, quickly correcting any deficiencies and reducing losses due to photodegradation.
Finally, the colloidal form of silicon contained in Manisi, unlike other sources of silicon, ensures high compatibility with most agrochemical products. On the contrary, silicon-based formulations with a sub-alkaline pH can negatively interfere with the efficacy of insecticides and other crop protection products.

ADVANTAGES
■ **Enhances plant tolerance to biotic stress**
■ **Reduces evapotranspiration and water loss**
■ **Improves the plant's resistance and tolerance to cold**
■ **Enhances photosynthetic efficiency under low light conditions**
■ **Boosts phosphorus absorption**
■ **Mitigates the toxic effects of aluminum on root growth**

MODE OF ACTION

Once absorbed, Manisi moves **systemically** within the plant in an **apical direction** through the xylem vessels. When present at low concentrations within the vacuolar sap, it remains in solution, however, as the concentration increases or it reaches organs with higher transpiration rates, silicon precipitates in the form of silicon dioxide (SiO_2), in this specific case also referred to as a phytolith. The precipitation of **phytoliths** leads to the formation of thin films that mineralize the cell walls of individual cells or adjacent cells, resulting in the development of elongated rod-like structures between the cells. This process of phytolith deposition and subsequent cell wall mineralization leads to the formation of a **protective layer**, which forms the basis of **plant biofortification**.

THE ADVANTAGES OF BIOFORTIFICATION

Biofortification with Manisi offers three main types of advantages:
structural, protective and physiological

STRUCTURAL

- **Strengthened cell walls** are less sensitive to mechanical damage caused by wind, hail and insects
- The fruit's epicarp becomes **more flexible and stronger**, making it less prone to cracking caused by insects and sunburn

PROTECTIVE

- The silicon deposited in the cell walls forms a **natural barrier** that **reduces the susceptibility of the plants** to **pathogen attacks**, making it harder for them to penetrate and spread through the tissues.

PHYSIOLOGICAL

- Strengthened cell walls promote **more erect growth** of plant organs, especially leaves. This **improves light penetration** throughout the plant, **increasing its photosynthetic capacity**.
  This characteristic is especially important for high-density crops like rice, wheat and corn.
- The silicon deposited beneath the leaf cuticle forms a protective layer that reduces rice transpiration during drought by up to 30%, thereby **increasing the tolereance of the plants to drought as well as high and low temperatures**.

These factors result in a marked enhancement of: the yield, organoleptic quality and shelf life of the harvested products. The fruits exhibit greater durability throughout harvesting, transportation and storage stages.

INSTRUCTIONS FOR THE USE

Manisi is a product suitable for both foliar and root applications (drip-irrigation and soilless systems).

Manisi has a slightly acidic reaction, with a pH between 5 and 6, making it compatible with most common foliar fertilizers and agrochemicals without the need to acidify the solution (it is suggested to perform a small compatibility test before preparing mixtures).

FOLIAR APPLICATION

It is recommended to apply Manisi during the most critical stages of the crops (early vegetative growth, before flowering, development of fruit/tuber) to reduce the impact of abiotic stresses (drought, heat waves, and mechanical damage from wind or hail).

CROP	TIMING			DOSE RATE
Wheat and other cereals	Autumn	Winter cereal	3rd - 8th leaves	0,5
	Spring	Winter cereal	Beginning of vegetative development	
		Spring cereal	Tillering, stem elongation – up to the beginning of heading, end of flowering	
Mais	2–8 true leaves, stem growth, tassel development, ear development			
Sugar beet	Beginning of rosette development, start of inter-row cover, development of storage root			
Potato	Inter-row cover 10-20%, inter-row cover 30-50%, beginning of tuber growth, tubers at 70-80% of final weight			
Soybean and legumes	Shoot growth, floral bud development, beginning of pod and seed development			
Pome fruits	Green bud, pink/white buttons, end of flowering (advanced petal fall), between fruit set and 20-30 mm fruit development, 30-50% fruit enlargement			
Stone fruits	Inflorescence formation, fruit development, 50% fruit growth, beginning of ripening			
Citrus	New leaf development, shoot growth, white bud stage, fruit development (maximum 3 applications every 14–21 days)			
Olive	Bud break, new shoot development, floral buds start to open, fruit set, 50–80% drupe enlargement			
Grape	New shoot emergence, visible cluster stage, beginning of berry development, pre-cluster closure, ripening			
Solanaceae	Leaf development, first inflorescences emergence, beginning of flowering, beginning of fruit set, fruit development			
Cucurbits	Leaf development, lateral shoot development, floral bud formation, beginning of fruit development			

DRIP-IRRIGATION

	TIMING	DOSE RATE (ml/ha)
ON SOIL	Every 2 weeks	500
SOILLESS	Use when needed, especially at the beginning of vegetative growth	

IRRIGATION

Suggested concentration is 0.1%, equivalent to 100 ml of Manisi in 100 liters of water.
Apply to crops 2 to 4 times during the vegetative season.



TRIALS

Spinach: quality and post-harvest shelf life

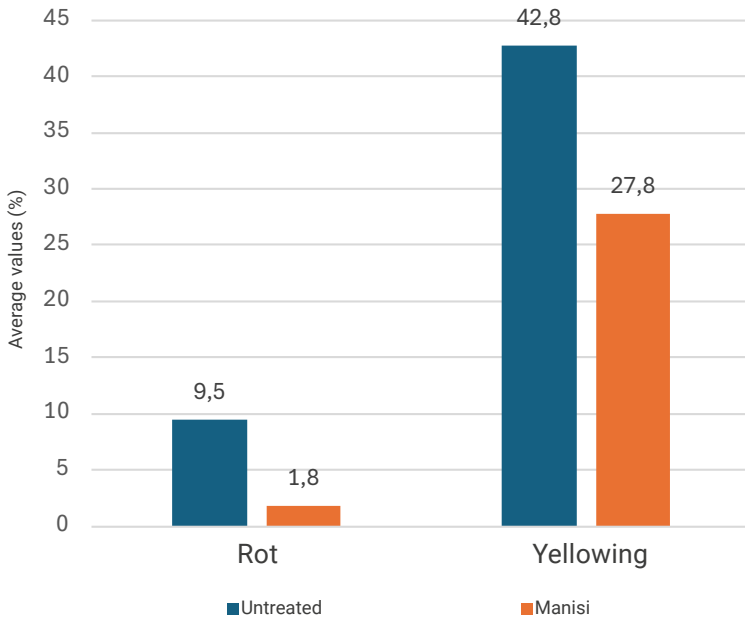
To demonstrate the contribution of the colloidal silicon of Manisi to improve the shelf life of fresh horticultural products, the trial was conducted on spinach — a crop known for its delicacy during storage. The treatment strategy involved one application of Manisi per week for six weeks. At the end of the cycle the product was harvested and stored in the laboratory at 5°C. The quality analyses were carried out at three different times: April 14, April 16, and April 18, 2025.

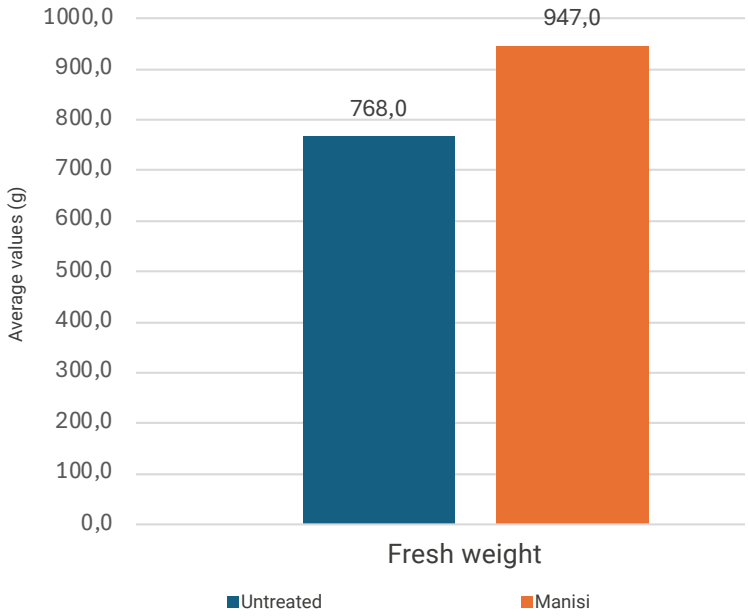
Since the first assessment (April 14), the untreated samples showed a higher percentage of rotting, yellowing and pest attacks, with an incidence almost twice as high as that of the samples treated with Manisi.

During the storage the quality difference became more pronounced: in the untreated samples, wilting and deterioration increased, while the samples treated with **Manisi** maintained a **fresh and intact appearance**. By April 18, the percentage of rot in the Manisi treatment remained low, compared to 11% in the untreated treatment.

From a quantitative point of view, the average fresh weight measurements showed a clear advantage for the Manisi thesis, with an average increase of about 200 g per sample compared to the untreated.

These results confirm that the supply of colloidal silicon through Manisi contributes not only to **improving resistance to post-harvest physiological stress**, but also to **extending shelf life and enhancing the commercial quality** of the product.





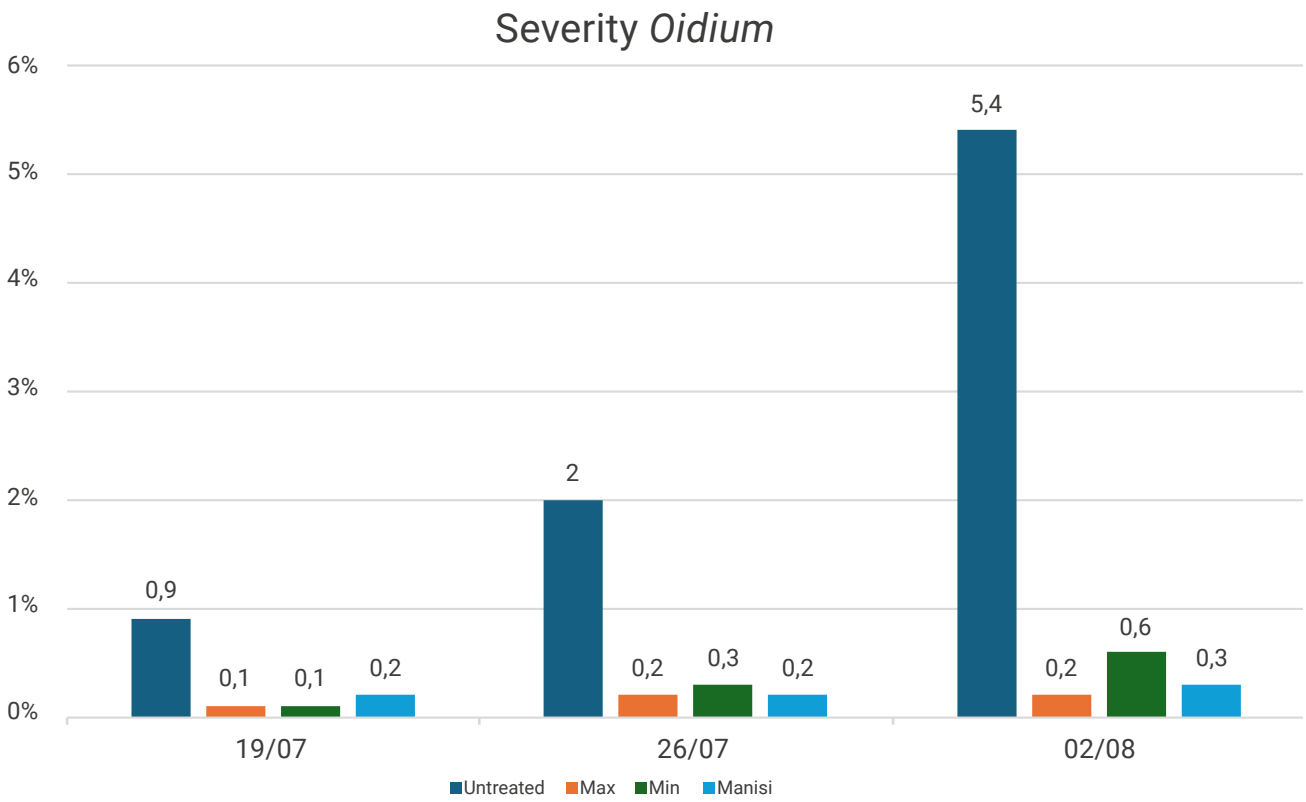
Grape: enhancing natural defense mechanisms

During the 2024 growing season, an experimental trial was conducted in Sicily on grapevines (cv. Carricante) to evaluate the efficacy of an integrated powdery mildew management strategy based on the combination of Sulphur and Manisi. The aim was to assess the effect of colloidal silicon, delivered through Manisi, in stimulating the endogenous defense mechanisms of the plants, in support of the preventive action of sulfur. To highlight the specific contribution of Manisi, Sulphur was applied at a reduced dose rate, simulating a phytopathological pressure condition not fully controlled by the fungicide.

One application per week was carried out for a total of eight consecutive weeks, starting from the end of flowering to the beginning of fruit set. In the first assessment, the standard MAX and MIN treatments showed greater efficacy, as expected. In the subsequent assessments, the Manisi treatment showed a progressive recovery, with infection levels comparable to those of the MAX treatment, indicating a possible induced effect of silicon on the activation of the plant's physiological defense mechanisms.

Thesis	Products	Dose l/ha
Untreated		
MAX	Sulphur 49.5%	3,75
MIN	Sulphur 49.5%	2
Manisi	Sulphur 49.5% Manisi	1,75 1

The results suggest that the integration of Manisi with a minimal dose of sulphur may represent a promising strategy for reducing the use of plant protection products, while still maintaining a good level of protection against powdery mildew.



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