INCOTEC INTEGRATED COATING AND SEED TECHNOLOGY ®

New developments in seedtechnology

DanSeed Symposium
26feb08

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0411V8RW

Contents

- Introduction Incotec
- Technologies
  - Overview incl. future perspectives
- Applications
  - Improved germination characteristics
  - Improved seed production
  - Efficient distribution of plant protection products

Introduction of Incotec

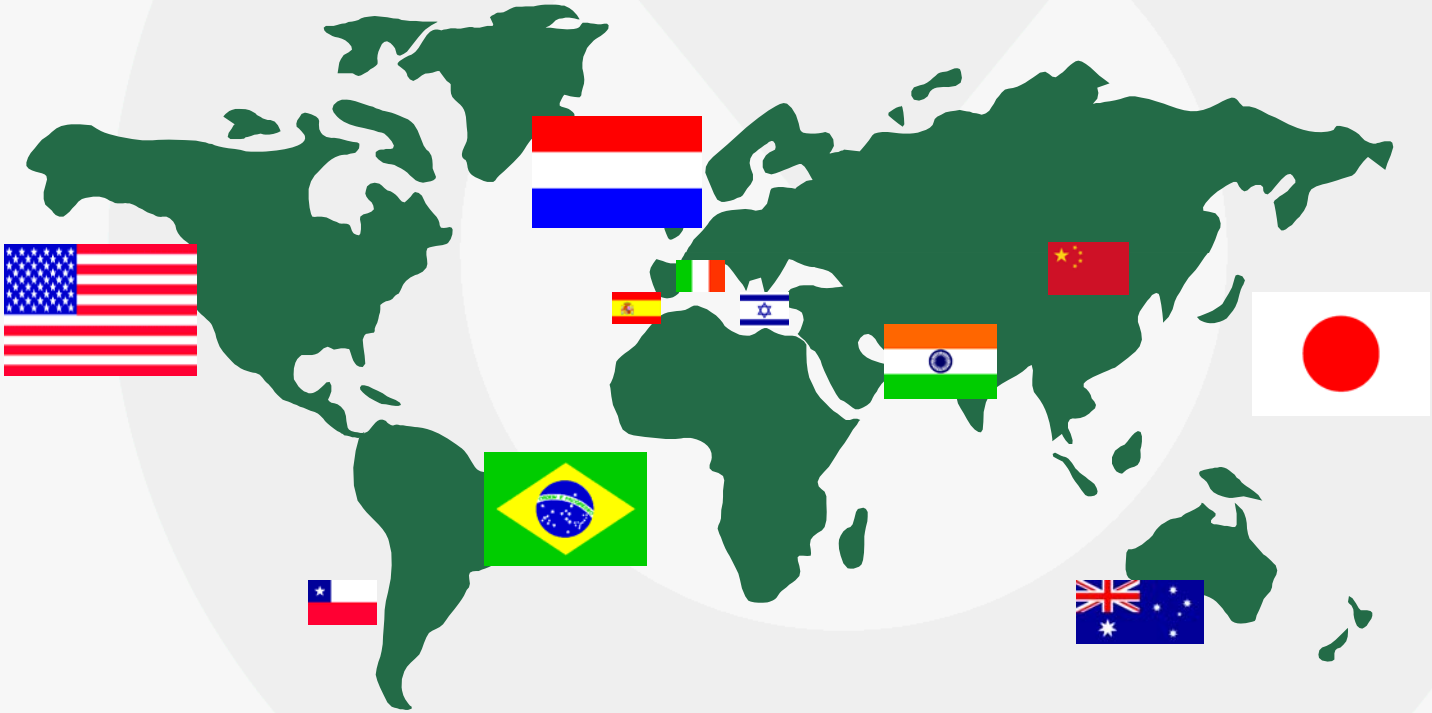
- 2006: Acquisition Proteios International
- 2005: Acquisition of Flower Seed Technology
- 2002: Incotec independent (MBO)
- 1996: Merge of Asgrow coating technology
- 1996: Acquired ISO 9001 status
- 1989: Incotec an independent company
- 1978: Start production facility USA
- 1973: Introduction of priming Endive
- 1969: Start research seed technology
- 1968: Introduction of Split Pill
- 1963: Start research coating technology within Royal Sluis

INCOTEC world-wide

Employees in 2008: 270

Production locations: 6

Research group: 35

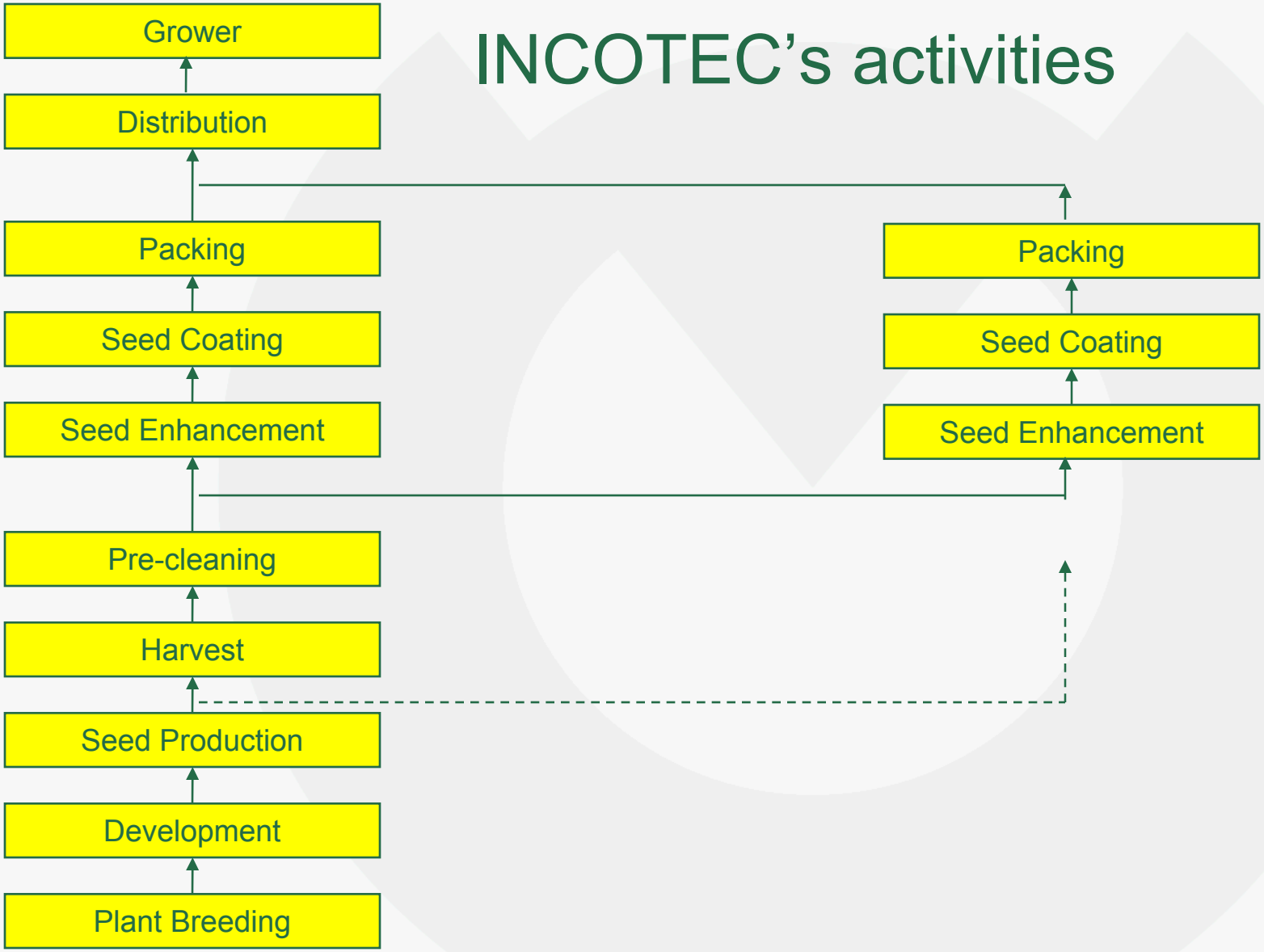


INCOTEC's activities

Market's

- Vegetable seeds
- Flower seeds
- Tobacco seeds
- Agronomic seed crops

INCOTEC's activities



TECHNOLOGIES

- Seed enhancement
  - Upgrading
  - Priming
  - Disinfection
- Seed coating
  - Encrusting & Pelleting
  - Filmcoating
  - Additives & Actives

Seed enhancement

Objectives:

- Improve speed of emergence
- Improve germination capacity
- Overcome dormancy
- Eradicate seed-borne diseases

Original lot

After seed enhancement

Upgrading

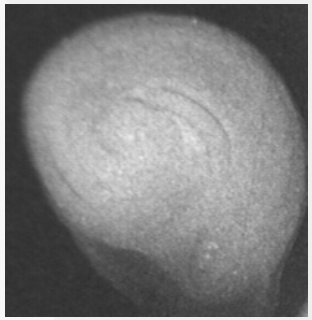
Separation in fractions:

- Mechanical
- Liquid density separation

X-ray Upgrading

After 10 years of research: Incotec presents an X-ray based sorting machine for tomato seed

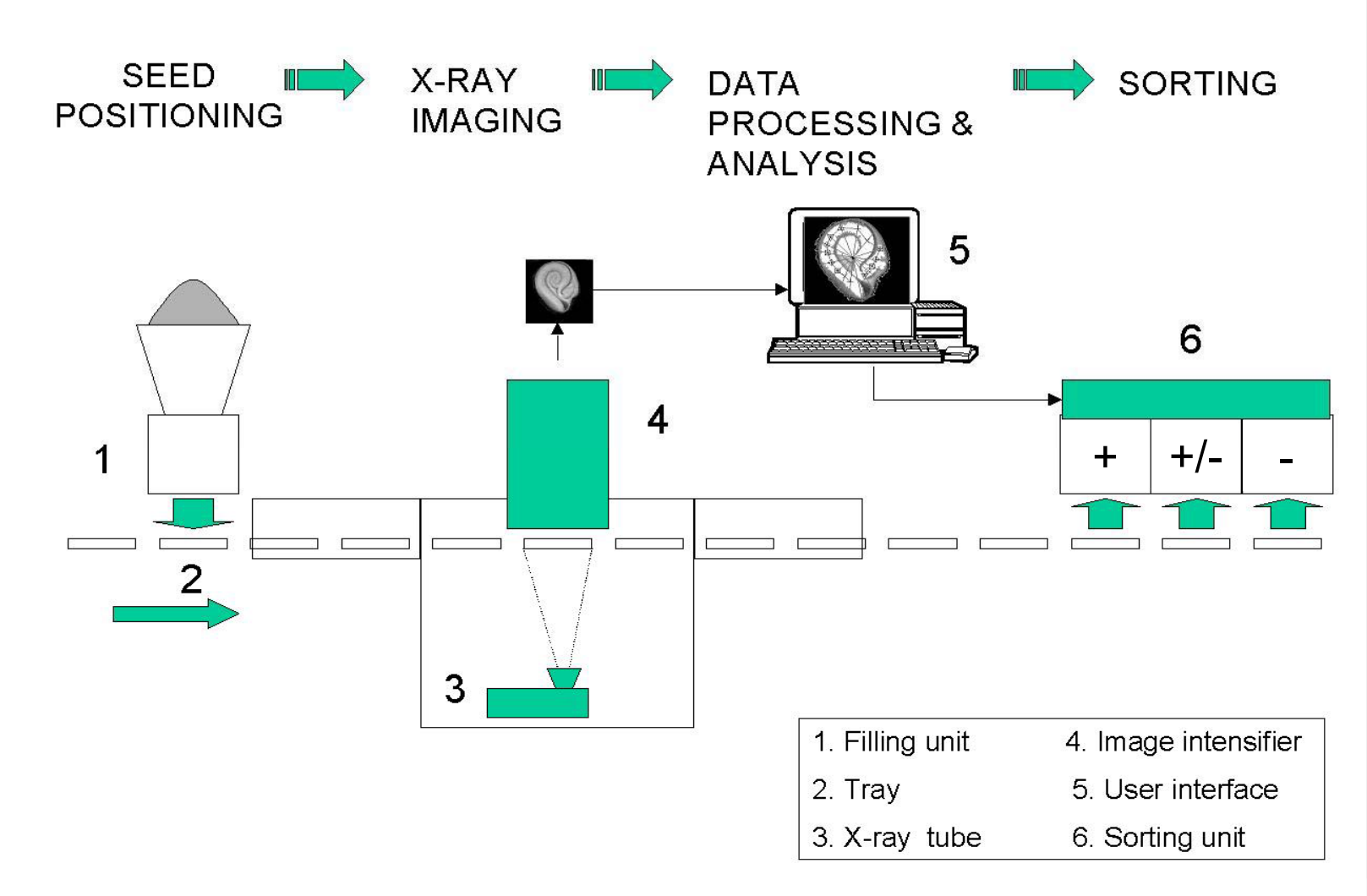
- X-ray:
  - better, more efficient upgrading
  - new technology
- Tomato
  - problems with seed quality
  - expensive seed: economically interesting,
  - combination with priming is essential



not primed

primed

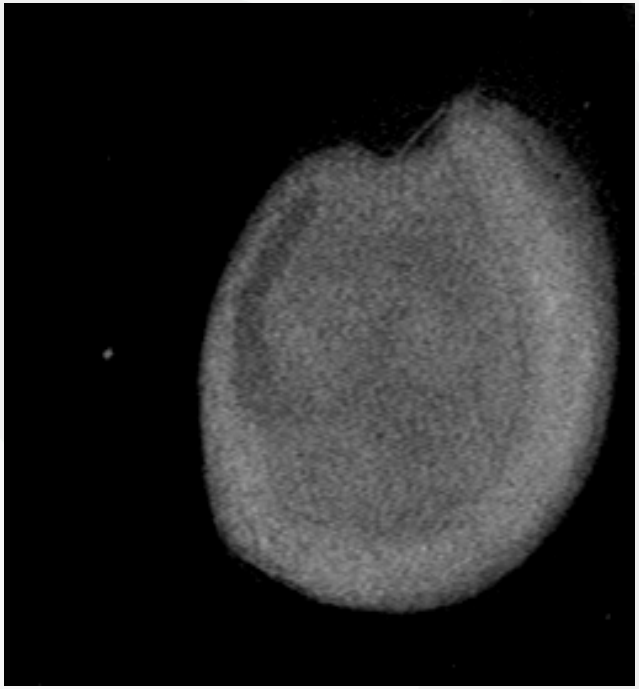
Design X-ray seed sorting machine



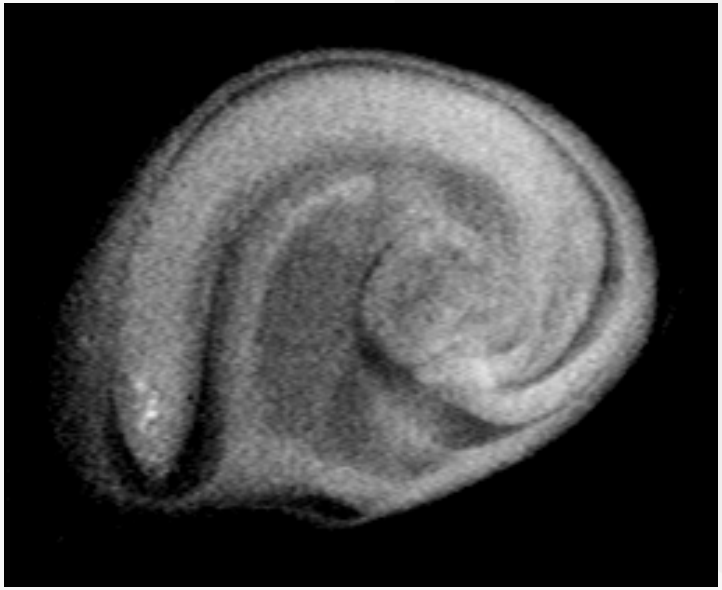
X-Ray seed sorting machine

X-Ray picture ↔ GLB Evaluation

Good



Not germinated

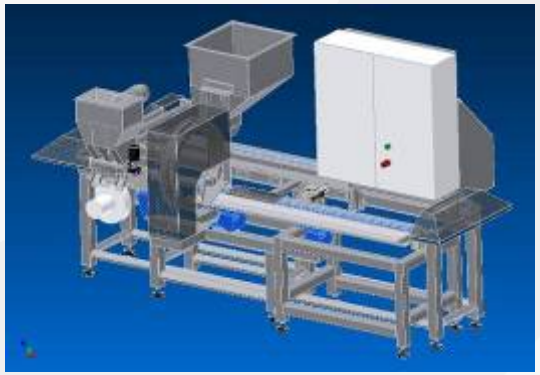


Abnormal

Upgrading

Future:

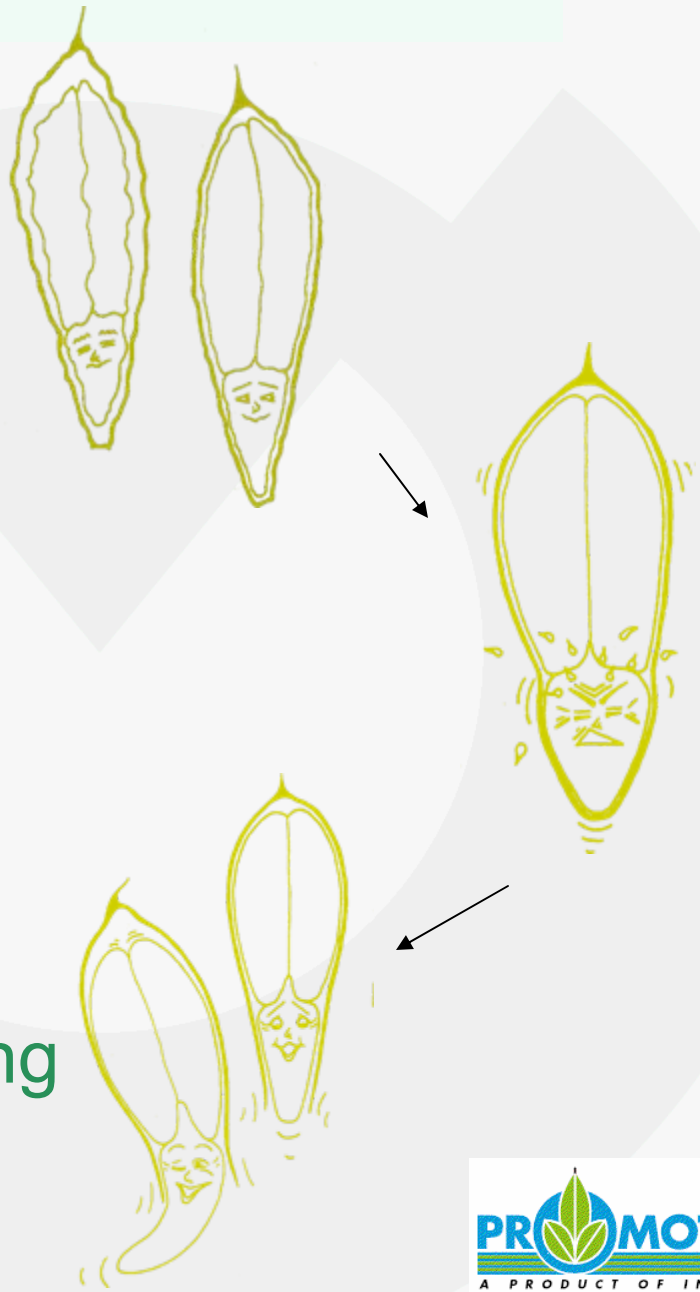
- Application of X-ray on more crops
- More new upgrading technologies
  - External vision



www.seedsorter.com

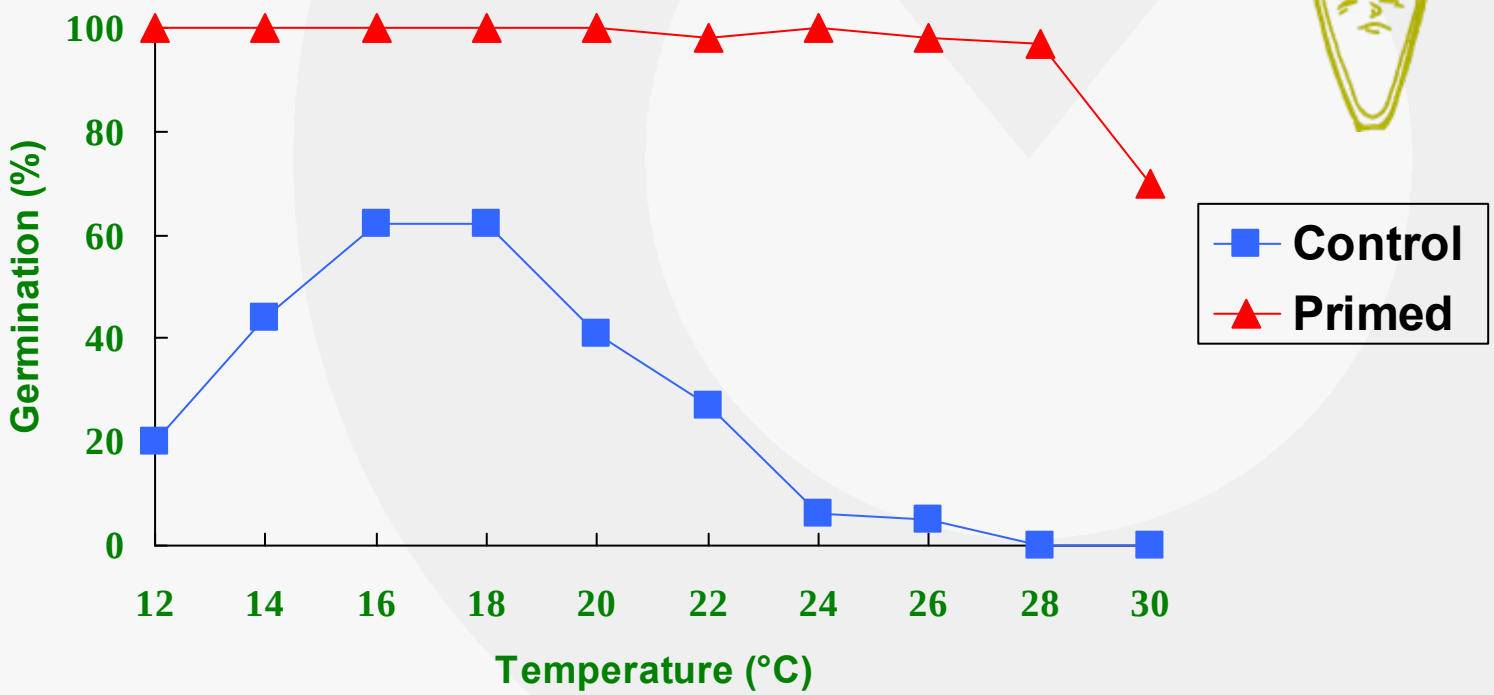
Seed priming

- Suitable conditions:
  - Temperature
  - Oxygen
  - Duration
  - Moisture
- Major technologies:
  - Osmotic priming
  - Solid Matrix Priming
  - Drum priming



Effect of priming

Dormancy breaking



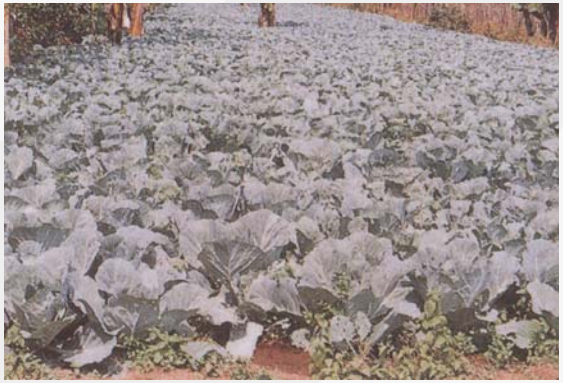
Priming

Future:

- Markers for optimal priming
  - Search continues
- Large scale priming
  - Sugarbeet

Disinfection

- Eradicate seed-borne (bacterial) diseases Xanthomonas campestris on Brassica
  - Effective combination with priming
  - Xanthomonas assays became more distinctive



Disinfection

Future:

- Seed borne diseases increasingly problematic
- Sustainable solutions needed:
  - Heat treatment alternative for HWT
  - Organic compounds

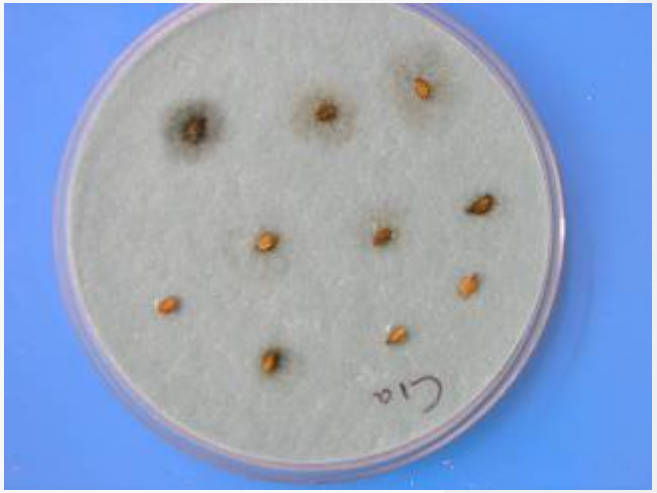
Disinfection

Effect of heat treatment

Crop	Seedborne Micro-Organisms	Eradication Micro-Organisms	Negative Effects
Spinach	*Stemphylium, Verticillium*	+	None
Carrot	*Alternaria sp.*	+	None
Brassica	*Xcc*	+	Physical, quality

Disinfection

Effect of organic compound on carrot with Alternaria



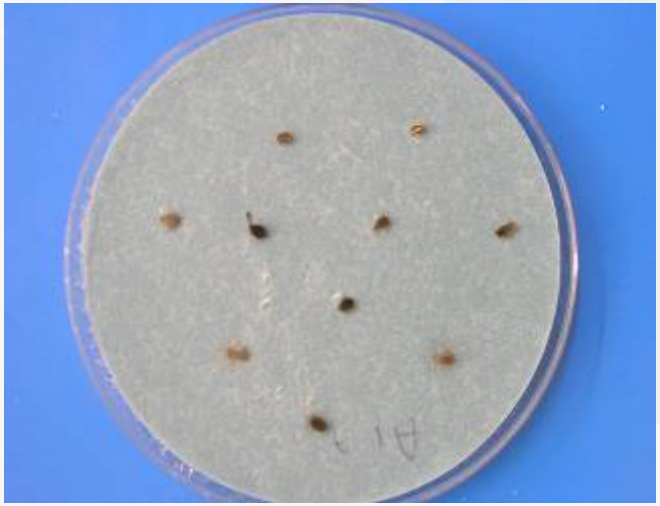
Control

Lot A

80% ← *A. radicina* → 5%

10% ← *A. dauci* → 0%

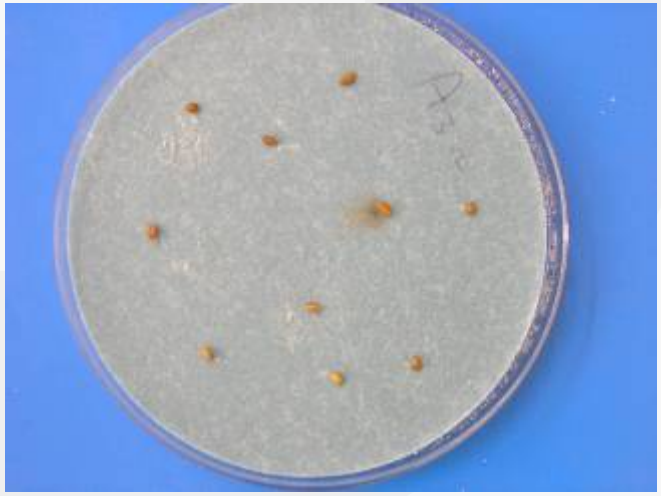
4.07.032



Lot B

45% ← *A. radicina* → 0%

55% ← *A. dauci* → 0%

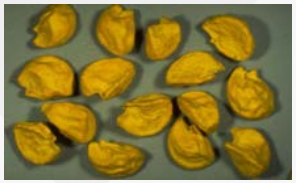


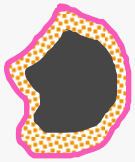
Seed coating

Product Forms

Basiscoat,
Weight increase 0.2-2%

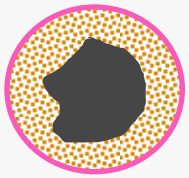
Complete Filmcoat,
Weight increase 3-20%





Encrustation,
Weight increase 1-5X

Mini pill,
Weight increase 10-25X

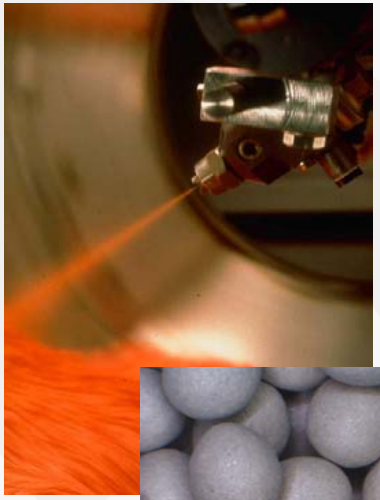


Standard pill,
Weight increase 15-100X

Seed coating

Objectives:

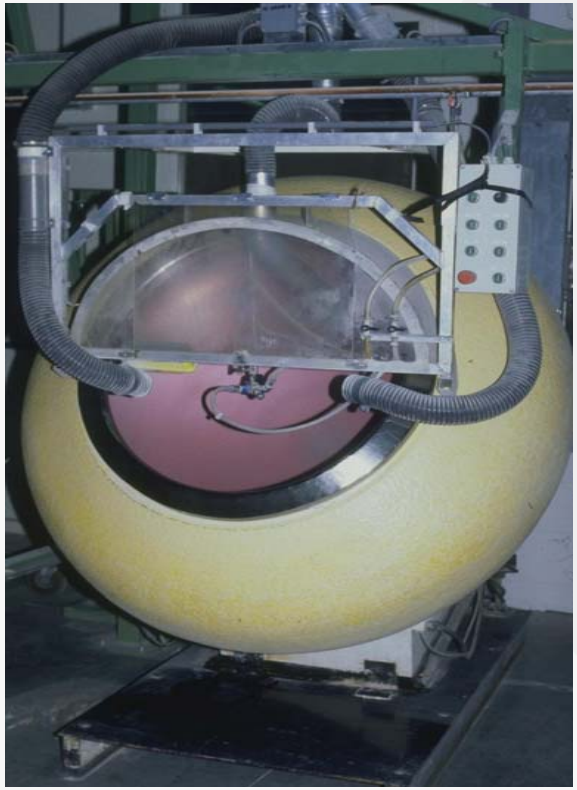
- Improved plantability
- Carrier for actives (PPP's)
- Cosmetic appearance
- Improved processability
- Reduced dustiness
- Improved distribution of additives



vision disco

Pelleting & Encrustation

Coating pan

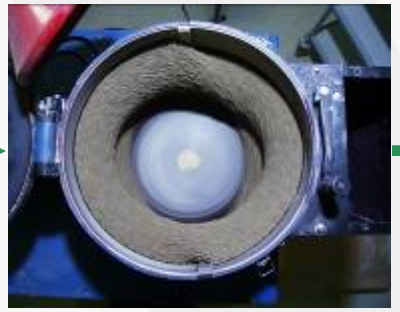


Rotary coater

Rotary pelleting

- A fully automated process for encrustation and pelleting
- Advantages: short process, 2-4 higer capacity, little physical labour, closed system, little moisture uptake

Raw Seed



2 Minutes

5 Minutes

3-3.5mm Onion pellets

Filmcoating

Rotary coaters

- Low/mediumdosages
- Without or with post drying

Side Vented Pan Coaters

- High rates
- Continuous drying

Application of plant protection products

- Type of formulation
- Tox classification
- Rate of active
- Product form
- Occurance of phytotox
- Priming treatment
- Cost price

- Liquid
- Powder
- Color
- Solvent
- Smell

Low	0,1 - 2 w/w %
Medium	2 - 10 w/w %
High	10 - 500 w/w %

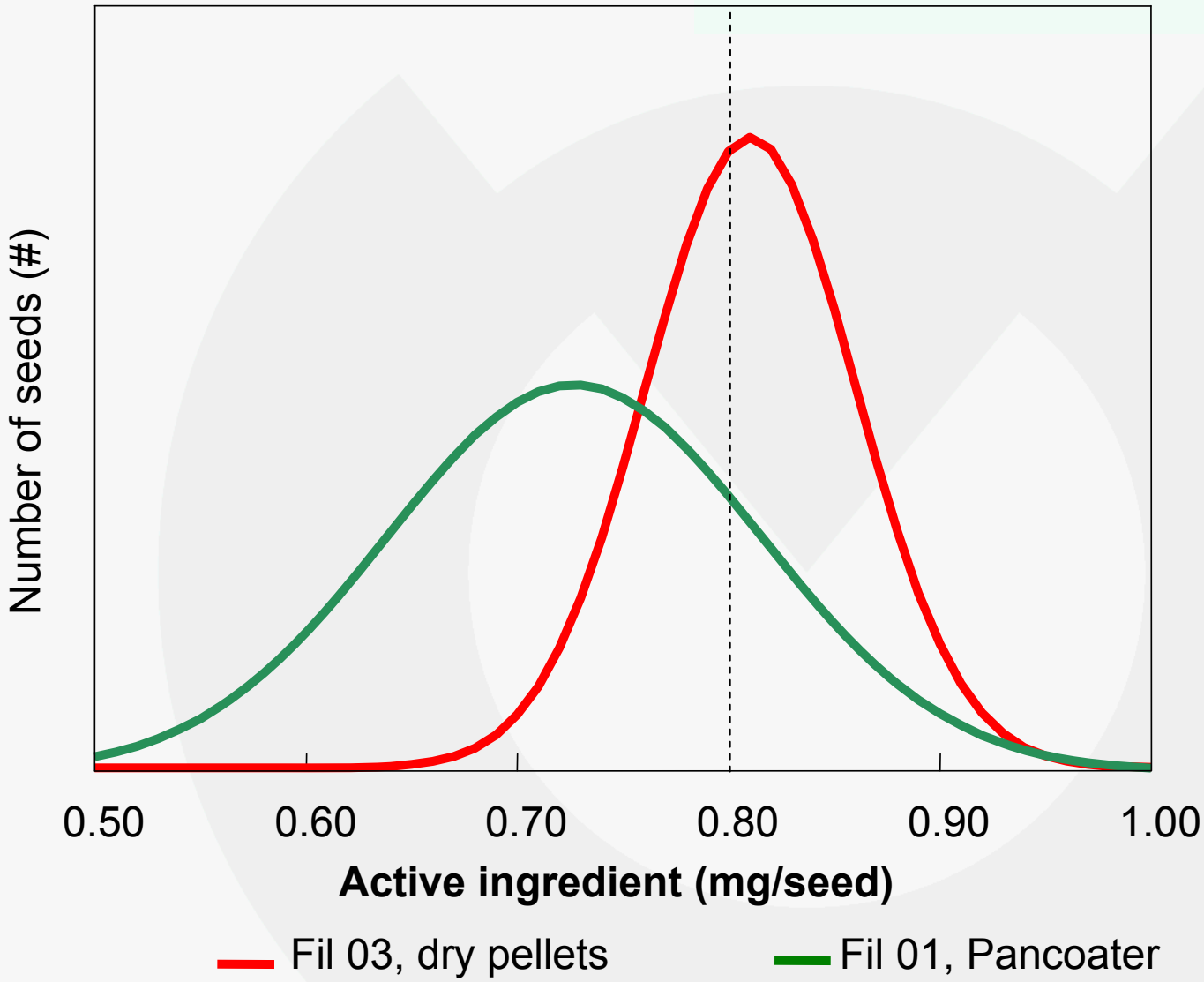
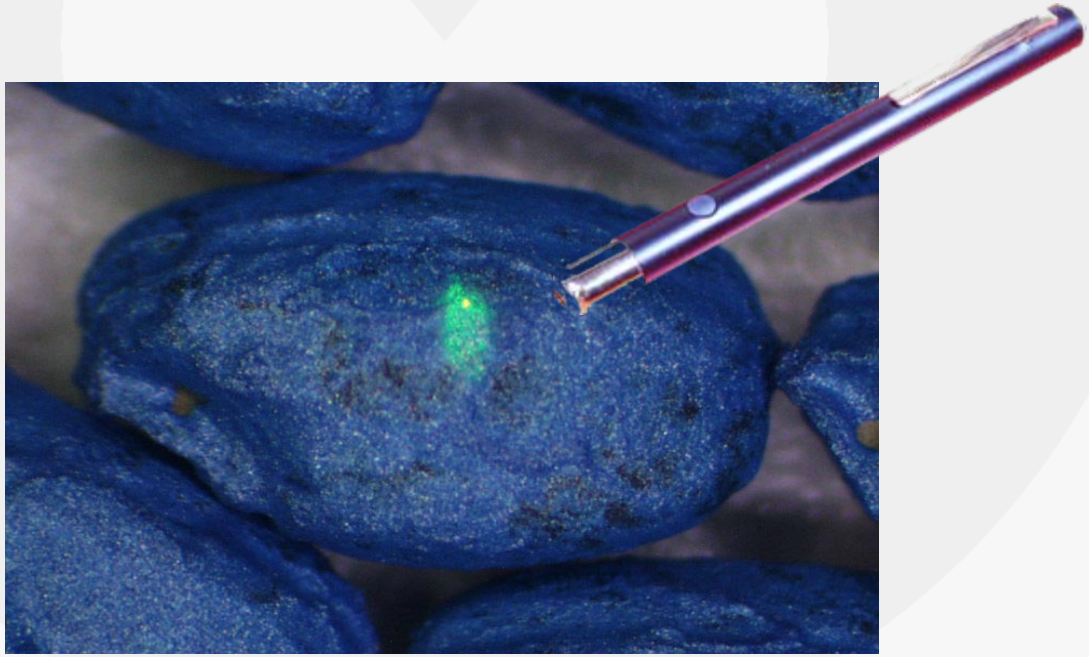


Fig. 8: Histograms of Cruiser® distribution on lettuce pellets coated with two different coating technologies

Speciality coating

For recognition of your own material

- Visible marker
- Invisible marker (Tracer)



Disco filmcoat formulations

- 20 years' experience
- Quick, professional service
- Personalized support through branch offices world wide
- Perfect adhesion and seed protection
- Guaranteed dust-free
- Absolutely safe to use
- Optimal seed flow
- Blending facilities world wide
- Tailor-made formulations possible

Seed Coating

Future:

- More plant protection products applied as seed treatment
- More professional approach in application of additives
- Organic filmcoat

APPLICATIONS PER CROP

Flowers:
(FST)

Mainly Vegetables:

- Lettuce
- Celery
- Chicory
- Endive
- Leek
- Carrot
- Onion
- Pepper
- Tomato
- Brassica
- Spinach
- Fennel
- Tobacco

Agronomics: supply

(Film) coating materials

Split Pill Thermocure Lettuce

Product adaptation through the years

Lettuce - for plantraisers

- Split Pill (developed in 1968!)
  - 3.5 mm (organic)
  - 2.75 mm
- Split Pill Thermocure
  - pellets above including priming
  - priming based on upper temperature limit and deterioration (Special cultivar lists)
- Sanokote
  - 3.5 mm pellet including Gaucho

Quality Inspection

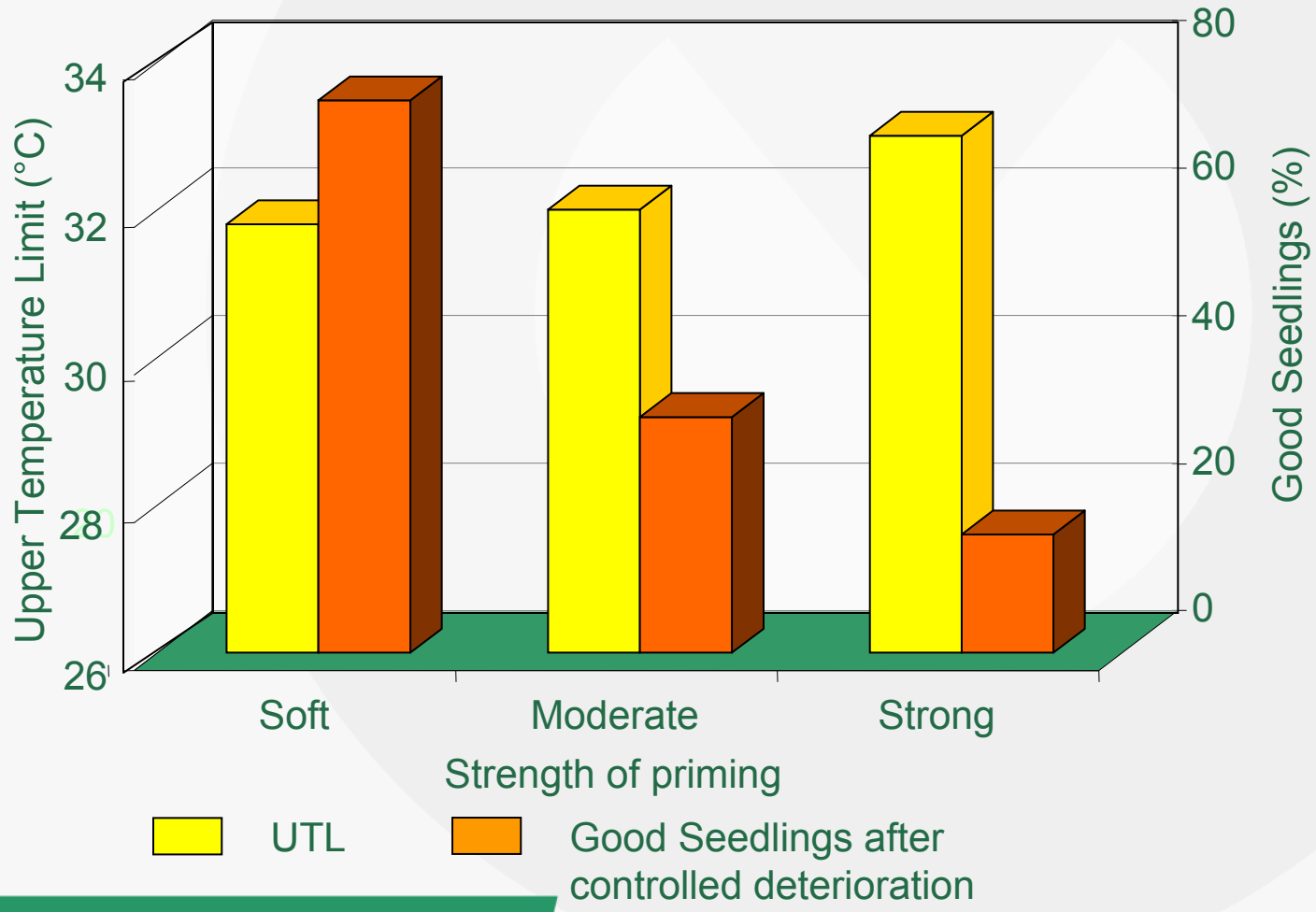
- Split Pill Thermocure:
  - Seed: Planttype, thermogradient
  - SPT: GHT, thermogradient, CDTest

Controlled Deterioration Test:

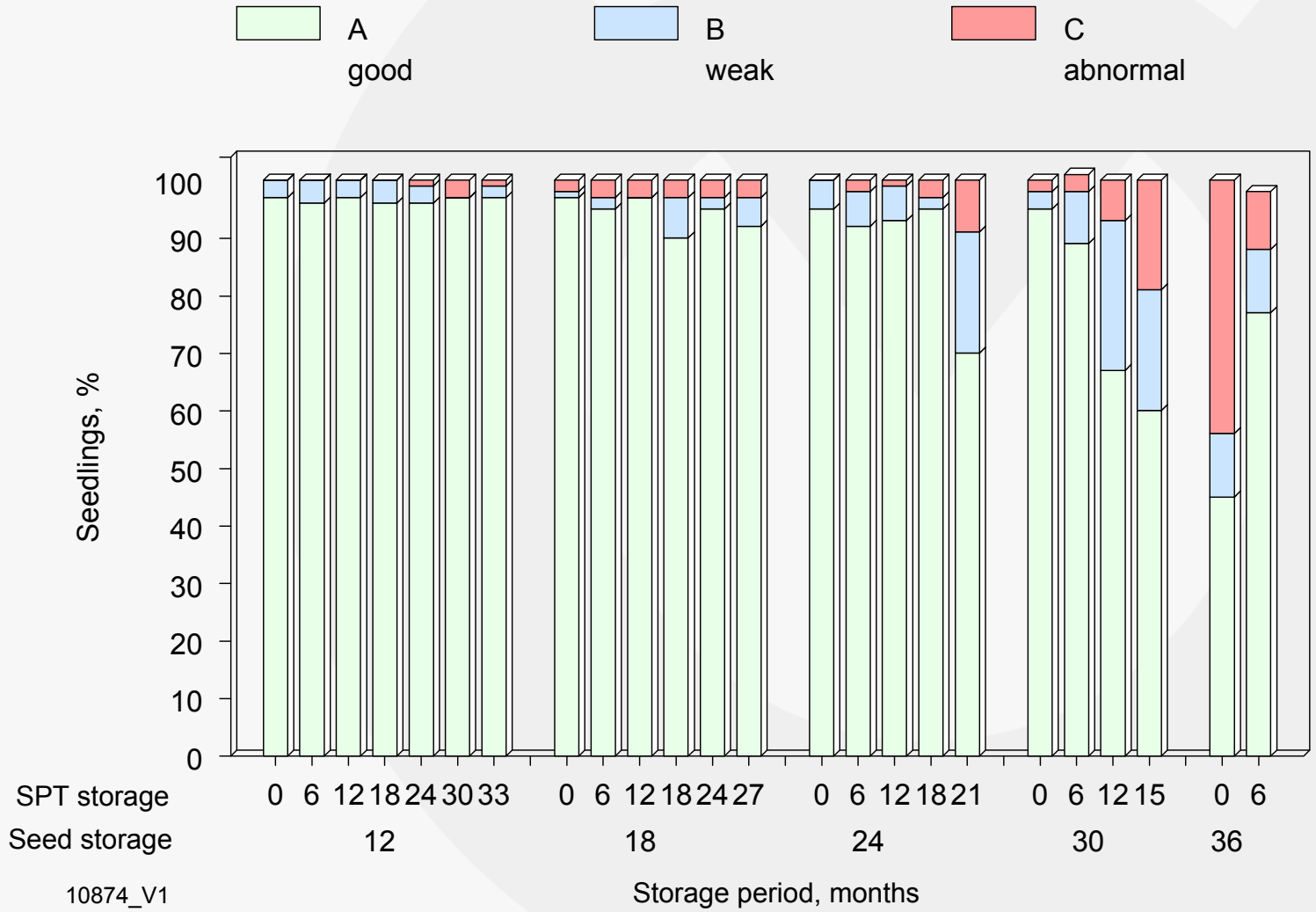
- Determine sensitivity for ageing
- As warning signal for short shelflife
- To improve the production process

Priming and Shelflife Lettuce

An enhanced priming effect may reduce shelflife



Effect of seed storage at 15°C/30% rh on quality of SPT
Storage of SPT cv. V at 20°C/40% rh



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Enhancement tomato rootstock

Seeking for a faster, uniform germination

Solanum rootstock

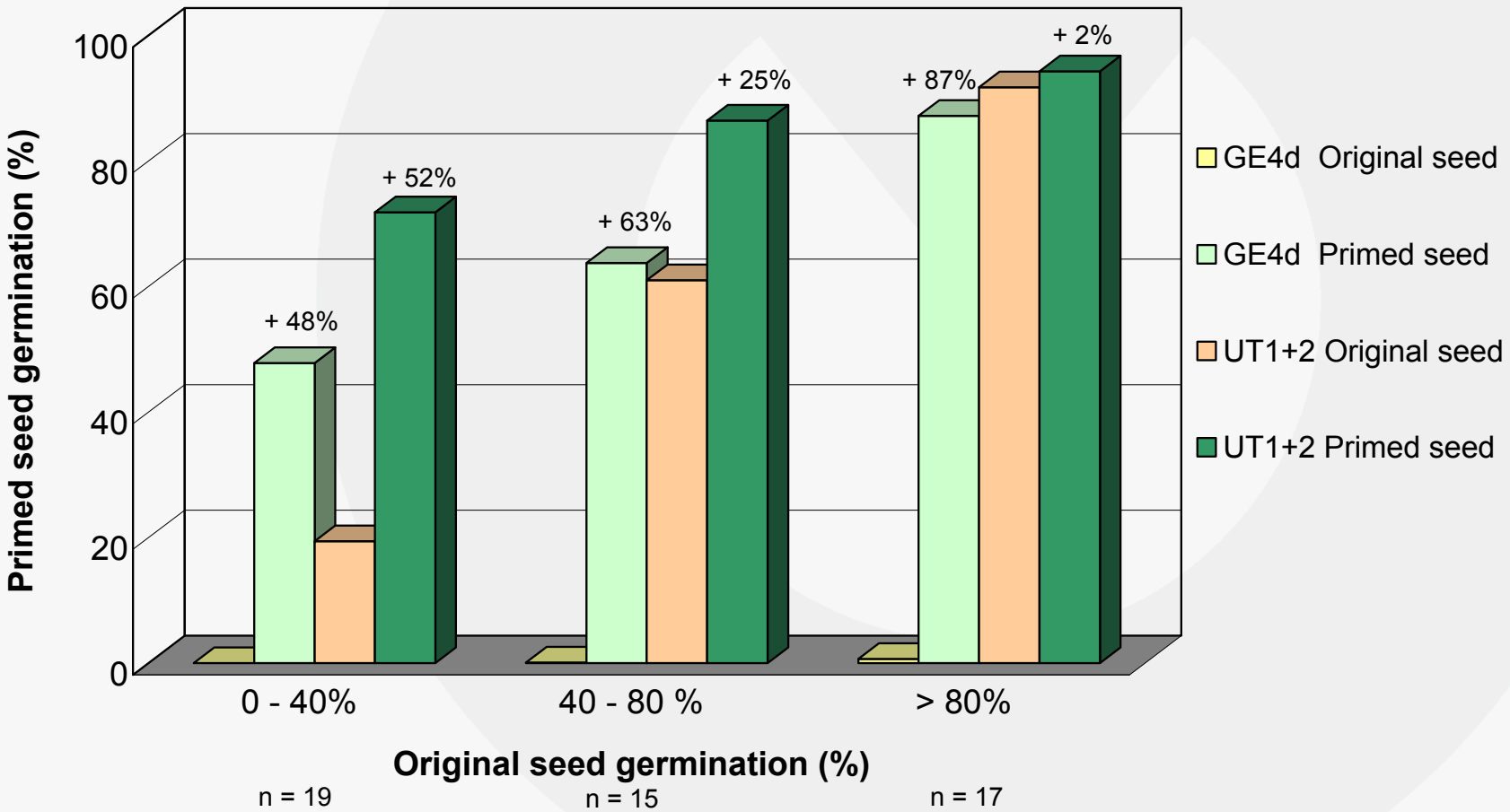
- Used for grafting of tomato, eggplant.
  - more vigorous growth
  - resistancies against soil pathogens
- Several species
  - interspecific hybrids between tomato and wild tomato (“tomato rootstock”)
  - wild species, like S. torvum
- Problems
  - slow, uneven germination
  - low total germination %

Results rootstock priming

- Broad approach to determine possible causes of dormancy/slow germination
- Research focused on determining crucial factors
- Tailor made priming, based on pilot results

Effect of priming on different quality seedlots

Germination Energy after 4d (GE4d) and Usable Transplants after 14d (UT1+2



Tomato rootstock: effect of priming

Greenhouse 25°C test Incotec, 5d after sowing

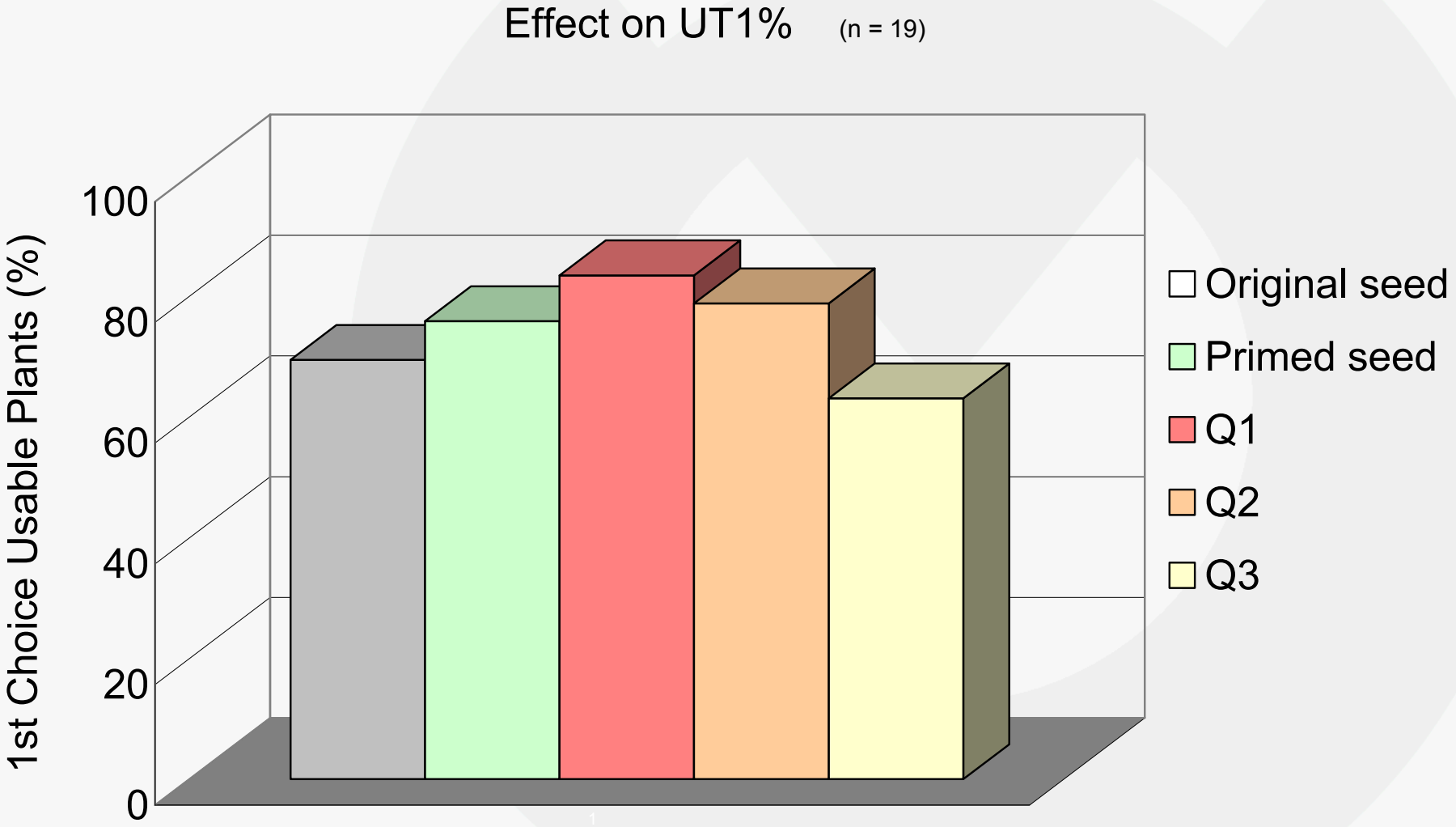
Original seed

Primed seed

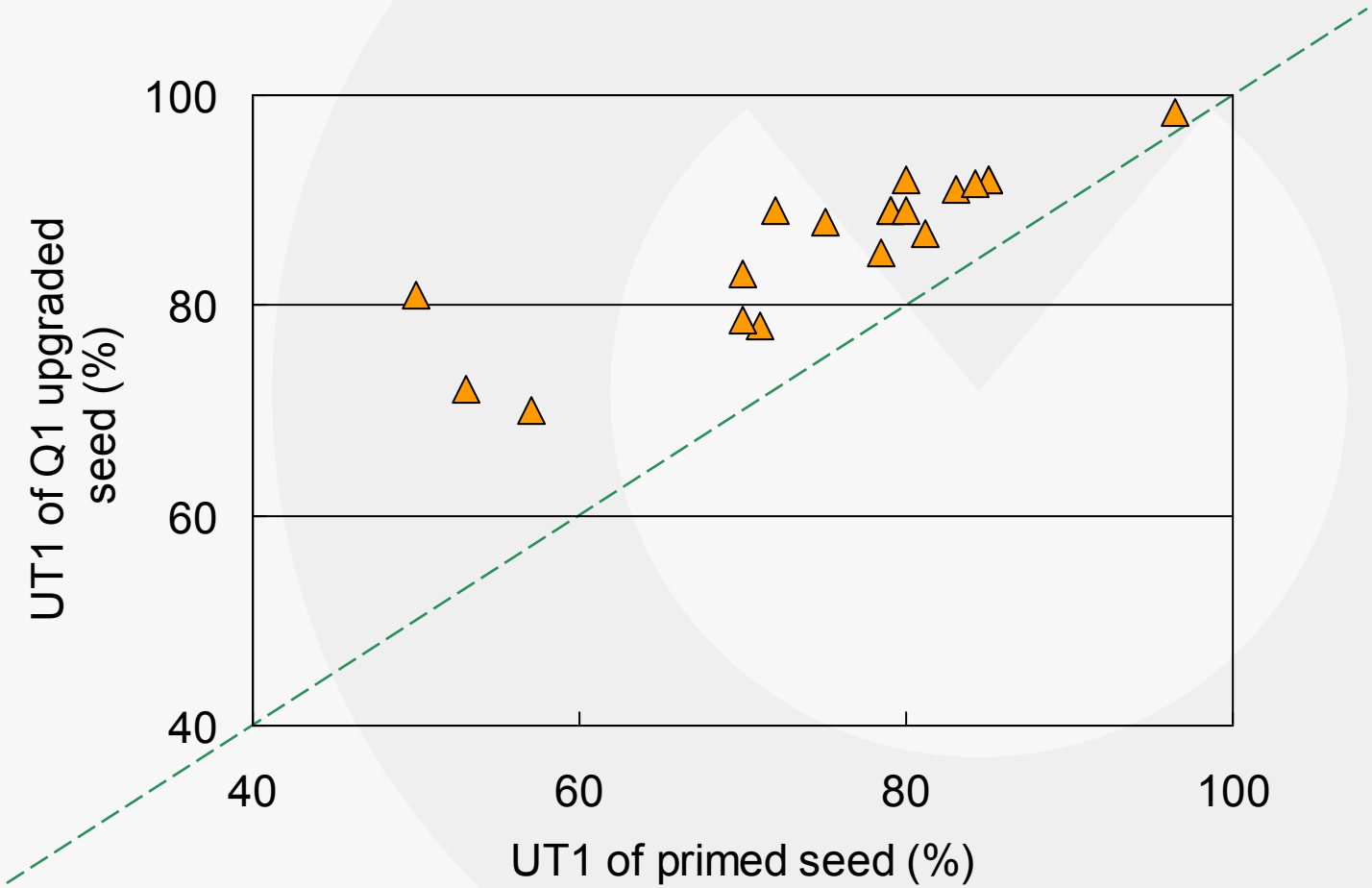
Upgrading tomato

A new way of upgrading by using X-ray images

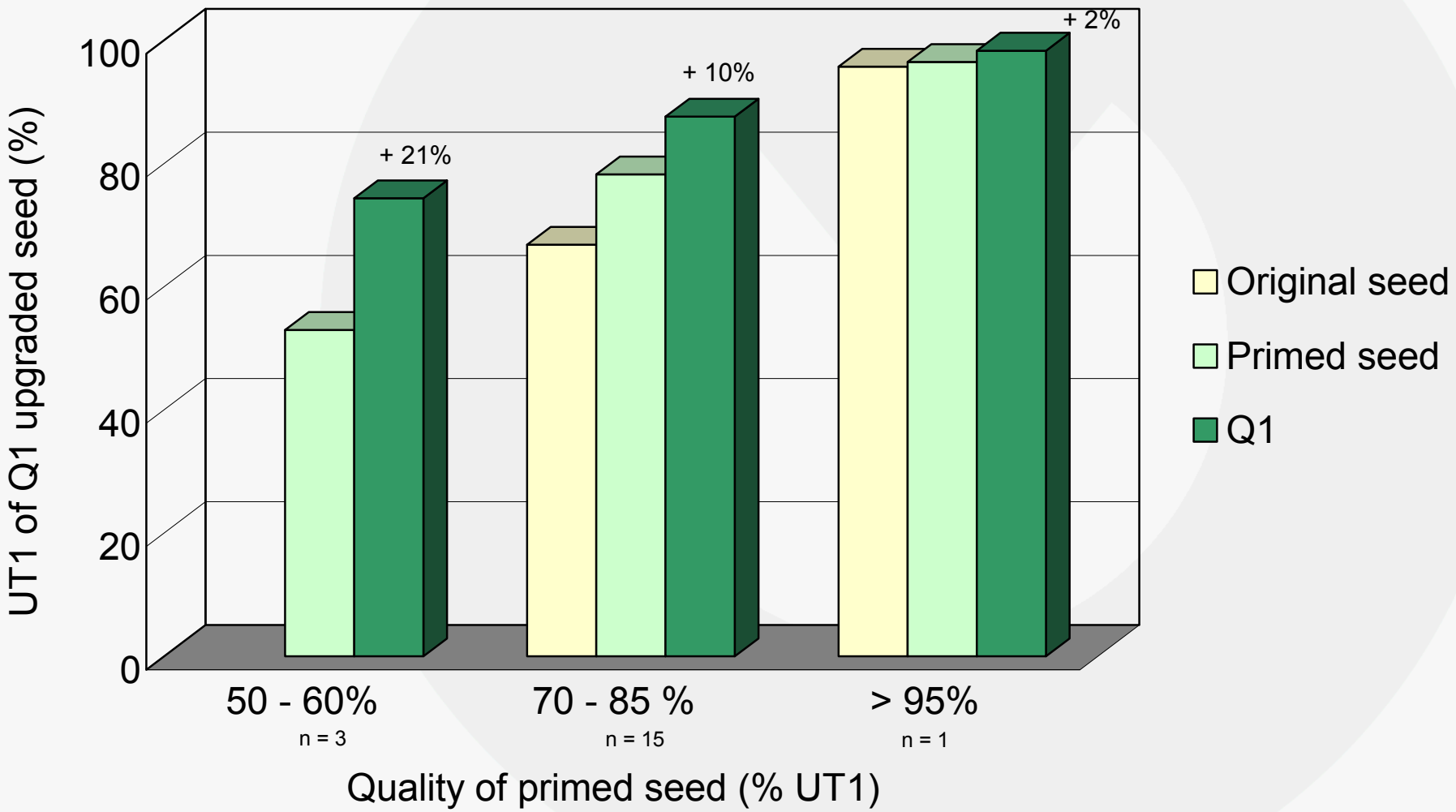
Results of X-Ray machine upgrading



Effect on UT1 % per lot

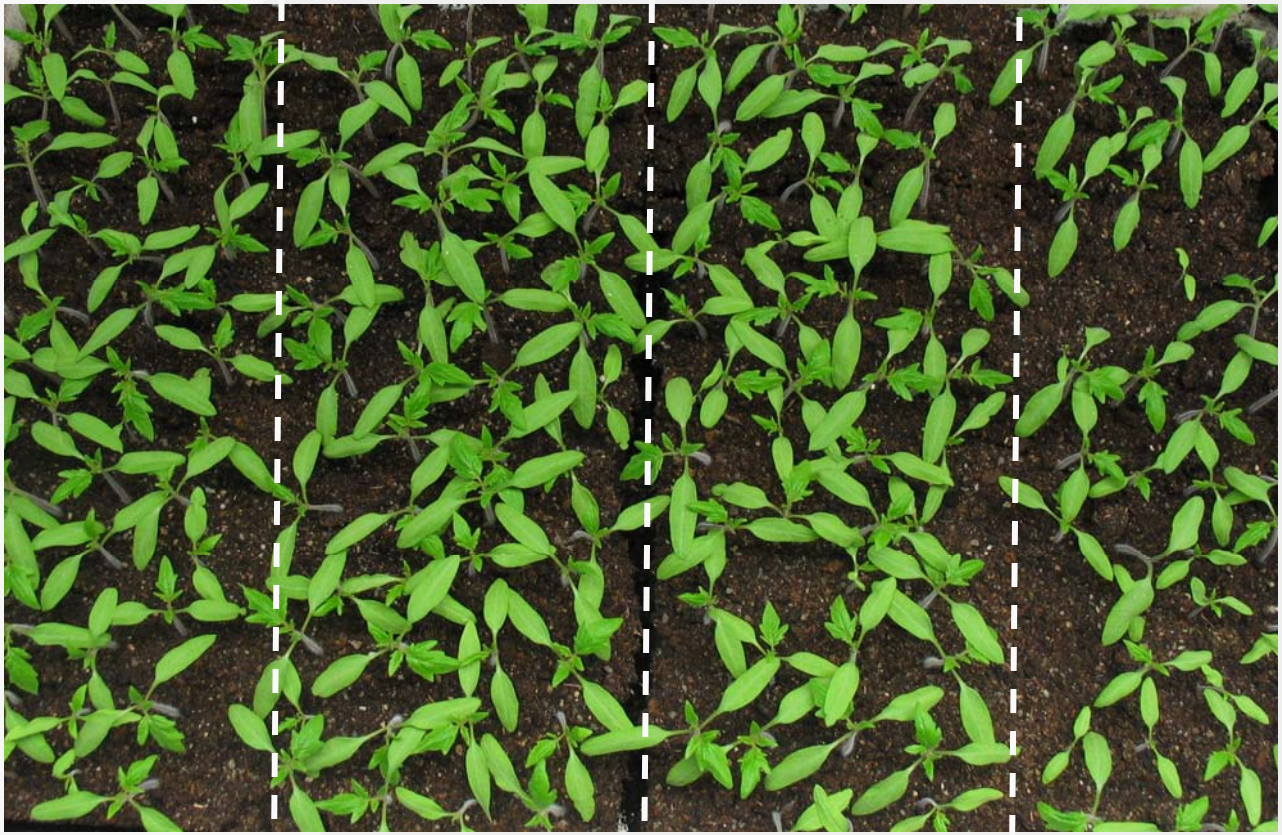


Averaged effects for different quality seedlots



Results of machine upgrading

Greenhouse 25°C test Incotec, 11d after sowing



	Primed seed	Q1	Q2	Q3
UT1	74%	89%	66%	41%
Fr wht	100%	36%	45%	19%

Spinach SDR

A new way to synchronise spinach flowering

Spinach (SDR)

- Spinach requires a daylenght of 12 - 14h for stem and flower formation
- SDR = priming which results in vernalisation
- Speed of bolting and flowering improved up to more than a week

Spinach (SDR)

- SDR may be used on either Male and Female lines
- Improved synchronized bolting and flowering in combination with fast bolting female or male types
- Higher quantity of flowers
- Higher pollen production
- More uniform bolting
- More bolting side shoots

Spinach (SDR)

- Also used in combination with non treated male, for longer flowering period
- Longer flowering in combination with higher pollen pressure leads to improved hybridity
- Less stress symptoms
- Increased seed production

Sanokote Smart

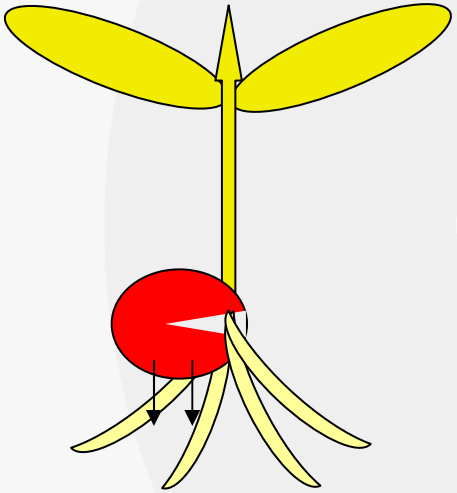
Lettuce and Brassica

How smart a dummy can be!

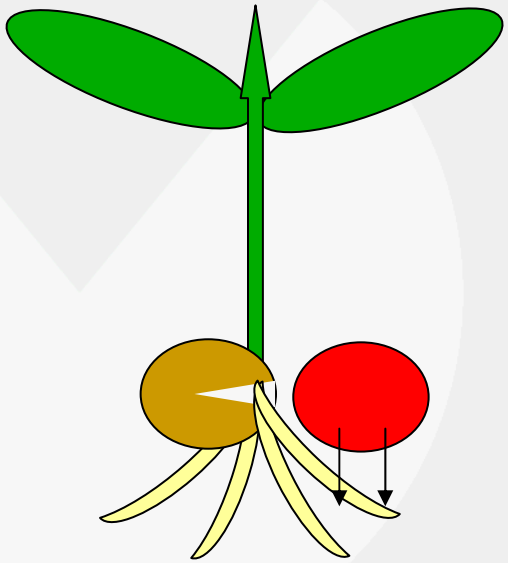
Why Smart technology?

- Development of new systemic insecticides
- Seed treatment can have negative effects:
  - emergence
  - % good seedlings
  - shelflife

Concept Sanokote® Smart



Standard Sanokote / Sanocrust

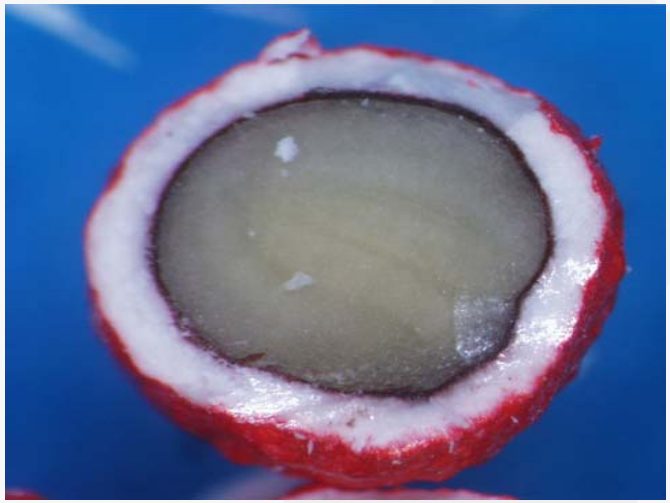


Standard Splitpill / zaad + Sanokote Smart

Characteristics Sanokote® Smart

- Is a seed treatment
- Contains not germinating seed
- Systemic active ingredients
  - Gaucho (imidacloprid) Bayer
  - Poncho (clothianidin) Bayer
  - Cruiser (thiamethoxam) Syngenta
- Registration for seedtreatment available
- Produced as standard seedcoating product
- Sanokote® Smart is sown beside standard pellet/seed

Sanokote® Smart in practise

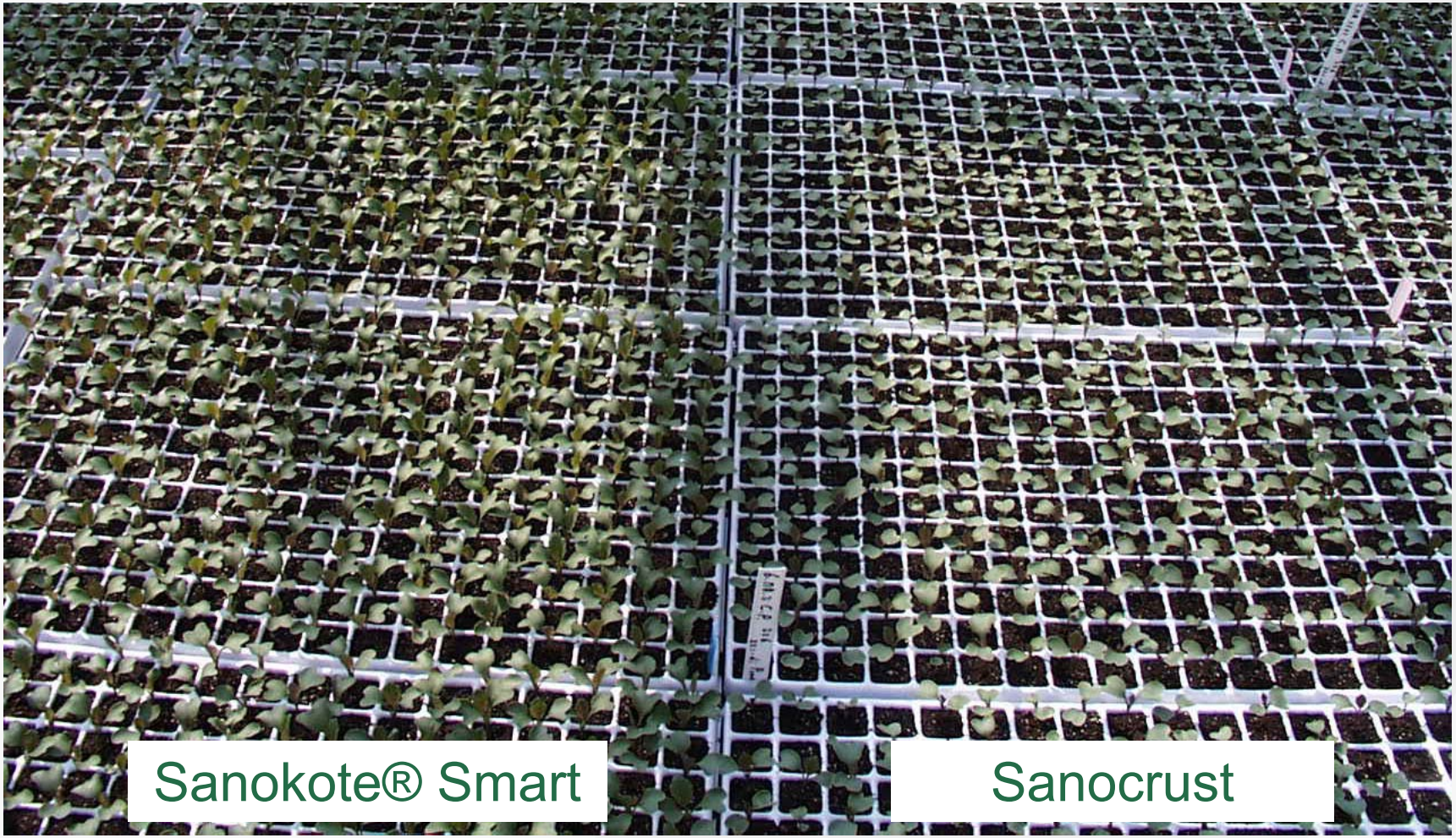


Brassica

Lettuce

Sanokote® Smart in practise

Brassica



Thrips in white cabbage with Gaucho

Object	Active ingr. mg/plant	Count Date (insects per 5 plants)			
		13 juli	8 aug	7 sep	13 okt
Check	0	0	0.3	16	48
Sanocrust	1.4	0	0	11	23
Sanokote® Smart	1.4	0	0	8	14
Admire soiltreatm.	3.5	0	0	7	5
Double concentration Smart	2.8	0	0	11	4

Questions?