



Listen to the genes

Peter Balk, CTO
Alphen aan de Rijn, 12th of July 2017

About NSure

- Established in 2006
- Spin-off from Wageningen University
- Privately owned by investors and senior management
- Strong team of molecular scientists and sales professionals
- Optimize production/reduce waste for arable crops, vegetables, fruits, ornamentals and conifers
- Mode of action/Optimize effectivity of Biostimulants and chemical agents
- Easy methods



The future of horticulture



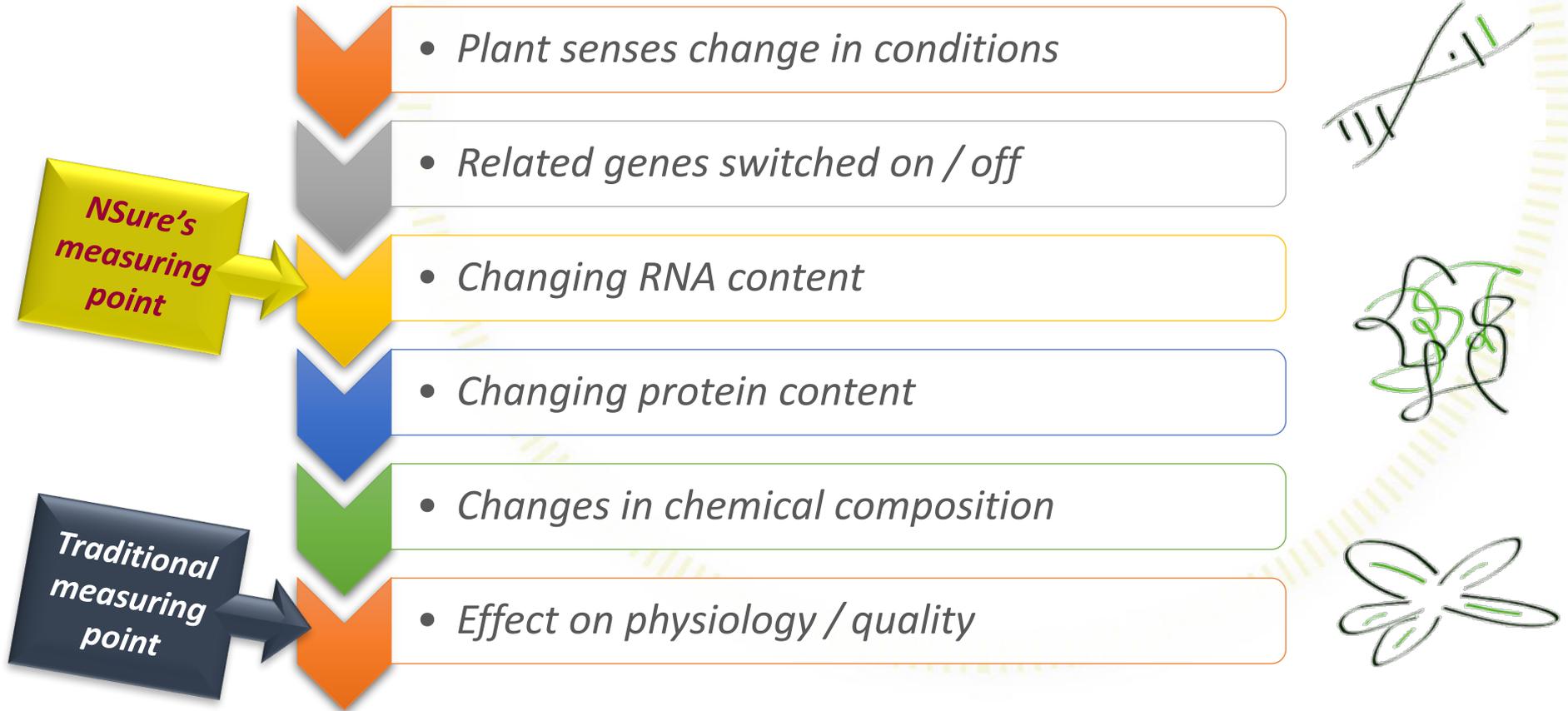
Take control

Know when to take action

and at the earliest stage!

Nsure's technology

Focus on gene activity analysis



NSure's focus area's

1. Physiological switches

Defining and understanding important tipping points in plant development (e.g. cold tolerance, bud break, ripening)



2. Early Warning

Limiting damage during cultivation or storage through the early detection of plant responses to pathogens or stresses (carrot, tomato, strawberry)



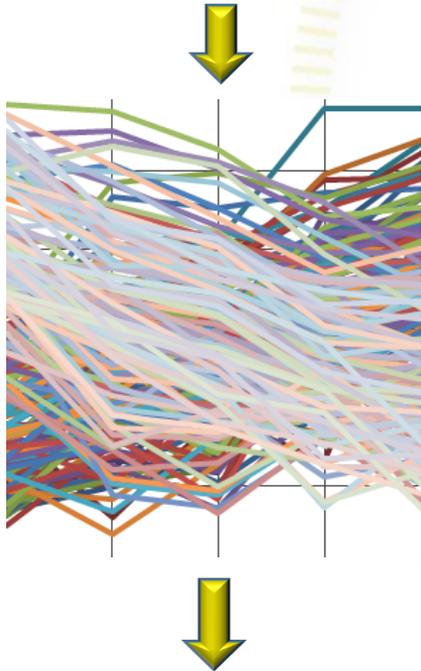
3. BioResponse - Response to treatments

Evidence and understanding the effects of crop agents and biostimulants, and optimize their usage (kiwifruit, grape, cherry, soybean, tomato, apple)



NSure's approach

Analyse and compare
the activity of all genes



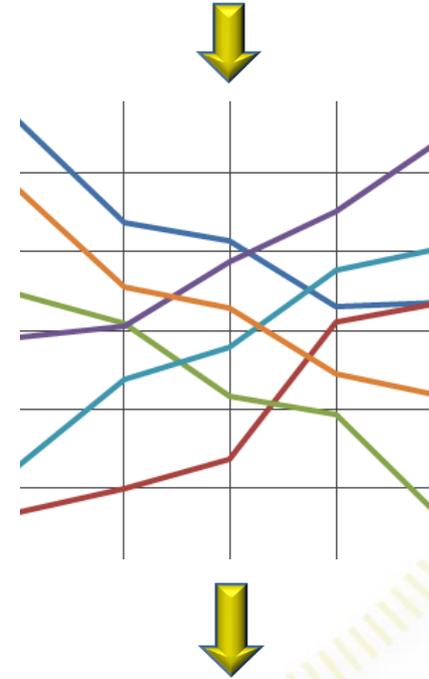
Mode of action



*Reveal
correlations,
identify relevant
genes*



Analyse the activity
of individual genes



Use individual marker genes for:

- Monitoring treatments
- Determine effectiveness
- Test development

Applications of NSure technology

Tailormade tests
(development and analysis)

R&D services
(mode of action studies)



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One of our first tests (2007)



Certainty on seedling frost tolerance

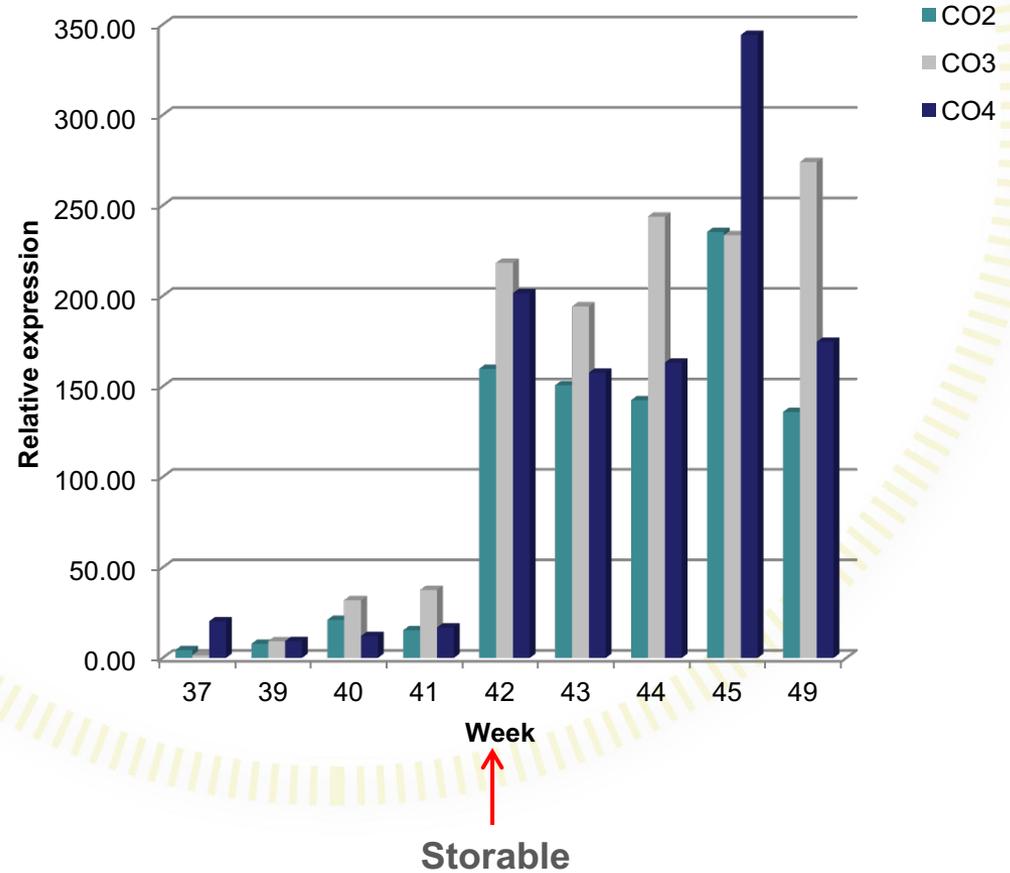
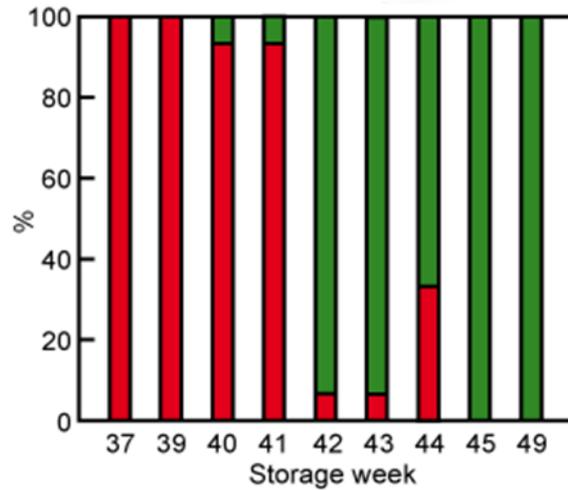
ColdNSure

for forestry
nurseries



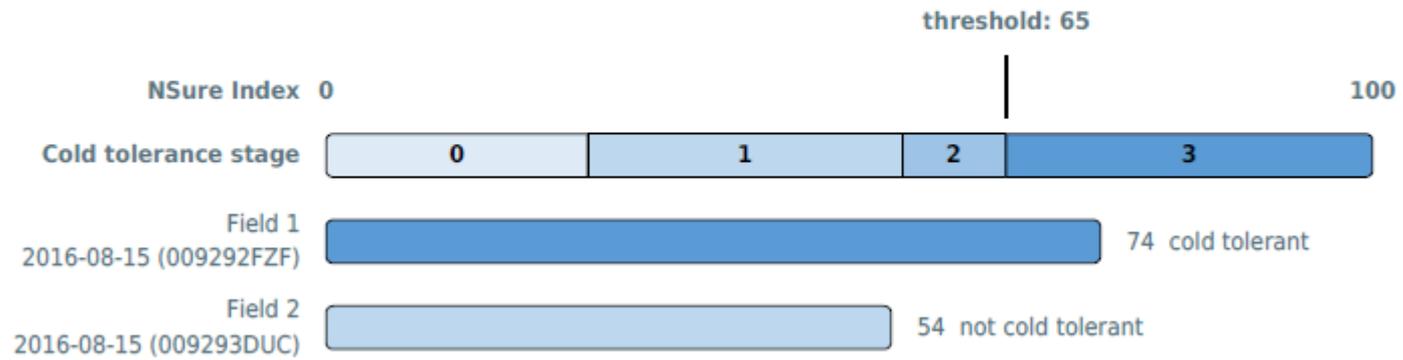
Visit our website: www.nsure.eu

ColdNSure – Determines cold tolerance for storage planning



ColdNSure – Result report

Concerns ColdNsure Picea abies
Report date 2016-08-22

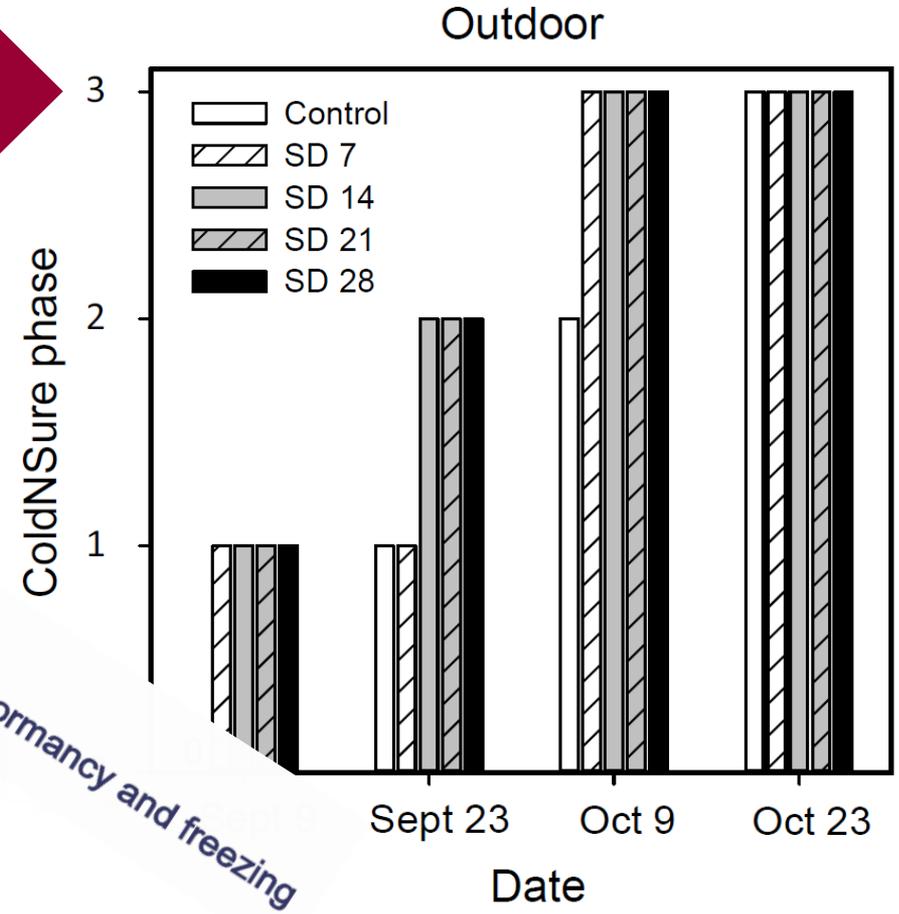
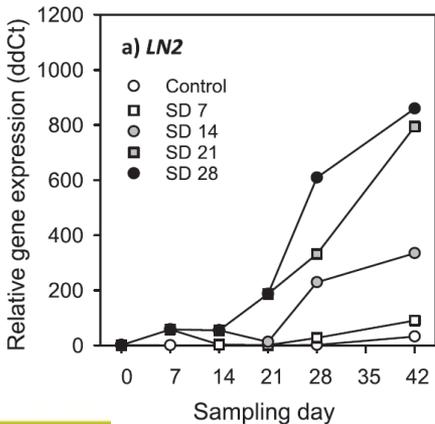


Tools related to long night treatment (induce frost tolerance and dormancy)

Stage of full tolerance reached earlier

Short-day photoperiods affect expression of genes related to dormancy and freezing

Annals of Forest Science
tolerance in Norway spruce seedlings



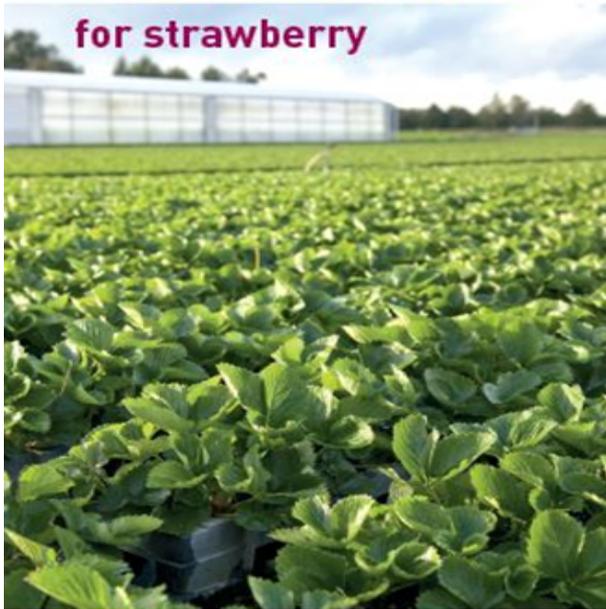
Related test – Optimal moment for long term storage of runner plants



Be certain of the optimal lifting moment for your trayplants

StoreNSure

for strawberry



Visit our website: www.nsure.eu



Related tests – Optimal moment for cold storage

Be certain of the quality of your flower buds

BloomNSure

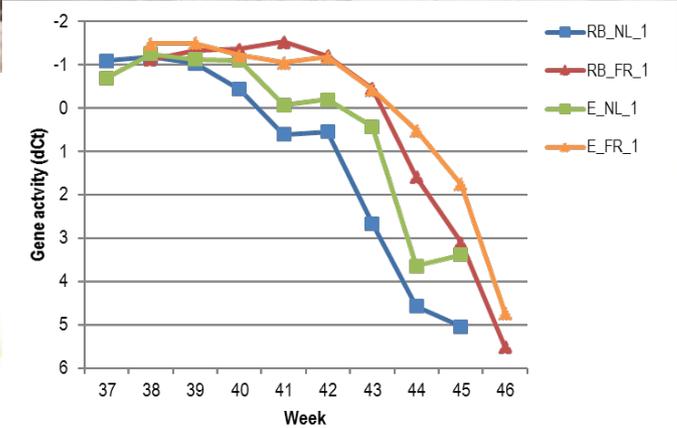
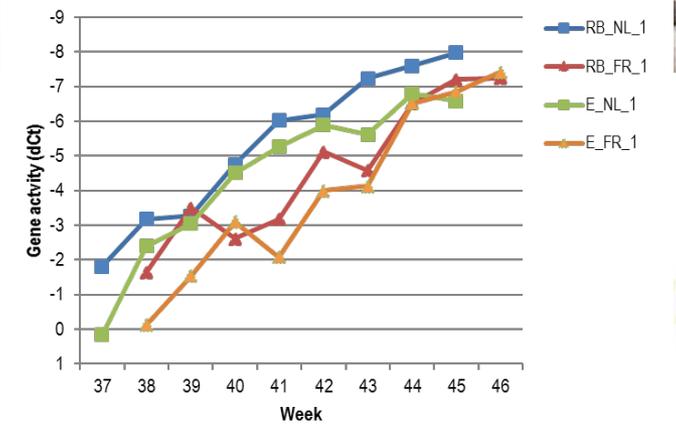
for Hydrangea



Visit our website: www.nsure.eu



Related tests – BloomNSure Hydrangea



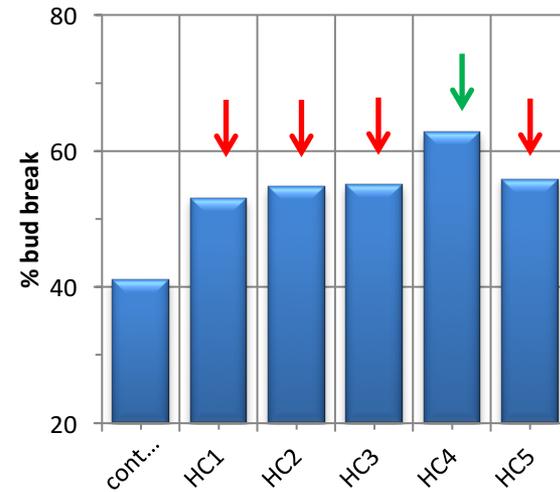
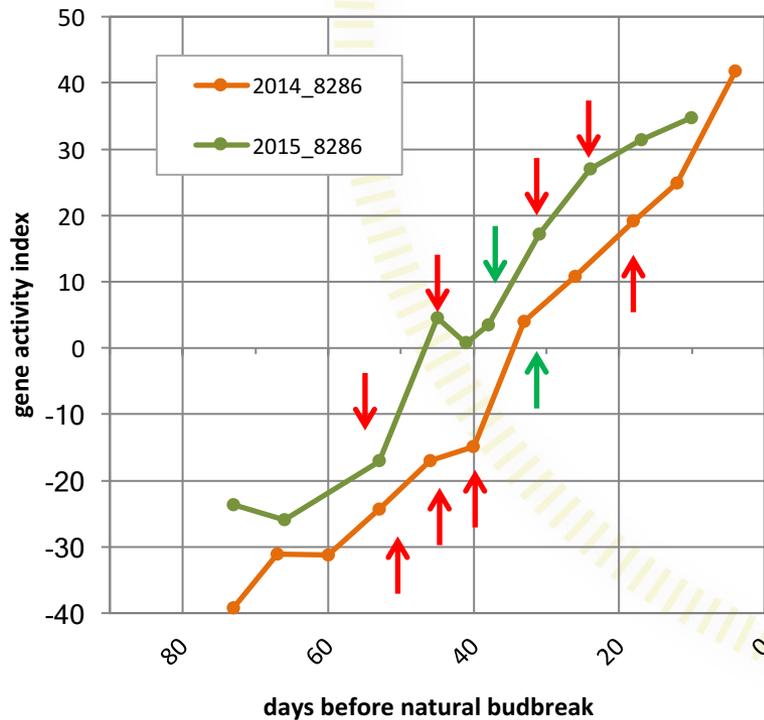
BreakNSure for kiwifruit

- The effect of bud break enhancers depends on moment of application.
- Monitor the physiological status of kiwifruit buds in order to determine the optimal moment of application.

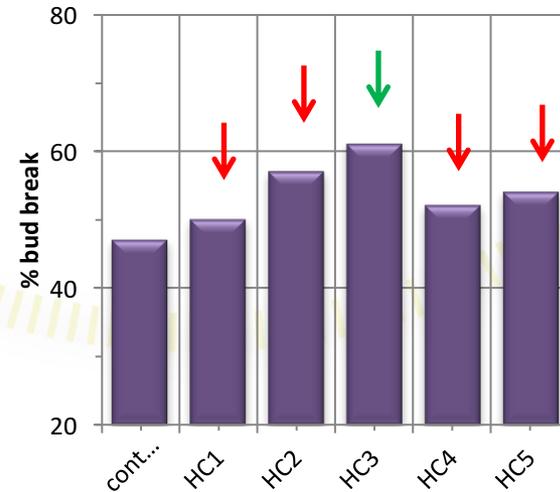


BreakNSure kiwifruit

Gene activity tells you when to apply



2014

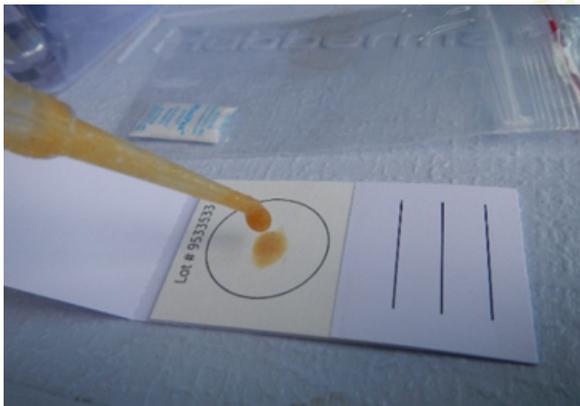


2015

BreakNSure kiwifruit in practice



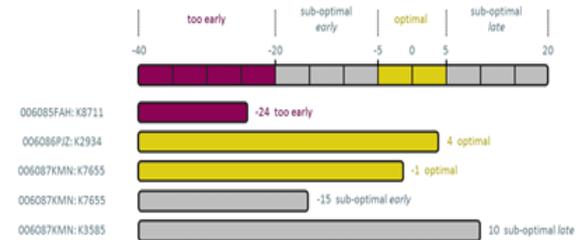
↓ easy sampling



from juice to advice



↑ secure optimal yield



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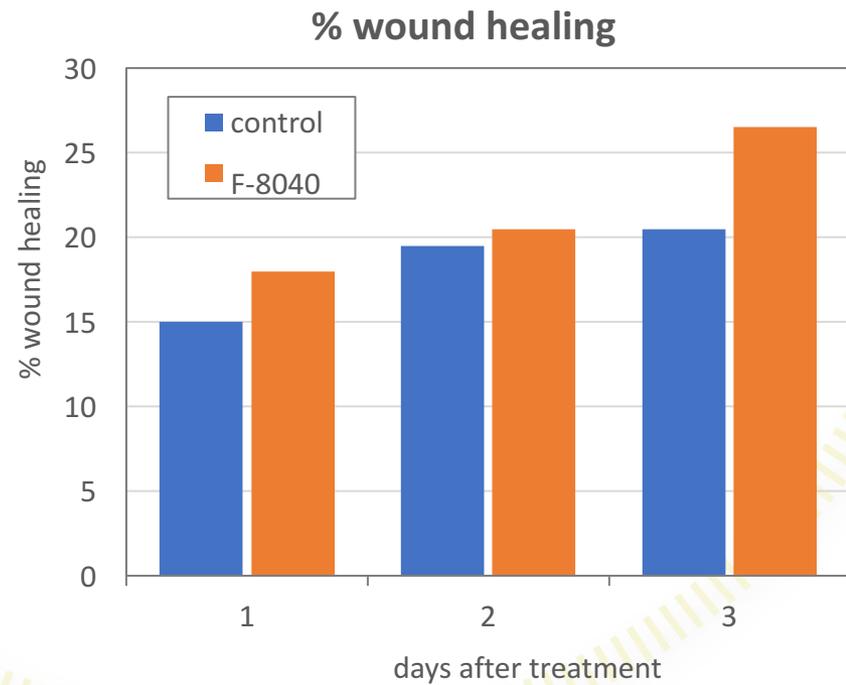


Mode of action of a biostimulant

- De-leafing in tomato is common practice
 - Speed up harvesting, improve airflow, remove diseased foliage
 - Loss of water, risk of infections
- Compound F-8040 is used to promote scar tissue formation in e.g. tomato (de-leafing) and zucchini (harvest).



F-8040 promotes scar tissue formation in tomato



RNA-seq sampling setup



**Untreated
control**



**Treated with
F-8040**

Sample	Treatment
1	control
2	control
3	control
4	F-8040
5	F-8040
6	F-8040

Differential gene expression: control vs. F-8040

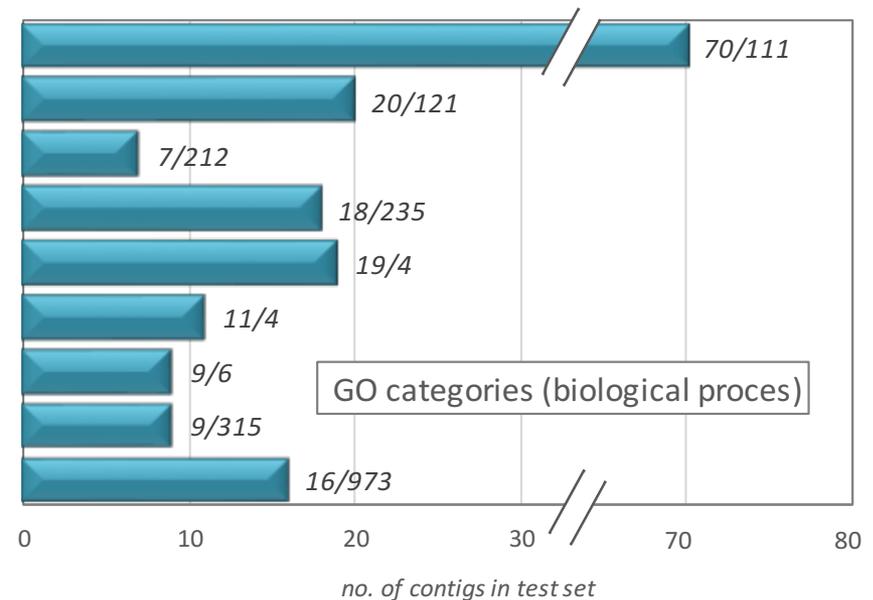
- Number of differential genes 6 hours after treatment:

	FC > 2	FC > 3	FC > 4	FC > 8	FC > 10
<i>up</i>	528	291	186	81	62
<i>down</i>	208	68	29	7	5
<i>total</i>	736	359	215	88	67

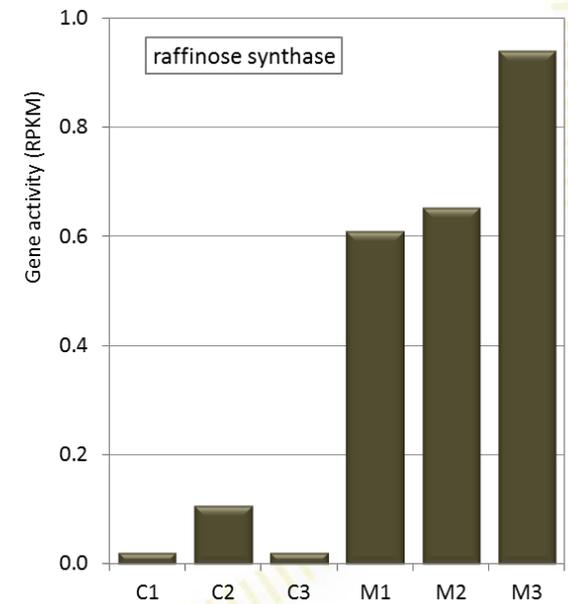
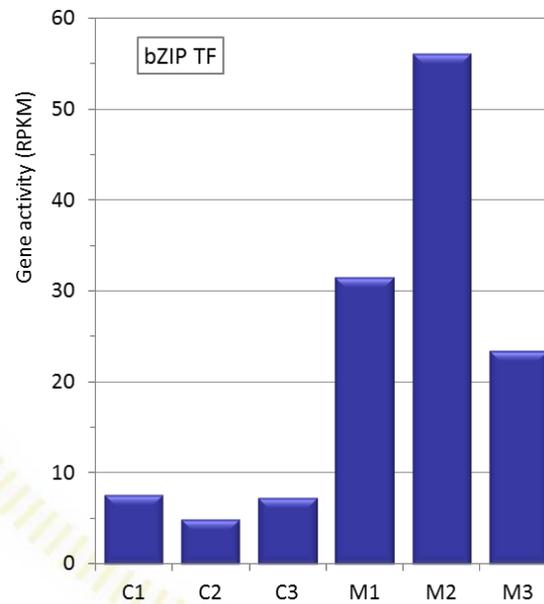
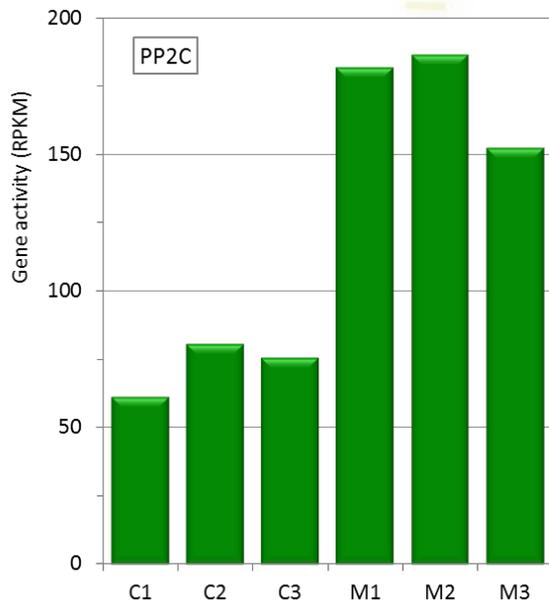
Functional analysis of regulated genes

- Statistical test to determine whether specific GO terms (biological processes) are significantly overrepresented

GO-id	Term	FDR
GO:0042221	response to chemical	3.4E-04
GO:0009414	response to water deprivation	3.4E-04
GO:0010029	regulation of seed germination	2.4E-02
GO:0009409	response to cold	2.4E-02
GO:0009737	response to abscisic acid	2.6E-02
GO:0006066	alcohol metabolic process	2.9E-02
GO:0006310	DNA recombination	2.9E-02
GO:0046395	carboxylic acid catabolic process	3.1E-02
GO:0007049	cell cycle	4.9E-02



Genes involved in ABA responses

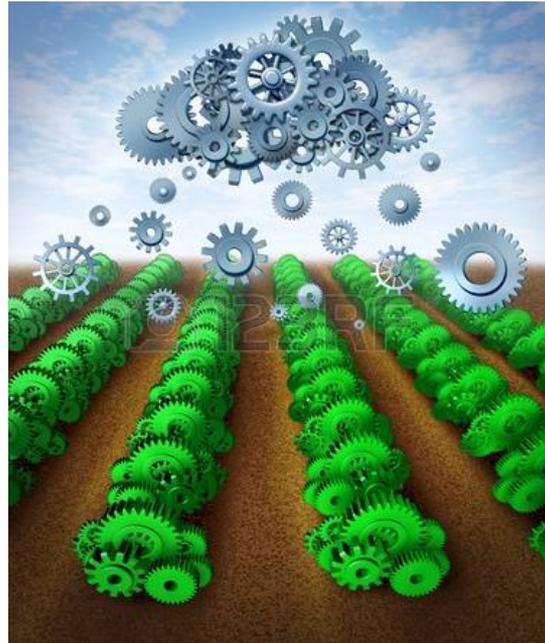


Conclusions mode of action F-8040

- F-8040 induces ABA-mediated responses.
- ABA mediates the formation of a suberized stem scar tissue in tomato fruits (Leide *et al.* 2012).



The future of agriculture



Take control for a sustainable future

- Know when to act → Optimal yield/Good quality
- Know what you are doing → Proven/Optimal effect of a treatment

Join our mission

Contact us:

- Give us a call **+31.317.466666**
- Send us an email **info@nsure.nl**
- Visit us in Wageningen or at **www.nsure.eu**

Thank you for your attention