Hungarian University of Agriculture and Life Sciences as Global Agro-industrial Trading Hub

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Bishkek
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HUNGARIAN UNIVERSITY OF
AGRICULTURE AND LIFE SCIENCES

Rector's Greeting

HUNGARIAN UNIVERSITY OF AGRICULTURE AND LIFE SCIENCES

Prof. Dr. Csaba GYURICZA

University Professor, Rector

With the foundation MATE (Hungarian University of Agriculture and Life Sciences), **one of the largest agricultural-focused, multi- disciplinary higher education institutions in Europe** was established on 1 February 2021.

The backbone of the new university infrastructure is provided by our prominent campuses where our professional teaching staff and a unique green environment make the students feel welcome.

Buda, Gödöllő, Gyöngyös, Kaposvár and Keszthely Campuses offer constantly renewed degree and training programmes and make significant investments in order to strengthen their ties to international higher education.

We consider lessons learned from the most successful European universities and we combine our traditions with the solutions of modern ages. Our long-term objective is to make MATE one of the thirty best agricultural higher education universities in the world.

HUNGARY IN BRIEF

SIZE:	93,000 square kilometres
DIMENSIONS:	250 km (North-South) and 524 km (East-West)
POPULATION:	9.7 million
CAPITAL:	Budapest (1.7 million)
LARGEST CITIES:	Debrecen, Szeged, Miskolc, Pécs, Győr
CLIMATE:	dry continental with four seasons
LANGUAGE:	Hungarian
NEIGHBOURING COUNTRIES:	Austria, Croatia, Slovakia, Slovenia, Serbia, Romania, Ukraine
GOVERNMENT:	parliamentary constitutional republic
CURRENCY:	forint (HUF)
TIME ZONE:	CET (GMT +1)

10 THINGS ABOUT HUNGARY

1. Budapest the **„City of Spas"** is the only capital in the world with thermal/medicinal baths
2. **The 2nd subway line** of continental Europe was built in Budapest.
3. **The 3rd largest parliament building** in the world is the Hungarian Parliament.
4. The Hungarian alphabet has **44 letters.**
5. Amongst the many **Hungaricums 5 of them** are related to Hungarian **gastronomy**.
6. With almost **600 square kilometres, Lake Balaton** is the largest lake in Central Europe.
7. In **1974** the immensely popular **Rubik's-cube** was invented by the Hungarian Ernő Rubik.
8. Settelment of the Magyars in the Carpathian-Basin (today's Hungary) in **895.** Long history, huh?!
9. Hungary is subdivided administratively into **19 counties.**
10. Hungary became a Christian monarchy **in 1000-1001** with the crowning of St. Stephan, which was recognized by the pope.

Mission and Strategic Areas

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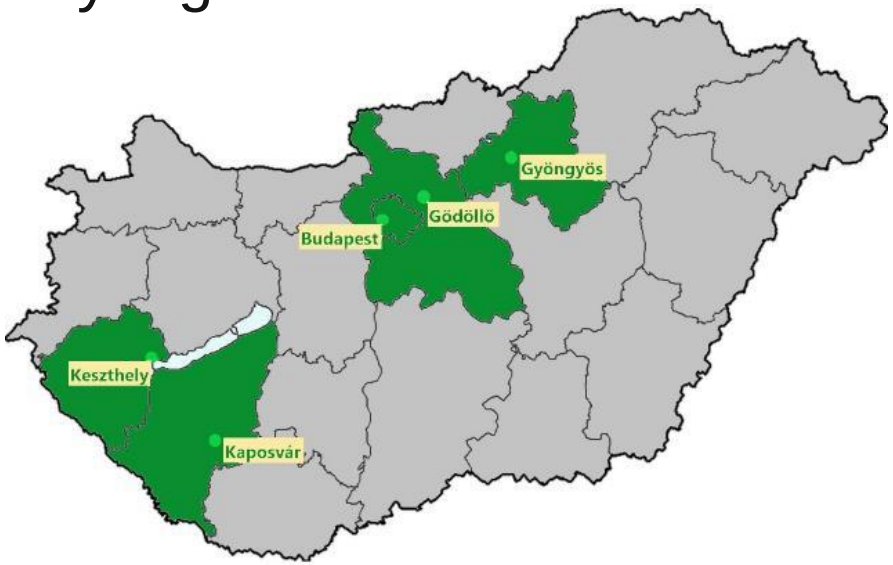
One of the largest agricultural-focused, multidisciplinary higher education institution in Central-Europe



Campuses:

- Szent István Campus, Gödöllő
- Buda Campus, Budapest
- Kaposvár Campus
- Georgikon Campus, Keszthely
- Károly Róbert Campus, Gyöngyös.

Strategic areas:

- Teaching and research of food source production
- Food quality and safety
- Water and soil as strategic resource
- Environmental protection and sustainability
- Energy security
- Bioeconomy
- Data driven agriculture

MATE in Figures

- Number of institutes: 21
- Number of students: 15 576
- Number of international students: 2 314 (14.9%)
- Number of countries of international students: 102
- Number of PhD schools: 12
- Number of PhD students: 870
- Number of international students: 316 (36.5%)
- Number of academic staff: 976
- Number of staff: 1221
- Languages of the courses: Hungarian, English

Gödöllő, headquarter

Ranking Positions

HUNGARIAN UNIVERSITY OF AGRICULTURE AND LIFE SCIENCES

QS World Ranking: 801-1000th
https://www.topuniversities.com/university-rankings/world-university-rankings/2021

By Agriculture and forestry subject: 151-200th
https://www.topuniversities.com/university-rankings/university-subject-rankings/2020/agriculture-forestry

In the Region: 110th
https://www.topuniversities.com/university-rankings/eeca-rankings/2020

THE Europe Teaching Ranking: 126-150th
https://www.timeshighereducation.com/rankings/europe-teaching/2019#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/undefined

Emerging Economies University Ranking: 351-400th
https://www.timeshighereducation.com/world-university-rankings/2020/emerging-economies-university-rankings#!/page/0/length/25/name/szent/sort_by/rank/sort_order/asc/cols/stats

QS WORLD UNIVERSITY RANKINGS

THE WORLD UNIVERSITY RANKINGS

Business Innovation Model

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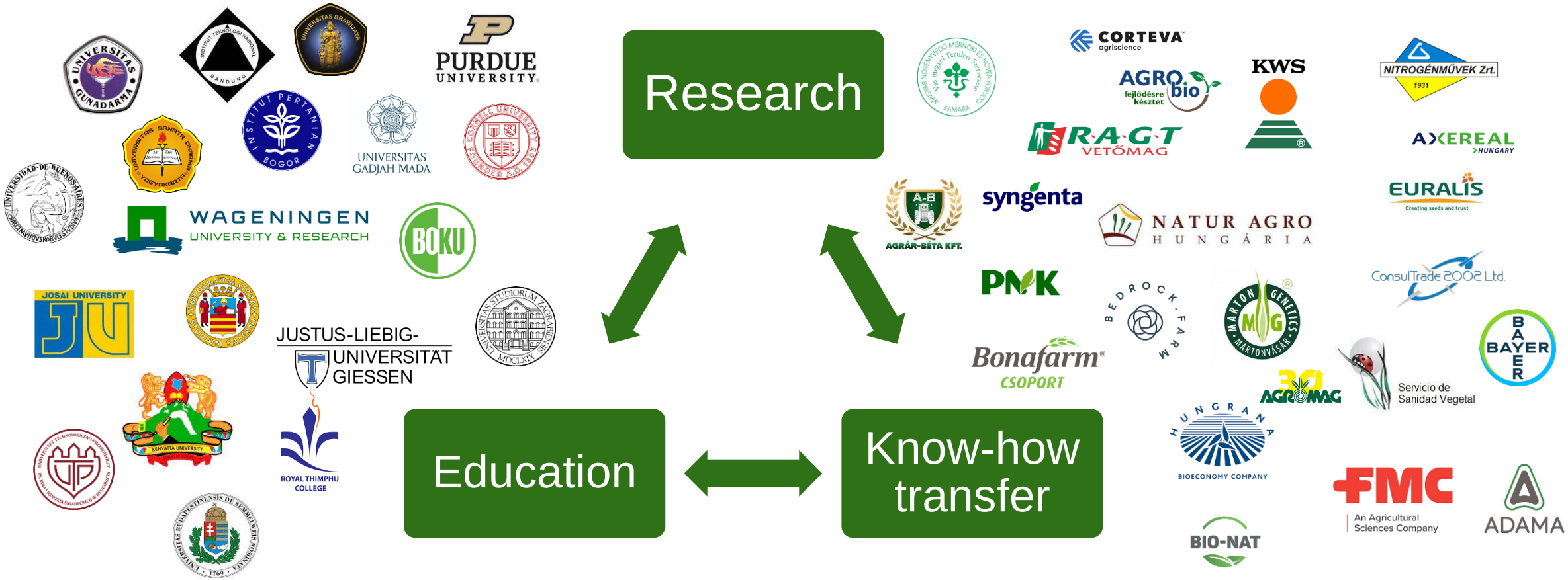
University relations

Business partnerships



Courses in English Language

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Bachelor Programmes:

Agricultural Engineering

Environmental Engineering

Horticultural Engineering

Wildlife Management Engineering

Business Administration and Manage

Mechanical Engineering

Engineering Management

Tourism and Catering

Food Engineering

Courses in English Language

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Masters Programmes:

Mechanical Engineering
Engineering Management
Environmental Engineering
Agricultural Water Management Engineering
Crop Production Engineering
Agricultural Biotechnology
Wildlife Management Engineering
Rural Development Engineering
Management and Leadership
Supply Chain Management
Tourism Management
Garden Art and Landscape Design
Horticulture Engineering
Food Science and Technology Engineering
Food Safety and Quality Engineering
Plant Protection
Executive MBA
Master of Business Administration (MBA)

Doctoral Schools at MATE

Gödöllő Campus:

Doctoral School of Animal Biotechnology and Animal Science
Doctoral School of Biological Sciences
Doctoral School of Environmental Sciences
Doctoral School of Plant Sciences
Doctoral School of Economic and Regional Sciences
Doctoral School of Mechanical Engineering

Buda Campus:

Doctoral School of Food Sciences
Doctoral School of Horticultural Sciences
Doctoral School of Landscape Architecture and Landscape Ecology

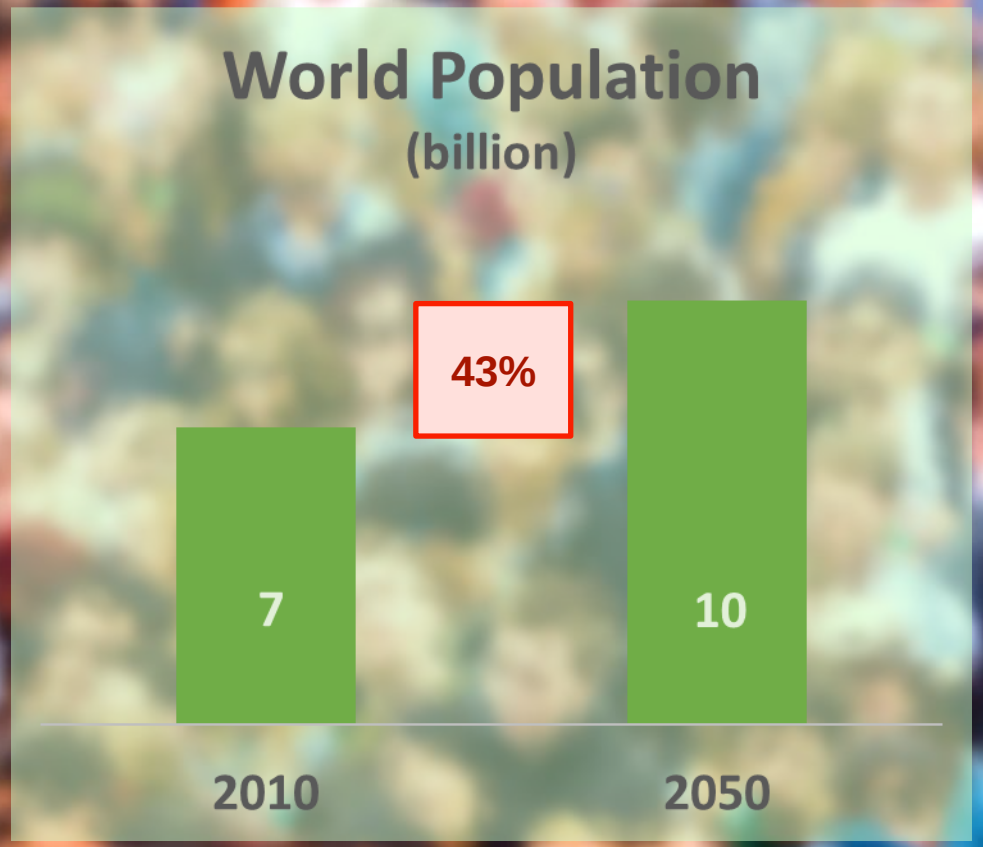
Kaposvár Campus:

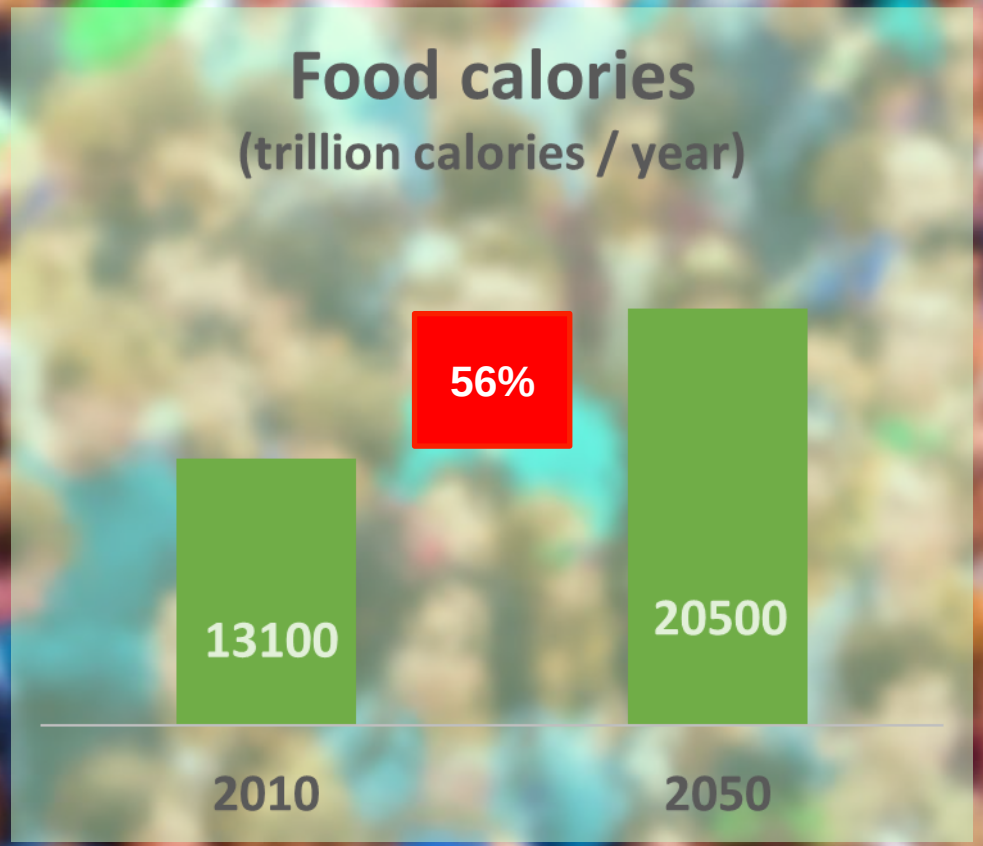
Doctoral School of Animal Science
Doctoral School of Management and Organizational Science

Georgikon Campus:

Festetics Doctoral School

Increasing Demand for Food





Increasing Risks for Food Supply

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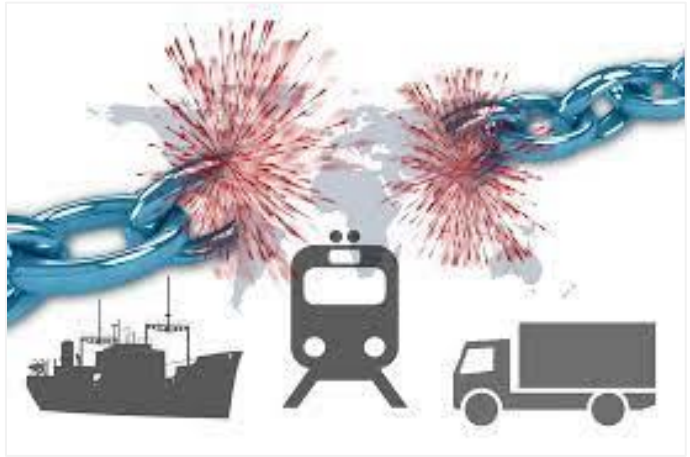
Soil degradation

Reduced crop yields

Disrupted supply chains



Field Cultivation vs. Indoor Farming

- Low upfront investment
- Low cost of cultivation
- Susceptible to climate effects
- Logistical risks
- Significant delivery loss

- Can be deployed in urban areas
- 2% water usage vs. open field production
- No pesticides, herbicides
- Independent from weather fluctuations
- Year round production

Food Security for Urbanized Areas

Mitigating food security risk

Localized food production
Urban agriculture
Controlled environment agriculture
Vertical farms, plant factories

Use case: indoor farming

Leafy greens
Edible flowers
Herbs
Medical plants

Protein crops:
soybean,pea

Commodities

Know-how from Seed to Food

Germination

Environment control

Nutrients

Lighting

Post harvest

Seedlings

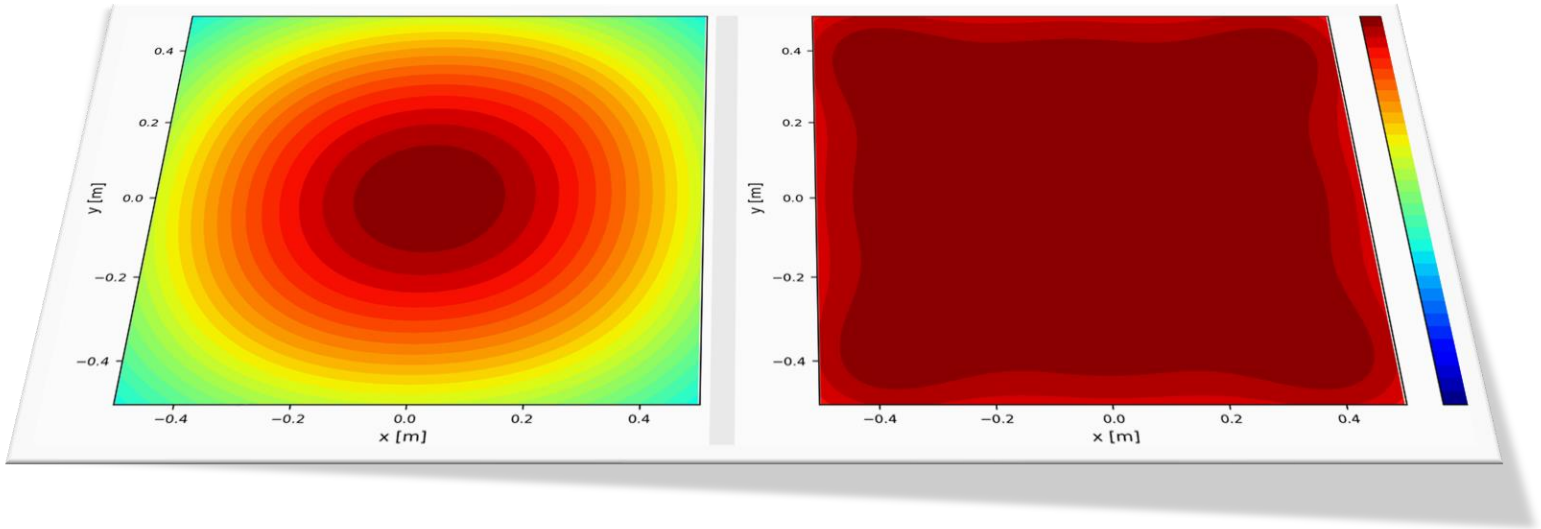
Crop monitoring and qualification

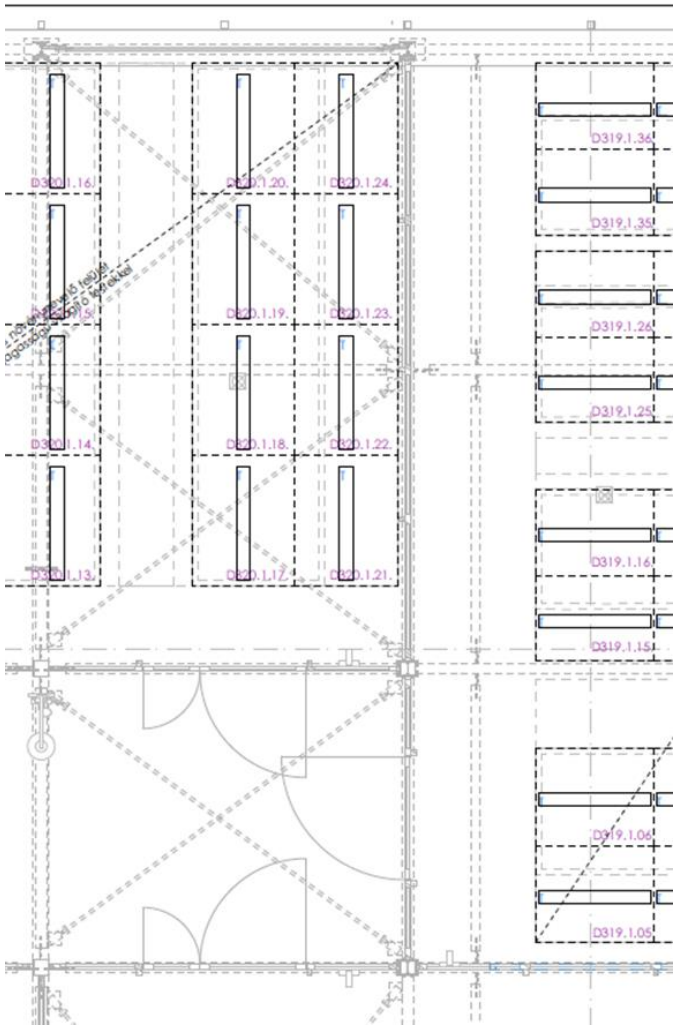
Data driven decisions

Lighting Design

Conventional design

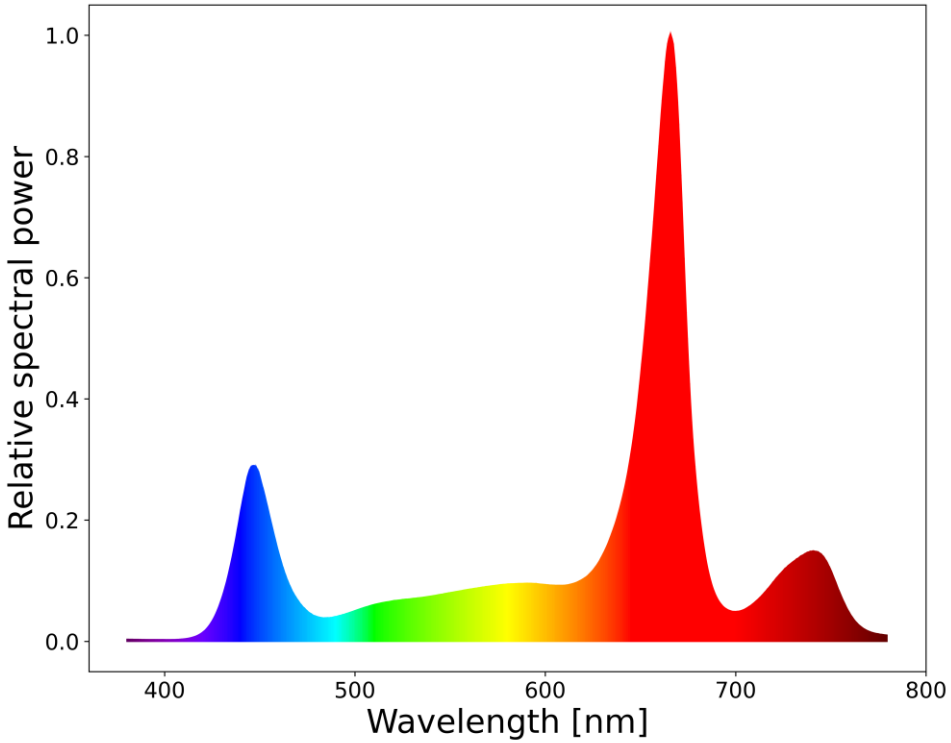
MATE know-how for optimized uniformity and light utilization





Light Recipes

Spectral composition of light tailored to the specific plant needs



Environment Control

- Sensors and actuators for automated environmental monitoring and control
- IoT solutions
- Predictive analytics
- Machine learning
- Artificial Intelligence

High Quality Seeds






Plant breeding

Specific varieties

Is there a need for optimizing height, vegetation cycle pest resistance etc. for vertical farms?

Digital Twin of the Crop

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Real crop

Digital twin of the crop

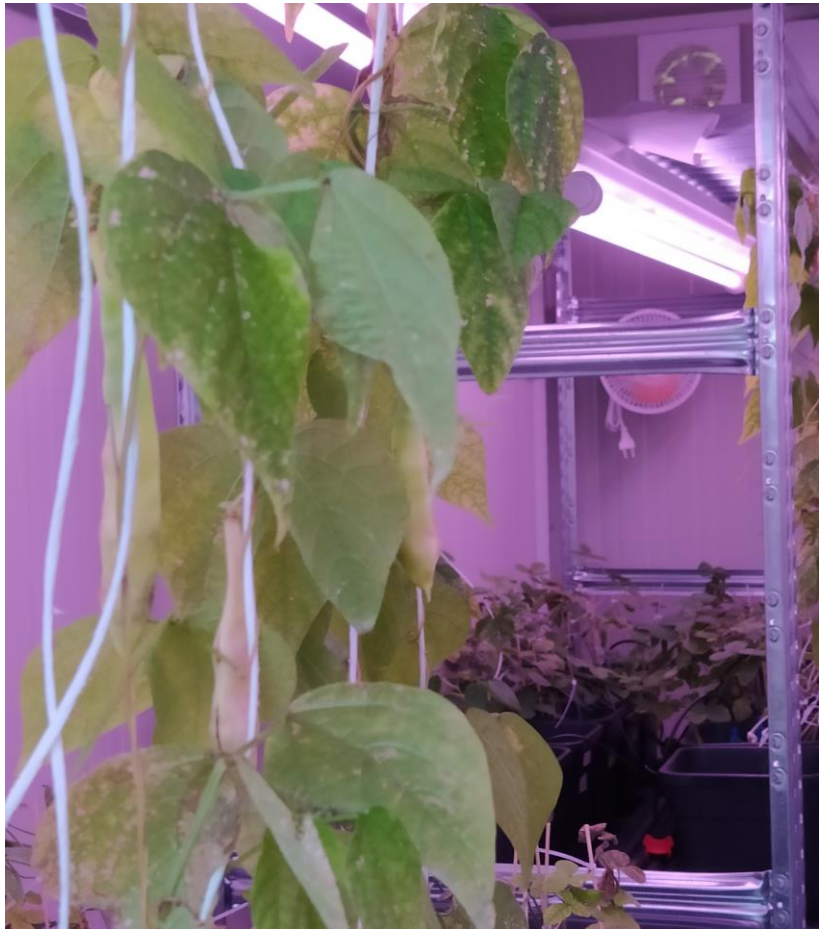
```
def get_E_dist(xE,yE,xLED,yL
    # modified for 2D
    num_xE = len(xE)
    num_yE = len(yE)
    num_LED = len(xLED) * len(

    xx = np.zeros(num_LED)
    yy = np.zeros(num_LED)
    k = 0
    for ii in range(len(xLED)):
        for jj in range(len(yLED)):
            xx[k] = xLED[ii]
            yy[k] = yLED[jj]
            k += 1
```

- Measuring plant's response as a function of environmental parameters
- Create digital models of the specific crop
- Use models to optimize and predict crop yield

Crop Quality and Food Safety

- Precision food analytics
- Microbiology
- Nondestructive analytical methods
- Quality assurance

Modular Cultivation Unit



- Containers as stand alone cultivation units
- Scalable technology
- Dual-use technology: applicable both for civillan humanitarian and military use

Sustainable Business Models

Labor
Electricity
CO_2
Nutrients
Seed
Water

Product
O_2
Plant residues
Waste water

Biogas
Animal feed

Cooperation Opportunities

- Know-how transfer - in cooperation with business partners
- Optimizing cultivation technology for specific crop
- Trainings
- Exchange programs

Global Trading Platform

Global Trading Platform: International trading

Connecting sellers/farmers and buyers on a new online platform that is used only for agro-industrial trades.

It would be open for registration for any company all around the world.

Possible income: commission (%) after the transactions

Global Trading Platform

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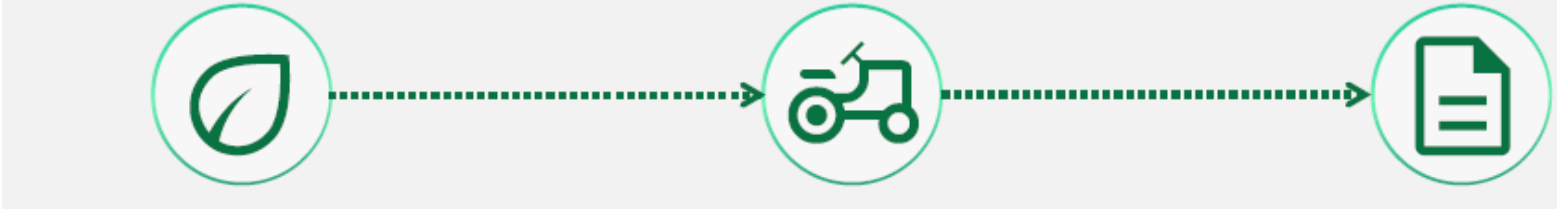
Market analysis, data collection



The full process

Global Trading Platform

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What are the benefits of the Platform?

1. International network management is centralized on the platform
2. Relevant data colelction frpm the agro-industr via the users
3. Multiple income options: commission after transactions, data selling, researcher experts for international projects
4. Increasing the international reputation of MATE

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