AIR TRAY®
by Blackmore Company

AIR TRAY®
TECHNOLOGIES

Ellepot/Air Tray Technologies for Berry Crops

It takes a systems approach

01.

AIR TRAYS®

Air Trays® are a selection of exclusive production technologies complimentary to the Air Tray® and developed by green industry leaders. Air Tray® Technologies are customized solutions tailored for seamless plant production efficiencies.

02.

AUTOMATION

Blackmore Company pioneered seed automation and continues to lead the market in seed automation equipment, while also offering automation equipment for Ellepot manufacturing, transplanting, tray filling, dribbling, pot filling, and more.

03.

AIR TRAY® RACKS

Air Tray® Racks offer a cost-effective way to automate movement of plants from a centralized transplanting and grading around the nursery

Plants benefit from the increased air movement and reduced risk of pathogen transfer

AIR TRAY® TECHNOLOGIES

Automation and Technology basics

- Labor is your most valuable asset, so use it wisely
- Don't automate your problem, remove it
- Don't use automation to make your bottle neck worse
  - Modernize your process through technology NOT by technology
  - LEAN manufacturing – You can't process any faster than your slowest operation
  - Reduce hard work – happy staff is more productive and doesn't leave
  - Move plants to people not people to plants

THE VISION

1) Precision ag needs to be adopted in all areas of production
2) Remove waste
3) Remove non value added steps
4) Don’t spend money on something you can’t sell
5) Don’t ship your problem to the next department

What is root circling?

1) Apical dominance in the primary roots are maintained. This limits secondary root formation.
2) Once roots reach the bottom of a traditional pot, roots will start to circle, following the couture of the pot or cell.

Problems with root circling?

1) Inhibition of secondary roots will slow rooting out after transplant.
2) Circling roots can lead to girdled roots in the field.
3) Stability issues in the field
4) Didn’t add value to the plant

Roots need to breath!

1) Creates a gap that minimizes the contact between the Ellepot and the AirTray®.

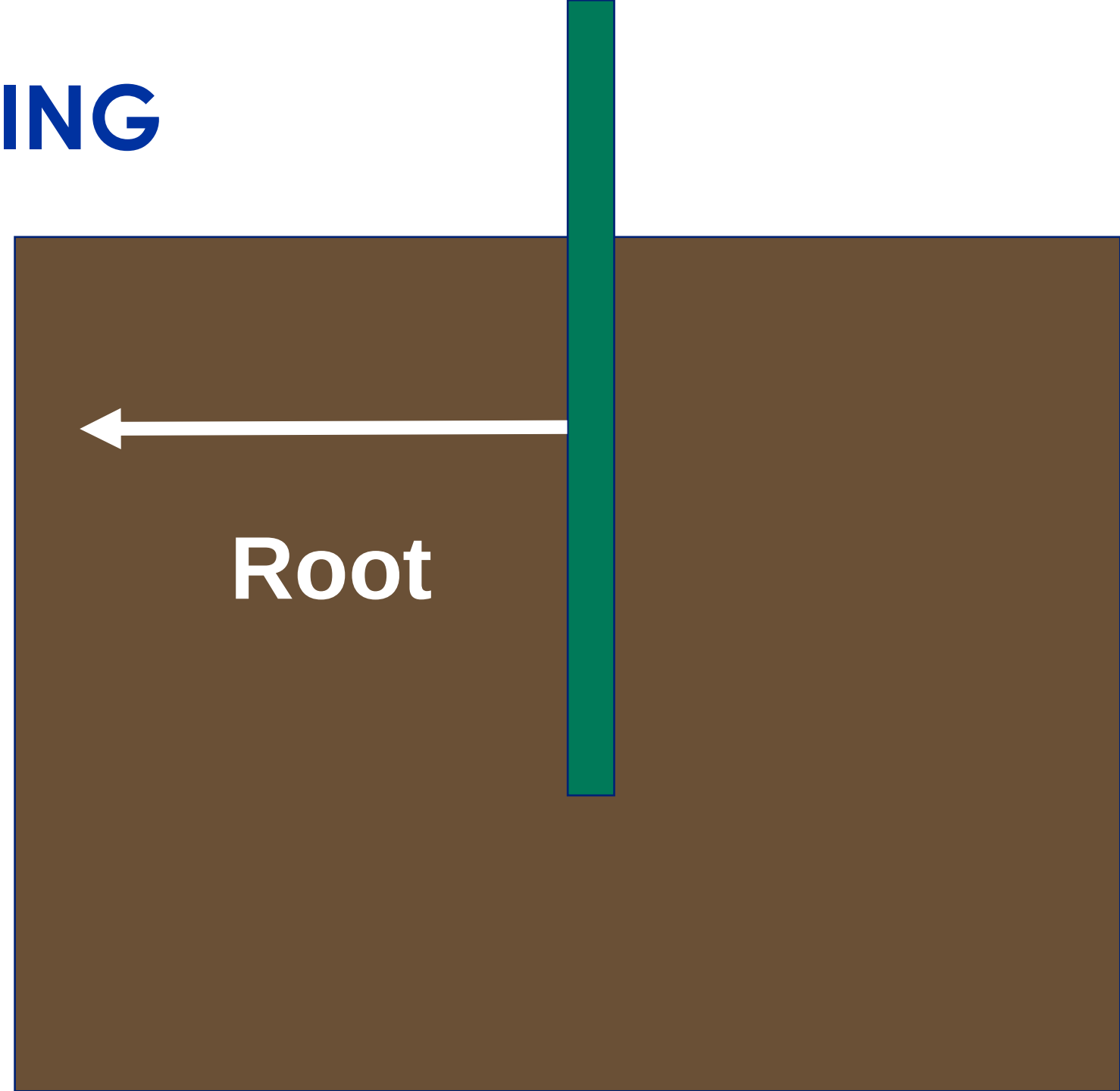
Allows air to circulate around Ellepot.

- Faster drying/more wet/dry cycles
- Air pruned roots

WHAT IS AIR PRUNING

Ellepot

Plant Stem

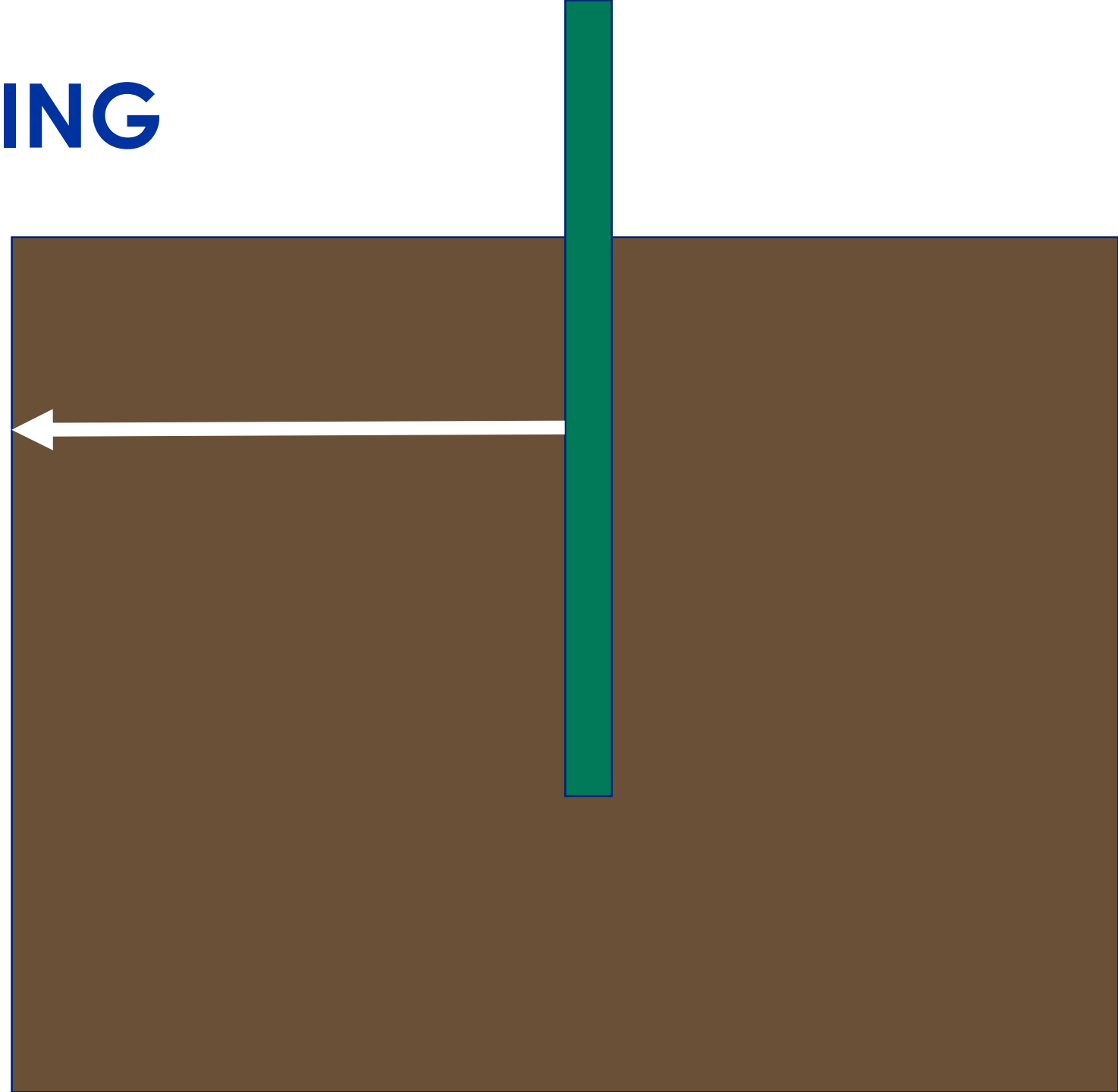


WHAT IS AIR PRUNING

1) Root tips need moisture to grow

2) When a root tip reaches the edge or bottom of an Ellepot, it is exposed to air.

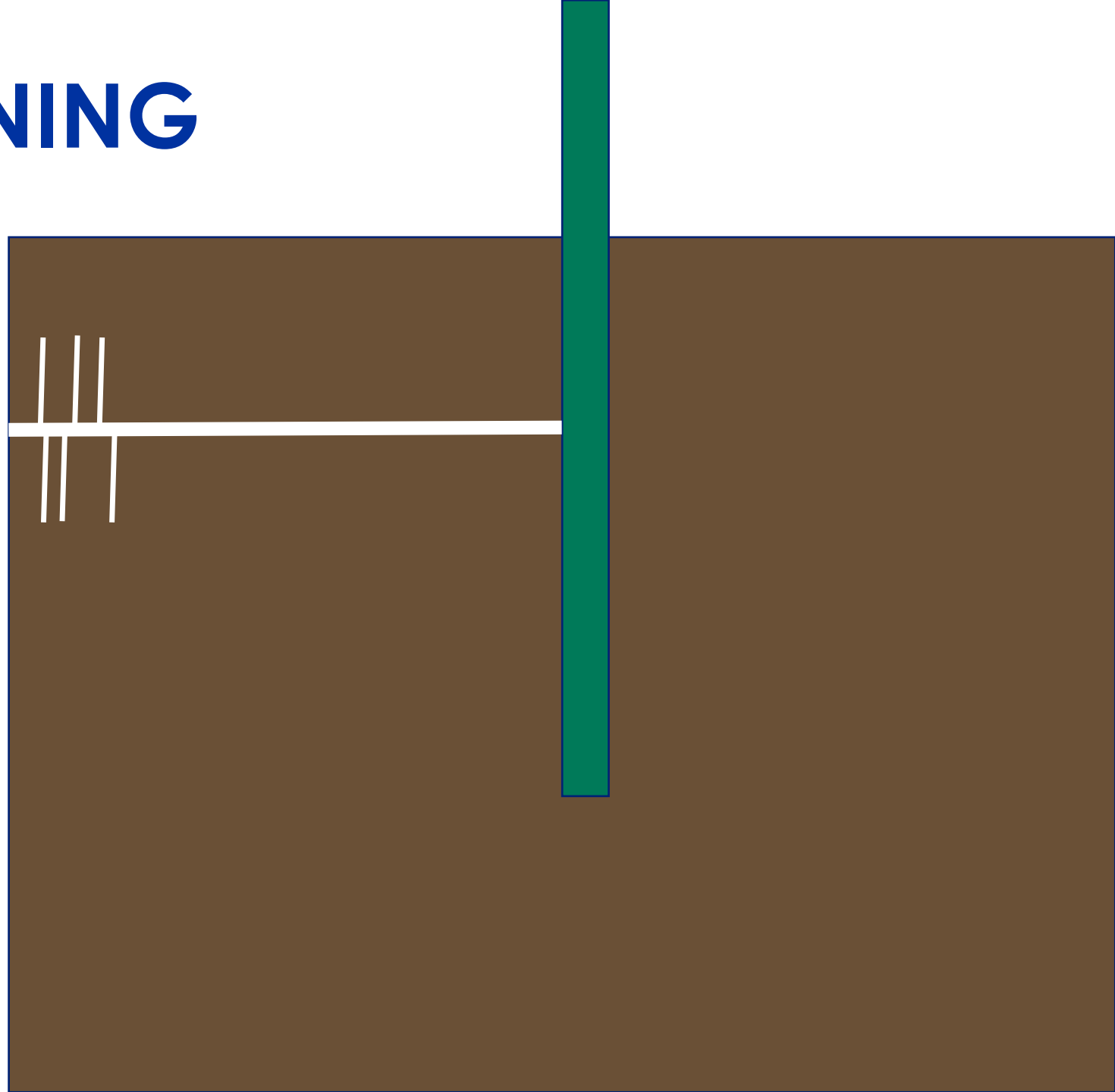
3) When exposed to the lower moisture of the air, the root tip stops growing



WHAT IS AIR PRUNING

4) Apical dominance is lost allowing secondary root formation to occur.

5) As the secondary roots grow, they will also come into contact with the side or bottom of the Ellepot, causing the air pruning process to start again.



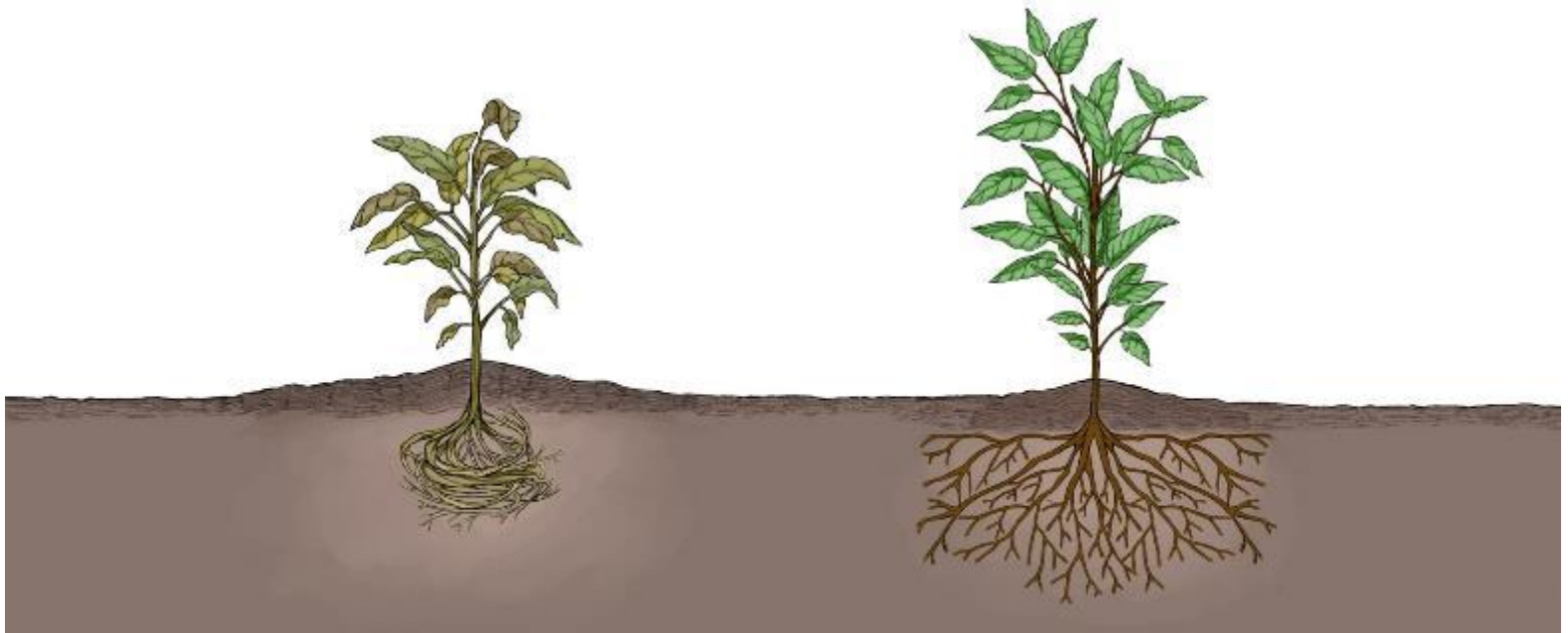
Air Pruning

- Creates a gap that minimizes the contact between the Ellepot and the AirTray® producing more root branching

- No Horizontal surfaces.
  - No circling roots
  - Air pruning
- Maintain actively growing roots
- Increased root efficiency in water and nutrient uptake
- DON’T waste money and time on something you are going to chop off

STANDARD PLASTIC POT

AIR TRAY®



Do all Ellepots give you air pruned roots?

1) Close contact between the Ellepot and a traditional tray side wall will reduce or eliminate air pruning.
2) A flat bottomed of a traditional tray will promote root circling.

Do all Ellepots give you air pruned roots?

3) Close contact between the tray and the ground will cause roots to contact the ground, promoting apical dominance.

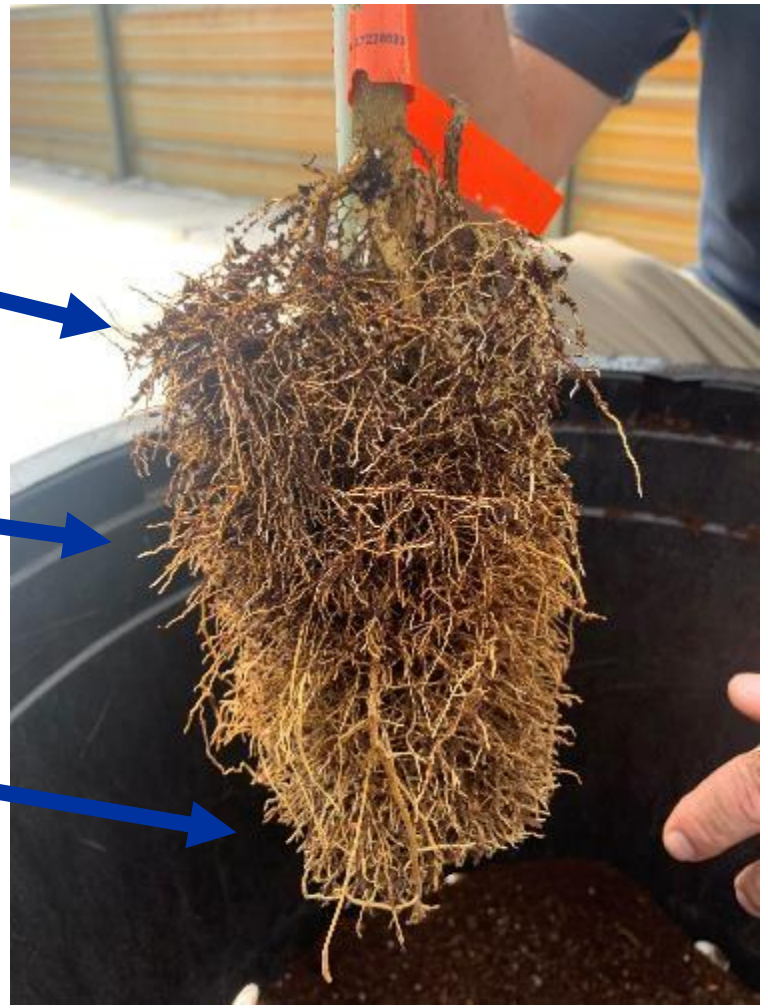
Air Pruned root system

Propagation & Step - Ups

Secondary and Tertiary Root Formation

Air Pruned Roots

No Circling Roots



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Almonds

Grapes

Christmas Trees

Blackberries

Roots are important!!

- Reduced transplant shock
- Faster access to water and nutrients
- Better root architecture
- Roots out of the entire profile not just the bottom
- Earlier establishment means better growth and performance

AIRTRAY®
TECHNOLOGIES

Optimize Plant Movement

AIR TRAY® RACKS

- Air Tray® Racks offer a cost-effective way to automate movement of plants around the nursery
- Easily centralize transplanting and grading
- Plants benefit from the increased air movement and reduced risk of pathogen transfer
- Keep plants off the ground and your roots in the container

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AIR TRAY® RACKS

THE RESULT:

Labor Savings

- Multiple plants moved at once = lower cost per tray to move
- No bending, less physical strain

Space Savings

- Maximize bay utilization with neat, consistent lines

- Automation Savings:
  - Compatible with Ellepot machinery
- Infrastructure Savings:
  - Air Tray® and racks act as benches, eliminating need for additional benching systems

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PLANT MOVEMENT

TRADITIONAL METHOD

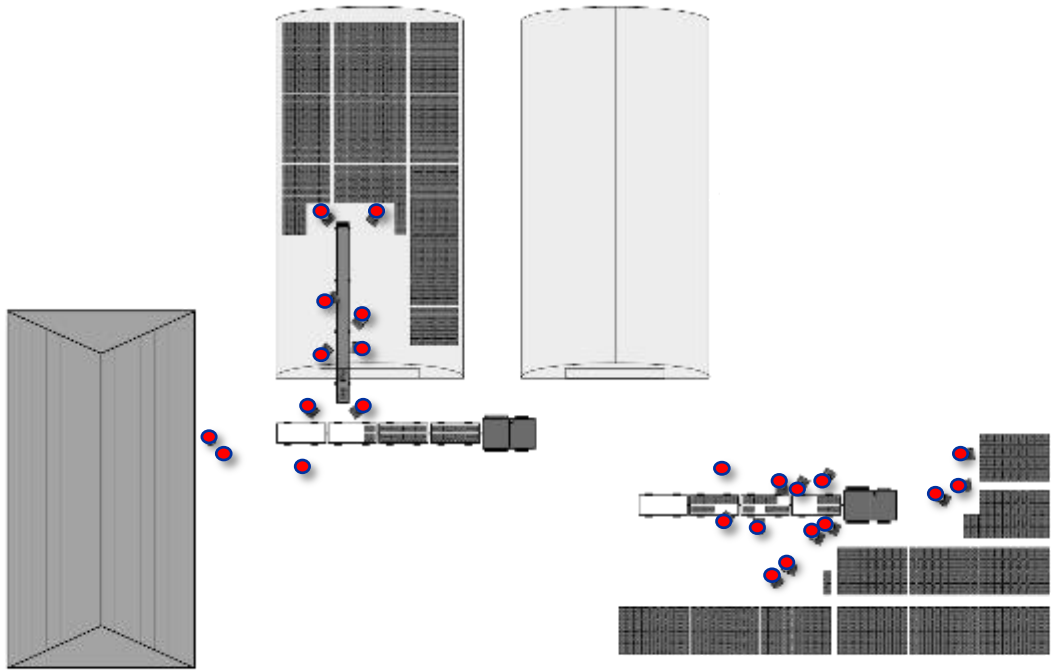
People moving to the plants

Costs

- High amount of people doing physical labor

Equipment

- Conveyors, tractors and trailers



REVOLUTIONARY METHOD

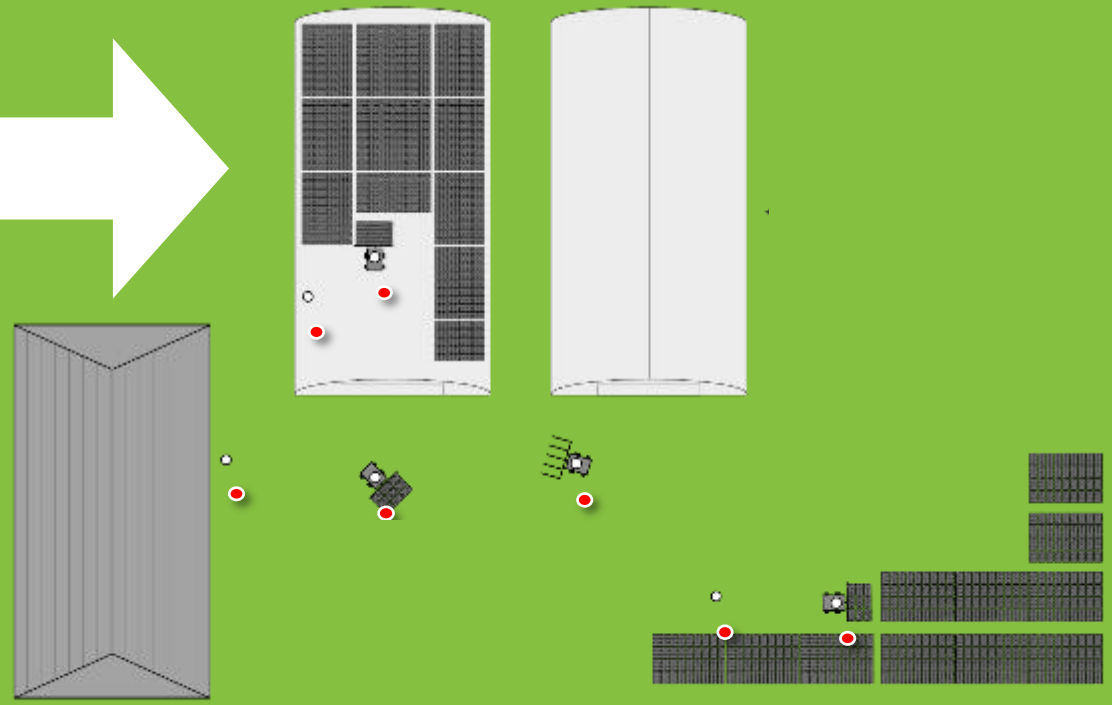
PLANTS MOVE TO THE PEOPLE

Savings

- Up to 70% reduction in labor

Equipment

- Forklifts with modified forks



Importance of AirTray® Technologies

Reduce labor via centralization and mechanization

Better Quality Plants through:

- Higher % take and more plants in same space = lower unit cost = greater return per sq. Ft Greenhouse
- Faster growth rate = lower unit cost
- Better uniformity = better sales
- Automation to improve yield & quality & reduce labor = lower unit cost
- Air pruned roots give high amount of young vigorous roots that will lead to a higher success rate for consumer

OTHER BENEFITS OF MOVING THE PLANTS, NOT THE PEOPLE:

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HAPPIER WORKERS

- Easier, more comfortable work
- Less risk of injuries and strain
- Less workers to supervise and oversee

ENVIRONMENTALLY FRIENDLY

Less waste
Trays are recyclable
Paper is degradable

BETTER PLANTS

- Higher quality
- More consistency
- Healthier actively growing roots

AIRTRAY®
TECHNOLOGIES

Case Studies

Dutchman Tree Farms

- Large Christmas tree grower
- Had a 5 million tree bareroot nursery
  - Trials in large AirTrays® have reduced nursery time by 2 years
  - Far superior root system
  - New growth trajectory is indicating a reduction of 4 years per rotation
- Built a new greenhouse complex
  - 2023 – grew 3.2 million seedlings in 30-mm x 90-mm (150-count) AirTrays® grown on AirTray® racks.
  - Transplanted 260,000 seedlings into 80-mm x 160-mm (10-count) AirTrays® grown on AirTray® racks for field production in 2024.
  - 18 month old 80-mm x 160-mm tree liner vs 4-5 year old bareroot tree

Michigan Forestry & Christmas Tree Nursery

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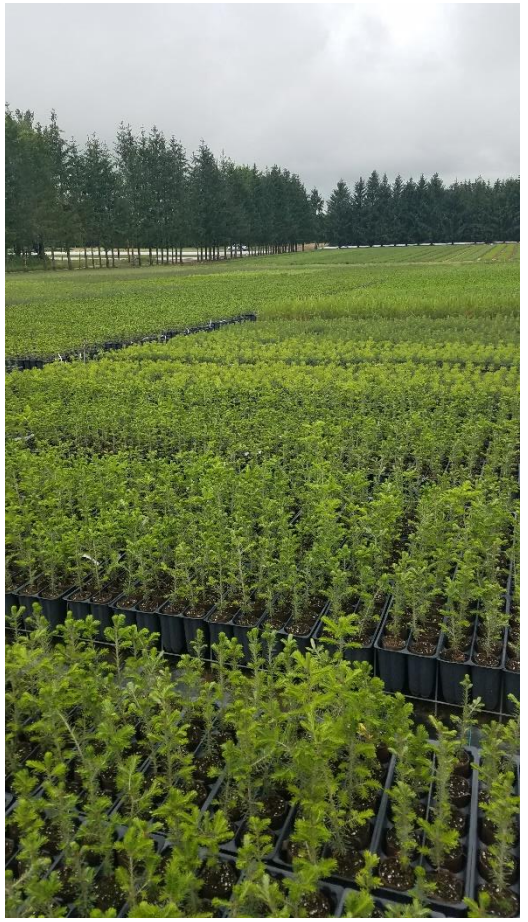
Air Tray Technologies®

Outdoor compounds – keeps off the ground and forklift logistics



Nourse Farms

- Currently using AirTray ® Technologies to propagate raspberries and blackberries

- 35-mm x 60-mm 72 ct. AirTray

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Nourse Farms

Current Long Cane Production

- Individual pots are transplanted manually.
- Individual pots are moved and placed into the field manually.
- The bottom of the pot sits 1 inch off the ground.

Nourse Farms

Long-Cane production with AirTrays® Technologies

- AirTrays® will be used with 100-mm x 160-mm Ellepots (4 per tray) held a minimum of 8 inches off the ground.
- 2 30-mm x 60-mm Ellepots will be transplanted into each 100-mm Ellepot.
- Each AirTray® rack holds 4 trays (16 100-mm Ellepots.
- Filling of AirTrays® and transplanting will be automated and centralized.
- Multiple AirTray® Racks can be moved to the field at one time.

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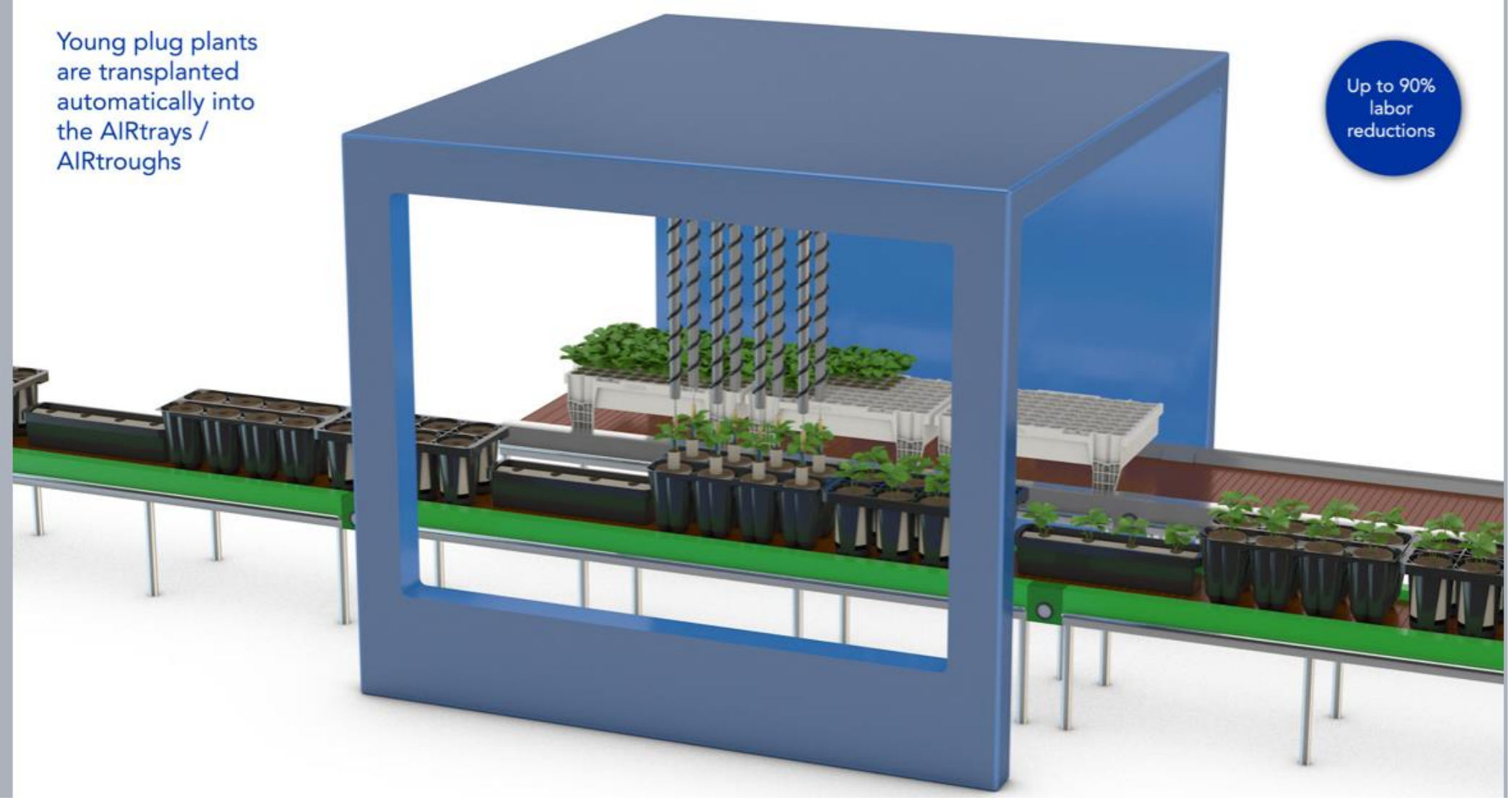

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- 2 30-mm x 60-mm Ellepots will be automatically transplanted into each 100-mm x 160 mm Ellepot contained in a 4-count AirTray®.

The AIRtrays / AIRtroughs then get lifted automatically into wire benches with four per rack.

Four racks are marshalled together and lifted by forklift.

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Lars Jensen