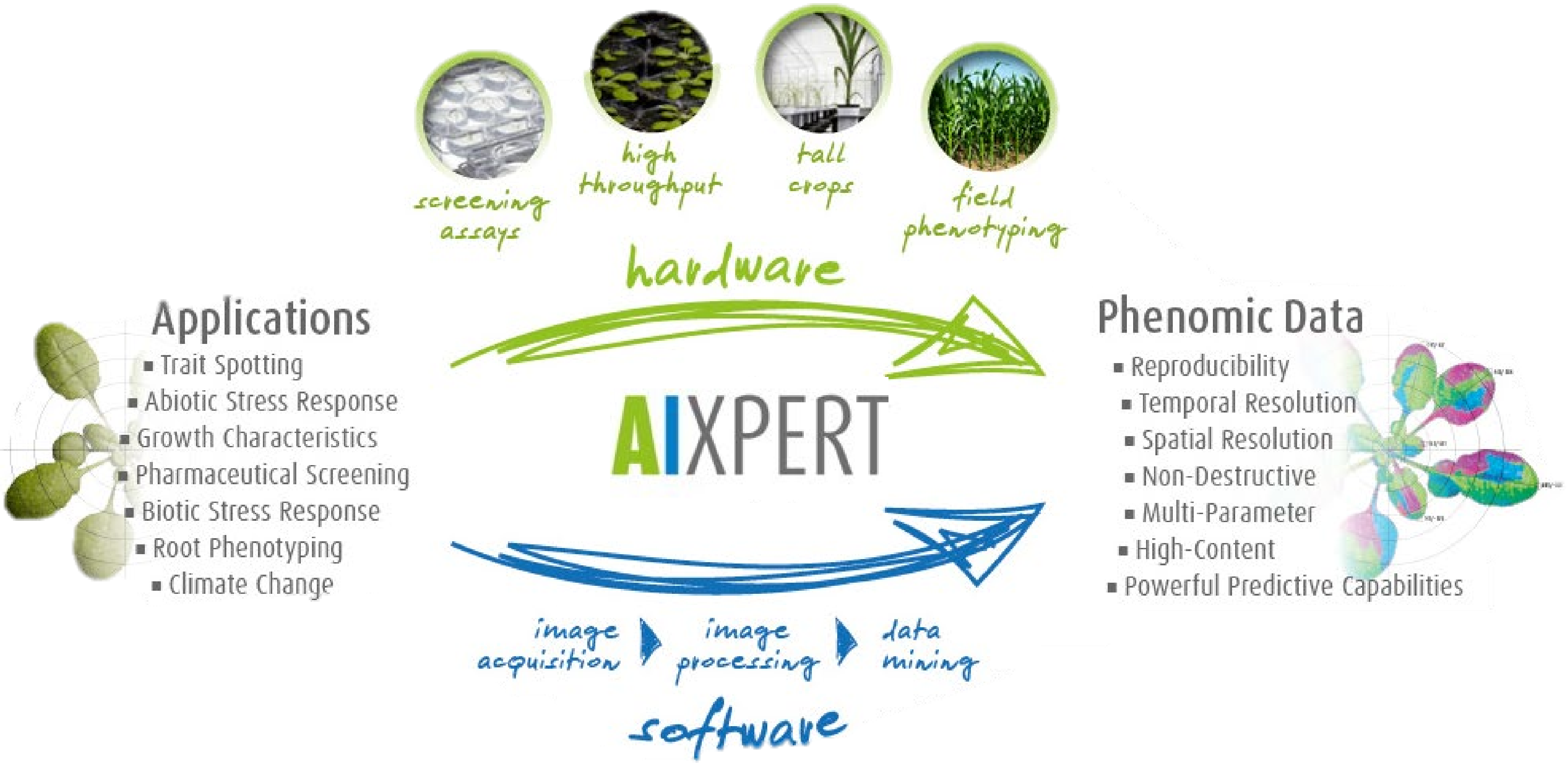
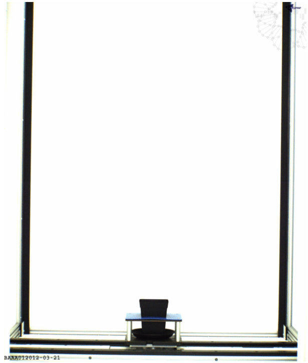
Vorstellung LemnaTec GmbH

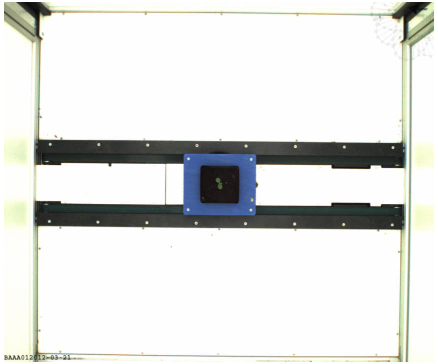
DLG Meeting Branchenstandards im Inhouse-Farming-Bereich

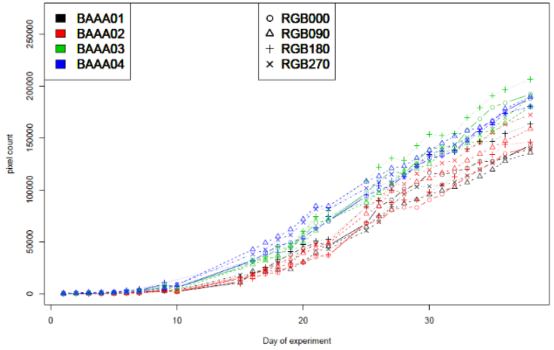
Dr. Robert Tietz, Geschäftsführer

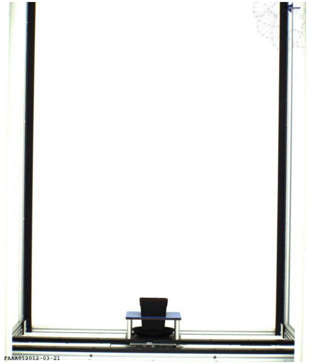

screening assays
high throughput
tall crops
field phenotyping
hardware
Applications
▪ Trait Spotting
▪ Abiotic Stress Response
▪ Growth Characteristics
▪ Pharmaceutical Screening
▪ Biotic Stress Response
▪ Root Phenotyping
▪ Climate Change
AIXPERT
Phenomic Data
▪ Reproducibility
▪ Temporal Resolution
▪ Spatial Resolution
▪ Non-Destructive
▪ Multi-Parameter
▪ High-Content
▪ Powerful Predictive Capabilities
image acquisition
image processing
data mining
software

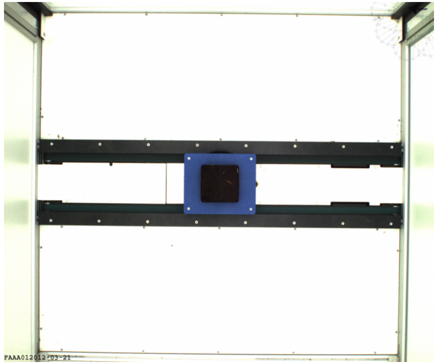
We want to see growth…

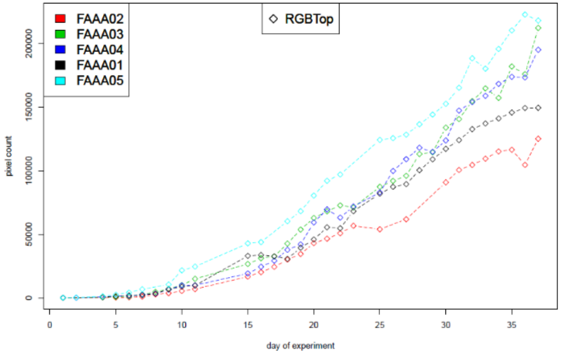










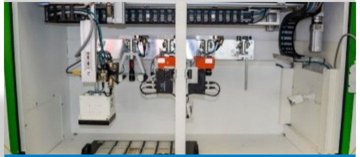


Global Leader in Digital Plant Phenotyping

Image- and data analysis
- Advances image processing
- Machine learning
- Data Analysis
- Data Interpretation
- Value Generation

DATA ANALYSIS

Lab
- Single- and multi-sensor solutions
- Structural and physiological phenotyping
- Disease assessments
- Seeds and germination



LAB

Greenhouse & Growth Room
- Multisensor plant-to-sensor and sensor-to-plant solutions
- Structural and physiological phenotyping
- Genetic and environmental studies

GREENHOUSE

Field/Outdoor
- Multisensor
- Sensor-to-plant solutions
- Structural and physiological phenotyping
- Genetic and environmental studies

FIELD

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Bayer CropScience
MONSANTO
WASHINGTON STATE UNIVERSITY
USDA
PIONEER
A DUPONT BUSINESS
DOW
DUPONT
CIMMYT
DONALD DANFORTH PLANT SCIENCE CENTER
DISCOVERY | COMMUNITY | IMPACT
N
THE UNIVERSITY OF ARIZONA COLLEGE OF AGRICULTURE & LIFE SCIENCES
Maricopa Agricultural Center
Experiment Station
McGill UNIVERSITY
ENERGY.GOV
STATE
zoetis
Colegio de Postgraduados
Bayer CropScience
BASF
We create chemistry
LfL
KWS
JKI
Julius Kühn-Institut
ROTHAMSTED RESEARCH
IPK GATERSLEBEN
CSIC
CHAP
Universität Bremen
Leibniz-Institut für Pflanzenbiochemie
BRITISH AMERICAN TOBACCO
MARTIN-LUTHER-UNIVERSITÄT HALLE-WITTENBERG
LIST
KeyGene
ALSIA agricoltura 2.0
UNIVERSITÉ DE GENÈVE
syngenta
Valagro
Where science serves nature
CBGP
CENTRO DE BIOTECNOLOGÍA Y GENÓMICA DE PLANTAS
PRIFYSGOL ABERYSTWYTH UNIVERSITY
UNIVERSITAS Miguel Hernández
vienna BIOCENTER
Sant'Anna
Scuola Universitaria Superiore Pisa
UNIL | Université de Lausanne
JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN
UNIVERSITEIT VAN AMSTERDAM
Rural Development Administration
National Institute of Agricultural Sciences
垦丰种业
KENFENG SEED
RIKEN
ICAR
NIASM
IRRI
AgriPheno
Phenotyping Future
SUMITOMO CHEMICAL
兰州大学
LANZHOU UNIVERSITY
中国农业科学院
CHINESE ACADEMY OF AGRICULTURAL SCIENCES
中国科学院
CHINESE ACADEMY OF SCIENCES
山東農業大學
SHANDONG AGRICULTURAL UNIVERSITY
ZBSTC
INDIAN AGRICULTURAL RESEARCH INSTITUTE
Taiwan Agricultural Research Institute
Ministry of Agriculture
KIMS
Korea Institute of Materials Science
VICTORIA State Government
Economic Development, Jobs, Transport and Resources
Australian Plant Phenomics Facility
ACPFG
AUSTRALIAN CENTRE FOR PLANT FUNCTIONAL GENOMICS PTY LTD
CSIRO
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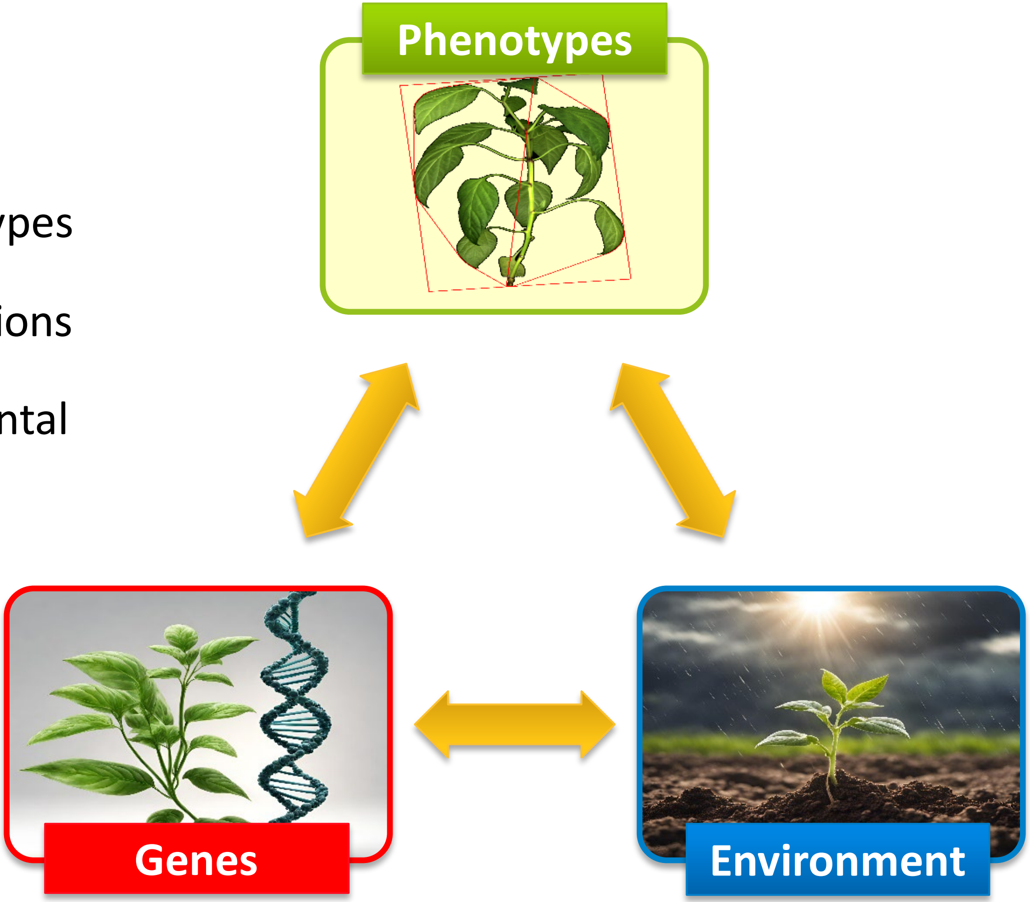
What is phenotyping?

- Measure and quantify phenotypes
- Link phenotypes to gene functions
- Link phenotypes to environmental influence



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Phenotypes – descriptons, measurements, interpretations

Plant or other organism

- Dimensions
- Outer properties
- Diseases and damages

Human vision and inspection

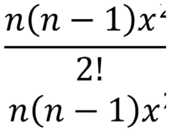
- Descriptions
- Measurements

Imaging Technology

- Photographs
- Spectral images
- Scans
- Specific wavelengths

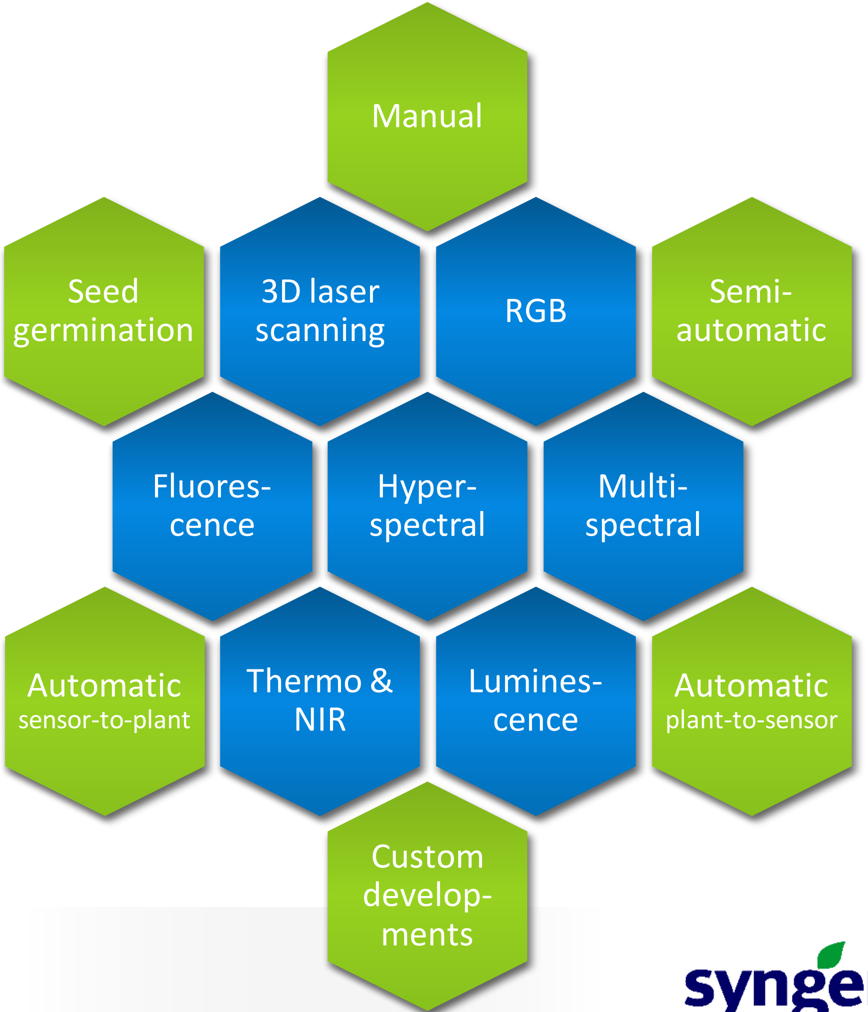
Image processing and analysis

- Image analysis algorithms
- Machine learning
- Artificial intelligence



Data interpretation and mathematical models

- Growth and development
- Environmental and stress responses
- Photosynthetic and biochemical features



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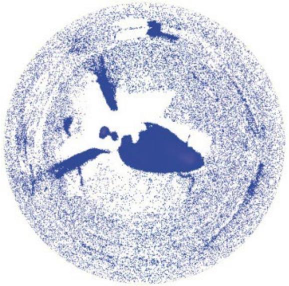
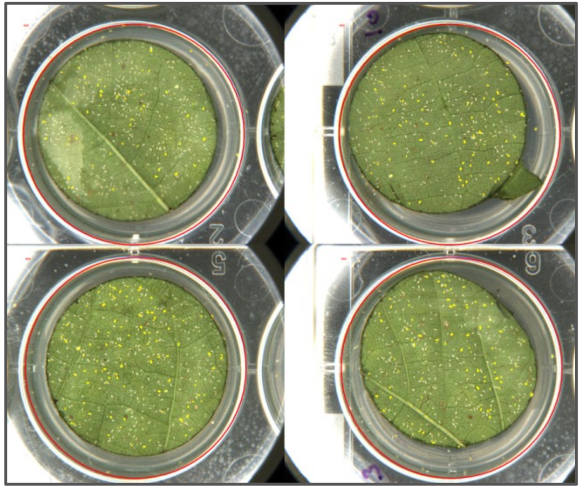
The **complete plant phenotyping system** that supports you in answering your **research question**

Out of one hand
For more than 25 years

Analyzing movement of small organisms



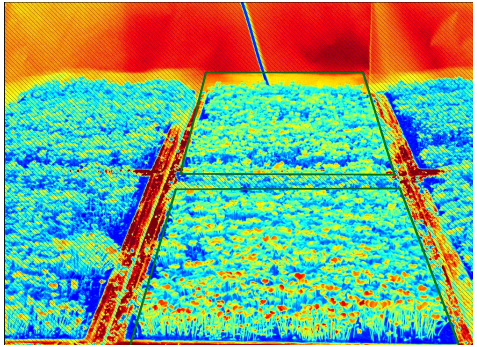
- movement quantification
- spatial distribution of movements
- movement pattern
- life/death classification



Phenotyping for Vertical Farming

Imaging growing and stressed microgreens

- Height
- Density/gaps
- Damages
- Vegetation Indices



Plant trait monitoring

- Seedling emergence and growth
- Height and density
- Stress factors and plant responses to stress
  - Wilting
  - Yellowing
  - Molding/fungal growth
  - Insect infestation
  - Plant bending/lodging
- Quality traits
  - Color
  - Shape and appearance of the canopy

Market-Challenges/ Herausforderungen

Herstellerübergreifender Standardisierungsbedarf („In folgenden Punkten sehe ich die Notwendigkeit zur Definition, Validierung und ggf. Prüfung durch die DLG.“)

- Qualitätsstandards sind essenziell
- Eine frühzeitige Erkennung von Krankheiten, Insektenbefall und ungewöhnlichem Wachstumsfortschritt sollte im Interesse der Betreiber von Vertical Farms liegen
- Die Technologien sind vorhanden und können entsprechend adaptiert werden

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