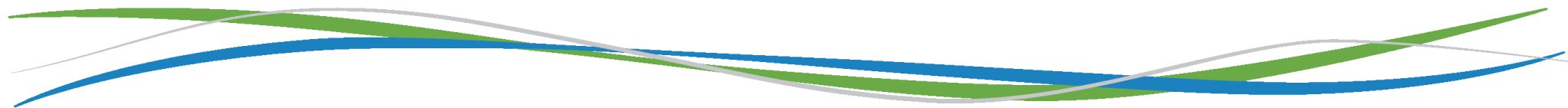


BioAg World

CONGRESS

AN EVENT BY THE INDUSTRY, FOR THE INDUSTRY



Soil Health Dilemma and Opportunities: Defining the Road map

Panel Chair: Giuseppe Natale, CEO and Founder, Valagro

Panelists: Kate Schaffner, Global Sustainability Manager, Kellogg's

Dan Stahl, Head of Biologics, AMVAC/Agrinos

Alan Boyce, Executive Chairman, Materra Farming Company

Francisco Manzano, Senior Vice President, Kimatec

Soil Health: The Field Perspective

Dan Stahl
Head of Biologics
AMVAC/Agrinos



- Joined AMVAC in October 2017
- Responsible for AMVAC Biologics and OHP, a leading supplier to the Greenhouse & Nursery marketplace
- Support the integration of Biologic technologies and creation of the AMVAC Global Biologics network

Focus on Soil Health Farmer Incentive

- Economic
- Stewardship
- Passion



Companies seek to increase sustainability

Microsoft, ADM, Corteva Agriscience, Bayer among companies announcing sustainability plans; lawmakers introduce Growing Climate Solutions Act.

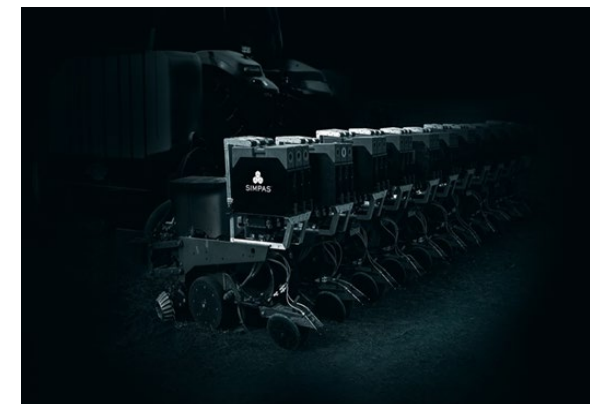
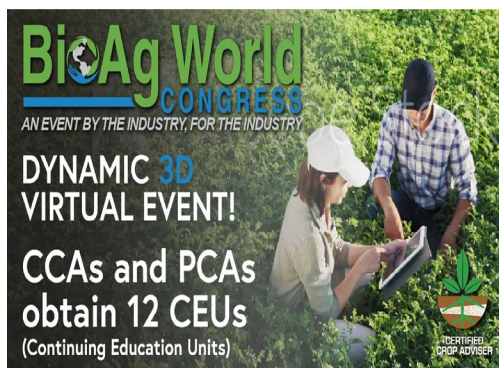
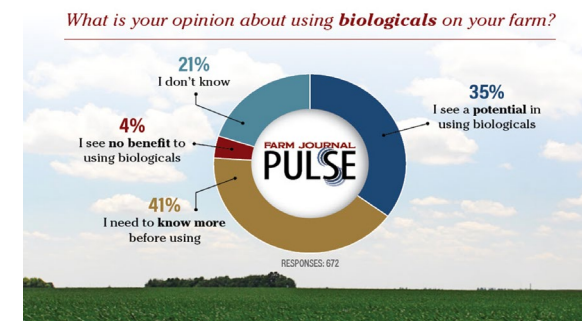




Focus on Soil Health Tools



- Products
- Programs
- Training/Education
- Hardware & Software Technology



Focus on Soil Health The Future

1

Biologicals

Leading Products and Pipeline

2

Precision Agriculture

Increase Crop Yields and Profitability

3

Traditional Chemistry

Emerging Discoveries & Pipeline

4

Operational Services

Trusted Partner & Supplier



Working with Nature

Alan Boyce
Executive Chairman
Matterra Farming Company





Soil – A living carbon sink

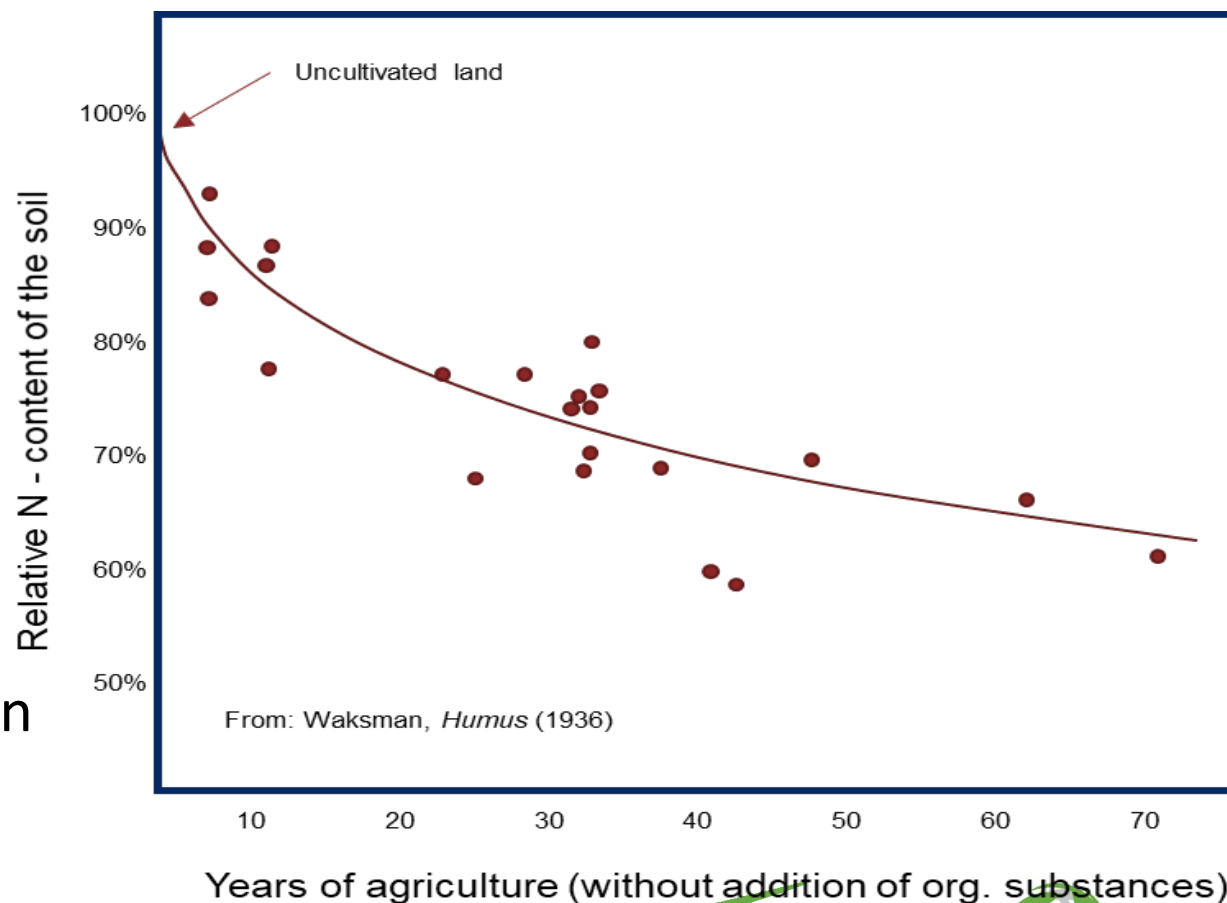
- World: 4+ billion hectares of cropland and pastures
- Organic Matter: 1-6%; 50% is carbon
- 1 gram of soil: 10 billion micro-organisms
- Roots: 30% of aerial biomass
- Cultivation destroys the carbon and then entire soil biome





No Till – Promoting soil health

- Enhancing:
 - Organic matter content
 - Water infiltration capacity
 - Carbon sequestration
- Reducing:
 - Erosion risks (wind, rains)
 - Use of agrochemicals
 - Use of diesel
 - Reverse damage from cultivation





Cover crops – Adding carbon

- Boosting organic matter build-up
- Helping with pest control
- Improving water infiltration
- Multispecies preferred
- Commercial species (pennycress, Brassica carinata)
- No open fields fills the vacuum





Innovation – Novihum Humus

- Humus effect is 10 times higher than manure
- Free from odors, pathogens, pollutants, salts and nitrate
- Patented manufacturing process
- Raw materials: lignite, ammonia, oxygen
- Improves fertilizer and water use efficiency of the crop





Roadmap – Working with Nature

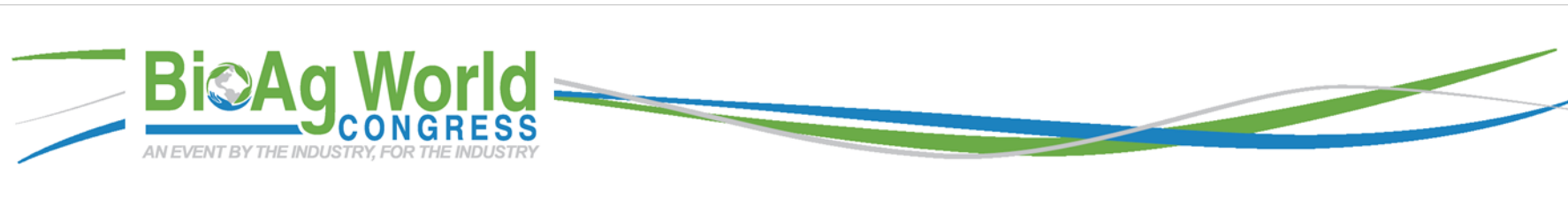
- Imitate natural ecosystems
- Keep something growing all year-around
- Increase diversity of crops
- Replace agrochemicals with bio-based products
- Promote carbon sequestration
- Mother Nature is your friend



SOIL HEALT DILEMMA & OPPORTUNITIES: DEFINING THE ROADMAP

Francisco Manzano

Senior Vice President
Kimatec





**FRANCISCO
MANZANO**

Senior Vice President, Kimatec

fmanzano@kimatec.com

(952) 303-2515

- 15+ years working with conventional and natural solutions
- Focused on forging global alliances with other technology providers and marketers, large growers, and retail (CPG) partners
- Responsible for Kimatec's entry in the USA

The Agrobiotic Movement



Traditional farming Years | 1960

World population | 3 billion
Production System Outcomes

Negative

Lower yields.
High pest pressure.

Positive

Greater flavor and aroma (organoleptic properties).
Rich, health soils.
No residue.



Industrial farming Years | 1960 – Recently

World population | 5,2 billion
Production System Outcomes

Negative

Less flavor / aroma.
Residues issues in food.
Eroded Soil, Environmental issues (i.e., leaching).

Positive

Increase in yield.



The Agrobiotic Movement is NOW!

World population | +7.5 billion
Production System Outcomes

Negative

Farmer adoption is challenging.

Positive

Heathy, suppressive soils.
Maintains or improves productivity.
Greater flavor and aroma (organoleptic properties) and chemopreventive action.
Zero or low residues.
Rational management of water and fertilizers.
Environmental restoring effect.

Agrobiotic Movement



M. Agrobiótico

Pre & Probiotics – A Tool For ISHM

Probiotics

1. Interspecific bacterial consortia.
2. Simulation of positive crop-specific core microbiome.
3. Phyllosphere Inoculants.
4. Obligated Symbionts.

Prebiotics

1. Core microbiome promoters.



KEY AREAS OF INTEREST

1. Increase production.
2. Improve vegetative growth.
3. Increase fruit size.
4. Increase soluble solids.
5. Increase mineral content.
6. Increase of fruit antioxidants.
7. Improve fruits' chemopreventive potential.

YIELD

QUALITY

HEALTH

Probiotic Treatments Increased Yield



On average: + 3.5 T/ha
On average: ROI 12

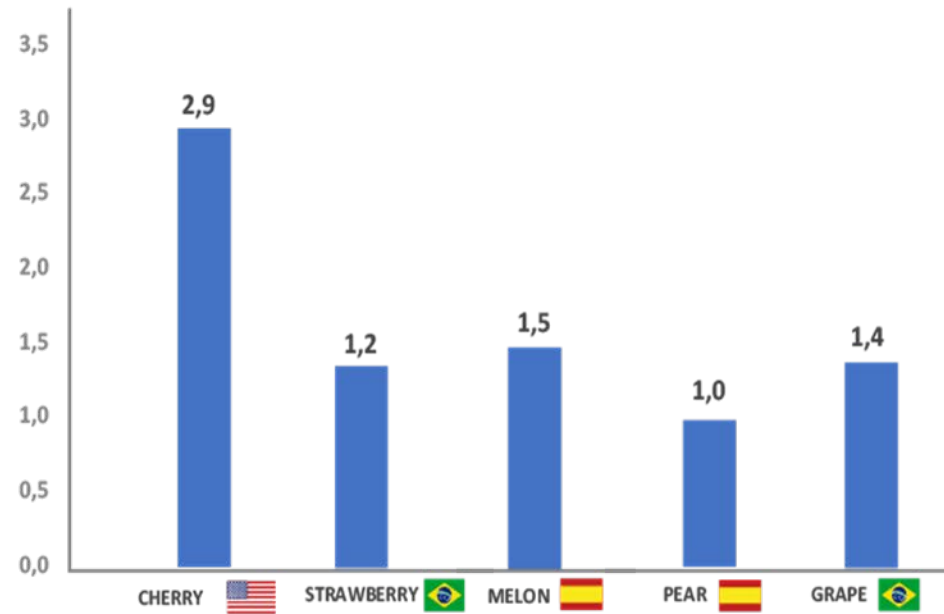


On average: + 18 T/ha
On average: ROI 7.5



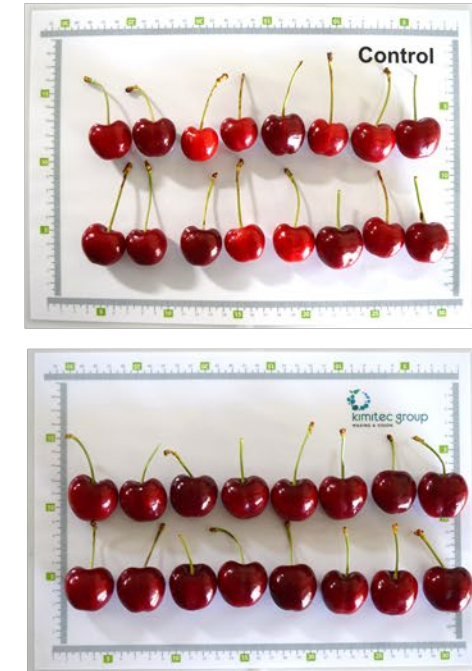
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Probiotic Treatments Increased Quality



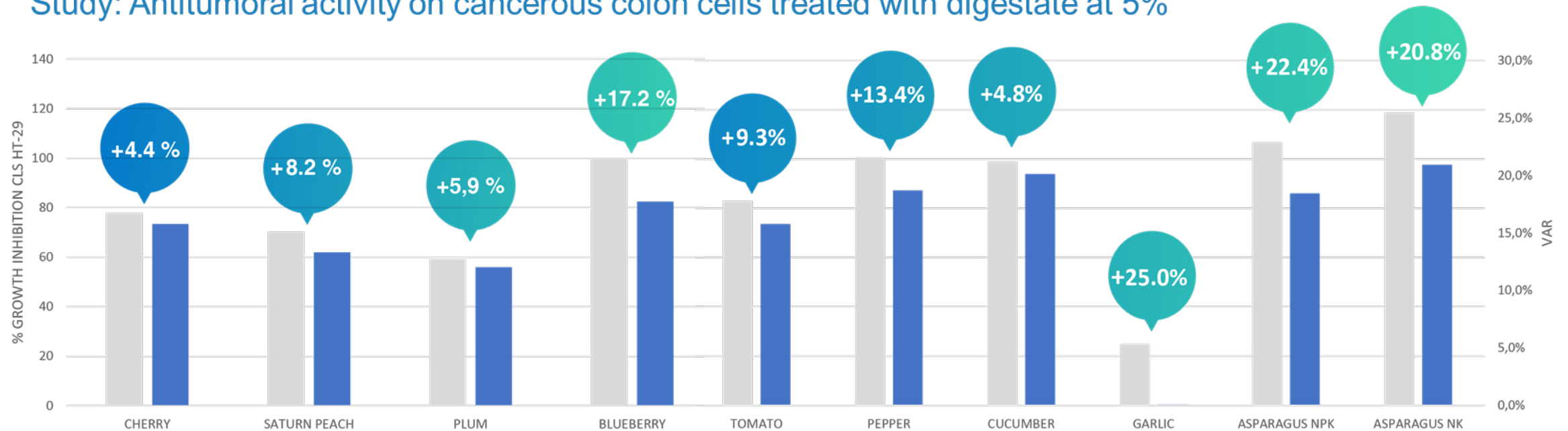
Increased fruit diameter

[Cherry, Spain, 2018]



Probiotic Treatments Suggested Improved Health Benefits

Study: Antitumoral activity on cancerous colon cells treated with digestate at 5%



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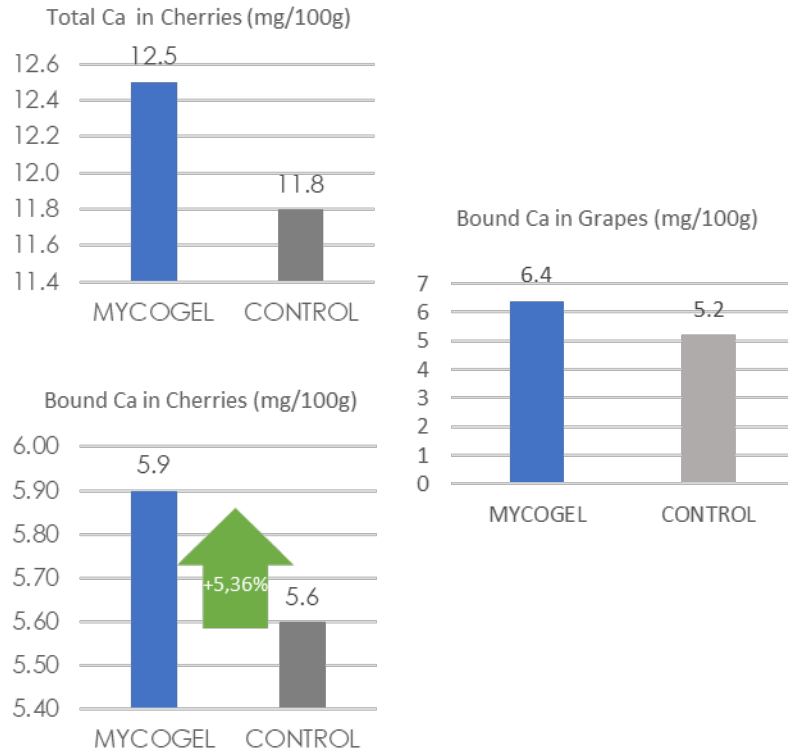
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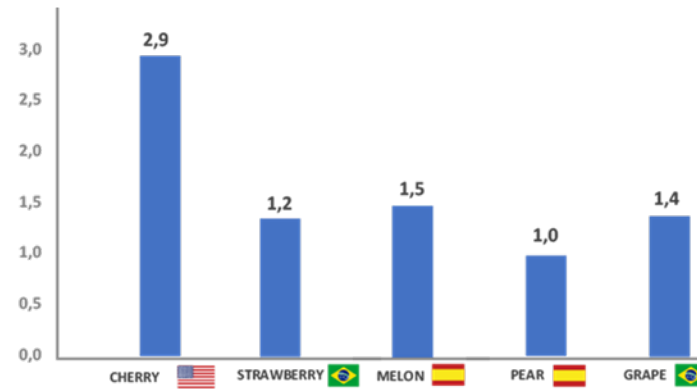
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Probiotic Treatments Increased Quality

Calcium Content in Fruit

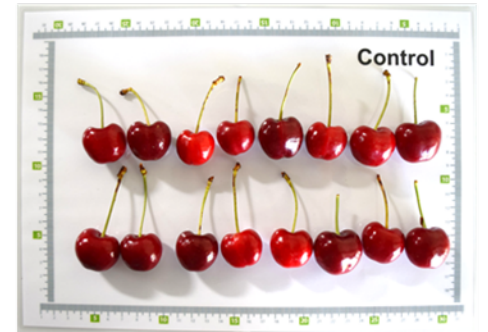


Brix Degrees

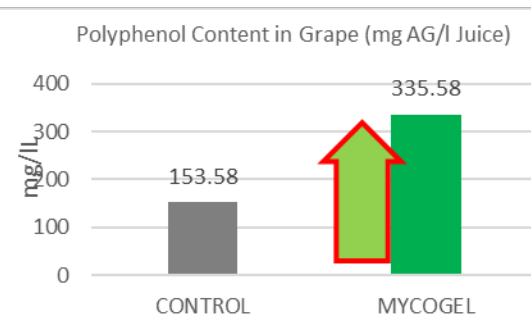


Fruit Caliber

[Cherry, Spain, 2018]

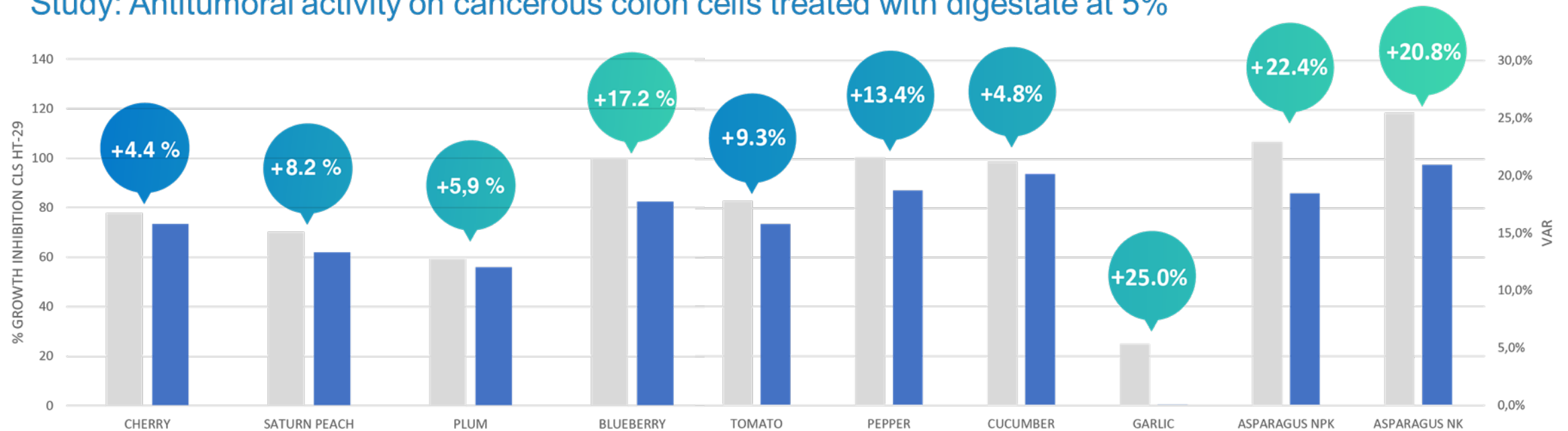


Polyphenol Content



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