

Tomato grafting

Young Plant Business Trends

Presentations

January 28-29

Almería 2015



The background image shows a close-up of a person's hand holding a small tomato seedling. The seedling has a distinct graft union where the stem meets the root system. The roots are visible through the transparent substrate. The background is a blurred view of a greenhouse with rows of plants.

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Syngenta solutions in production technology

Massimo Enzo

Syngenta | Tomato Grafting – Young Plant Business Trends
Almería, 28 January, 2015

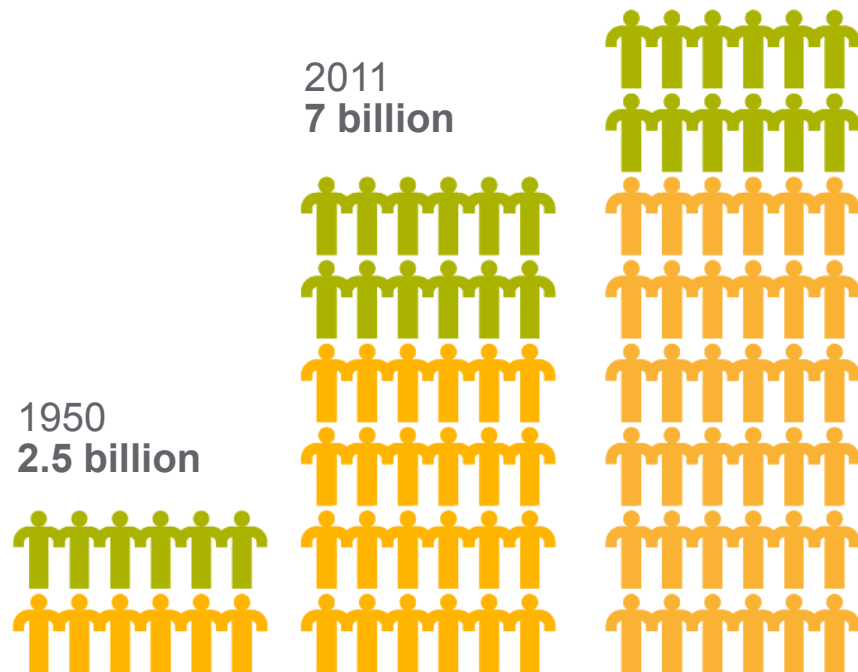
Demand for food is driven by population growth and rising calorie consumption

World population

> 80% of growth is in emerging markets

↑ Developed
↑ Emerging

2050
9 billion

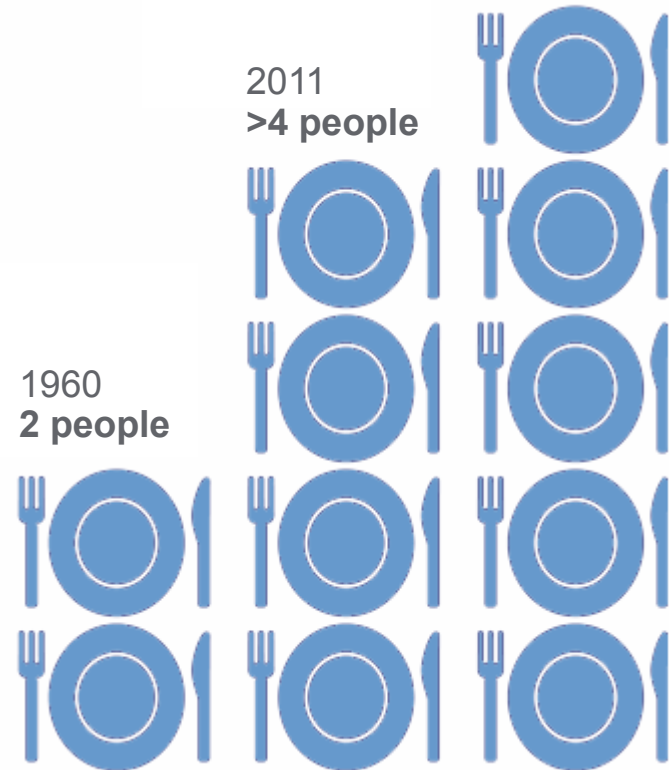


People fed per hectare

2050
>6 people

2011
>4 people

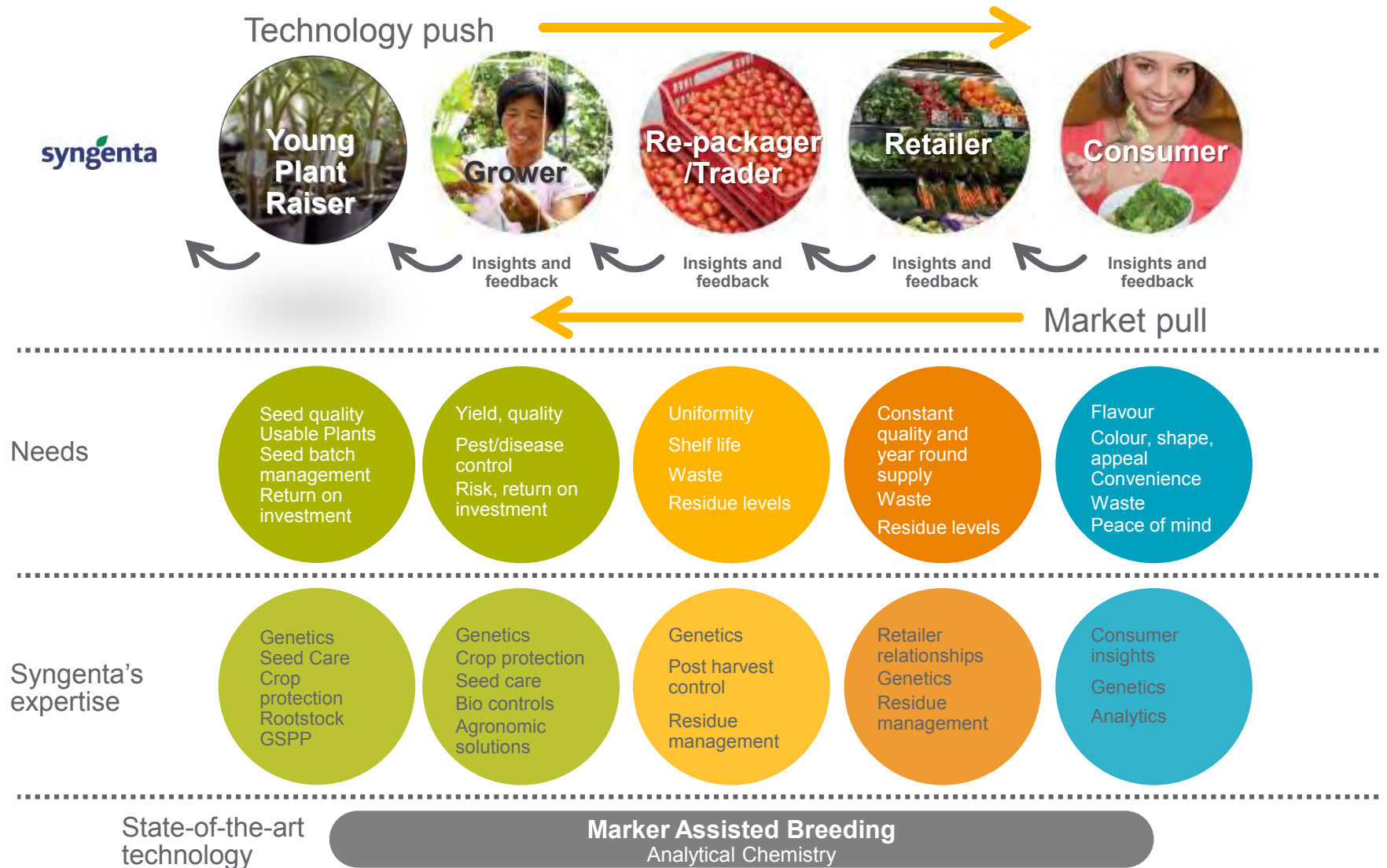
1960
2 people



Source: FAO, Syngenta analysis

Different needs in the value chain require specific servicing

A variety of needs, addressed by our expertise



Vegetables: diverse growing systems and challenges

Developed
value chain

Large farms, intensive open field

Examples: USA, Australia, Brazil



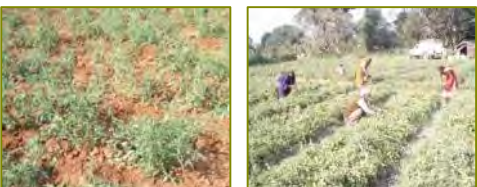
Characteristics

- Organized retail
- Moderate to high input, output
- Moving to protected production

Emerging
value chain

Smallholder, extensive open field

Examples: India, China, ASEAN, Africa



Characteristics

- Non-organized retail
- Low input, output
- Intensification

Highly intensive, protected production

Examples: Spain, Israel, Mexico, Netherlands, Canada, China protected



Characteristics

- Organized retail, high demands
- High input, output
- Fast growth, esp. passive protected

Open field

Passive protected

Active protected

Integrated solutions can address the multiple challenges faced by vegetable growers

Crop establishment



- Leading seed treatment portfolio
- Biotic and Abiotic stress management through rootstock

Integrated crop management



- Integrated solutions for sustainable pest and disease management

Value added produce



- Molecular breeding platform for produce with food chain benefits

Smallholder intensification



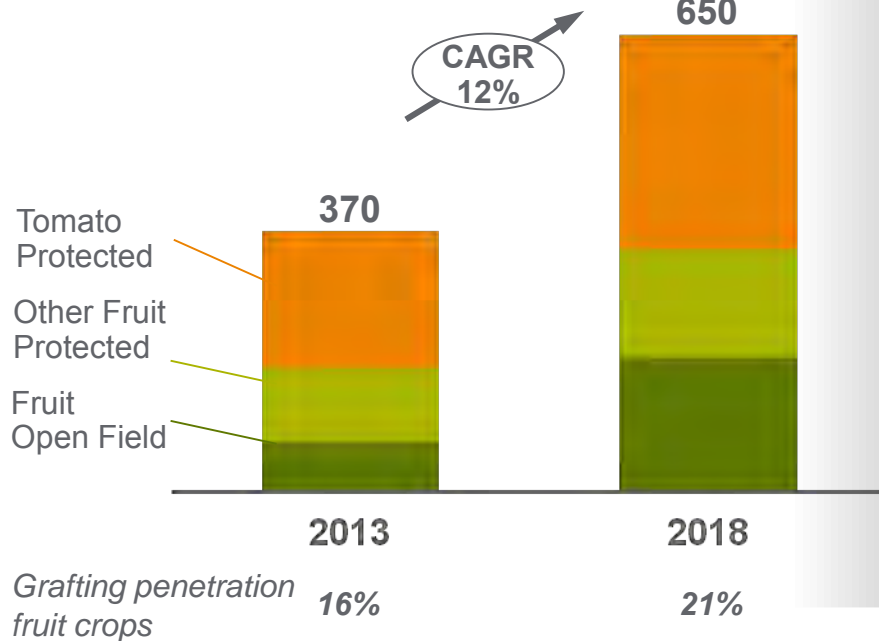
- Supporting smallholders in emerging markets to intensify vegetable production

Grafting: fast-growing innovation in high value vegetables meeting value chain needs

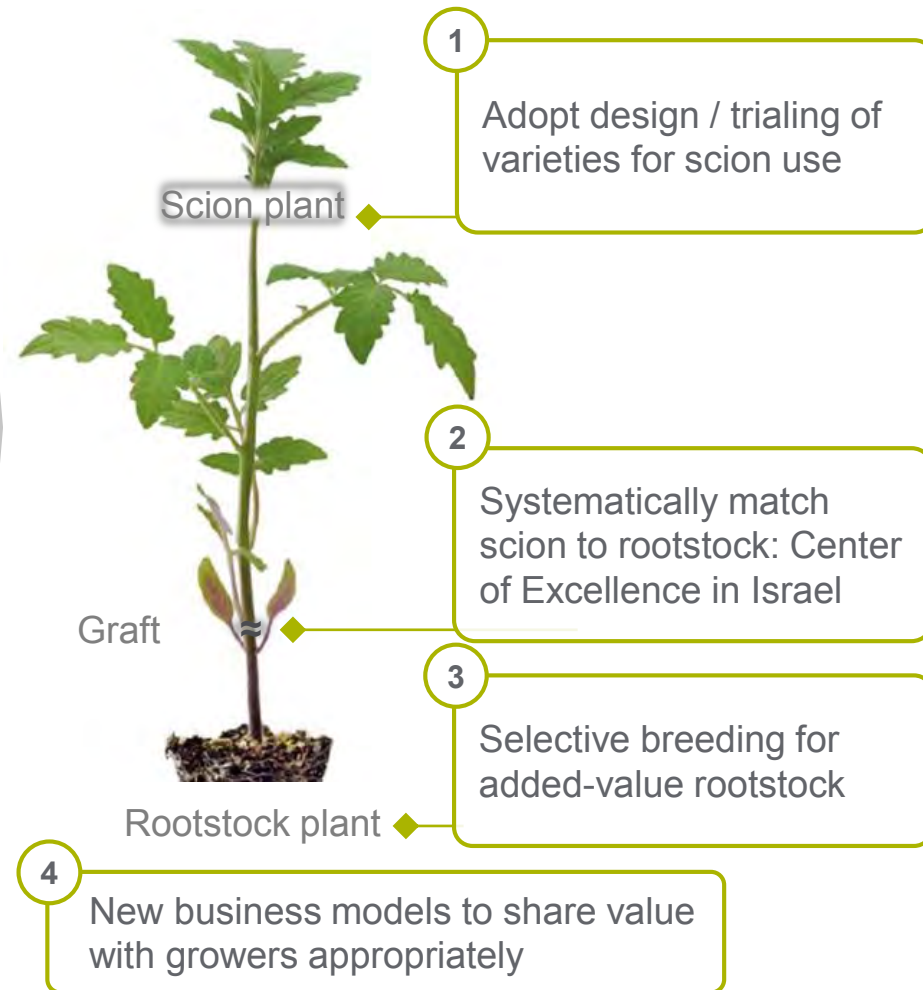
Benefits driving fast adoption

- Higher tolerance to Abiotic Stresses
- Higher resistance to soil-borne diseases
- Extension of crop cycle
- Higher marketable yield
- Faster than traditional breeding

Global Grafted market (seeds value) \$m*



Syngenta's focus in R&D strategy



Source: Syngenta estimates



TOMATO ROOTSTOCK GRAFTING

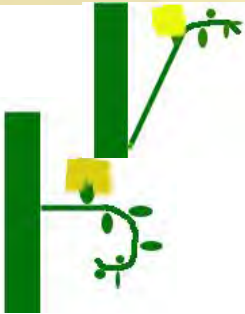
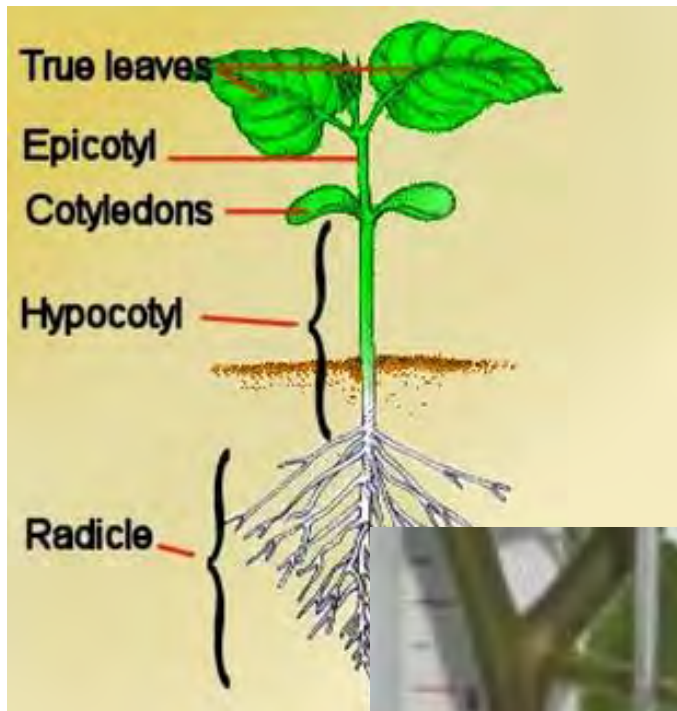
Abiotic stress management for long-cycle crops,
in unheated greenhouses.

Structure of the presentation



- Vocabulary
- Optimized crop techniques towards 2020
- Managing abiotic stress with grafted plants
- The adapted kind of grafting

Vocabulary



- **Epicotyl:** stem above cotyledons
- **Hypocotyl:** stem under cotyledons
- **Cotyledons:** reserve tissue
- **Rootstock:** root bearing variety
- **Scion:** fruit bearing variety
- **Passive greenhouse:** unheated
- **Xylem:** tube in the plant transporting minerals and water upwards
- **Phloem:** tube in the plant transporting sugar and water downwards
- **Vigour:** large stem diameter with blue
- **Vegetative:** little flowering on head, upright truss stem
- **Generative:** abundant flowering on head, curved truss stem

Vocabulary



Which plant brings your client money?

- Big leaves or thick leaves?
- Short plants or slim plants?
- 2 or 6 week old plant?
- Leaves under first truss: 6 or 9?
- Stone wool block or peat plug?
- Plant weight: 12 or 30 grams?
- Grafted or not?
- Topped on cotyledons, on 2nd leaf or on 3rd leaf?
- 2 stems or 3 stems/rootstock?

Structure of the presentation



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Optimizing crop techniques towards 2020.

What does the customer want from the producer?

- Adapt production to commercial agreements;
a more reliable production flow in winter.
- Maintain quality during periods of stress;
low temperatures, high relative humidity...
- Reduce cost price;
through increased production/m² and a longer production period.

What winning options does the producer want?

=> to be the preferred supplier; offer reliability, even in difficult conditions; ensure profitability;

Optimizing crop techniques towards 2020 - 1

- More sensors in the greenhouse => greater demand for homogeneous plants

Selecting plants: 30% more homogeneity results in 10% more production

- Higher substrate, less volume => faster steering,
better root in winter due to higher oxygen level

Wider leaves at first: larger block; extra 100g substrate gives 1kg/m² more production

More leaves at first: 6-9 leaves under first truss (darker and warmer)

- Leaf juice analysis => nutrients available in the plant

30 to 50% less nitrogen concentration at first

in grafted plants, less calcium in fruit/leaves

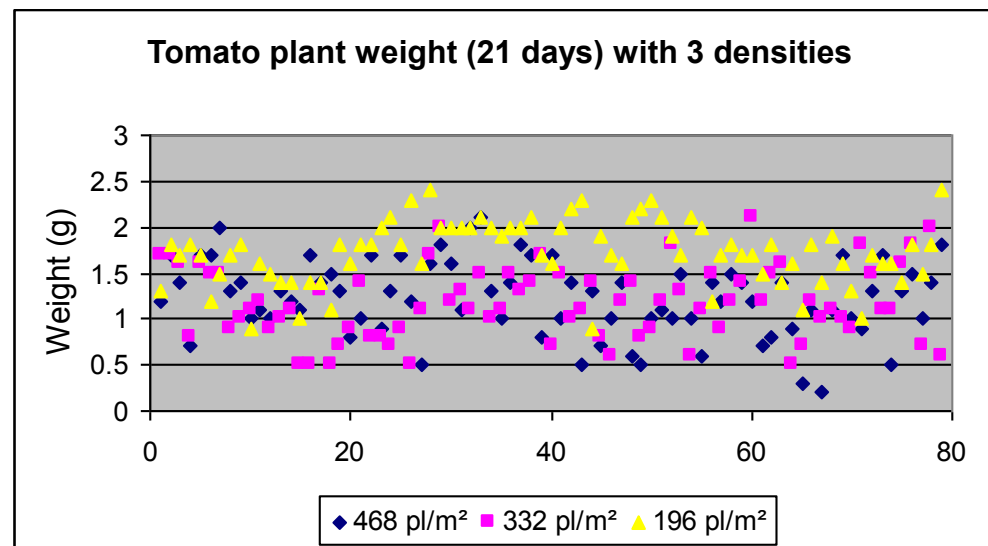
Optimizing crop techniques towards 2020 - 2

- Soil tensiometer and suction pump => less irrigation problems, irrigation when required by plant

From general rootstock to soil/greenhouse adapted rootstock

- Weight of a young plant indicates production

1 gram heavier (50 days, NG) = 8% more production (Klapwijk, 1987 and Welles, 1989)



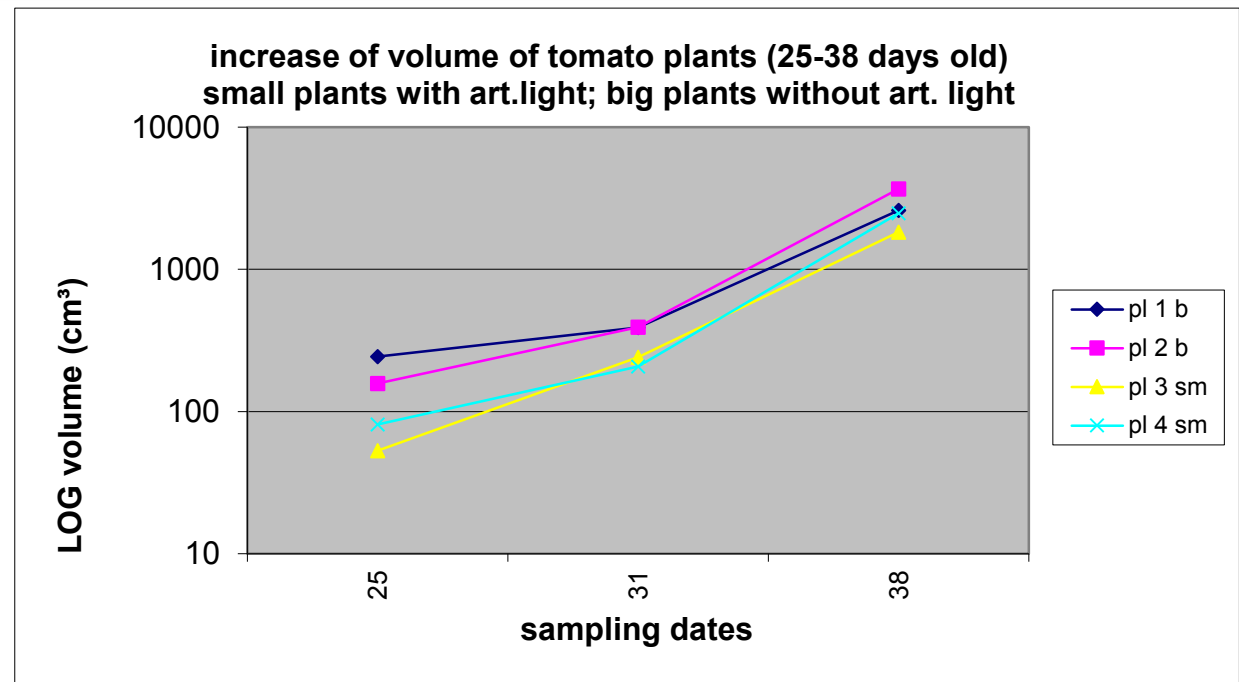
Optimizing crop techniques towards 2020 - 3



- Crop registration is objective management information

Measurement shows plant response 1 week earlier than grower's eyes.

Logarithmic volume growth between 14 and 40 days (InnoGreen 2009)



Grafting-> no longer needed to overcome root problems
(fusarium, verticillium, corky root... nematodes)

Grafting leads to more vigour for:

More numerous, bifurcated roots => better uptake => higher fruit quality

More growth => more resistance to diseases/stress

More vigour => more flowers => easier pruning => better quality

Grafting gives a better plant balance:

Better, faster setting: larger fruits

Faster recovery after loaded plants

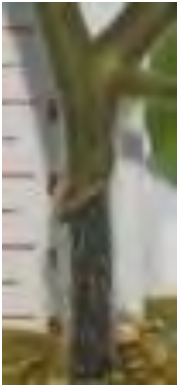
Faster setting in winter climate

Structure of the presentation



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- The adapted kind of grafting

Managing abiotic stress with grafted plants



Recognising a well grafted young plant

- Diameter of graft and scion identical
- Equal shoots
- Power: anthocyanin on stem and large stem diameter
- Generative Balance: abundant flowering on the head and curved truss
- Bifurcated roots, completely rooted

Managing abiotic stress with grafted plants

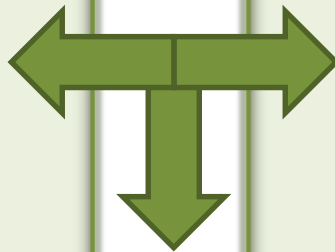
Combine graft and scion according to:

Scion behaviour :

- open/closed growth
- easy/difficult setting
- strong/weak growth
- low/high light reaction
- resistances

Rootstock behaviour :

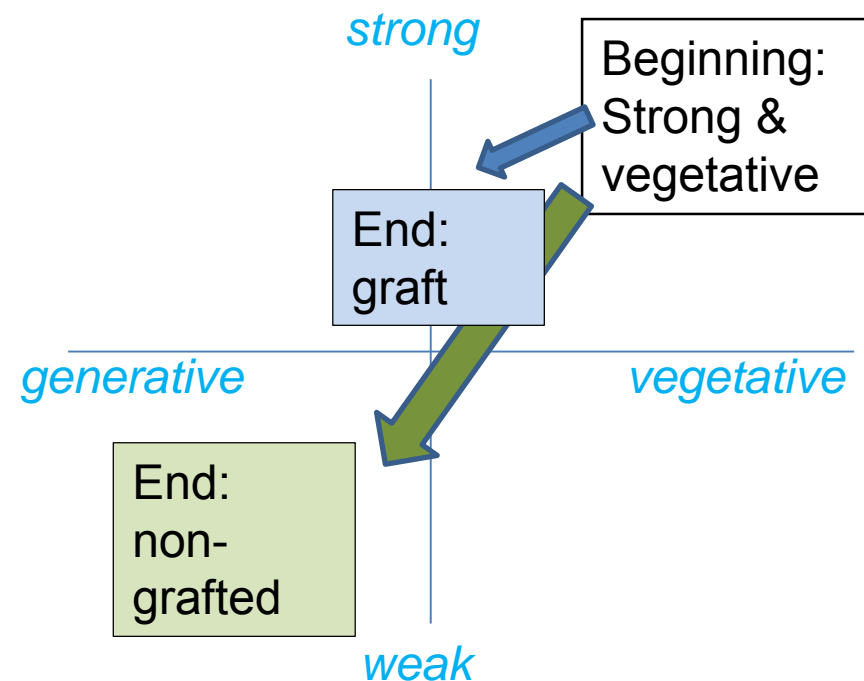
- bigger/smaller leaves
- more/less root tips
- more/less generative stress
- resistances



Greenhouse type:

- low/high greenhouse
- low/high heating capacity
- low/high ventilation capacity
- good/poor irrigation water

Managing abiotic stress with grafted plants



General management of grafted cropping

- Grafting results in more vigour but also more vegetative growth
- This is compensated by
 - More DIF ($T^{\circ}\text{CD} / T^{\circ}\text{CN}$)
 - Higher EC
 - Boost at midday
 - Stable and balanced growth leads to increased production

Managing abiotic stress with grafted plants



From client wish to objective propagation product

•FROM CLIENT WISH:

- big & short,
- fast, flowering within 1 week,
- good roots,
- homogeneous,
- X flowers/truss ...

•TO PROPAGATOR PRODUCT:

- weight & volume,
- speed,
- balance & vigour,
- leaf colour,
- blue stem ...

•HOW TO MAKE THE PRODUCT:

- measuring,
- analysing,
- planning

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The adapted kind of grafting - Type of young plant

1 rootstock on 1 scion



pinch leaf 1 and 2



pinch on cotyledons



Advantages

- Very strong growth / vigour
- Good, uniform first truss
- 1 or 2 leaves extra under 1st truss

- Vigour from 3rd truss
- Secured to help shoots

- Good quality 1st truss
- Equal shoots on plant

Risks

- High vegetation, needs strong light
- Considerable need for nutrients

- 1st truss: ribbed fruit
- Irregular shoots on plant

- 1 shoot / rootstock
- Split ripping
- Less uniformity between plants
- YPL raising less successful in low light

The adapted kind of grafting to a young plant

1 rootstock on 1 scion



pinch leaf 1 and 2



pinch on cotyledons



Impact

- **Delivery:** very good
- **Labour:** intensive
- **Result:** strong, homogeneous plants

- **Delivery:** medium size plants
- **Labour:** grower - average
- **Result:** uniform homogeneous plants

- **Delivery:** medium size plants
- **Labour:** grower - average
- **Result:** uniform homogeneous plants

General risks

- Delay in earliness
- Headless
- Uniformity of graft/scion
- Increased hygiene/risk management
- More generative actions needed in the crop

Conclusions

- Grafting combines the advantages of two varieties.
- Intuition in propagation and growing will be enhanced by objective measurements, resulting in better planning.
- Grafting techniques and rootstock will depend on the type of greenhouse and the available infrastructure.
- Grafting has already led to a steady flow of products during winter, to meet demand from supermarkets.
- New grafting applications will further improve sub-optimal growing conditions.



Thank you!

innogreen

What are the prospects for Young tomato plant raising in 2020?

Ewald de Koning

Plantenkwekerij Van der Lugt

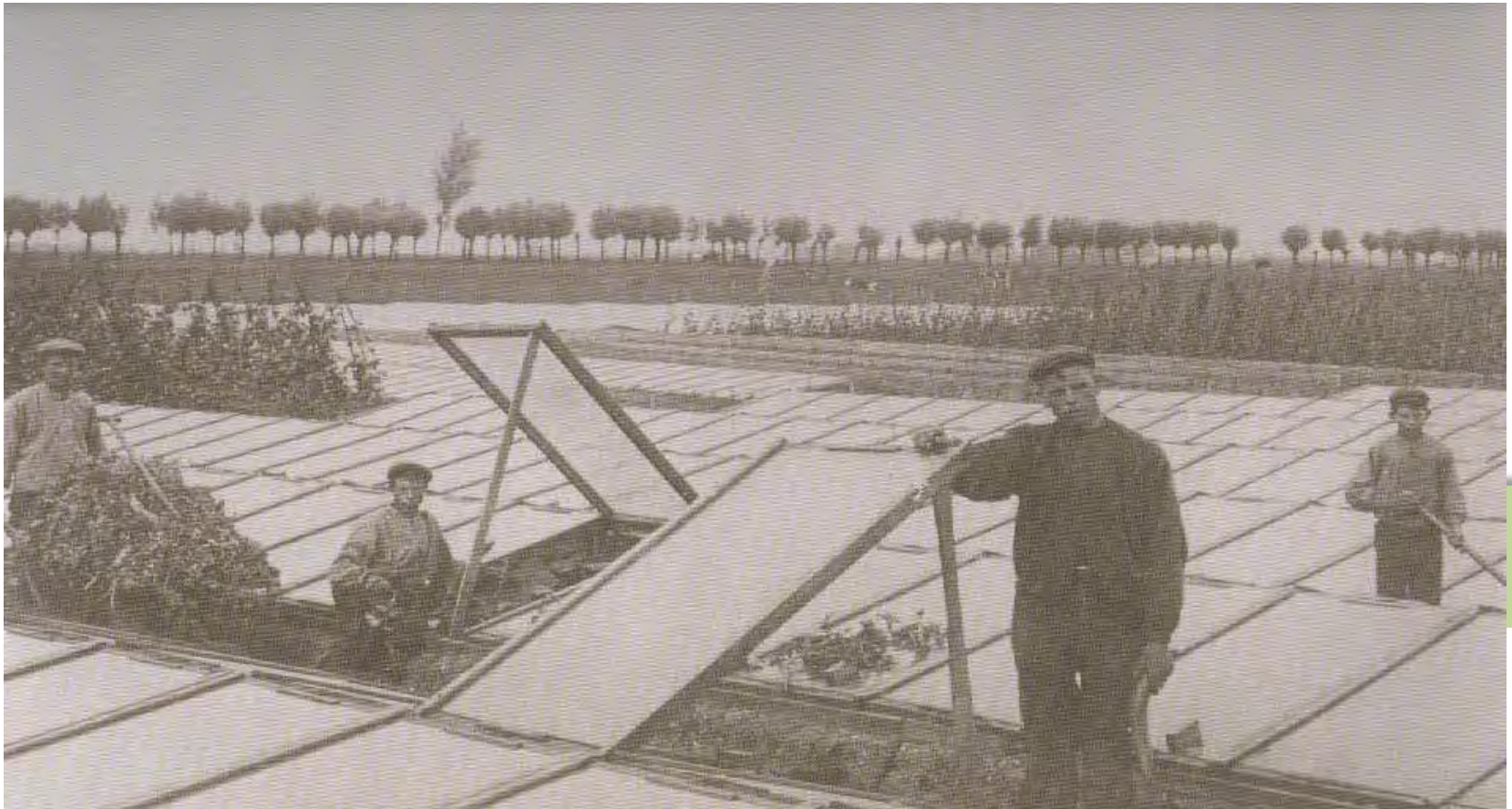


Content

1. History to 2015 - “Plantenkwekerij Van der Lugt” young plant raising.
2. Customer and market needs in Northern Europe.
Young plant innovations during the last 10 years at Van der Lugt.
3. Trends in young plant raising towards 2020.

History to 2015 - “Plantenkwekerij Van der Lugt” young plant raising.

- Founded in 1904 as a vegetable producer.



History to 2015 - “Plantenkwekerij Van der Lugt” young plant raising.

- Founded in 1904 as a vegetable producer.
- In 1920 it began to raise young plants for vegetable growers.

1904 1920 1950 1970 1975 1980 1990 2005 2015

Production of vegetables

Raising young vegetable plants

Production of ornamentals / pot plants

Raising young ornamental plants

first greenhouse
begins grafting

artificial lights

first concrete
floors

Grafting climate
rooms

History to 2015 - “Plantenkwekerij Van der Lugt” young plant raising.

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Production of vegetables

Raising young vegetable plants

Production of ornamentals / pot plants

1000 m²

1.115.000 m² greenhouse

first greenhouse
begins grafting

artificial lights

first concrete
floors

Grafting climate
rooms



History to 2015 - “Plantenkwekerij Van der Lugt” young plant raising.

1. Core business:

12 million young vegetable plants.

- Grafted tomatoes
- Grafted eggplant
- Cucumber
- Grafted cucumber
- Sweet pepper

2. Out of season products:

Pot plants / Fruit carrying vegetable plants

“Snacker Funfoods” consumer market

Young ornamental plants


- Border plants
- Pansy / Primrose



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Customer and market needs in Northern Europe / grower needs over last 10 years.



Market: Supermarkets drive the trends,
tomato is driver for innovation:

- Year round delivery
- Constant quality
- Planned demand

Reaction of growers

- 
- -> Planned production
 - Consistent and reliable delivery.
 - Increase in scale, consolidation.
 - Diversification in crop model, cultivars and plant model.
 - International produce collaboration (outside the Netherlands).

Reaction of Van der Lugt

1. Improve reliability of young plants.
2. Achieve customization, flexibility, diversity in young plants.
3. Improve hygiene and plant grafting techniques.

Young plant innovations in the last 10 years at Van der Lugt.

1. Improve reliability of young plants.

- Knowledge of growers, growers' needs.
- Controlled growth conditions: climate and crop protection.
- Germination tests = reliable supply.
- Climate rooms after grafting = reliability.
- Mechanical seedling grading = uniformity.
- Track & Trace system.



Young plant innovations in the last 10 years at Van der Lugt.

2. Achieve customization, flexibility, diversity in young plants.

- Communication
(Customized flexible production)
 - Order system / all order details agreed by customer / all details available in the produce department.
 - Customer portal internet connection.
 - Product - plant evolution via pictures available on portal.
- Stepless pot spreading machines 4 to 50 plants/m².
- Open costs calculation requires registration of system labour.
- Cooperation with another plant raiser WPK for consolidated customers / orders.



2. Achieve customization, flexibility, diversity in young plants.

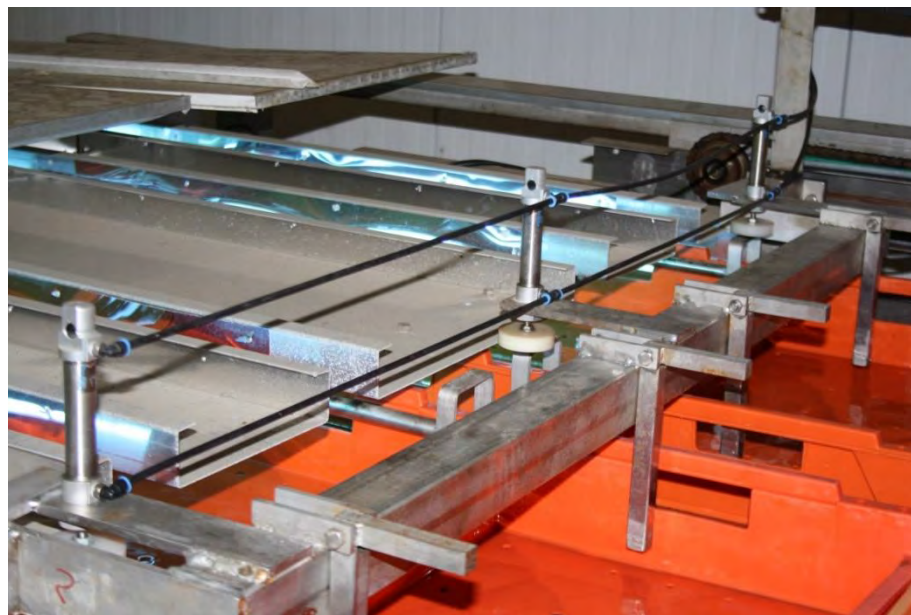
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3. Improve hygiene and plant grafting techniques.

- Hygiene protocol based on GSPP and risk management.
 - Water
 - People
 - Seeds
 - Materials
- GSPP certified seed.
- Recycling, cleaning and disinfection of water.
- Seedling trays used just once.
- Cleaning/disinfection equipment for crates and trays.
- Scrubber-Sweepers for disinfection of floors.
- Hygiene ports at entrances / clothes.

Every season! Every crop!



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Trends for young plant raising towards 2020.

1. Technology.
2. Crop techniques.
3. Market development.



Trends for young plant raising towards 2020.

1. Technology.

- Measurement of plant quality at delivery.
 - ✓ Weight
 - ✓ Flowering
- Machine sorting seedlings with optical technology, more effective than grower's eye.
- Grafting robot.
- LED light.

2. Crop techniques.

- Innovative pinching and grafting techniques for double heads.
- Diversification of rootstock.



Trends for young plant raising towards 2020.

3. Market development.

- Restriction on use of chemicals and discharging.
- Increase in substrate and longer cycle in Southern Europe.
 - Increase in long cycle leads to more yield/ha
 - = reduction of ha = reduction in total no. of tomato plants.
- Increase in grafted young plants = increase in plant value.
- Cooperation - consolidation between plantraisers
 - ✓ Consolidation to specialize.
 - ✓ Specialize and deal with large volumes inside country.
 - ✓ Northern-Southern Europe: entry into growing markets.



Conclusions

- Supermarkets drive the trends.
- Growers' demands = improve stability and reliability in young plants.
- Growers' needs require specialization in the YPR business.
- Outcome is grafted plants of high quality.
- For good grafting results:
 - ✓ Good hygiene
 - ✓ Stable growth conditions and knowledge for reliable planning
 - ✓ Uniform plants thanks to mechanized sorting of seedlings

A winning scion/rootstock combination: An example from Spain

FRANCISCO JOSÉ RODRÍGUEZ NOGUERÓN



syngenta

Spain is Europe's orchard and the tomato is the most important vegetable crop, leveraging cutting edge PGH technology

Spain provides Europe with key vegetables



% Tomato value in €K / total vegetables

Production	Exports
22.3%	25,8%
(352,800)	(500,832)



Tomato production in Spain is innovative and leverages cutting edge technology

- Rapid adoption of innovative solutions that ensure profitability and differentiation
- 10% of total acreage is for innovative tomatoes
- 80% IPM
- **70% production is grafted**



Producers face strong challenges: they must meet the market's demands for break-through solutions while assuring their profitability

Producers: Key challenges

Market

- Year round supply
- Consistent quality
- Sustainability
- Innovation



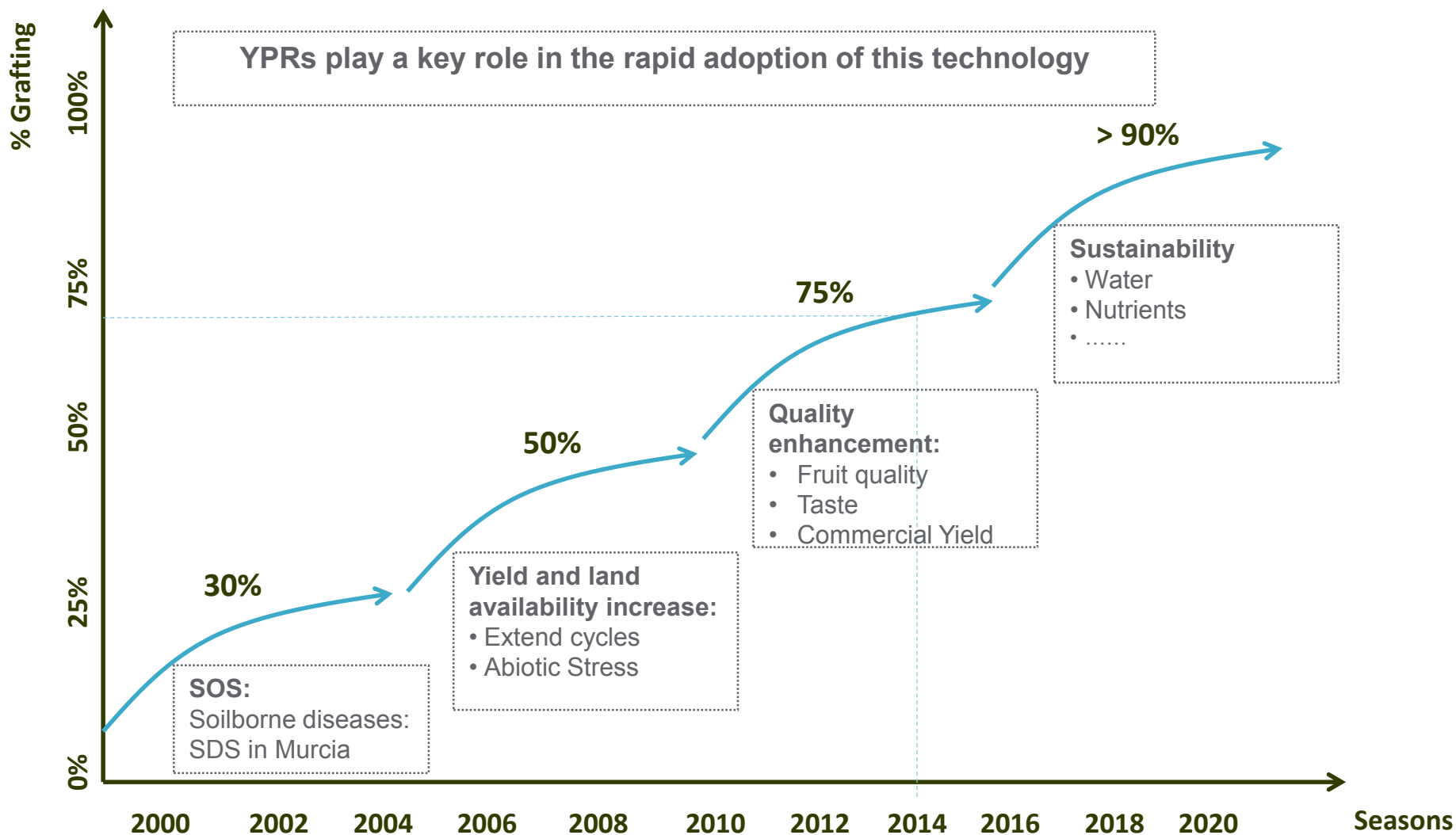
Complexity

- Legal regulation
- Labour regulation
- MRL
- IPM

Profitability

- Profitability
- Market access
- Cash flow management
- Differentiation
- Sustainability

Grafting is a vital technology for the tomato industry



Influence of grafting on grower profitability

Producers: Key Benefits

Production of More for
Less

Soilborne diseases

- Nematodes
- Verticillium
- Fusarium
- SDS

Crop cycles

- Extend the crop cycle

Fruit Size

- Maintain fruit size

Commercial yield

- Yield increase
- Quality enhancement

Fruit Quality

- Colour
- Firmness
- Taste

Abiotic stress

- Salinity
- Cold & Hot cond.
- Soil exhaustion



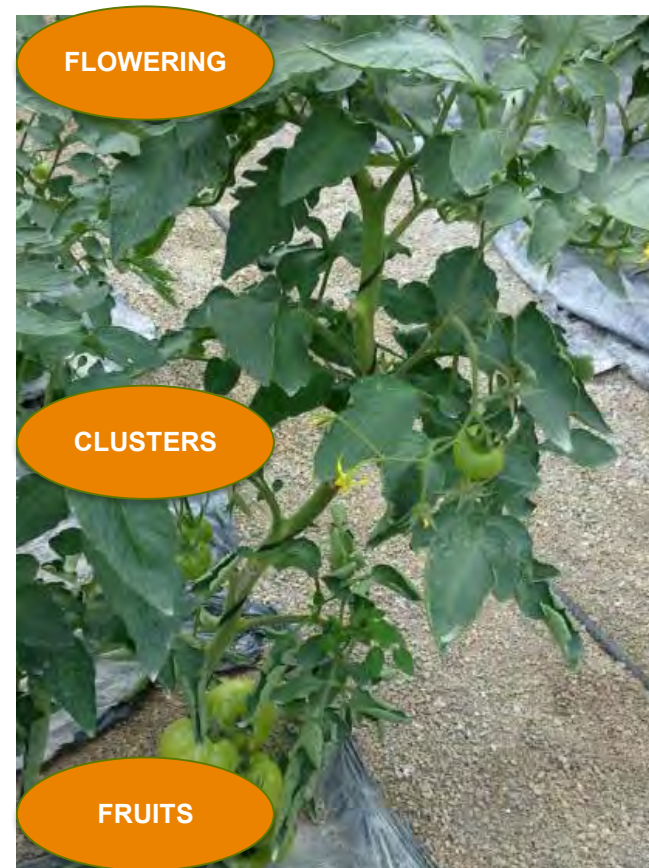
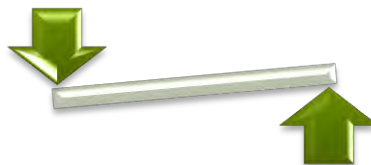
Influence of grafting on plant balance



VEGETATIVITY

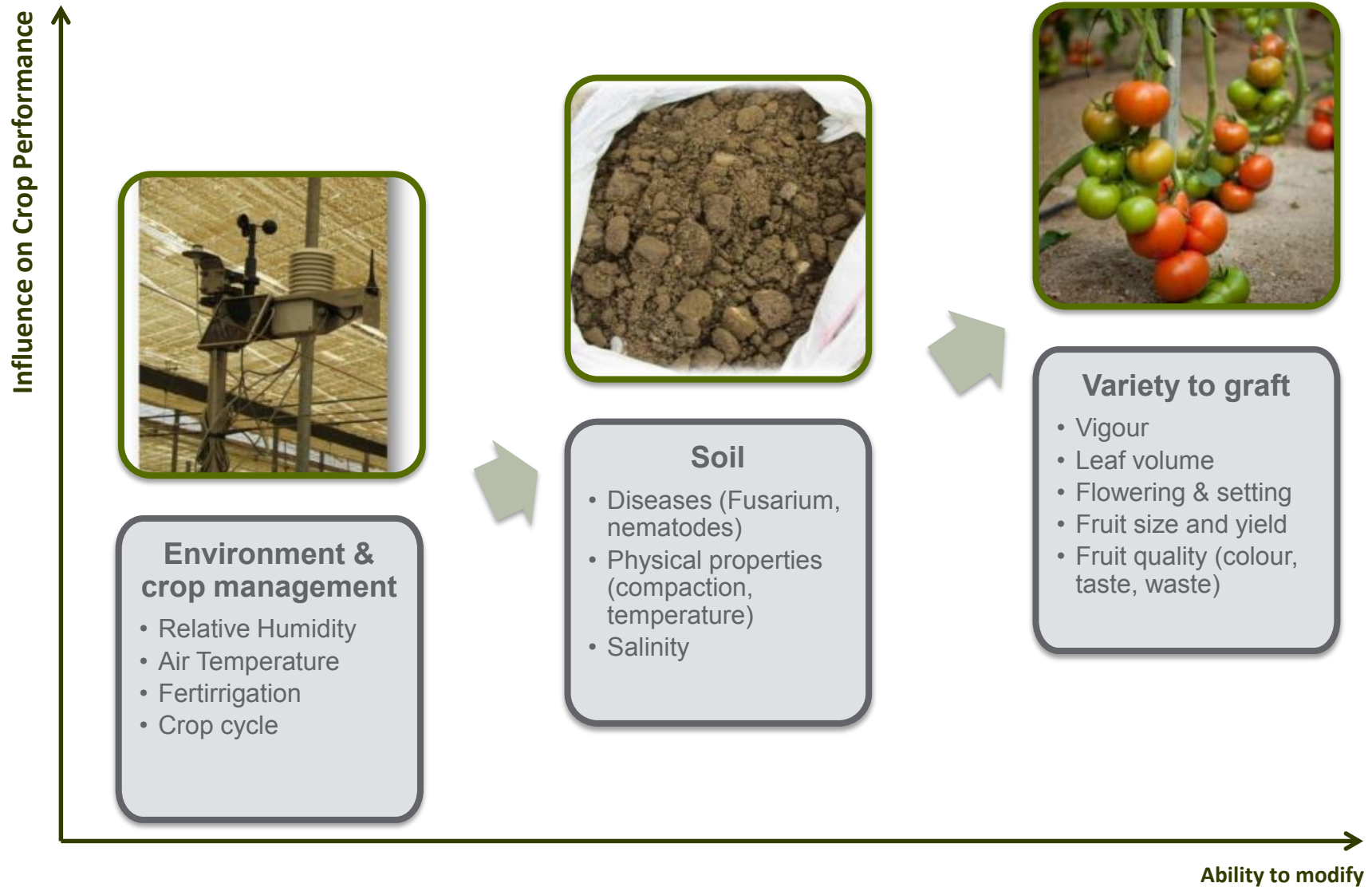


Balance is Key

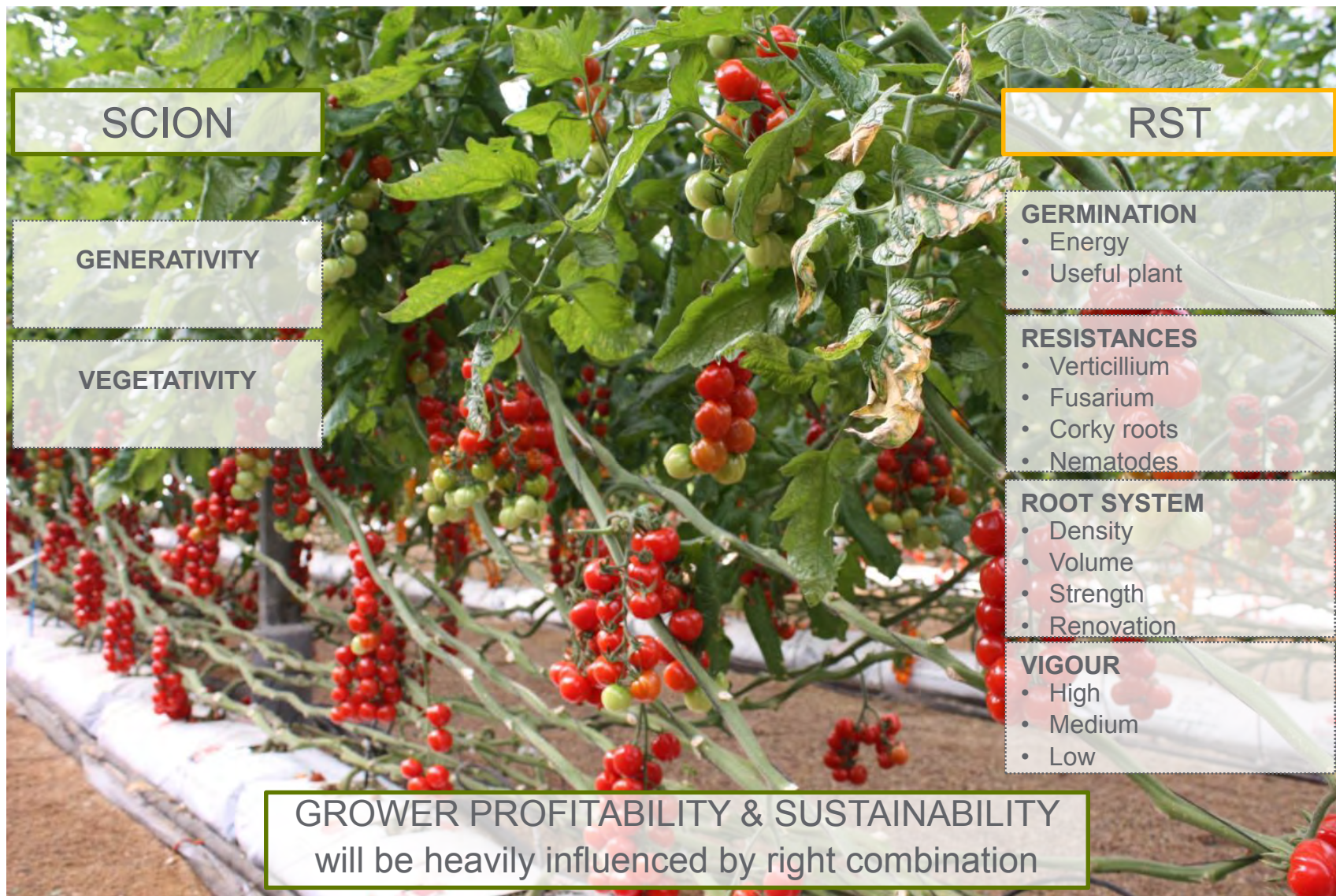


GENERATIVITY

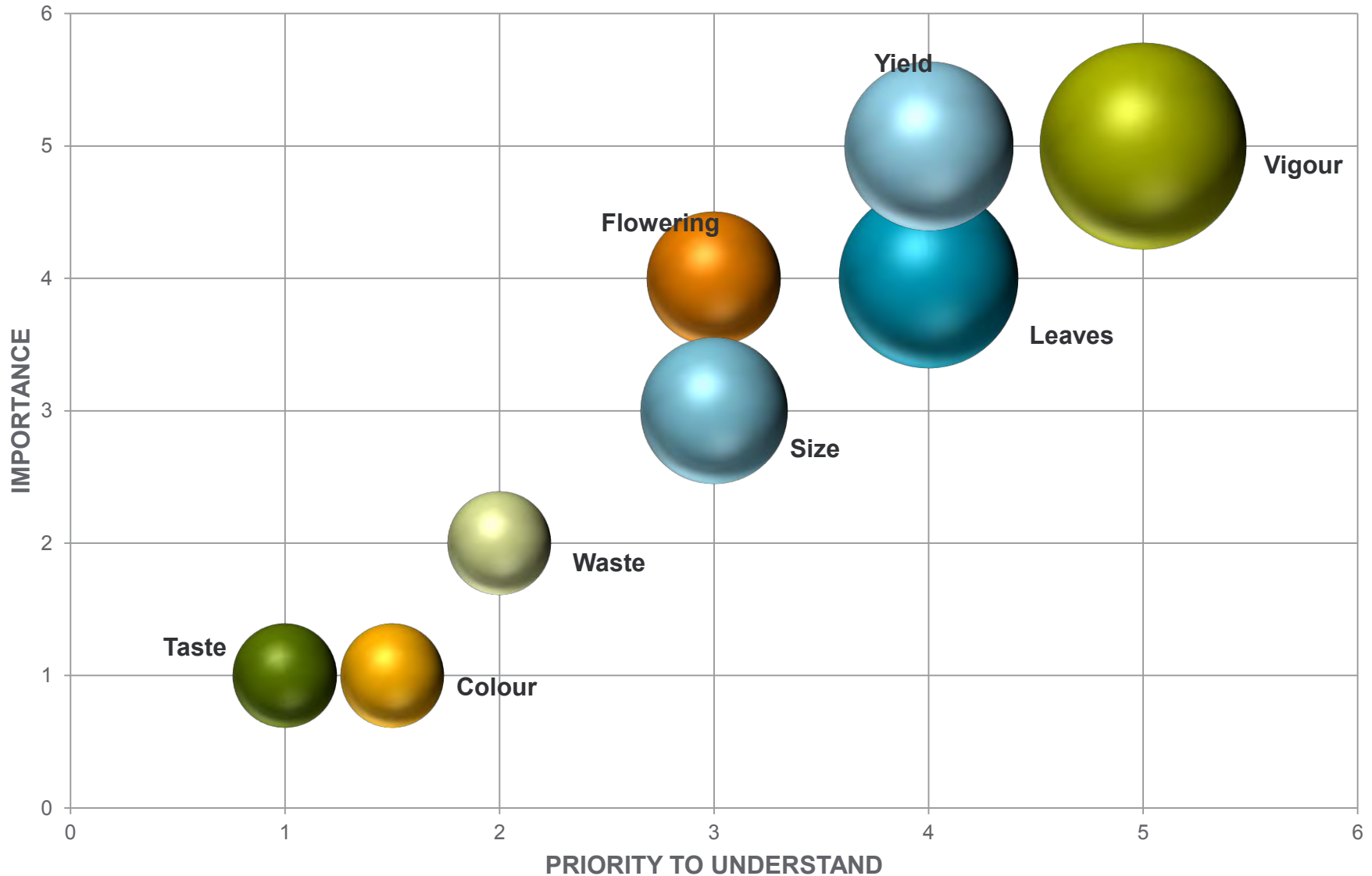
Influence of Rootstock on Crop performance




Scion & Rootstock interaction needs to be understood



Not all characteristics interact in the same way



SYNGENTA STRATEGY

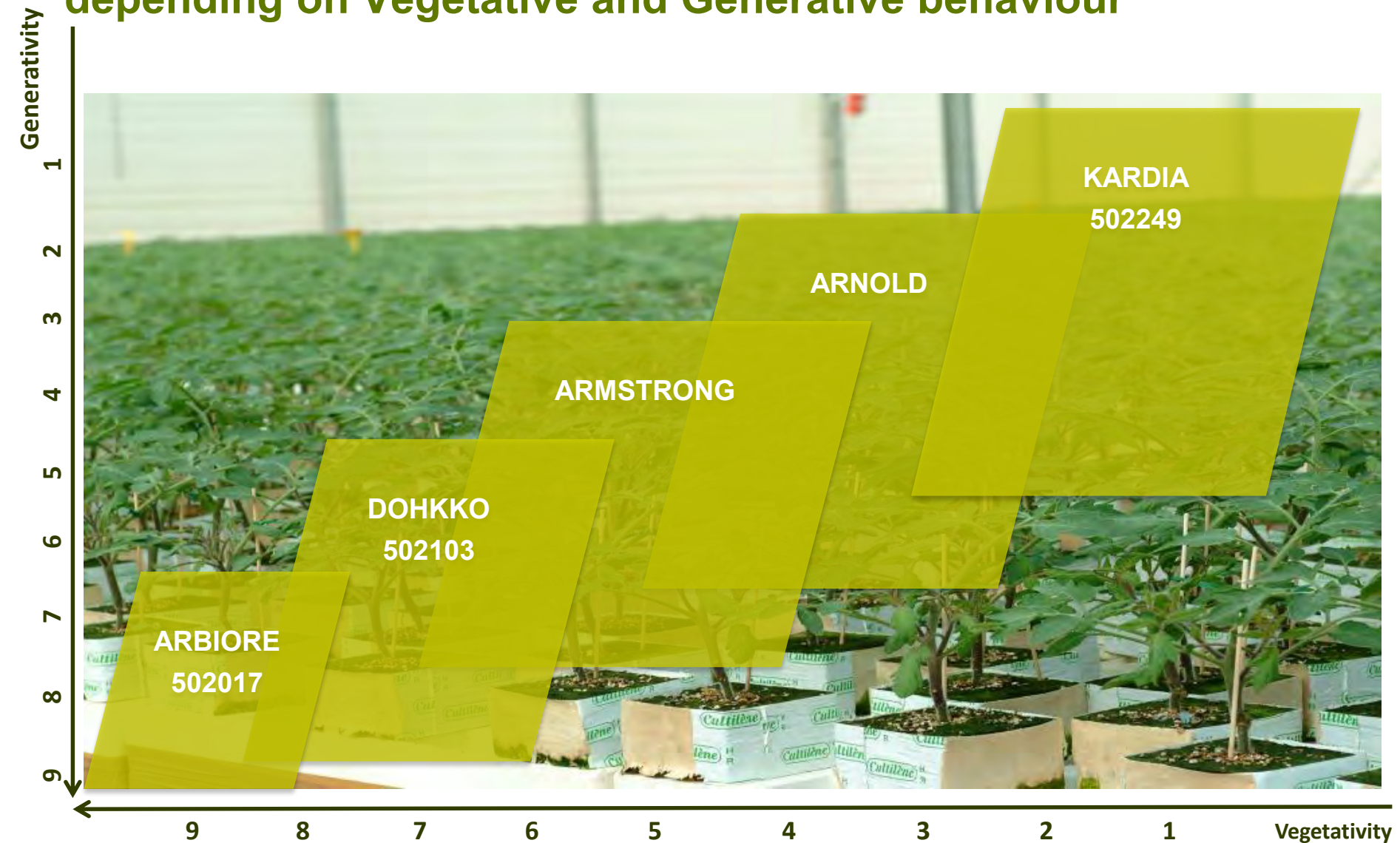
The background of the slide features four tomato plants in black plastic pots, arranged in a row. The plants have green leaves and some small purple flowers. Overlaid on the image are three light green rounded rectangular boxes with white borders, each containing text. Small green downward-pointing arrows are positioned between the boxes. The first box is at the top, the second in the middle, and the third at the bottom.

**NOT EVERY VARIETY CAN
BE GRAFTED WITH ANY
ROOTSTOCK**

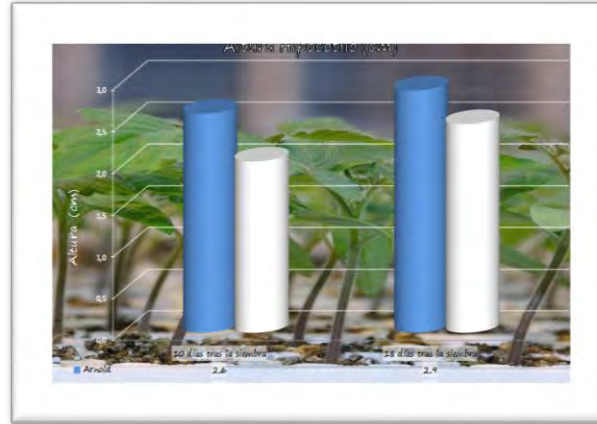
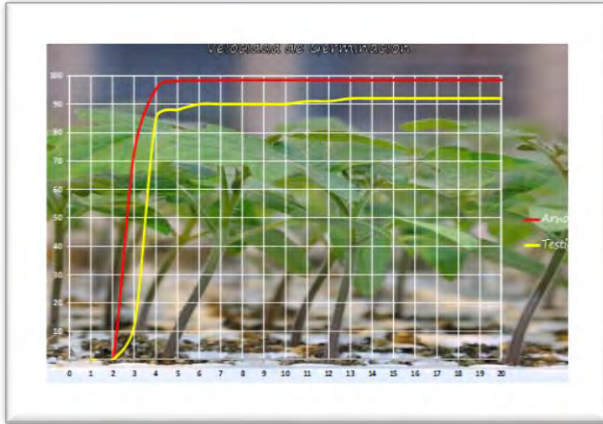
**WINNING COMBINATIONS
BY TYPOLOGY**

**WINNING COMBINATIONS
BY VARIETY**

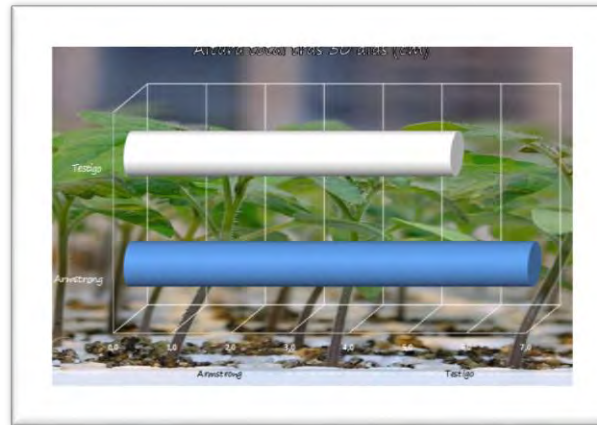
Our Rootstock portfolio. Matrix tool to classify RST and scion depending on Vegetative and Generative behaviour



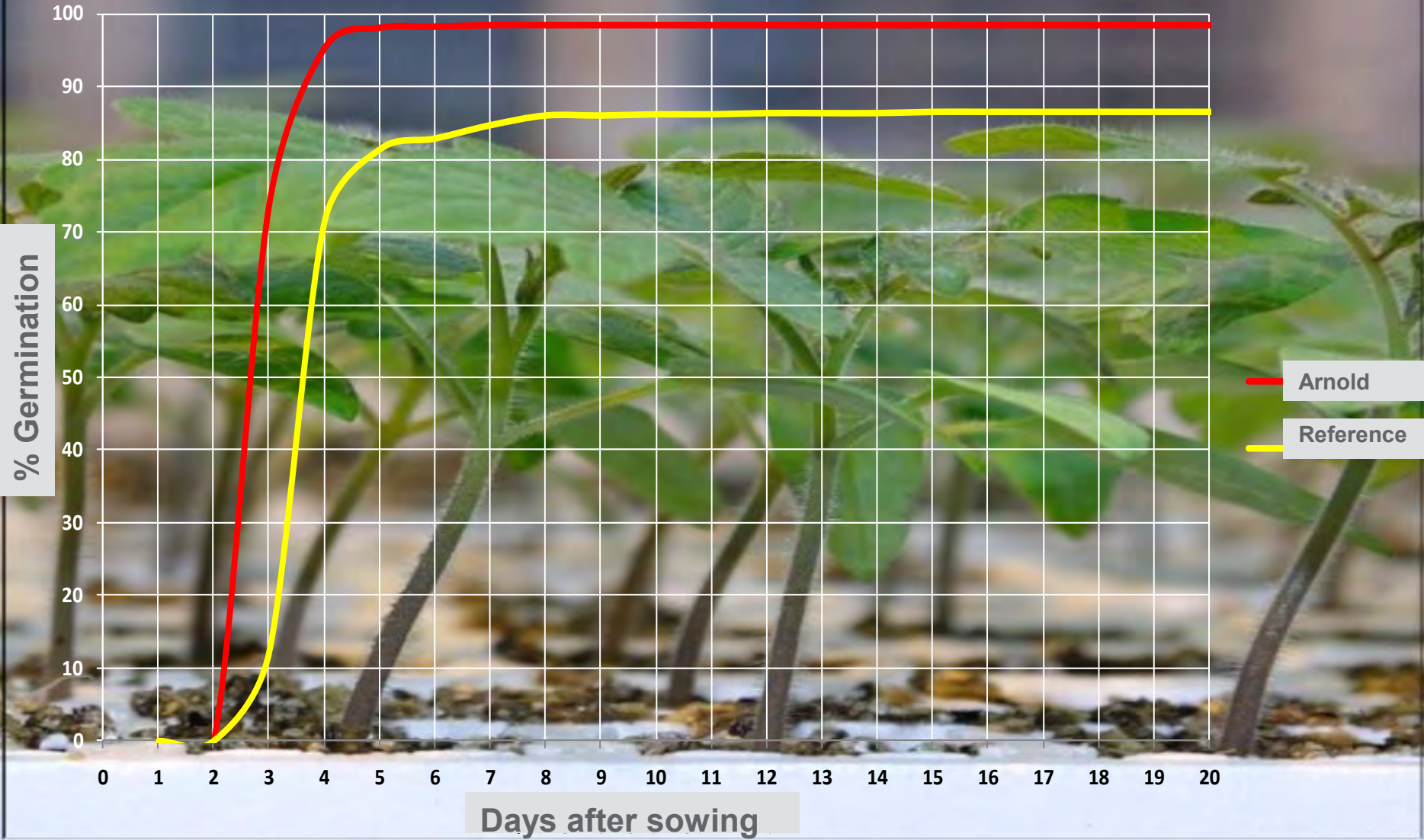
SYNGENTA Rootstocks improving YPR profitability



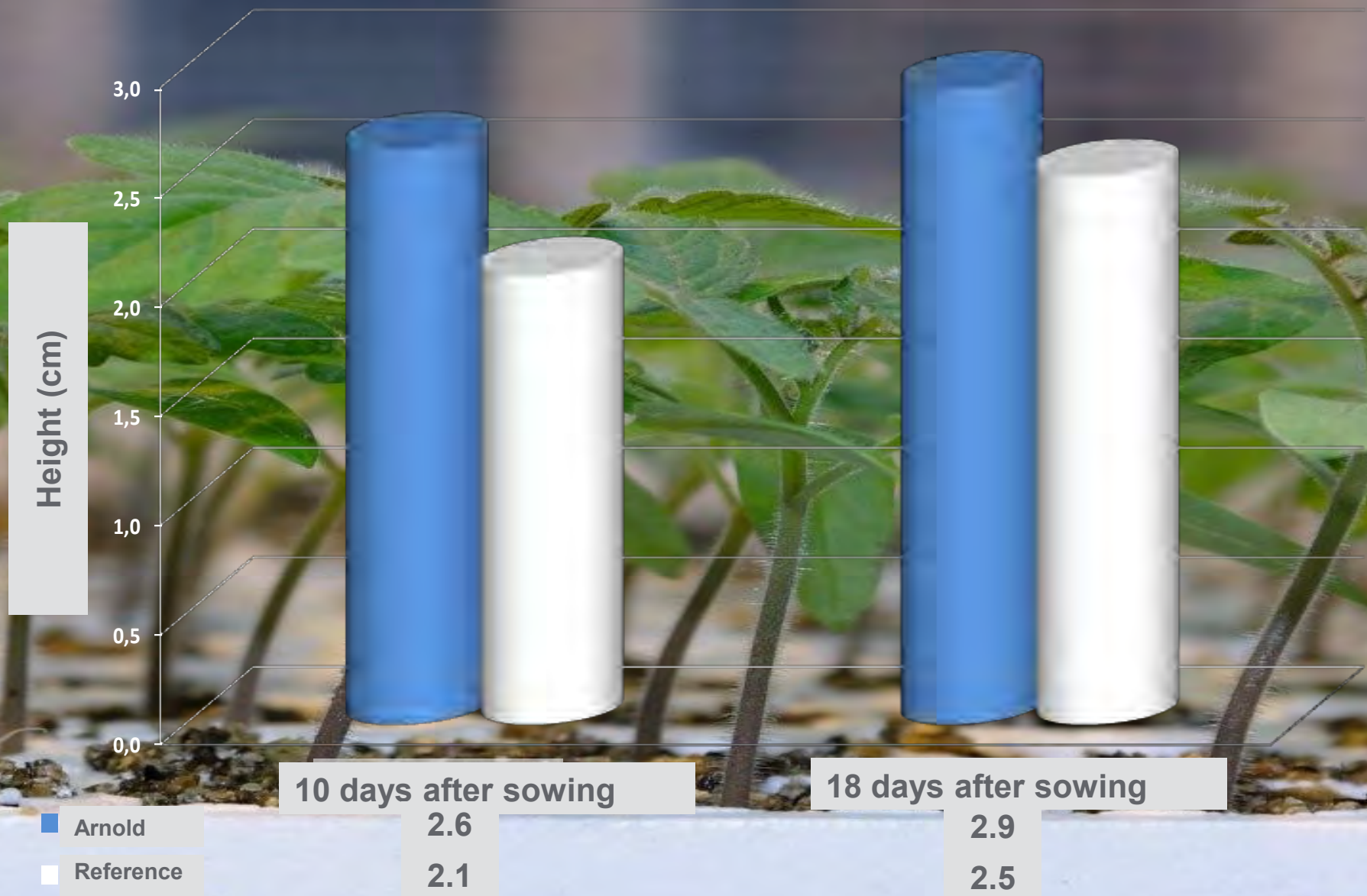
Uniformity



Speed of germination



Hypocotyl Height





Arnold + 7 days



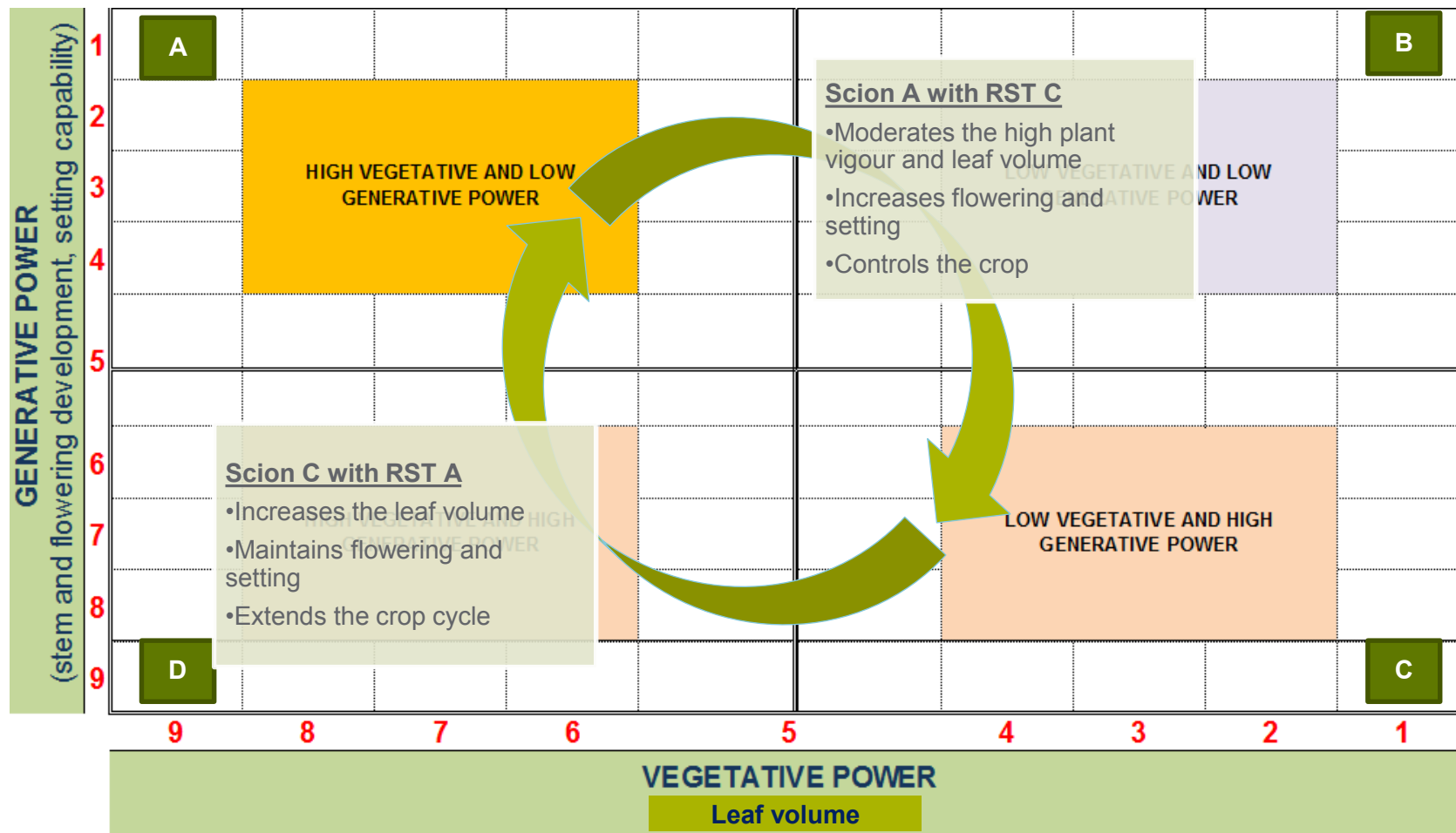
Reference + 7 days



500267

Arnold + 30 days

Varieties are classified according to plant behaviour. The matrix enables us to achieve the right combination.





At SYNGENTA we believe that Rootstocks represent a key strategic technology for the tomato industry.

We are working to provide the best solutions for YPRs and growers, with the aim of ensuring more sustainable agriculture.

Bringing plant potential to life

GSPP

Good Seed and Plant Practices

An international hygiene and management system in the chain of seed production and plant raising to protect tomato seed and plant lots from infection with *Cmm*

Presentation for Syngenta
Almería, Spain, 28th January 2015
Claire Peusens

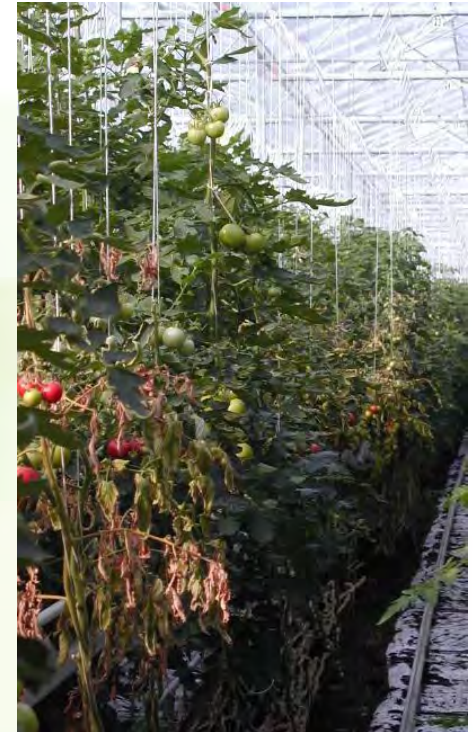
Content of the presentation

- What is GSPP?
- Why GSPP?
- GSPP vision and strategy 2015-2018
- Applying GSPP
- Some figures
- GSPP: organization
- Challenges of GSPP Standard & requirements
- GSPP's added value

What is GSPP?

Good Seed and Plant Practices (GSPP) is an international transparent business chain system.

The purpose of Good Seed and Plant Practices (GSPP) is to prevent tomato seed and plant lots from being infected by *Clavibacter michiganensis* subsp. *michiganensis* (Cmm)

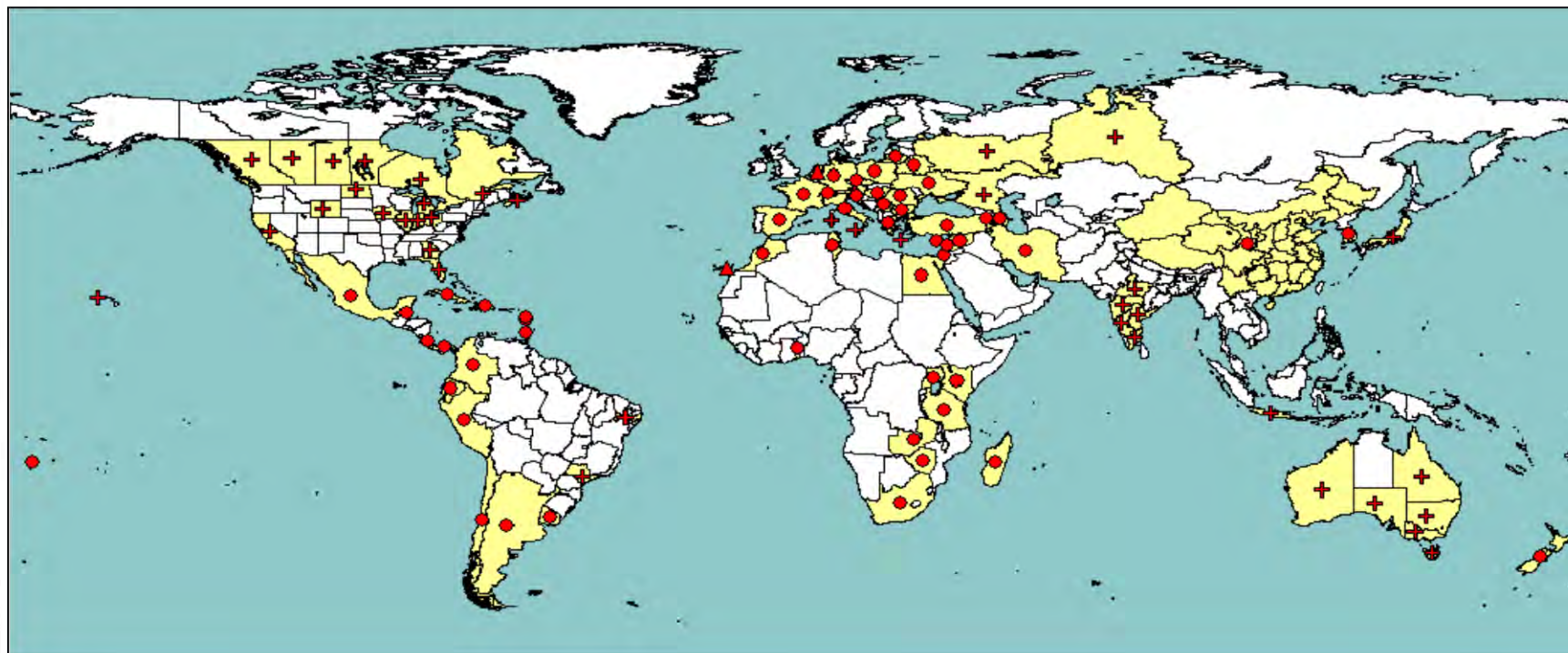


Distribution of *Cmm*






Clavibacter michiganensis subsp. *michiganensis*

EPPO Code : CORBM



Legend

-  Present (national record)
-  Present (subnational record)
-  Transient

Why GSPP?

- **Increasing risks** (due to more crop techniques for grafting and topping, growing scale of production).
- The **(financial) consequences** and damage caused by an outbreak are serious (destruction of a full production cycle, crop failure).
- **Joint responsibility** of seed companies, plant raisers and growers for managing and preventing the risk of *Cmm* (confidence in the chain, transparency).
- **Technical Investigation Procedure (TIP)**: independent expert, finding the root cause of the problem and improving the system.
- **Chain approach** – the whole propagation chain is involved. It is open to all partners.

GSPP vision 2015-2018

- *Cmm* is and will be seen as an industry problem; GSPP is the best solution for this and it requires preventive measures from all participants (also growers) in the chain.
- Increased number of GSPP accredited plant raisers; involvement of the chain.
- GSPP recognizes and takes stock of the differences between the participants.
- The GSPP Foundation is an international multi-disciplinary platform and network.

GSPP strategy 2015-2018

- Create an open system and foster the participation of all actors in the tomato production chain.
- Improve the *Cmm* reporting system; make the TIP Procedure more accessible to growers and non-GSPP plant raisers.
- Study the possibility of creating a starting programme for plant raisers.
- Increase the number of plant raisers.
- Develop a communication strategy to emphasize the importance of prevention of *Cmm* all the way along the chain.
- Spread information about *Cmm*: expertise centre for partners involved in GSPP.

Applying GSPP

Companies use the system for several reasons:

- Risk reduction - the costs of an *Cmm* outbreak are high.
- Not only seeds pose a risk. There are other risks!
- All parties in the chain have the responsibility to prevent the spread of *Cmm* contamination in facilities.
- Grafting, topping and cutting create a high risk of spreading *Cmm*.
- The disease can be latent for a very long time and can appear quite unexpectedly.

Applying GSPP

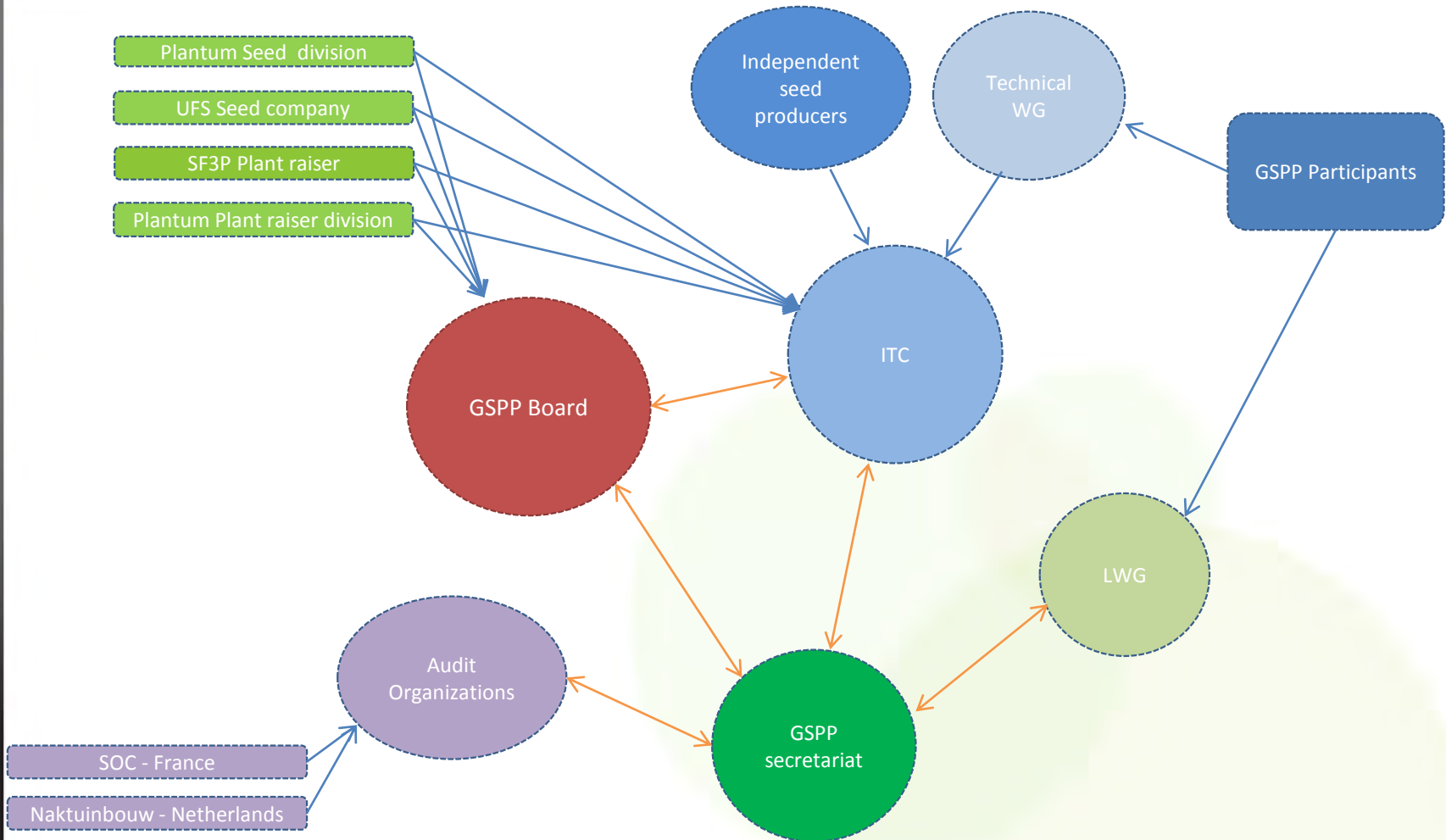
- A path to the continuous improvement of business processes.
- This is a system that is developed and improved through the experiences of the companies themselves.
- Mutual commitment and knowledge development of all parties involved in the system.
- In the long term, the sector as a whole is upgraded.
- Technical Investigation Procedure.

GSPP: some figures

- 34 companies are GSPP accredited.
- 83 production sites (22-12-2014):

Europe	N. & S. America	Asia	Africa	Middle East
40	14	12	6	11

GSPP: organization



Besides the general parts of the GSPP Standard, a specific part refers to the **production of plants for fruit production**:

Technical requirements (water, disinfection, materials and equipment, facilities, plant production for growers, etc.) – annex 14.5

Technical Investigation Procedure – annex 14.6

GSPP Diagnostic protocol for *Cmm* in symptomatic tomato plants – annex 14.2

GSPP standard requirements consist of:

1. Quality Management system

2. Technical requirements

3. Risk analysis of the defined risks

4 main risk factors:

Water

People

Propagation
material

Materials

GSPP challenges

A continuous and systematic approach related to:

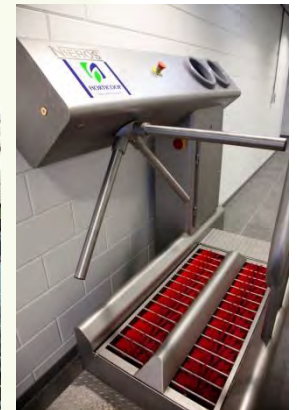
1. Quality Management system

- Clear organizational structure and supporting quality management system.
- Defined procedures (crop monitoring, crisis management, etc.) and working instructions.
- Staff qualifications and training.
- Systematic risk analysis in order to identify risks and associated control measures.
- Internal audits, corrective action procedures and management review.

GSPP challenges

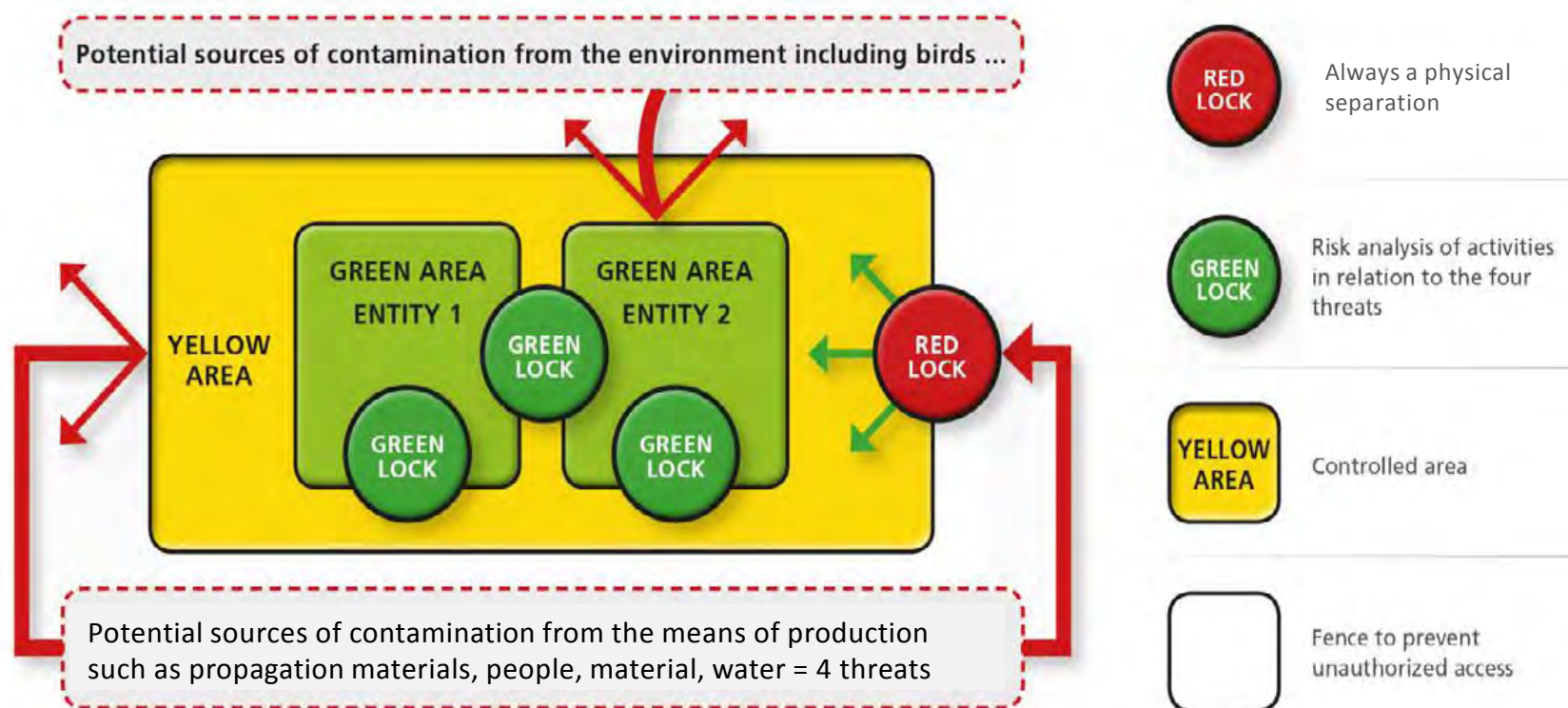
2. Technical requirements

- Implement the requirements relating to the use of water.
- Implement the requirements relating to disinfection.
- Materials and equipment passing the red or green locks (logical routing of materials, clothing, etc.).
- Requirements concerning facilities as explained in the scheme.



GSPP challenges

The principle of a GSPP site:



GSPP challenges

3. Risk analysis of the defined risks

- Risk identification (four risks)
- Risk analysis and control measures

Some examples of control measures:

- Hygiene sluices, disinfection of water, special clothing, disinfection of materials, adjusting internal transport routes.
- Restricted access to visitors.



GSPP accreditation cycle

- The accreditation cycle of GSPP is 3 years.
- The initial audit is performed by 2 independent auditors.
- The 1st cycle has 2 periodical audits.
- In theory, the renewal audit is performed by 1 auditor.
- The 2nd cycle has 1 periodical audit.

GSPP: how to become accredited

- Fill in the application form and pay a deposit.
- The GSPP secretariat informs the audit organizations (AO).
- Naktuinbouw/SOC performs the initial audit.
- The AO sends the audit report to the applicant.
 - Non-conformities may require correction and re-audit.
 - Possibility of appeal if applicant disagrees.
- The AO sends the recommendation to the Board and the Board makes a decision and informs the applicant.
- Accreditation is published on Foundation website www.gspp.eu

GSPP's added value

- Multi-disciplinary information exchange and international cooperation in the chain.
- Effective *Cmm* risk management and prevention.
- Increased customer confidence.
- Responsibility taken in the chain.
- Transparent and open system.
- Technical Investigation Procedure.
- Up to date on new international developments.
- Continuous improvement of the GSPP system and processes within the company.

GSPP

Good Seed and Plant Practices

Thank you for your attention!

GSPP Good Seed and Plant Practices

E-mail: info@gspp.eu

Website: www.gspp.eu

Syngenta rootstock event, Almería, 28 January 2015



Hygiene protocols at Centro Seia, a young plant raiser in Southern Europe

***Giovanna Causarano, R&D Manager,
Centro Seia Group***

1. Introduction to Centro Seia group
2. Tomato grafting – Cmm risk.
3. Centro Seia Cmm prevention year 2015.
4. What is going on in our market.
5. Next Cmm risk management steps.





Centro Seia – Sicily, Italy

Vivaio del Lago – Marche, Italy

Printemps du Lot – France

Adria-Hishtil – Bosnia-Herzegovina



Tri-hishtil – North Carolina

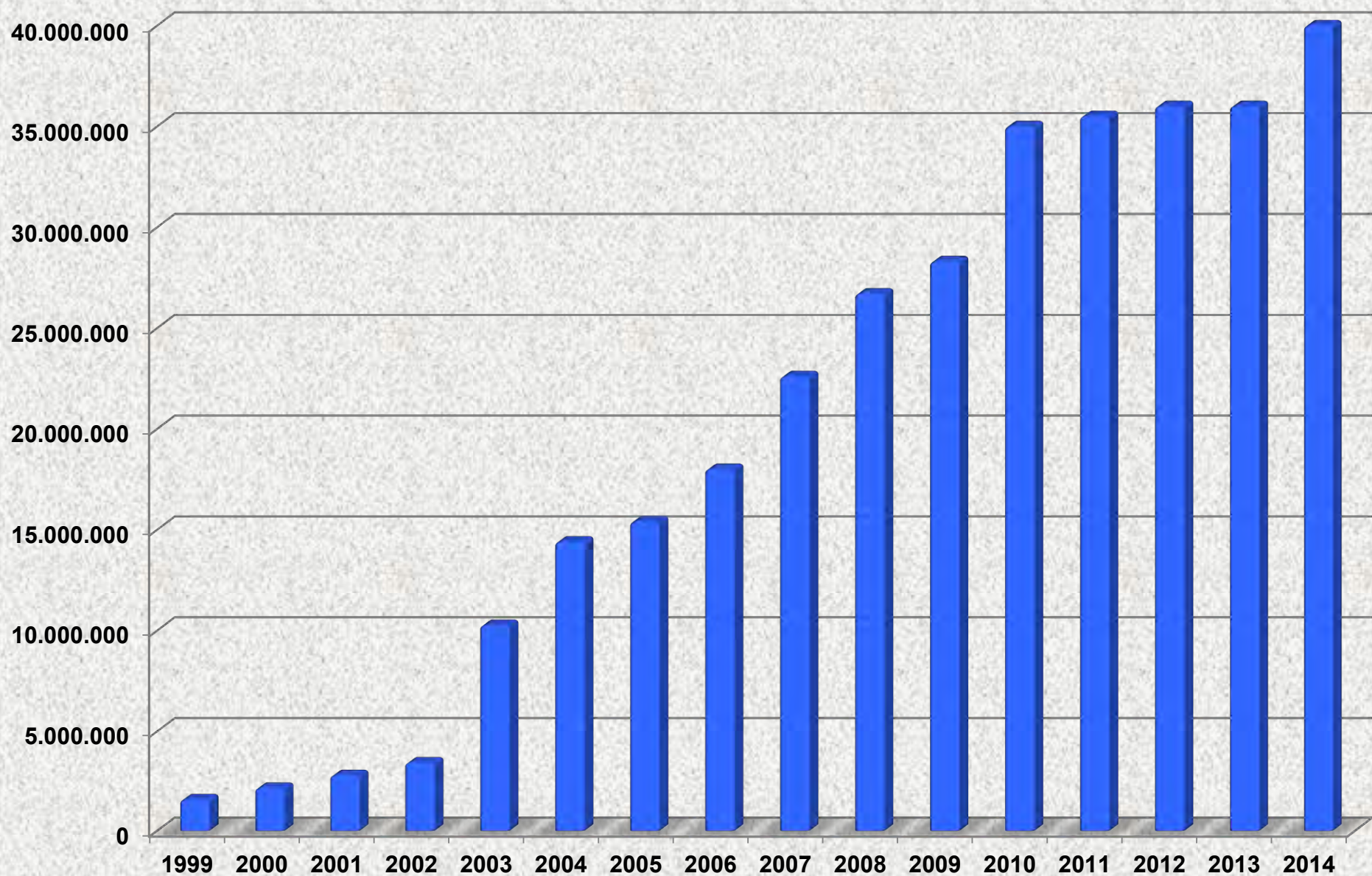


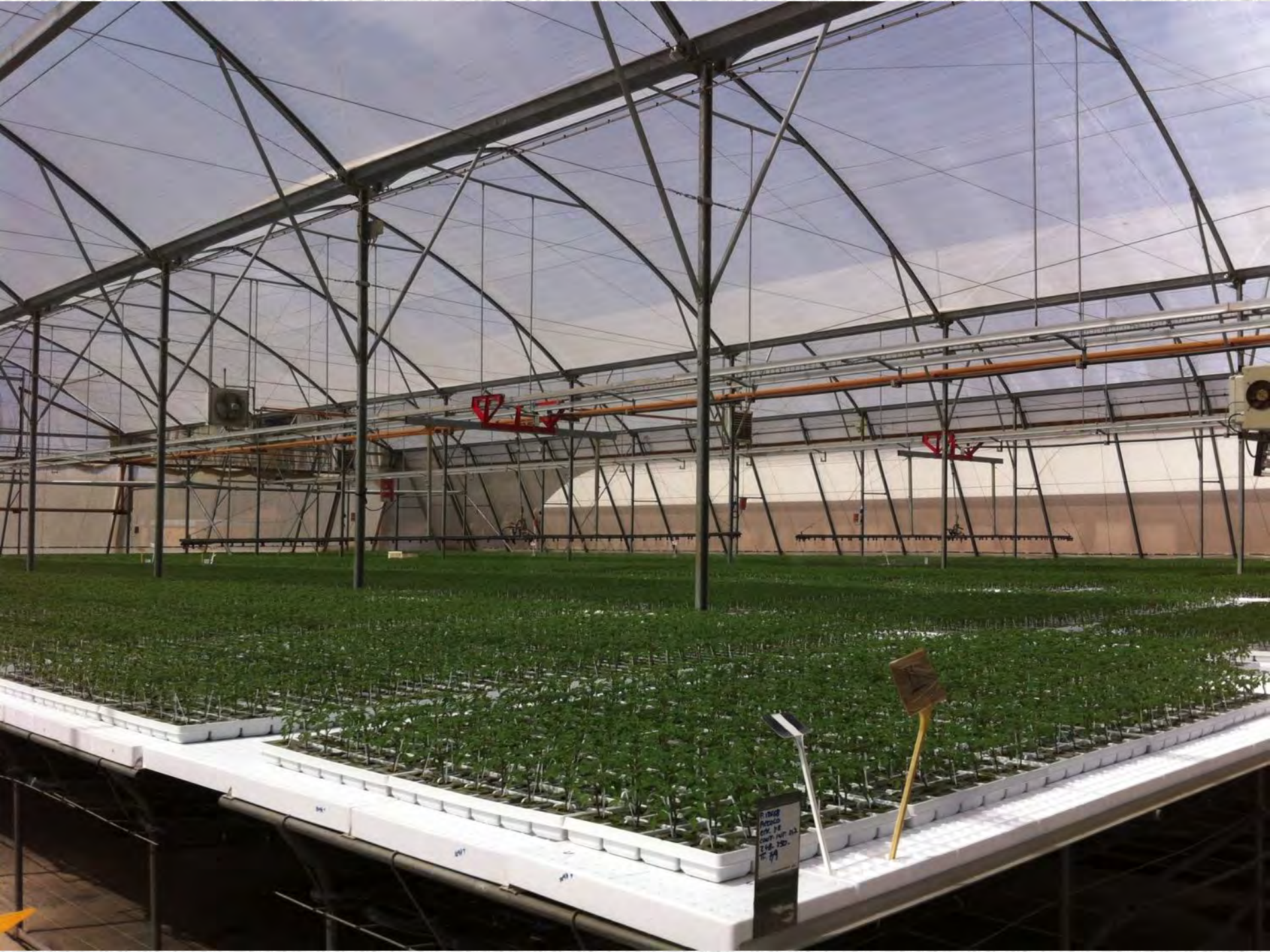
The Centro Seia group produces young vegetable plants for protected crops.

In 2014 the group produced **80 million** young plants, of which **40 million were grafted.**



Grafted plants Centro Seia, Adria, Vivaio del lago





Clavibacter michiganensis subsp *michiganensis*

It is well known and has been clearly demonstrated that:

- seeds are the **main long distance** spread vector
- the use of **healthy seeds** is the first step towards controlling the disease
- the bacterium is able to **infect plants** through stomata and other natural openings (hydathodes), wounds (grafting) and roots
- **infected tools** (blades, ...) and operators (hands, ...) can carry and spread *Cmm* inoculum

The bacterium survives for a long time in **plant debris** (months), **soil** (months) and on **tools and structures** (weeks)



Nurseries may pose the highest risk from an epidemiological point of view

Collection of risks from several sources:

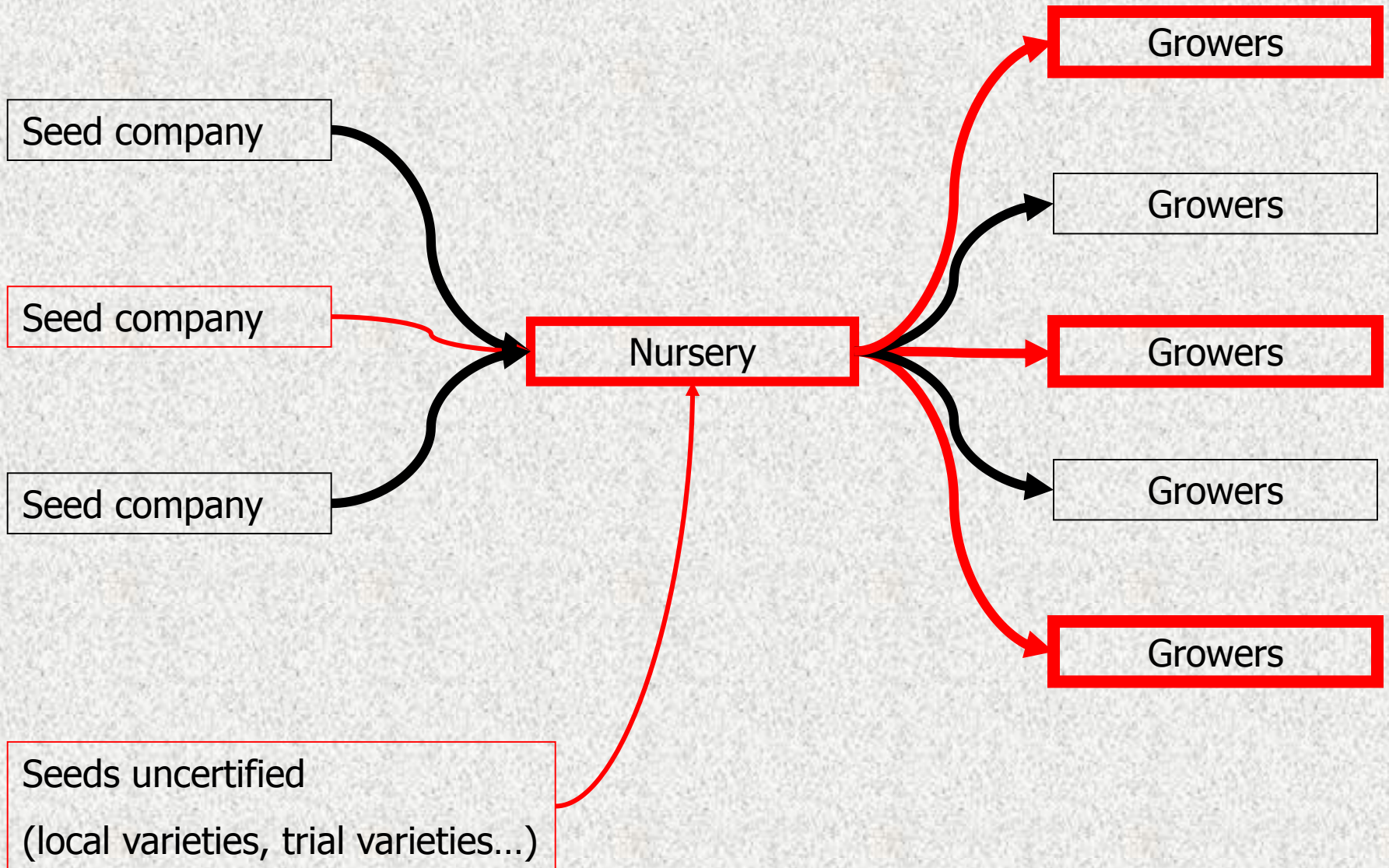
1. uncontrolled **introduction** of non certified/safe seeds in propagating areas;
2. repeated growing **cycles** in potentially infected areas;
3. continuous/repeated plant **manipulation** (grafted plants);
4. (sometimes) limited/low **technical awareness** of workers;
5. frequent and unregulated **access to growing areas** of technicians/workers/visitors;
6. frequent **internal transport** of seedlings and plants;
7. incomplete **efficacy of chemical** control methods.



What we have done



Risk analysis

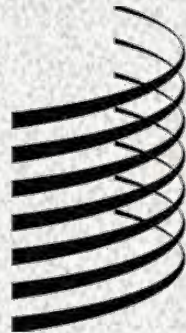






EPPO, the **European and Mediterranean Plant Protection Organization**, has declared that the Laser grafting technique is eliminating the risks of spreading *Cmm*.

WIPO



PCT

The International Patent System

WORLD INTELLECTUAL PROPERTY ORGANIZATION

I Title of Invention A CUTTING TOOL AND A METHOD FOR PLANT GRAFTING

II Applicant

II-1 This person is **Applicant only**

II-2 Applicant for **All designated States**

II-4 Name **CENTRO SEIA S.R.L. SOCIETA' AGRICOLA**

III-1-1 This person is **Inventor only**

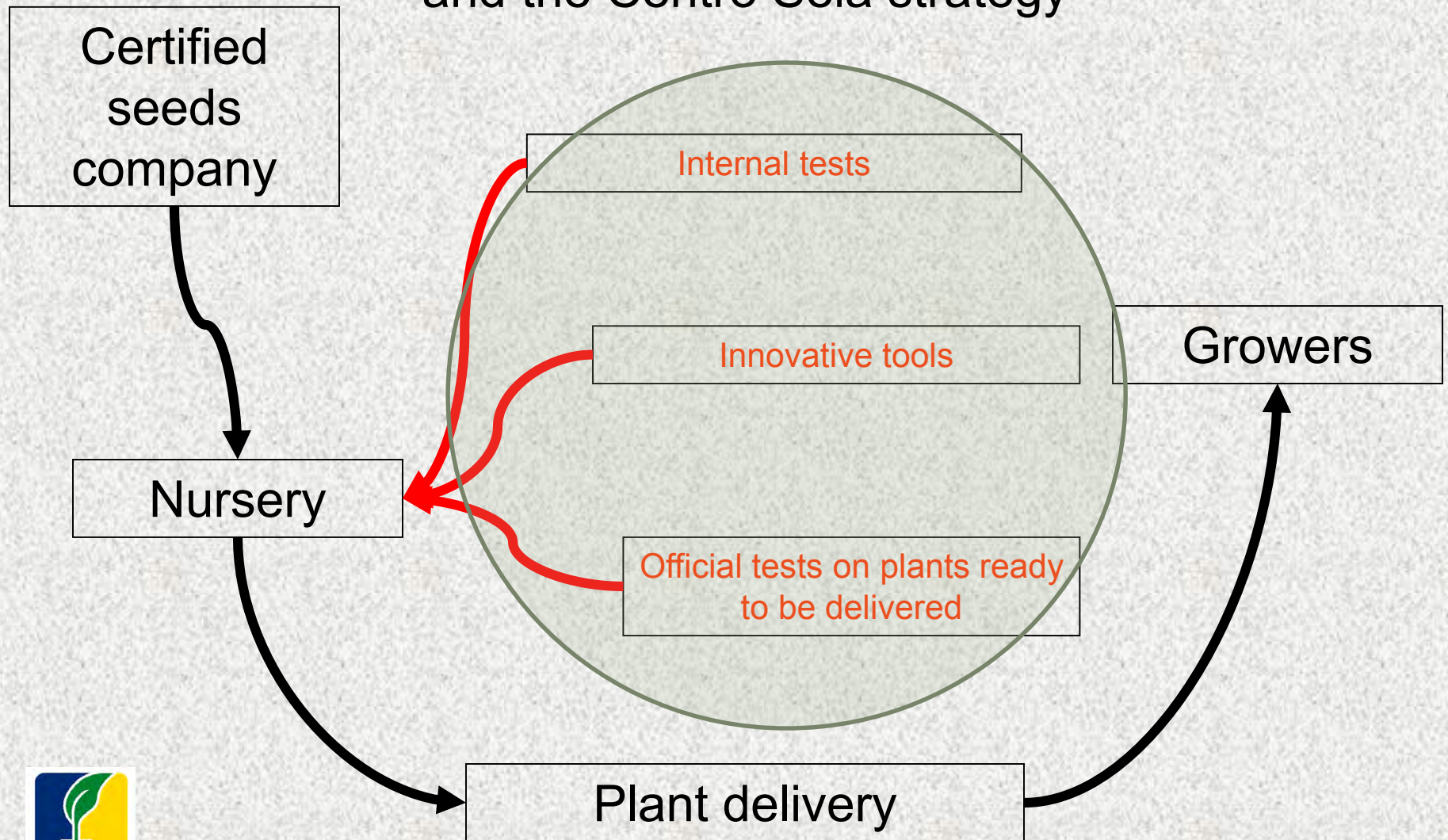
III-1-3 Inventor for

III-1-4 Name (LAST, First) **MARCELLINO, Filippo**



Specific **diagnostic**
for phytopathological
analysis during the
grafting process
developed together
with Cersaa and
Dr. **Andrea Minuto**

The chain, the phytosanitary risk and the Centro Seia strategy





Trade mark: ***ELITE***

Commessa IT MI.11.p13

Nr e titolo STP 005/207

CERTIFICATO DI CONFORMITA'
N° 11/058P

***“production of young tomato plants grafted
by sterile cutting techniques”***

What's going on in our market

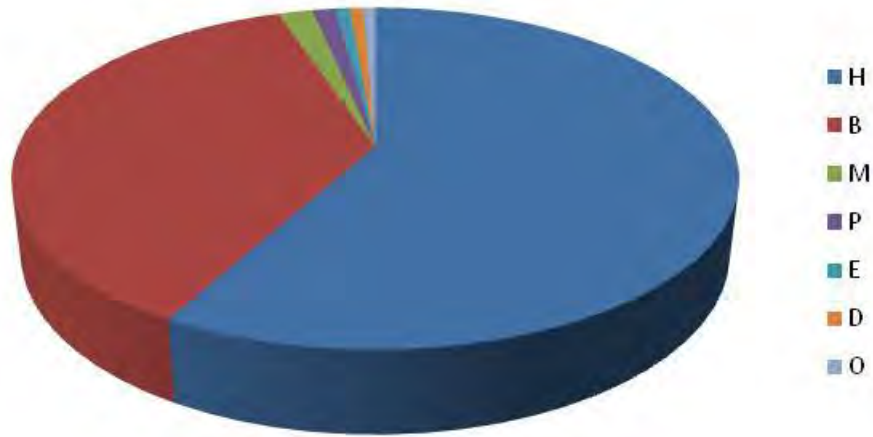


Tomato growing methods are evolving rapidly in Italy, with an increasing shift towards **soilless** cultivation.

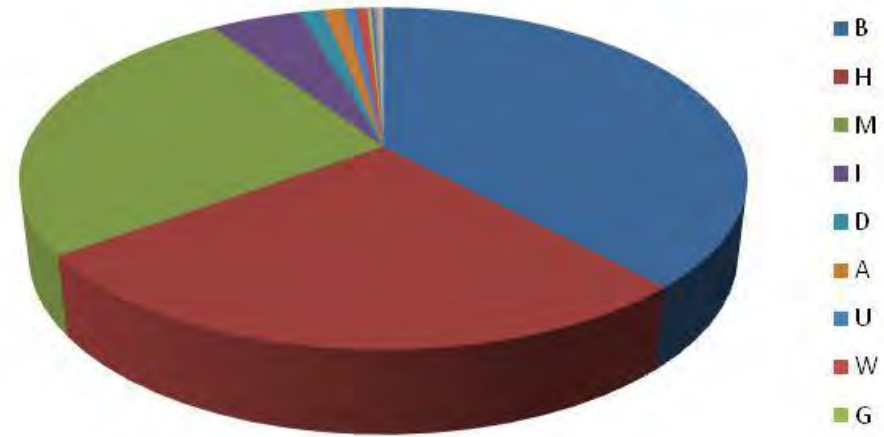




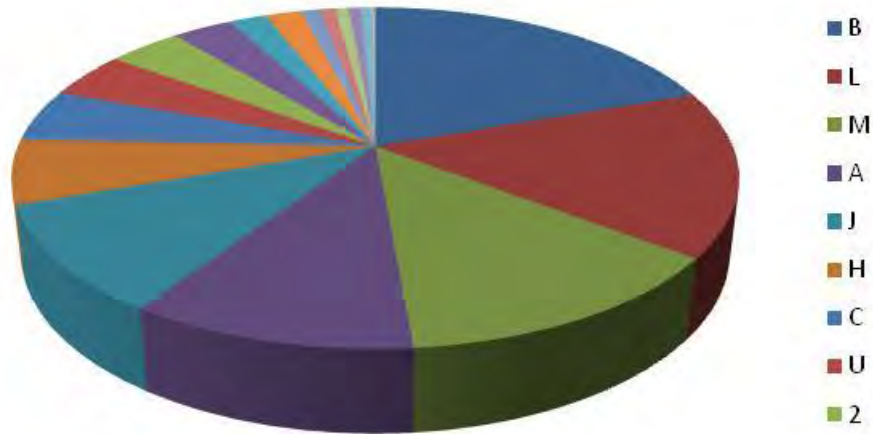
Tomato rootstocks 2004



Tomato rootstocks 2008



Tomato rootstocks 2013



Increasing number of rootstocks for young tomato plants at Centro Seia.

What we are thinking of doing

Our aims and GSPP protocol

- To deliver healthy product, with a strong, shared **hygiene protocol** to be adapted to all young tomato plants
- In the case of Cmm, to understand **the origins of the problem**, and with the cooperation of the seed companies and the growers, to face the problem together (**TIP**)
- To involve** all young plant raisers and to train growers in how to manage the problem

Next steps and GSPP protocol

- We have to understand how to manage tomato seeds which are not GSPP
- We have to see how the protocol can be adapted to different types of nurseries (Mediterranean type, old nurseries, etc.)
- If one of the players, be they a Seed company, a Young plant raiser or a grower, starts a court case, the TIP cannot begin. But we need to share responsibility and find solutions together.



Next steps and GSPP protocol

- We need to work together, **in the case of court action as well**
- Consideration must be given to how the protocol can be better adapted to **young plant raisers' needs**
- As part of the GSPP organization, the key players in the vegetable market can **share ideas and raise the level** of phytosanitary quality of tomato production, giving **the production chain added value**

Acknowledgments

Dr. Andrea Minuto

Centro di Saggio e Laboratorio

Fitopatologico Centro di Sperimentazione
e Assistenza Agricola Albenga (SV)

***Thank you
for your attention!***