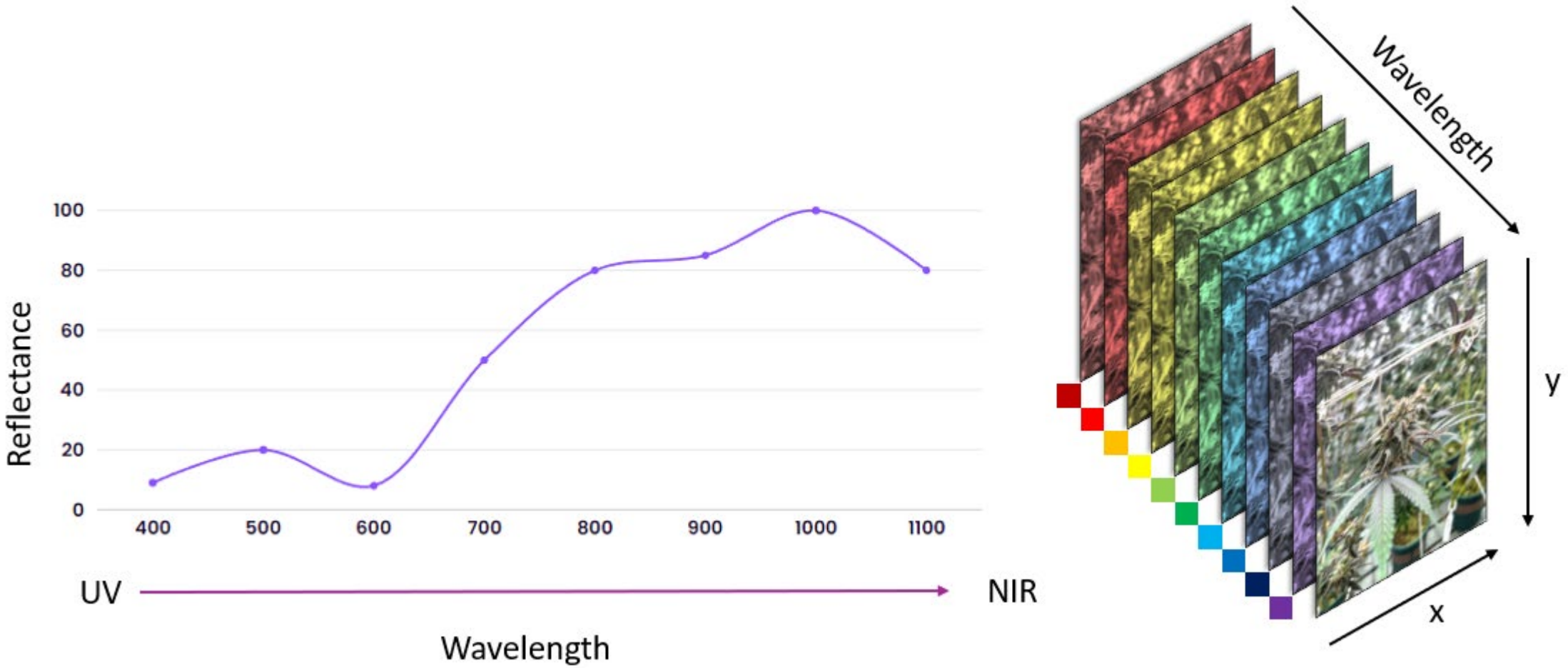
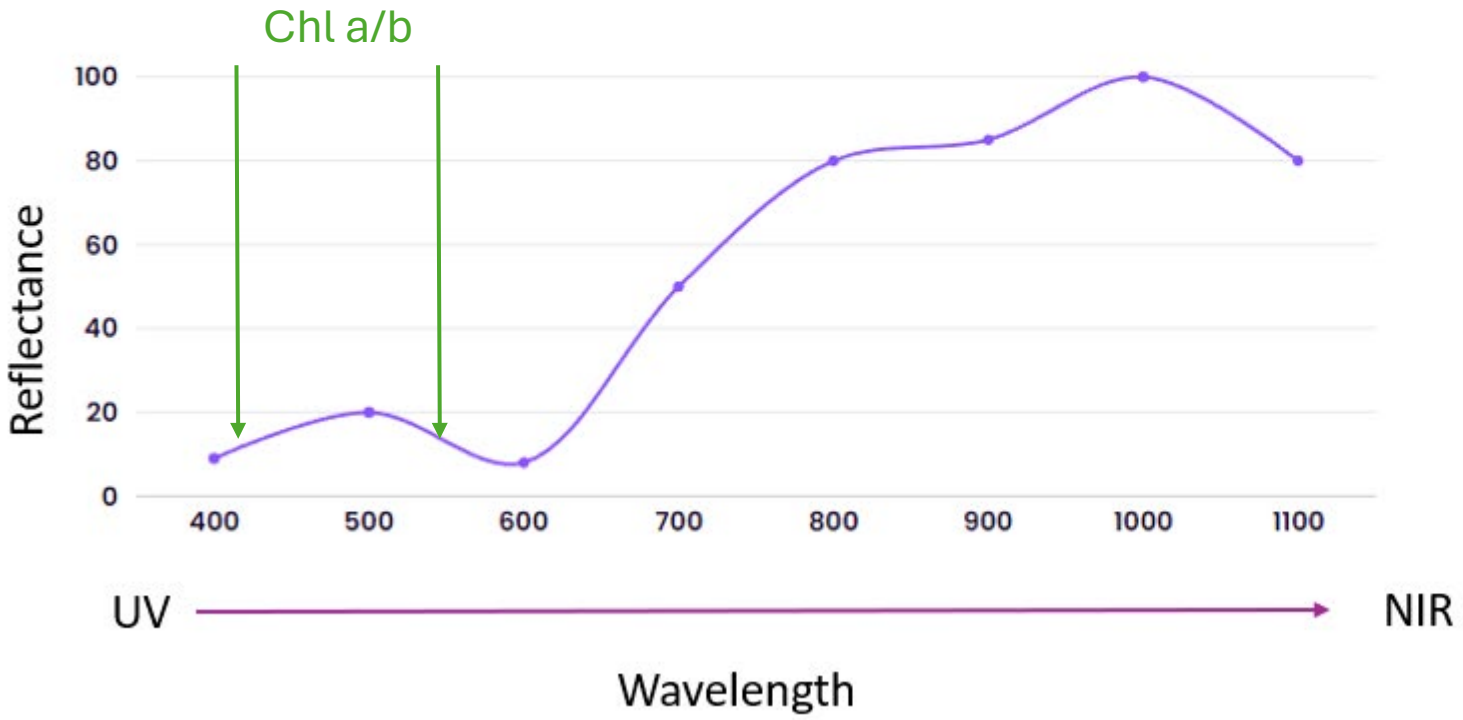
Measure your plants
SPECAI

Img 1

MCPIR
MEDICAL CANNABIS PLATFORM
FOR INNOVATION AND RESEARCH

Hyper spectral imaging


Reflectance
100
80
60
40
20
0
400
500
600
700
800
900
1000
1100
UV
NIR
Wavelength
Wavelength
y
x


Chl a/b
Reflectance
100
80
60
40
20
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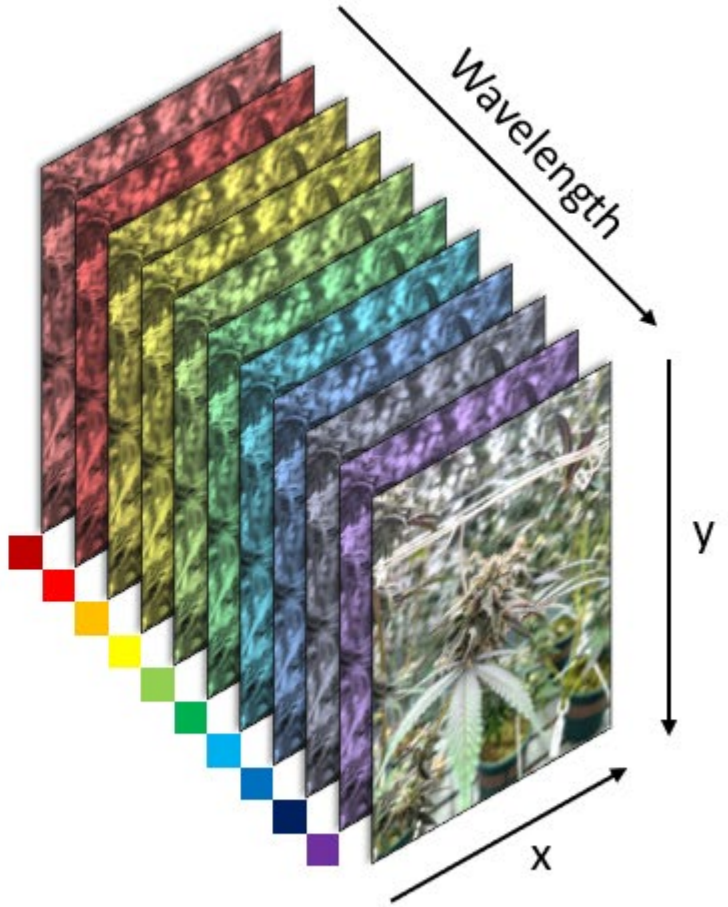
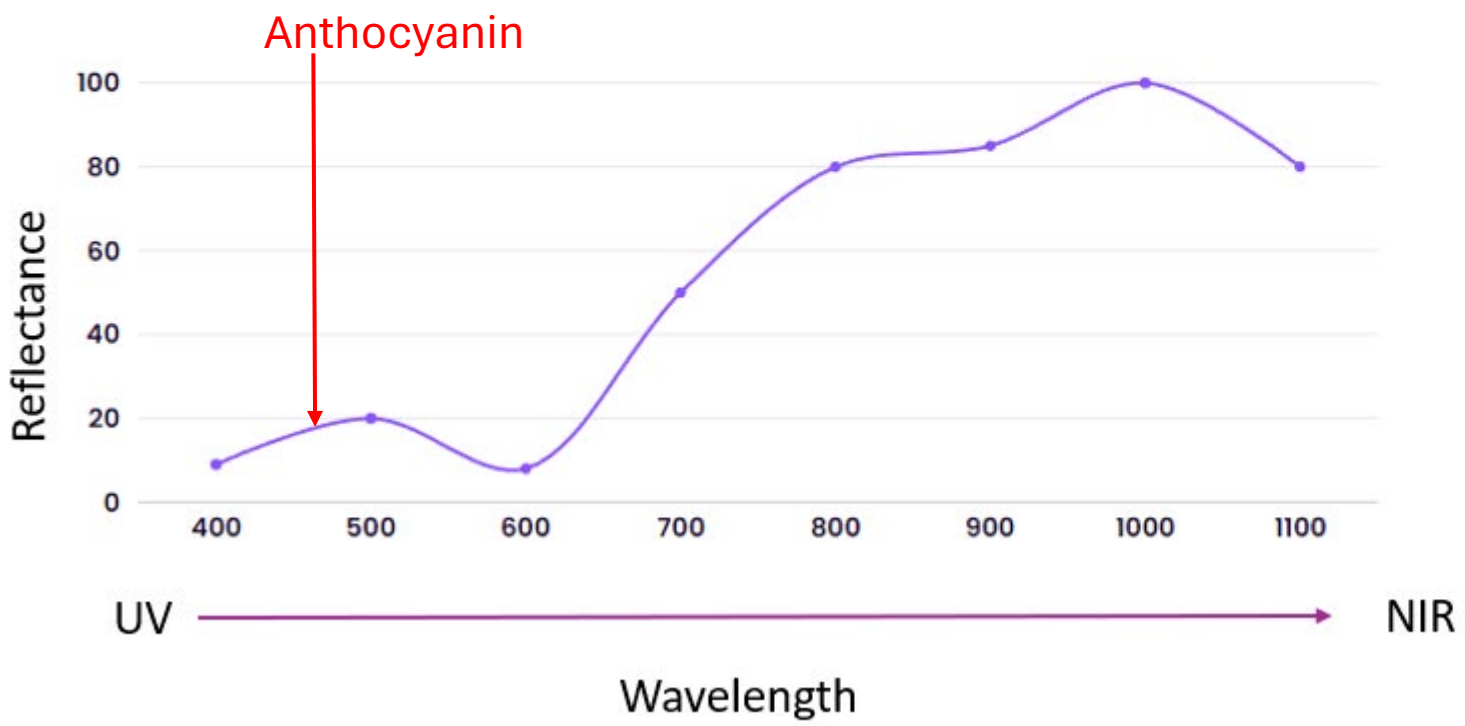
400
500
600
700
800
900
1000
1100
UV
NIR
Wavelength


Wavelength
y
x


Anthocyanin
Reflectance
100
80
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0
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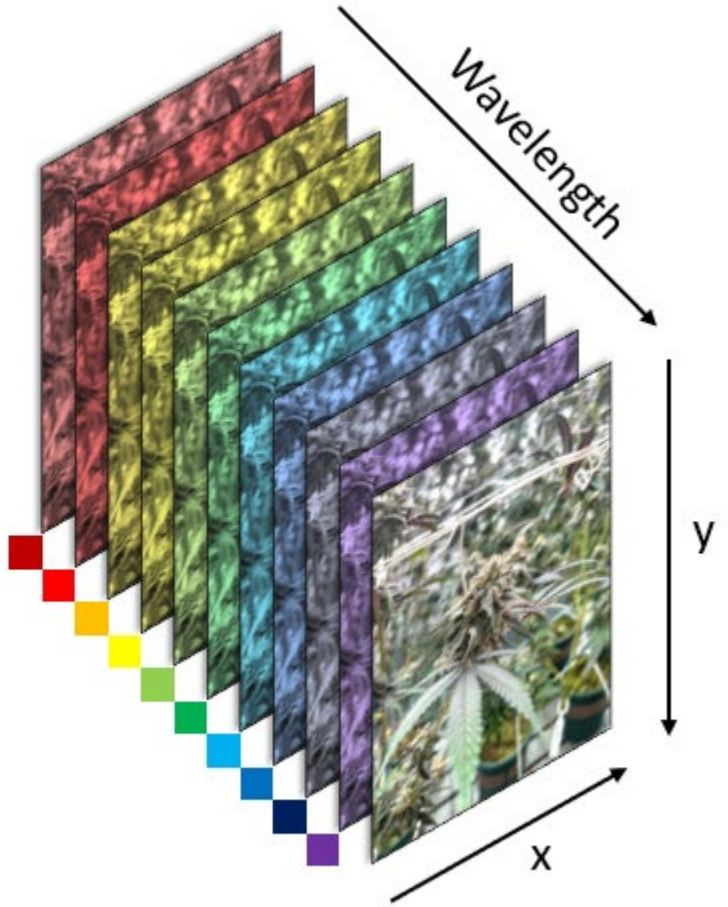
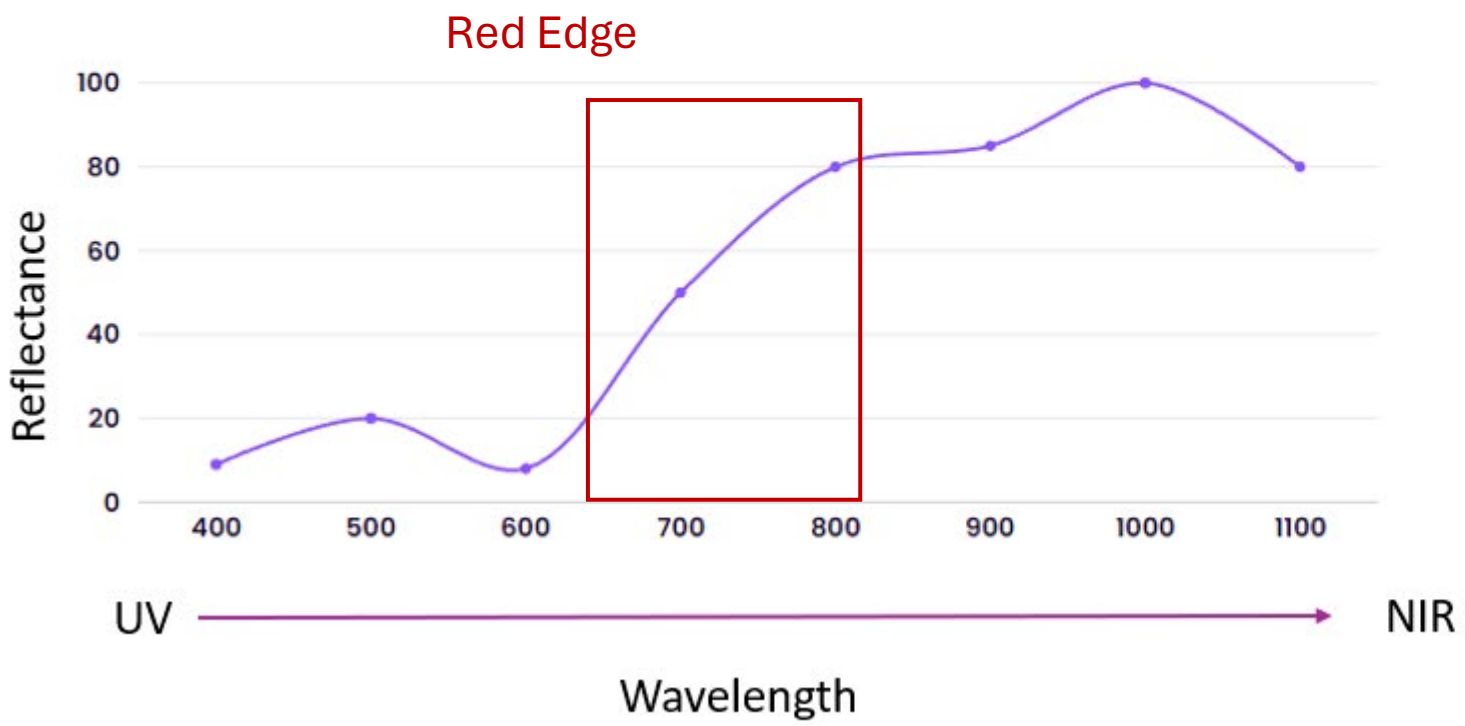
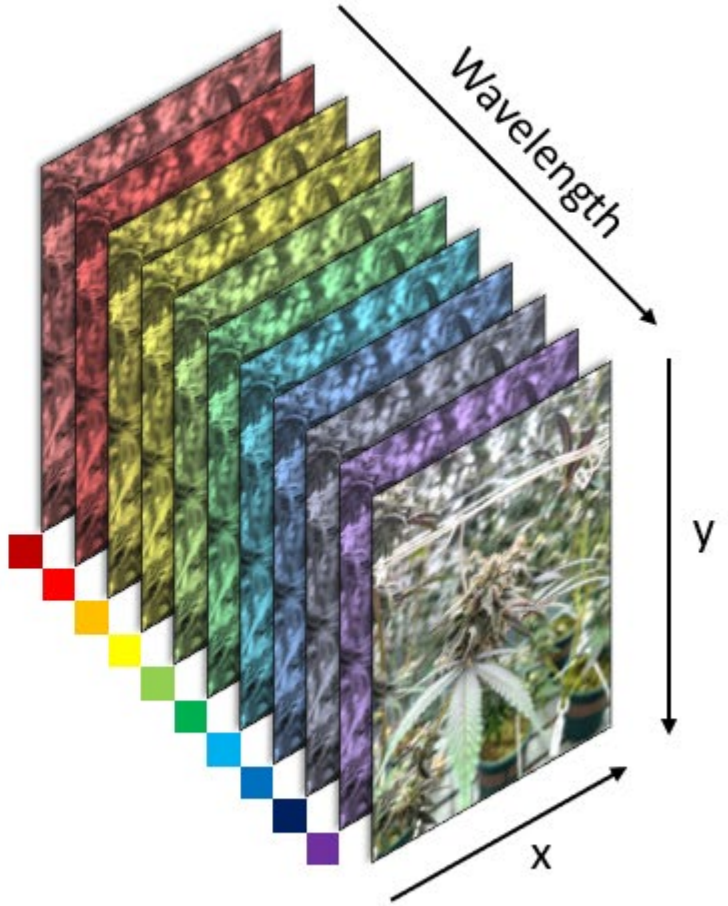
1100
UV
NIR
Wavelength


Wavelength
y
x


Red Edge
Reflectance
100
80
60
40
20
0
400
500
600
700
800
900
1000
1100
UV
NIR
Wavelength


Wavelength
y
x

What we scout for

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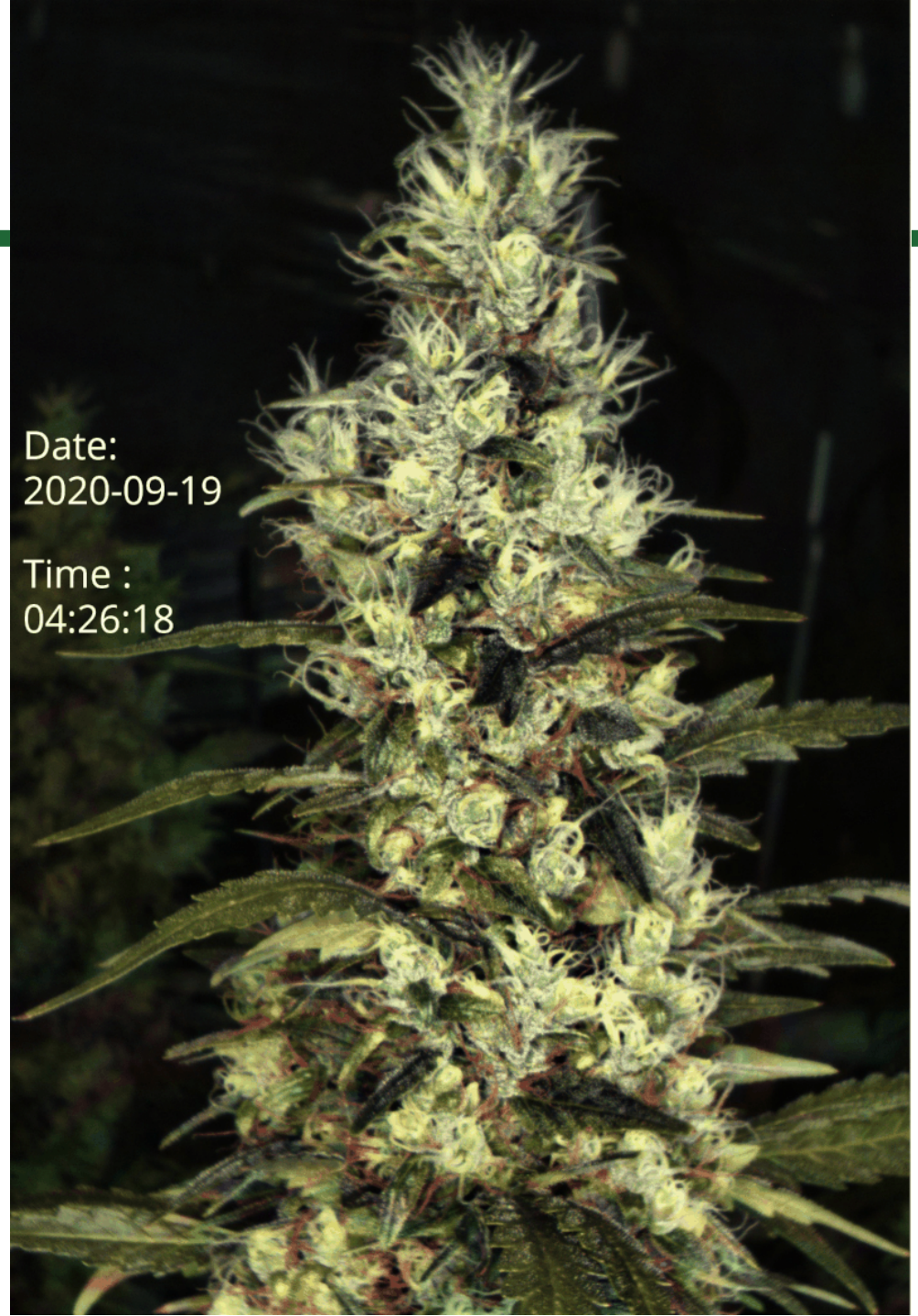
MEDICAL CANNABIS PLATFORM
FOR INNOVATION AND RESEARCH

- Pests, LeafMiner, Spider Mites, Aphids
- Diseases, Powdery Mildew, Botrytis
- Hop Latent Viroid
- …

Botrytis



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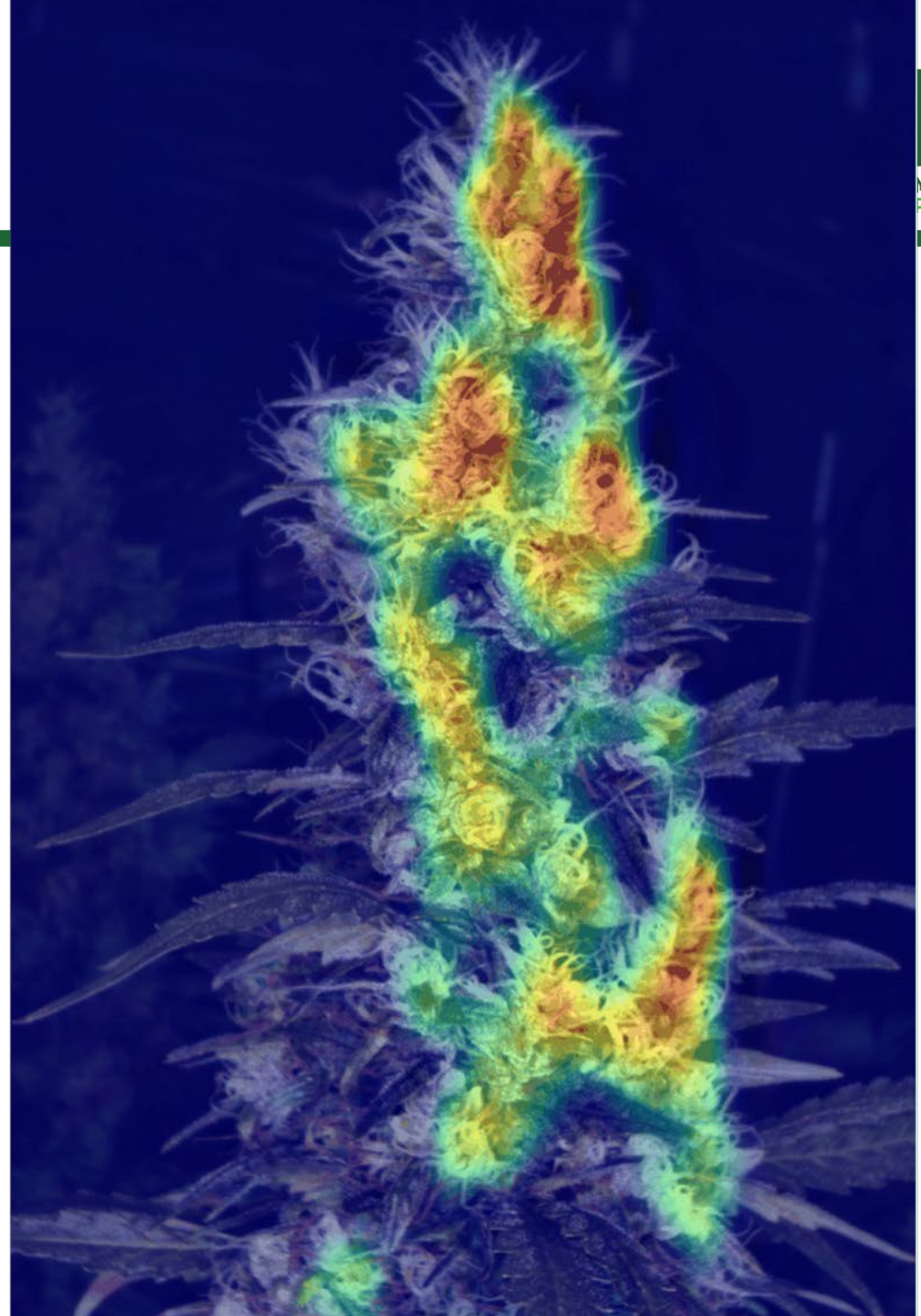
Botrytis

Date:
2020-09-19

Time :
04:26:18

Botrytis Probability:
99.99988 %

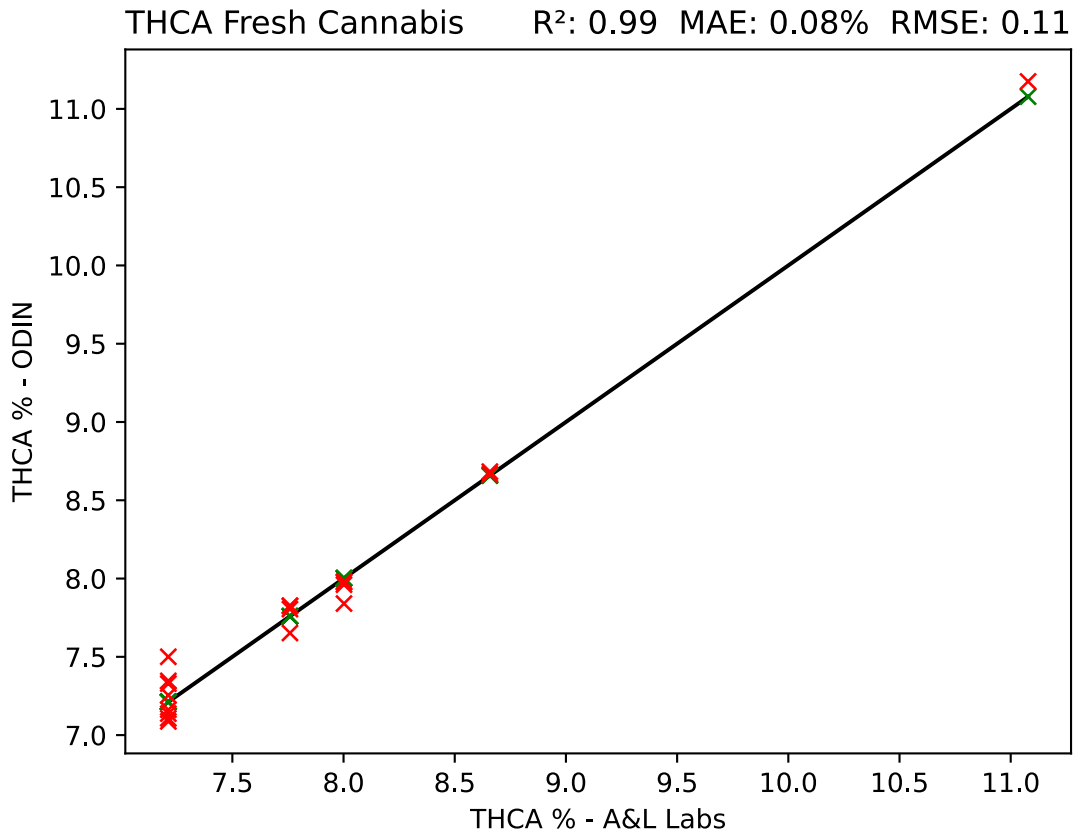


- Up to 10 days before visual symptoms appear

Deficiency

- Detect them early and act on them

THC value


THCA Fresh Cannabis
R²: 0.99 MAE: 0.08% RMSE: 0.11
THCA % - ODIN
THCA % - A&L Labs
11.0
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0
10.5
11.0

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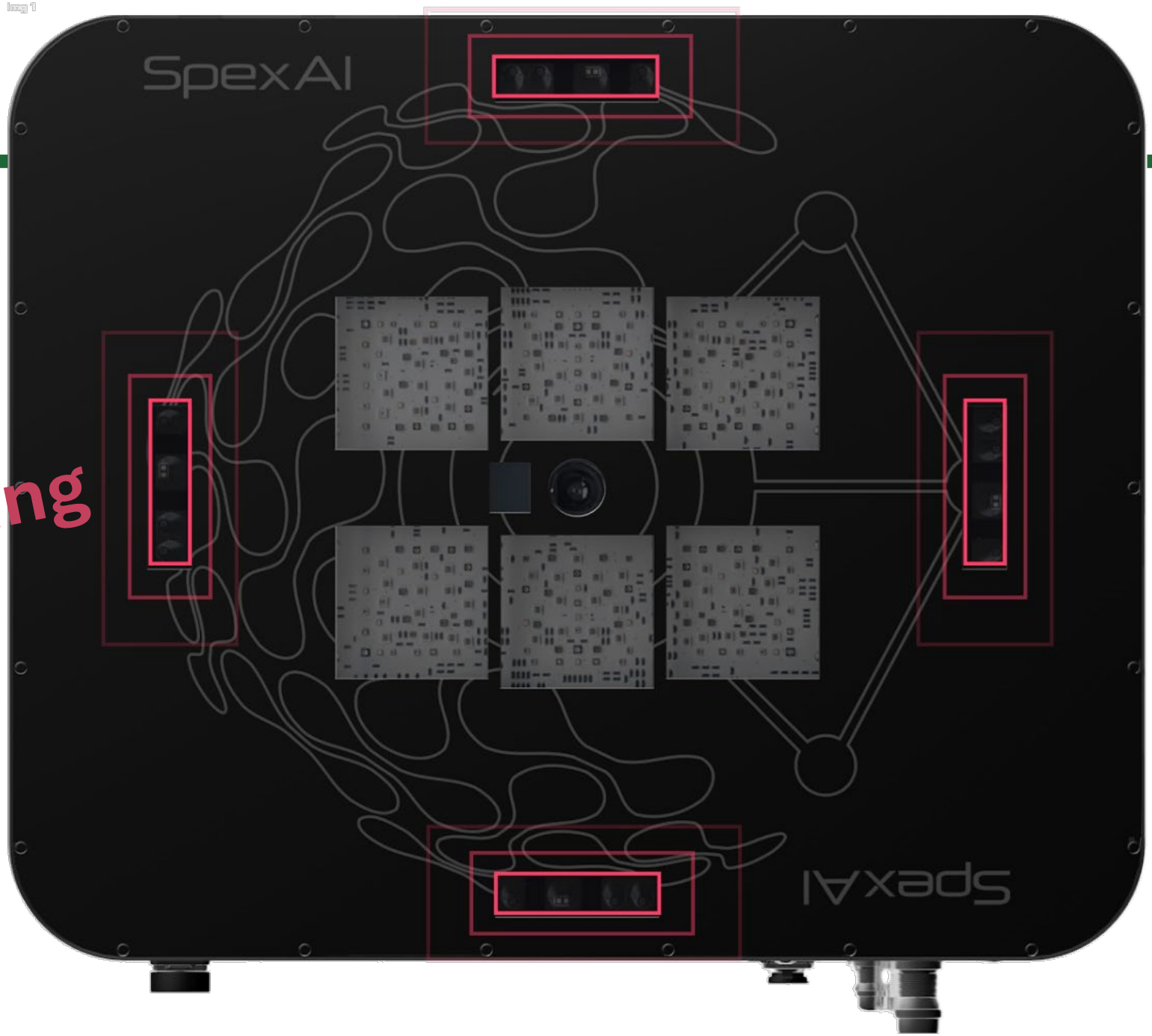
3D imaging



3D imaging – What we measure

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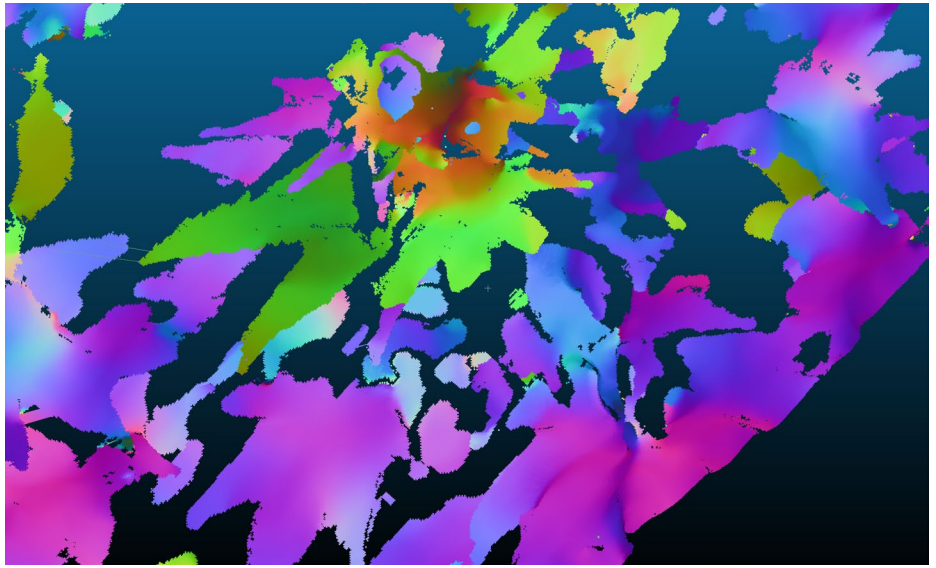
- Plant Height
- Leaf Angle Distribution
- Internodal Distance
- Volume of Flowers



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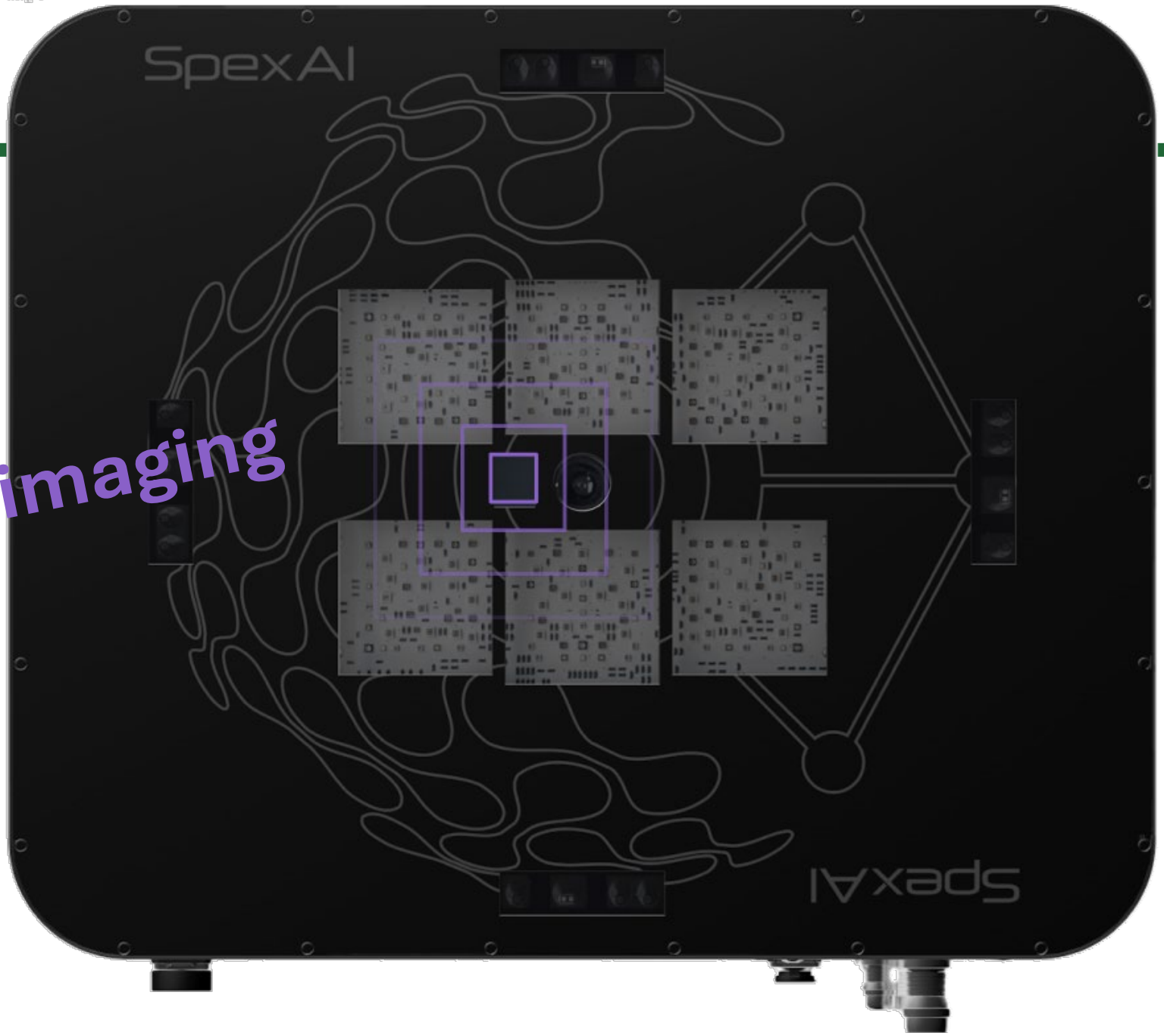
Thermal imaging



Thermal imaging – What we sense

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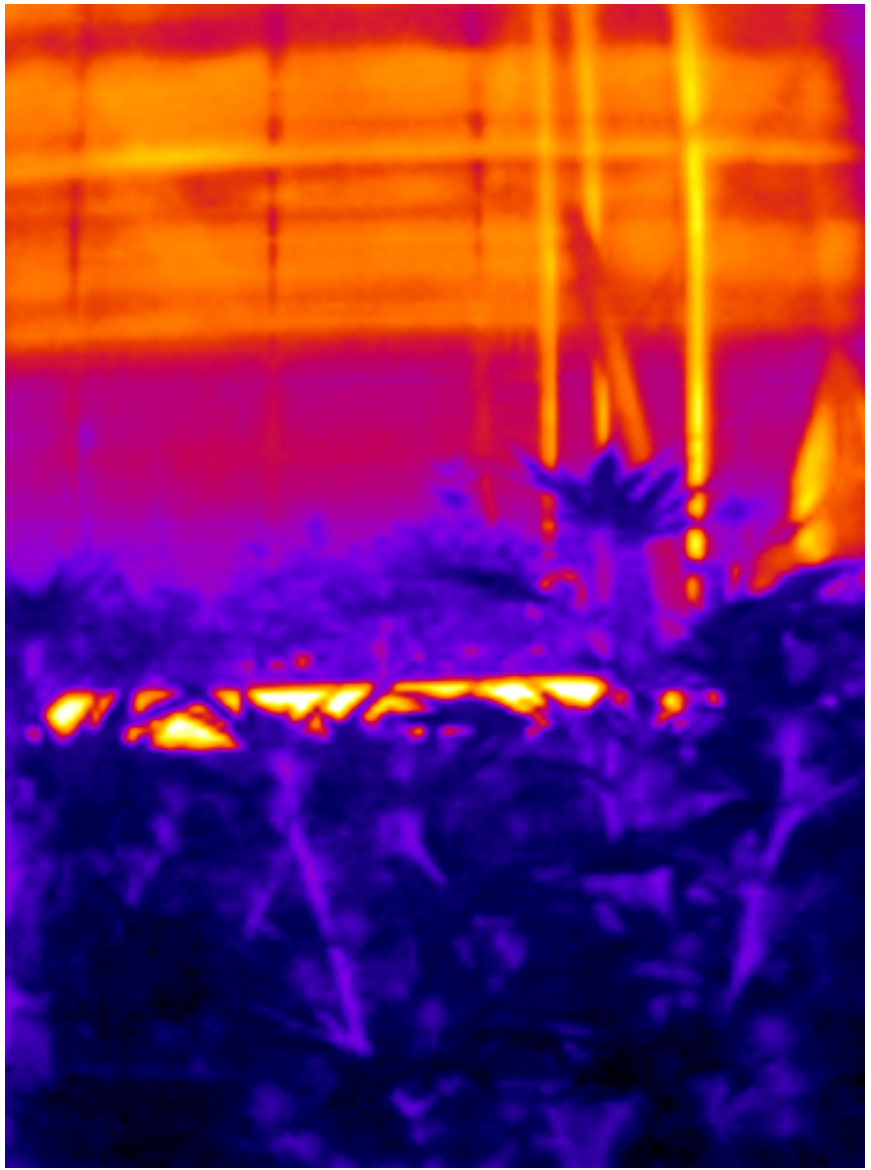
- Leaf Temperature:
  (25-30°C during day ideal?)
- Leaf VPD
- Crop Water Stress Index
- Actual Transpiration Rate



What makes us unique in MCPIR

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We are on a mission to simplify cultivation.

Measure: Yield and flower growth over time

--> Less manual measurement

Scout: Botrytis, Powdery Mildew, HopLatent Viroid, Pests

--> Problems we will hopefully never have here

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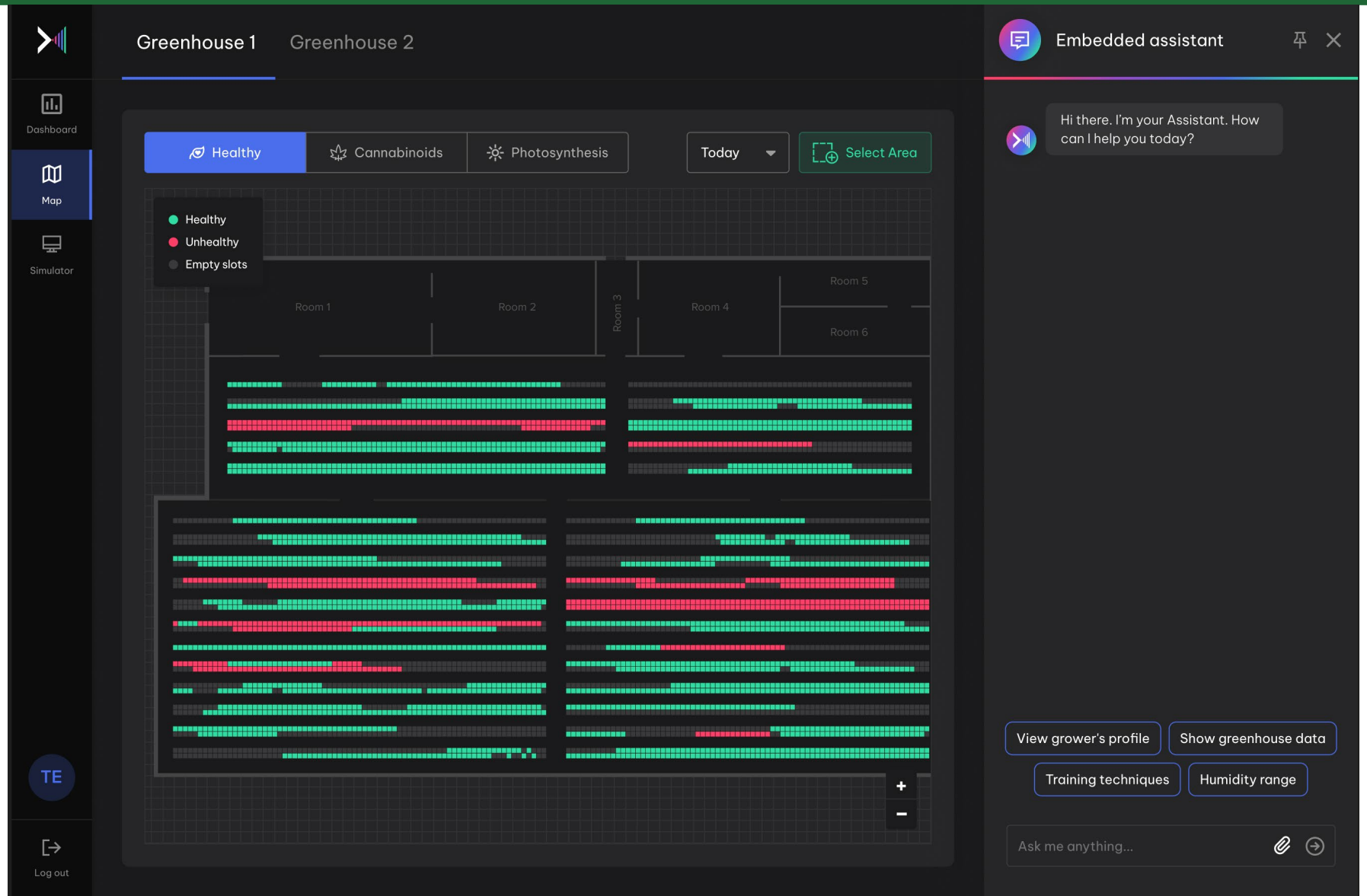

Why we joined MCPIR

- To better understand and model Plant <> Environment interaction

Plant Environment Interaction matters

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FOR INNOVATION AND RESEARCH

- We know temperature and light have a huge impact
  on plant development.
  - > Yield
  - > Risk for diseases

But we need to know the actual transpiration rate.

Factors that affect transpiration rate

- Light Intensity
- Temperature
- Air movement
- Humidity

But while we can only measure leaf temp on a plant level at canopy, environmental sensors are still too expensive to deploy at plant level.

Computational Fluid Dynamics

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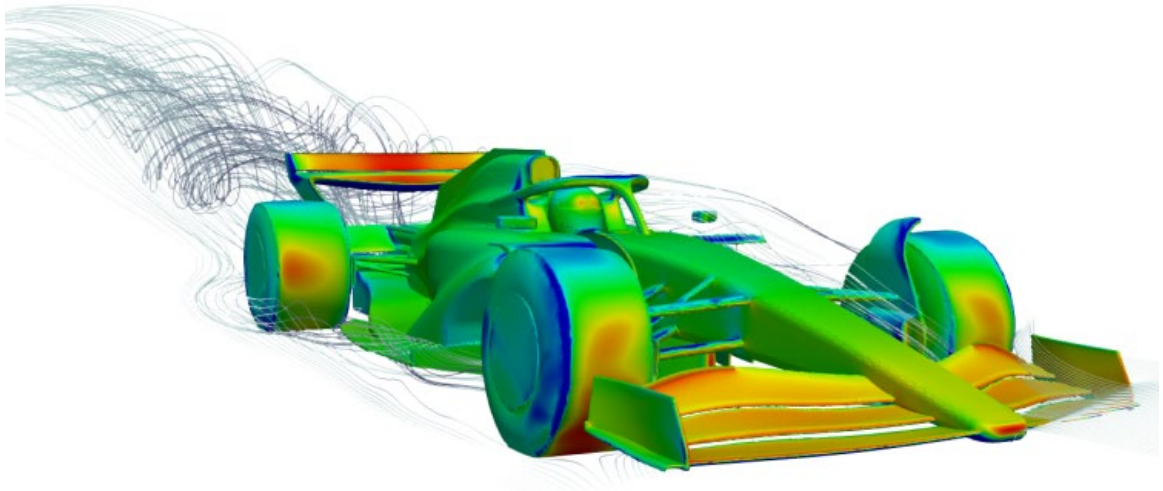

What is CFD?

Simulation of Fluid Flows:

Uses numerical methods to model liquid and gas behavior, solving complex equations to predict fluid interactions.

Wide Applications:

Crucial in aerospace, automotive, civil engineering, and environmental studies for designing and improving systems.

CFD for cannabis cultivation

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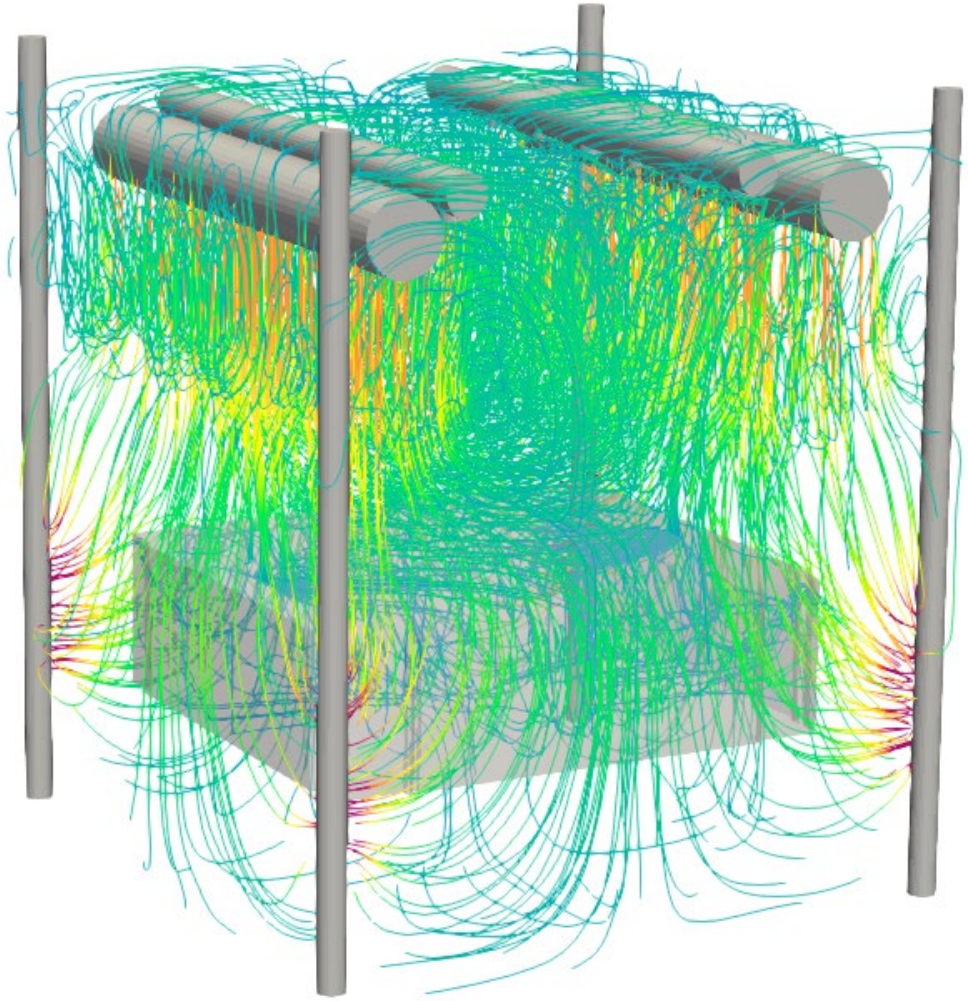


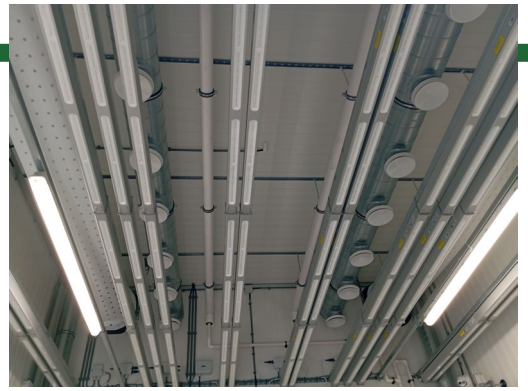
Why use CFD in horticulture?

Optimal Ventilation:
Ensures even airflow promoting healthy growth.

Uniform CO2 Distribution:
Enhances photosynthesis and growth by maintaining consistent CO2 levels.

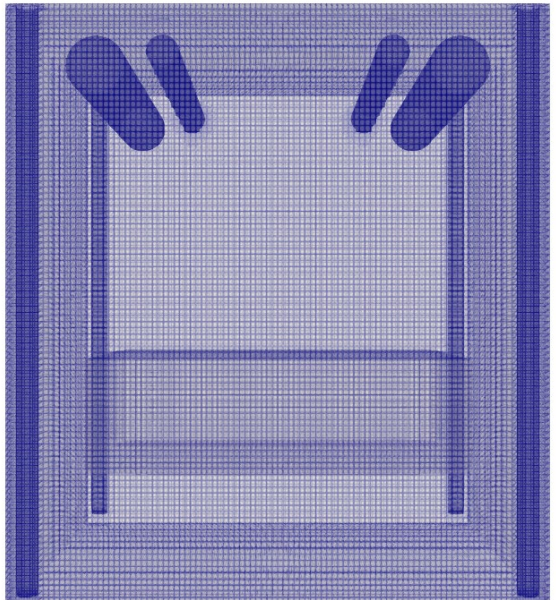
Temperature Control:
Maintains consistent temperatures for optimal plant growth.

Humidity Management:
Ensures uniform humidity levels to prevent mold and mildew.

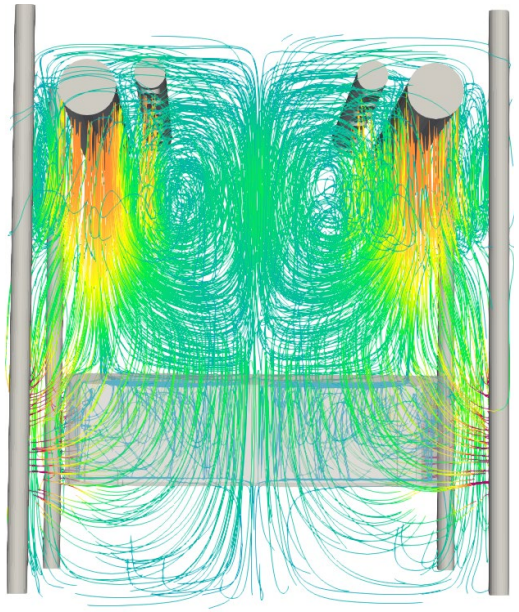


Actual Geometry

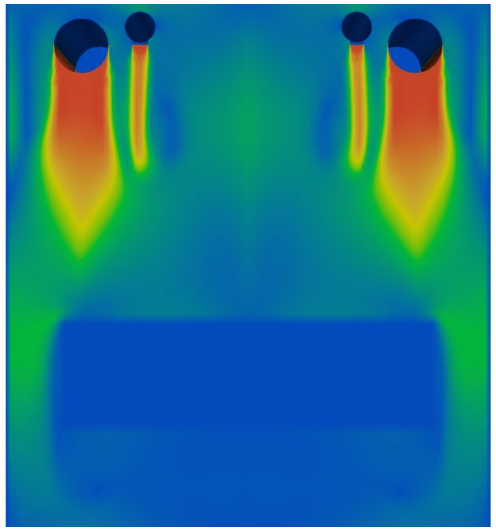
Simplified representation



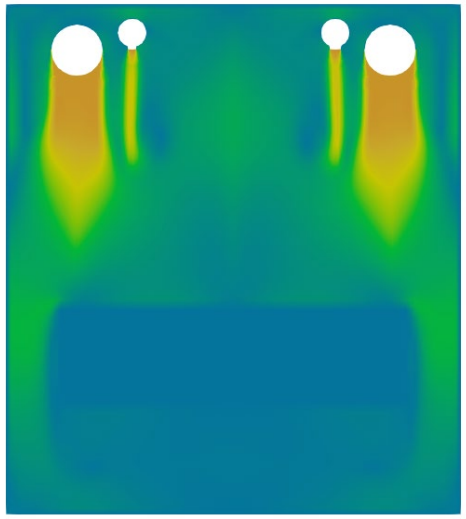
Simulation mesh



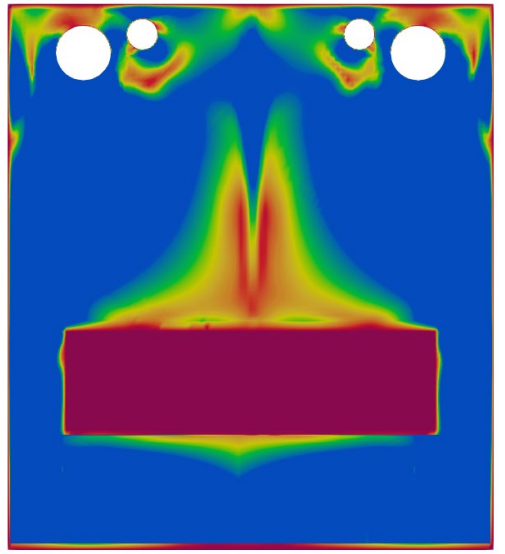
Velocity streamlines



Velocity contour



Mean air age



Temperature

Model transpiration rate

- Light Intensity --> CFD
- Temperature --> CFD
- Air movement --> CFD
- Humidity --> CFD

Develop Cannabis specific transpiration models.

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MEDICAL CANNABIS PLATFORM FOR INNOVATION AND RESEARCH

- Expand knowledge on Cannabis Cultivation
- Simplify Cultivation
- Cannabis is a plant, learn from experience
- Provide value to growers