

# KitoGreen® by KitoZyme

New elicitors and biopesticides from fungal chitosan



# About KitoZyme

- Key Facts & Figures
- Our Mission
- Facilities
- Market, Ingredients & Functions
- Unique & Patented Vegan Biopolymers



# KitoZyme : Key Facts & Figures



- Created in 2000, as a spin-off of the University of Liege
- Selling in 40 countries on five continents
- Excellence in Quality Management and Customer satisfaction
- 2 spin-out companies in the biomedical business : KiOmed Pharma & BioKuris
- 60 passionate employees in the group

# Our Mission at KitoZyme : To Contribute to a Healthier and a Greener planet



KitoZyme offers sustainable alternative vegetal ingredients to remove or reduce carbon-sourced, animal derived or toxic ingredients for Health or the environment.

# KitoZyme : Facilities

- Industrial scale production located in Herstal (Liege), Belgium
- State-of-the-art equipment for biopolymers extraction and purification
- 2 production lines
- Internal Development & Quality Control labs
- ISO 13485 & HACCP Certified





# KitoZyme : Markets, Ingredients & Functions



## WINE TREATMENT

KiOfine®  
Wine stabilization  
& fining



## CONSUMER HEALTHCARE

KiOnutrime®  
Fat binder  
& Prebiotic



## AGRICULTURE

KitoGreen® Technology  
Elicitor  
Biofungicide  
Biostimulant



## COSMETICS & PERSONAL CARE

KIOsmetine  
Film-former  
Antimicrobial  
Encapsulation polymer  
Hemostat

# Unique & patented vegan biopolymers

KitoZyme is a player of the **Circular Economy**:

Manufacturing ingredients from co-products of the food industry

We use fungal biomass as a green, non-GMO, renewable source to create two ranges of vegetal biopolymers:

**VEGETAL CHITOSAN**  
N-acetyl-D-polyglucosamine

**CHITIN – BETA(1,3) GLUCAN**



NATURAL



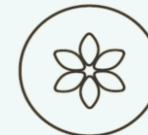
NON GMO



NON TOXIC



SUSTAINABLE



VEGAN



GLUTEN FREE

# KitoGreen® Technology

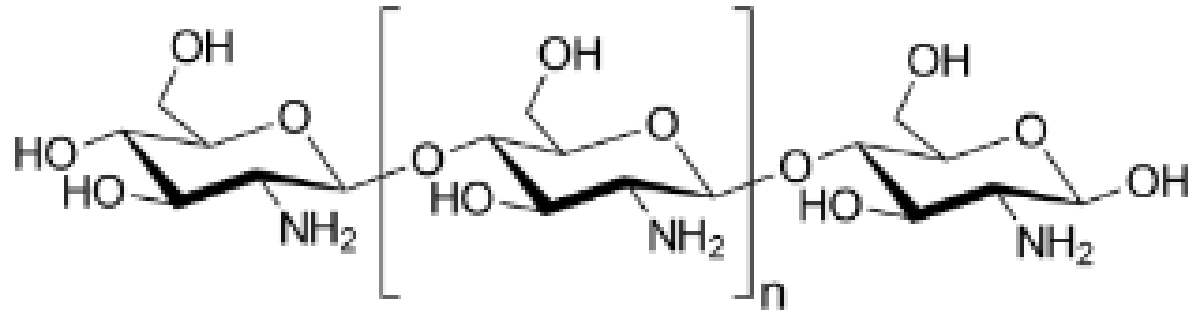
- What is KitoGreen® Technology ?
- Specification, Range & Advantages
- Applications
- Proven Multiple Effects
- Regulatory
- Results Prestetation : Biocontrol and Biostimulant





# What is KitoGreen® Technology ?

- Derived from fungal Chitin, KitoGreen® is the only industrial-scale non-animal chitosan (N-acetyl-D-polyglucosamine)



- Cationic polysaccharide
- Biodegradable, very safe for the environment, wildlife and human consumption.

# KitoGreen<sup>®</sup> : Specification

✓ Fungal Chitosan content	> 85%
✓ β-Glucans content	> 10%
✓ Degree of Deacetylation	> 80%
✓ Molecular weight	20 kDA
✓ Particle size	D 0.9< 250 microns

- Off-white to slightly brownish powder
- 100% non-animal,
- Non-GMO,
- Gluten-free
- Kosher & Hallal certified

# KitoGreen® Technology : Range of products

## KitoGreen® Master

- ✓ Powder
- ✓ Soluble in acidic solution

## KitoGreen® Direct

- ✓ In solution
  - 10% Fungal Chitosan
  - 5,3% acetic acid
  - 4,6 pH
- ✓ Ready to mix

# KitoGreen<sup>®</sup> : Advantages

- ✓ Uniquely derived from fungi
- ✓ Non-animal
- ✓ Non-GMO
- ✓ Renewable
- ✓ 100% reproduceable from batch to batch
- ✓ Safe supply chain, made in Belgium



Large spectrum  
of usage



Low molecular  
weigh



Flexible timing of  
application



Non toxicity



No PHI

# KitoGreen® : Applications

KITOGREEN® CAN BE APPLIED AT DIFFERENT TIMES, DEPENDING ON THE TARGET(S):

- ✓ Seeds Treatments
- ✓ Soil Applications
- ✓ Transplanting Seedlings
- ✓ Foliar Applications
- ✓ Near-Harvest Applications (on the harvested part just before harvesting).
- ✓ Post-Harvest Applications



# KitoGreen® : Proven Multiple Effects

OUR ENVIRONMENT-FRIENDLY **FUNGAL CHITOSAN** HAS VARIOUS BENEFITS  
AS **BIOPESTICIDE** OR **BIOSTIMULANT**

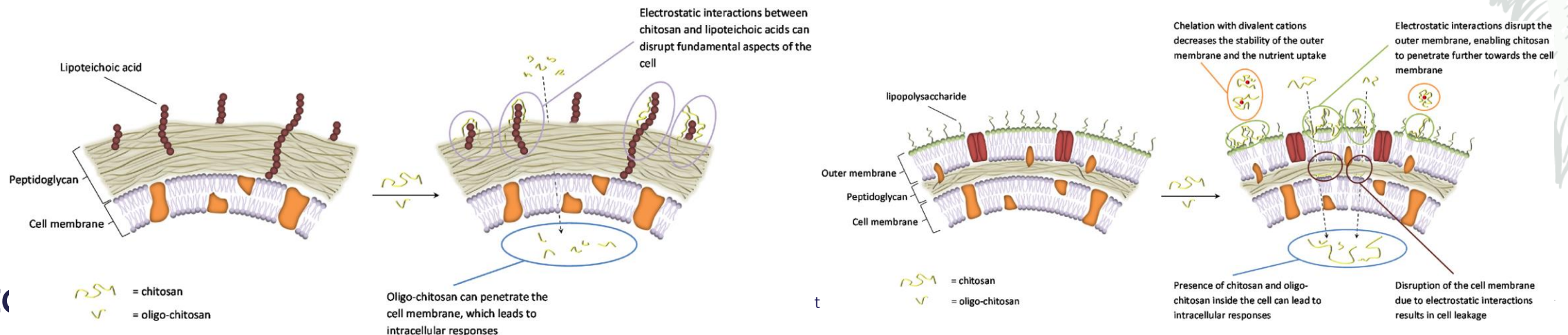
- ✓ Protects fruits & vegetables against several economic important diseases
- ✓ Enhances crop abiotic stress tolerance / Supports plants against abiotic stress and climatic factor
- ✓ Improves crop quality & fields / Elicitor of the crop's self-defense mechanisms



# KitoGreen® : Proven Multiple Effects

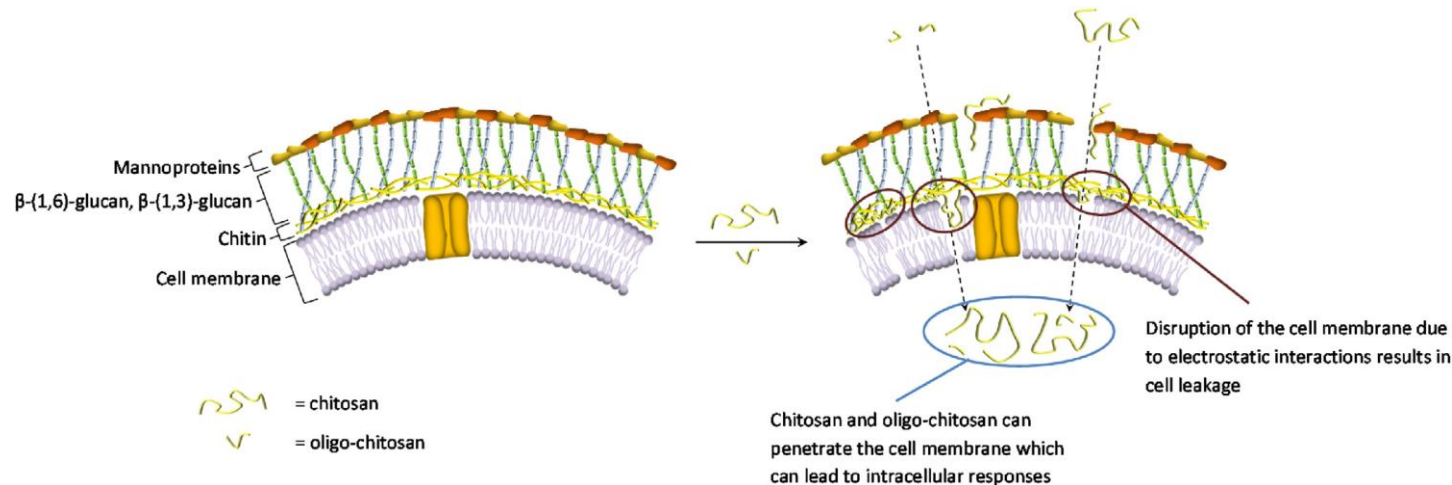
DEPENDING ON THE METHODOLOGY OF APPLICATION AND THE TARGET(S), DIFFERENT MECHANISMS OF ACTIONS WILL BE TRIGGERED BY THE KITO GREEN®:

- ✓ **Antimicrobial effects** with its direct impact on pathogens, including fungi, gram (+) and gram (-) bacteria. The mode of action will vary depends on the pathogen but we can see that chitosan penetrates the cell membrane, leading to intracellular responds. In addition to what the chitosan will also disrupts the cells membranes due to electrostatic interactions and causing cells leakage and/or a disruption of the fundamental aspects of the cells. (source: *recent developments in antibacterial and antifungal chitosan and its derivates*).



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# KitoGreen® : Proven Multiple Effects

DEPENDING ON THE METHODOLOGY OF APPLICATION AND THE TARGET(S), **DIFFERENT MECHANISMS OF ACTIONS** WILL BE TRIGGERED BY THE KITOGREEN®:

- ✓ As an **elicitor**, it will stimulate internal mechanisms of defense through different canals. It will lead the plant to be better prepared against pathogens but also to resist better to abiotic stress such as drought. In other actions, we can see a reduction on the opening of the stomates, a thickening of the cuticle or strengthening of vascular tissues.
- ✓ **Natural barrier** on the leaf or the seed (depending on the application). Thanks to the **film-forming** properties of the chitosan, it will help to physically prevent pathogens to grow but also reduce water loss.
- ✓ The positive charges will also allow the roots to **uptake nutrients** more efficiently if applied on the soil, on the roots or on seed.

# KitoGreen® : Regulatory

## European Union

Registered as a new Basic Substance → Fungal Chitosan : [https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/active-substances/?event=as.details&as\\_id=1490](https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/active-substances/?event=as.details&as_id=1490)

Registration as “plant elicitor, plant resistance against pathogenic fungi and bacteria” with two recipes : KitoGreen® Master (powder) and KitoGreen® Direct (solubilisation in vinegar)

Usages : Olive trees, Grapevine, Grass, Ornamentals plants, Post-harvest fruit treatment (peelable fruit), Fruits berries and small fruit, Vegetables, Cereals, Spices, Crops for animal feed, Cereals - Seed treatment and Sugar beet - Seed treatment.

# KitoGreen® : Regulatory

## USA - EPA

Since March 2022, KitoGreen is EPA approved :

[https://www3.epa.gov/pesticides/chem\\_search/ppls/099270-00001-20220307.pdf](https://www3.epa.gov/pesticides/chem_search/ppls/099270-00001-20220307.pdf).

Since October 2022, Chitosan (Including Chitosan Salts) has been added to the List of Active Ingredients Permitted in Exempted Minimum Risk Pesticide Products :

<https://www.regulations.gov/document/EPA-HQ-OPP-2019-0701-0025>

Note : KitoGreen is GRAS (Generally Recognize As Safe)



# Interested to partner with us?

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