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IN SUPPORT OF EXCELLENCE IN SCIENCE AND TECHNOLOGY

The criteria of sustainability, with particular emphasis on regenerative agriculture and its environment. The role and responsibility of the individual

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Feed the World and regenerate the Planet

By 2050, the Earth's population is projected to approach 10 billion from the current 8 billion. Providing this population with high-quality food (primus inter pare) while meeting sustainable ecological expectations poses challenges.

We live in an immoral world. More than 10% of the Earth's inhabitants are starving. According to FAO data, more people die each year due to hunger than from AIDS, malaria, and tuberculosis combined.

https://www.premiumtimesng.com/opinion/614968-nigeria-hunger-as-real-and-present-by-dakuku-peterside.html

https://drive.google.com/drive/folders/1XA6ckkliIn4F_D8jKg7bcrdNZbP7B5T_?usp=drive_link

Organic farming after 2022: Examples of the changes that made under the new organic legislation include: *a strengthening of the control system*, *helping to build further consumer confidence in the EU organics system*; *new rules for producers which will make it easier for small farmers to convert to organic production; new rules on imported organics to ensure that all organic products sold in the EU are of the same standard; a greater range of products that can be marketed as organic.*

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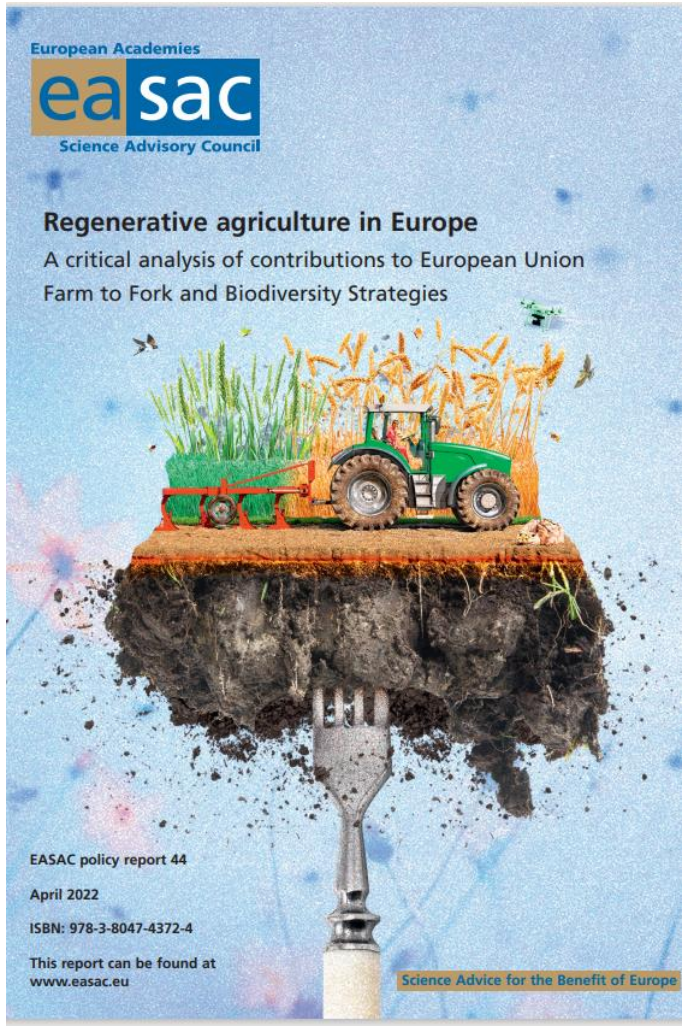
Although this is the ultimate goal, there is an intermediate goal for 2030, the date by which the EU wants to reduce emissions by 55% compared to 1990 levels. ….Energetic aspects: In particular, the Fit for 55 package sets a target of producing 40% of Europe's energy from renewable sources by 2030. Agricultural aspects: The program includes targets such as achieving 25% organic farming by 2030, reducing pesticide use by 50% and fertilizer use by 20% by 2030. Finally, the Green Deal also includes the *Zero Pollution Action Plan*, which aims to eliminate all sources of air, water and soil pollution by 2050.

Naturally, the EU also needs to consider general expectations and requirements. The 2030 Agenda for Sustainable Development (*Sustainable Development Goals: SDGs*), adopted by all United Nations member states in 2015 envisages global social, economic, and environmental reform.

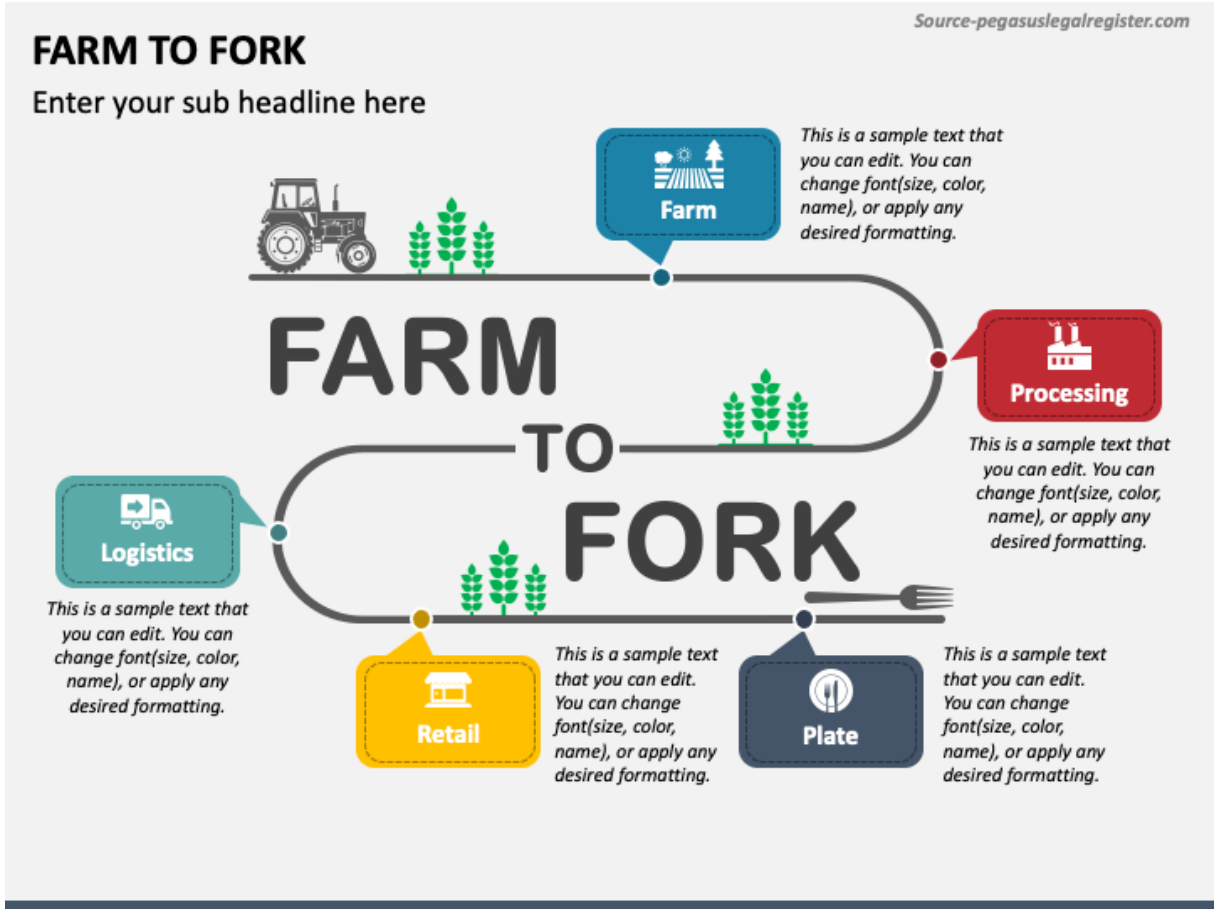


The development of expectations regarding regenerative farming is currently underway. Such concepts have been published by the European Academies Science Advisory Council.

Let's see the basic statements:

Although the concept of regenerative agriculture was developed in the 1970s, there is still no consensus on definition. Regenerative agriculture is maintaining agricultural productivity, increasing biodiversity and enhancing ecosystem services including carbon capture and storage.. Therefore, in contrast to some of the other approaches, regenerative agriculture does not exclude the use of, for example, modern plant and animal breeding technology, tilling, use of inorganic fertilizers or pesticides, but instead aims for a limited and more targeted use. *This is a new philosophical approach*.


market
Follow your food from farm to fork.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FARM TO FORK
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Plate
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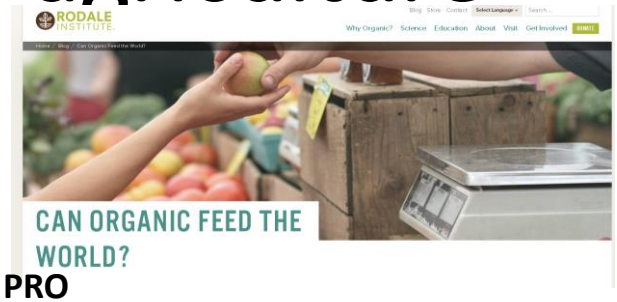
Environmental impact: Organic versus conventional agriculture



PRO

Farming Systems Trial of RODALE Institute started in 1981, is the longest-running side-by-side trial of organic and conventional in North America. Our data shows:

1.Organic yields are competitive with conventional yields after a 5-year transition
2.Organic systems produce yields up to 40% higher in drought
3.Organic methods leach no toxic chemicals into waterways
4.Organic uses 45% less energy
5.Organic releases 40% fewer greenhouse emissions
6.Organic earns 3-6x higher profits for farmers

The Farming Systems Trial is, however, limited. Our climate in Pennsylvania isn't reflective of growing conditions the world over. That's why we're expanding our research and replicating the trial in new regions.

In preparation for the lecture, I wrote a letter to the Rodale Institute. I asked the following questions:

- **Why is satellite-based yield measurement not utilized to validate your results?**
- **Why aren't the benefits of precision farming, site-specific treatments, and the possibilities of Variable Rate Application being applied? so far no answer has been received. It's true: I received brochures about the educational activities of the Rodale Institute without being addressed**

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HERIOT WATT UNIVERSITY

Heriot-Watt University
Research Gateway

Environmental impacts of conventional versus organic eggplant cultivation systems

Citation for published version:
Foteinis, S, Hatzisymeon, M, Borthwick, AGL & Chatzisymeon, E 2021, 'Environmental impacts of conventional versus organic eggplant cultivation systems: Influence of electricity mix, yield, over-fertilization, and transportation', *Environments*, vol. 8, no. 3, 23. https://doi.org/10.3390/environments8030023

The contradictions pertain to organic farming. **Using life cycle assessment (LCA), organic eggplant cultivation exhibited better environmental performance per unit area (24.15% lower total environmental footprint compared to conventional cultivation), but conventional cultivation performed better per unit of mass (28.10% lower total environmental footprint compared to organic cultivation).** The yield reduction in organic technologies is from 5.5 t/ha.to 3 t/ha. **The conventional system attained higher scores in eutrophication (up to 37.12%) and ecotoxicity (up to 83.00%) midpoint impact categories, due to the use of chemical fertilizer and pesticide. This highlights the need for spatially explicit LCA that accounts for local environmental impacts at the local scale .** We obtain similar results in animal breeding as well.

nature COMMUNICATIONS

ARTICLE

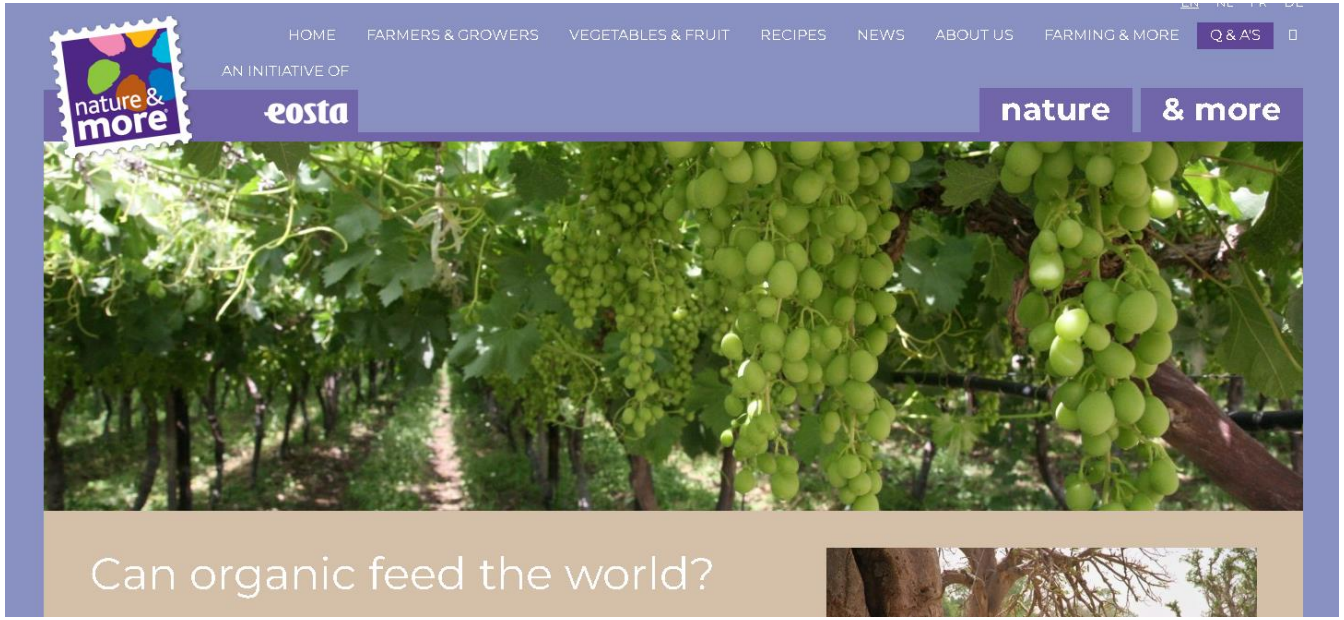
DOI: 10.1038/s41467-017-01410-w OPEN

Strategies for feeding the world more sustainably with organic agriculture

Adrian Muller[1,2], Christian Schader[1], Nadia El-Hage Scialabba[3], Judith Brüggemann[1], Anne Isensee[1], Karl-Heinz Erb[4], Pete Smith[5], Peter Klocke[1,6], Florian Leiber[1], Matthias Stolze[1] & Urs Niggli[1]

Here we show that a 100% conversion to organic agriculture needs more land than conventional agriculture but reduces N-surplus and pesticide use.

[394]



•In Europe and North-America: with good growing conditions, and assuming high use of fertilizer and pesticides, the yield of organic is 60 to 100% of conventional, depending on the crop.
•In the 2nd world: with moderate growing conditions and assuming more irregular use of fertilizer and pesticides, the yield of organic is 92 to 100% of conventional, depending on the crop.
•In the 3d world: with adverse growing conditions, with low inputs, in areas of subsistence agriculture, the yield of organic is 100 to 180% of conventional.

[396]

These are not systematically selected examples, but they indicate the essence of the problem

Who has right?

Gro Harlem Brundtland, 1939

Report of the Brundtland Comission (1987)

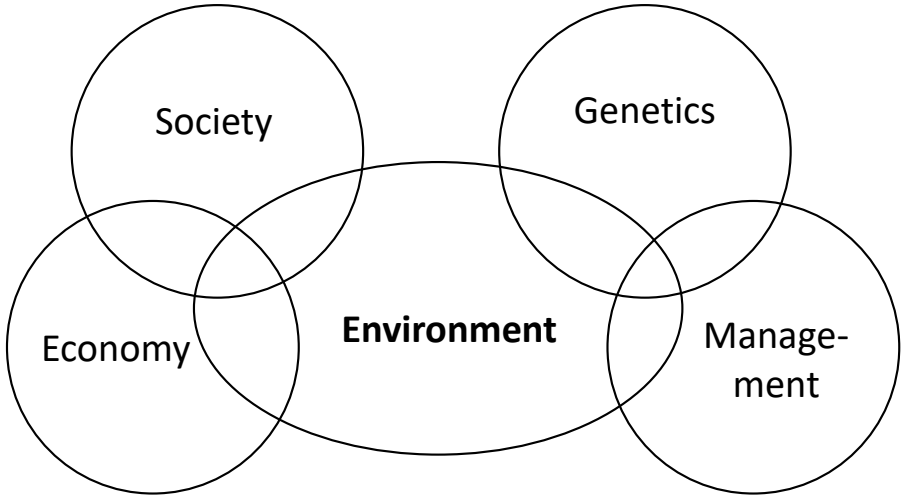
OUR COMMON FUTURE

THE WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT

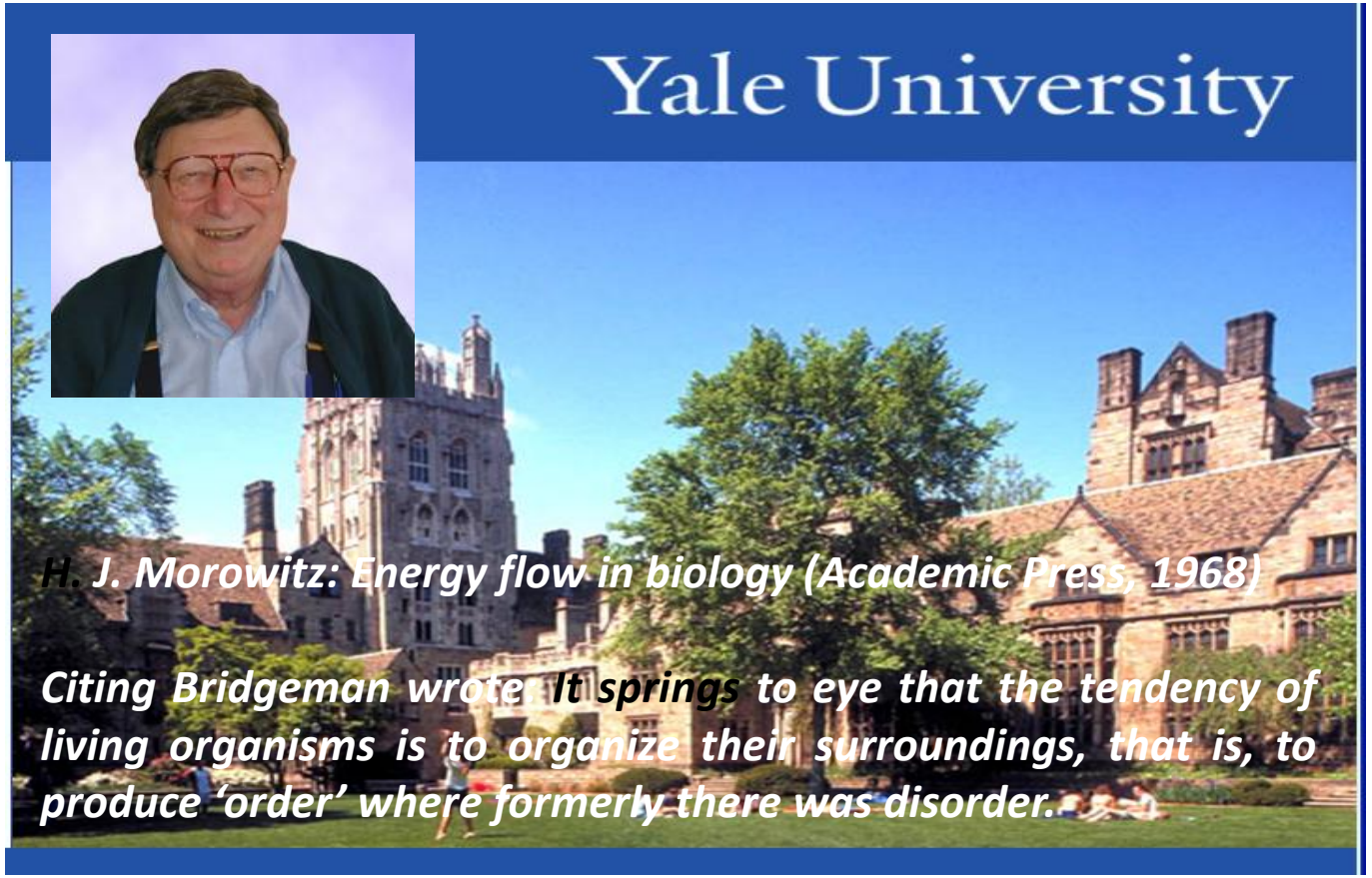
"Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs."

Unfortunately, the implementation of this respectable principle is already causing serious disputes, depending on personal interests.

The interconnection between general and agro sustainability. The harmony of the pillars of social and agrarian sustainability implies the coordination of multiple complex systems. A commonly accepted definition for social sustainability is the unity of the pillars of social development, economic growth, and environmental protection



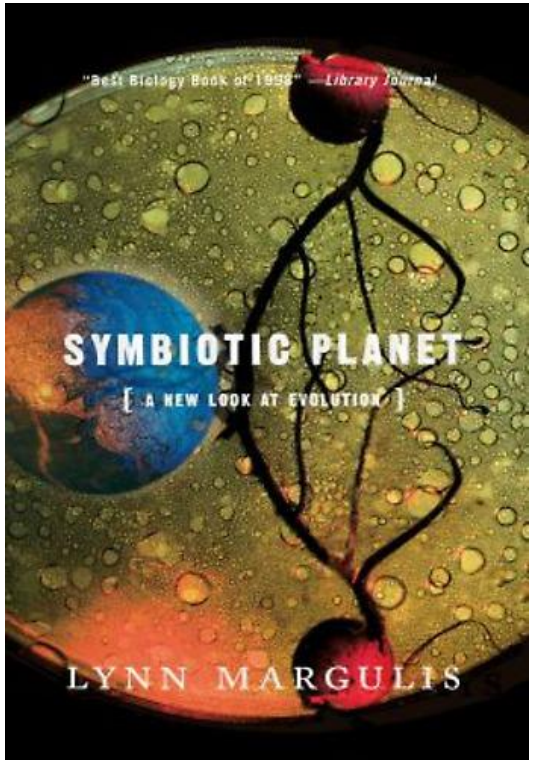
This integration needs to be harmonized with the pillars of agricultural sustainability: Genetics (related to cultivated genomes), Environment (covering production units such as fields, gardens, barns, and the food industry, as well as their surroundings), and Sustainable Management , as depicted in Figure. As evident, the environment and nature conservation play a crucial role here. Any significant change in any other pillar, whether positive or negative, typically manifests in the form of environmental changes. The question is what kinds of changes are occurring, how these changes can be detected or indexed, and how the changes in indexes can be monitored.



Why do we not have the right to do the same?

One organism's waste is another's food

Lynn Margulis: in her Symbiotic planet book qoutes from James E. Lovelock's book: "**No organism feeds on its own waste…One organism's waste is another's food.** ….Gaian system recycles matter on the global level…The sum of planetary life, Gaia, displays a physiology that we recognize as **environmental regulation.**" (Margulis, 1998).

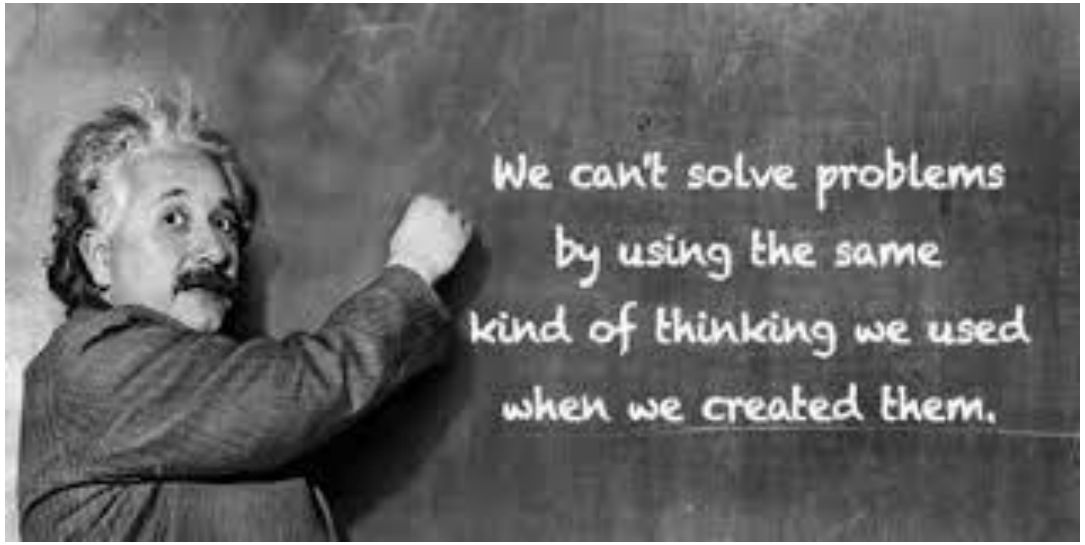


Only humans can ignore the dynamic equilibrium processes of nature and disregard the consequences that adversely affect future generation.

I try to proove, that

1.The latest scientific knowledge needs to be adapted. Iapproach the solution from an ICT perspective.

2.Our mindset needs to change, shifting from anthropocentric thinking to ecocentric thinking.



„Till now man has been up against Nature, from now on he will be up against his own nature."

Gábor Dénes

1900-1979

Received the Nobel prize in physics: 1971

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The start of application technology in agriculture, historical backround.

The 1st Green Revolution

Norman Borlaug: the fahter of 1st Green Revolution

1914-2009

Nobel Peace Prize: 1970

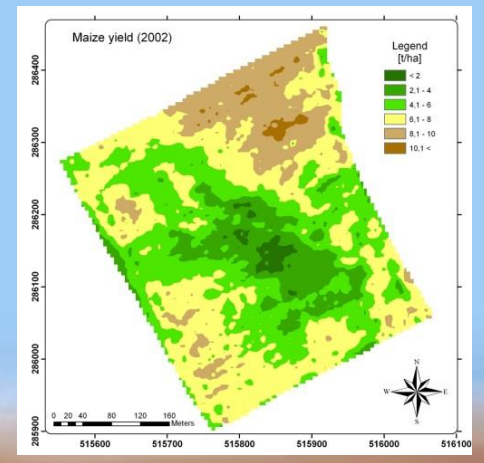
Honorary member of the Hungarian Academy of Sciences

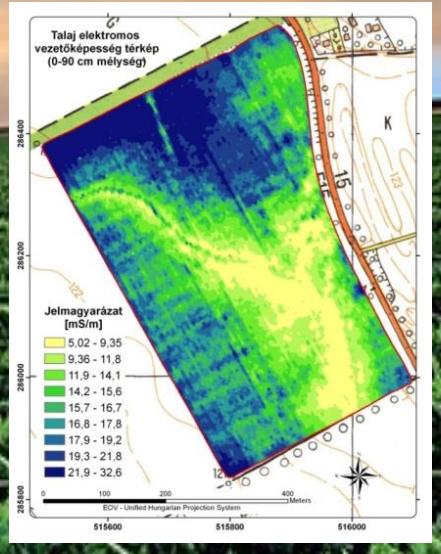
- „The first essential component of social justice is adequate food for all mankind."
- „You can't build a peaceful world on empty stomachs and human misery."

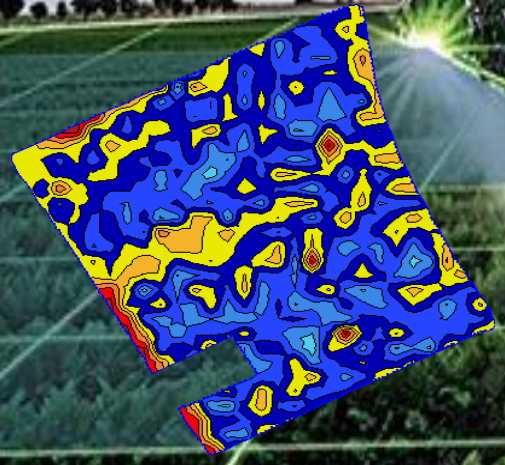
The 2nd Green Revolution (Global Positioning System, Precision agriculture, digitalisation of Agro-systems, the information driven agriculture) started in the beginning of '90s

Further advances, such as precision agriculture, **in which fertilizer application rates and timing are adjusted differentially across a field to meet crop needs, will increase agricultural efficiency and decrease adverse effects on the environment. However, a greener revolution is also needed a revolution that incorporates accumulated knowledge of ecological processes and feedbacks, disease dynamics, soil processes and microbial ecology. Experiments such as those of Drinkwater *et al.* need to be combined with studies of both the mechanisms controlling soil organic matter and nitrogen dynamics, and the dynamics of crop nutritional needs.**

Precision Crop Production

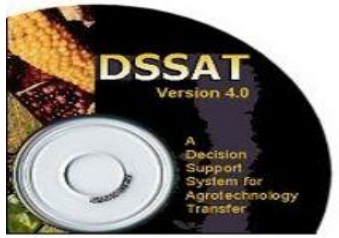






For this purpose, in 1982, the IBSNAT (International Benchmark Sites Network for Agrotechnology Transfer): *NASA, Economic Research Service (ERS), Soil Conservation Service (SCS), Foreign Agriculture Service (FAS), National Oceanic Atmospheric Administration (NOAA), USDA* and several US and foreign universities were launched. At the same time the system can accept the climate models, too.

Decision Support System for Agrotechnology Transfer (DSSAT)



•**SOIL**: soil type, date of soil sampling; soil physical properties (silt, sand and clay content): organic matter %; CaCO3%; pH; KCl; P2O5 mg/kg; K2O5 mg/kg; salt content (%).

•**MANAGEMENT**: planting date, variety of crop, row spacing, irrigation and NPK fertilizer amounts and dates.

•**CROP DATA**: phenological characteristics,biomass of yield,dates of anthesis and maturity, growth rate and Leaf area index, forecrop (type), main yield of forecrop, t/ha; secondary yield of forecrop (t/ha).

•**WEATHER**: daily maximum and minimum temperatures, wind speed, precipitation amounts, relative humidity, potential evaporation, sunshine duration and surface radiation.

More than 50 different properties are taken into consideration in a manager zone.

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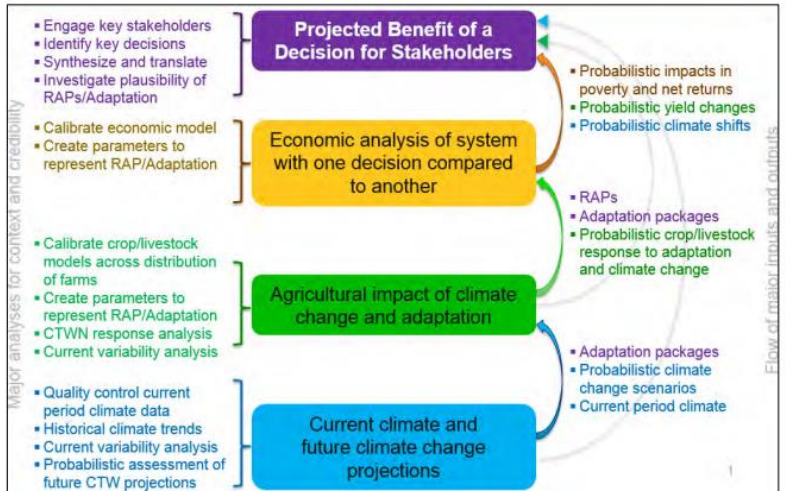
AgMIP

The Agricultural Model Intercomparison and Improvement Project

Compatibility of decision support (plant physiological) model



Forrás: AgMIP: Protocols for AgMIP Regional Integrated Assessments Version 6.0

NASA

Goddard Institute of Space Studies (NY)

2014

New York

2016

Measuring Farmland Biodiversity by Felix Herzog, Philippe Jeanneret, et al.

Genetic Diversity Indicators	
Number and amount of different breeds (2,3)	Simple count of breeds/varieties, based on farm interviews
Number and amount of different varieties	
Origin of crops (1,3)	Share of races maintained on farm
Species Diversity Indicators	
Number and amount of vascular plant species	Primary producers (plants), herbivores (bees), predators (spiders) and detrivores (earthworms)—all with low to medium mobility and therefore related to the plot/farm scale.
Number and amount of wild bee and bumblebee species	
Number and amount of spider species	
Number and amount of earthworm species	
Habitat Diversity Indicators	
Habitat richness	The four indicators describe the composition of the farm in terms of plot/patch type and geometry.
Habitat diversity	
Average size of habitat patches	
Length of linear elements	
Crop richness (1,3)	Indicators for specific habitats. Interpretation is contextual: higher percentage of shrubs implies more biodiversity on intensive farms, but abandonment on extensive farms.
Percentage of farmland with shrubs	
Percentage of farmland with trees (1,2,3)	
Percentage of semi-natural habitats (SNH)	Requires expert judgment; relatively low scientific validity, but high stakeholder interest.
Farm Management Indicators	
Total direct and indirect energy input	Negatively correlated with most species counts; a good proxy for intensity of farm management.
Intensification/Extensification (expenditures on inputs)	This monetary indicator correlated well with the number of wild species in most case study regions.
Area with use of mineral nitrogen fertilizer	The increased use of nitrogen affects the composition of plants, and thus indirectly acts on fauna.
Total nitrogen input	
Frequency of field operations	Each mechanical field operation disturbs the ecosystem.
Pesticide use (1,3,4)	Pesticides directly eliminate specific species.
Average stocking rate (2,3,4)	Farm animals interact with biodiversity both directly (grazing) and indirectly (nutrient input from organic fertilizer).
Grazing intensity (2,3,4)	

Farm-scale biodiversity indicators. Those restricted to specific farm types are indicated: (1) Field crops and horticulture, (2) Specialist grazing livestock, (3) Mixed crops—livestock, (4) Permanent crops.

Solutions

For a sustainable and desirable future

Search this site: Search

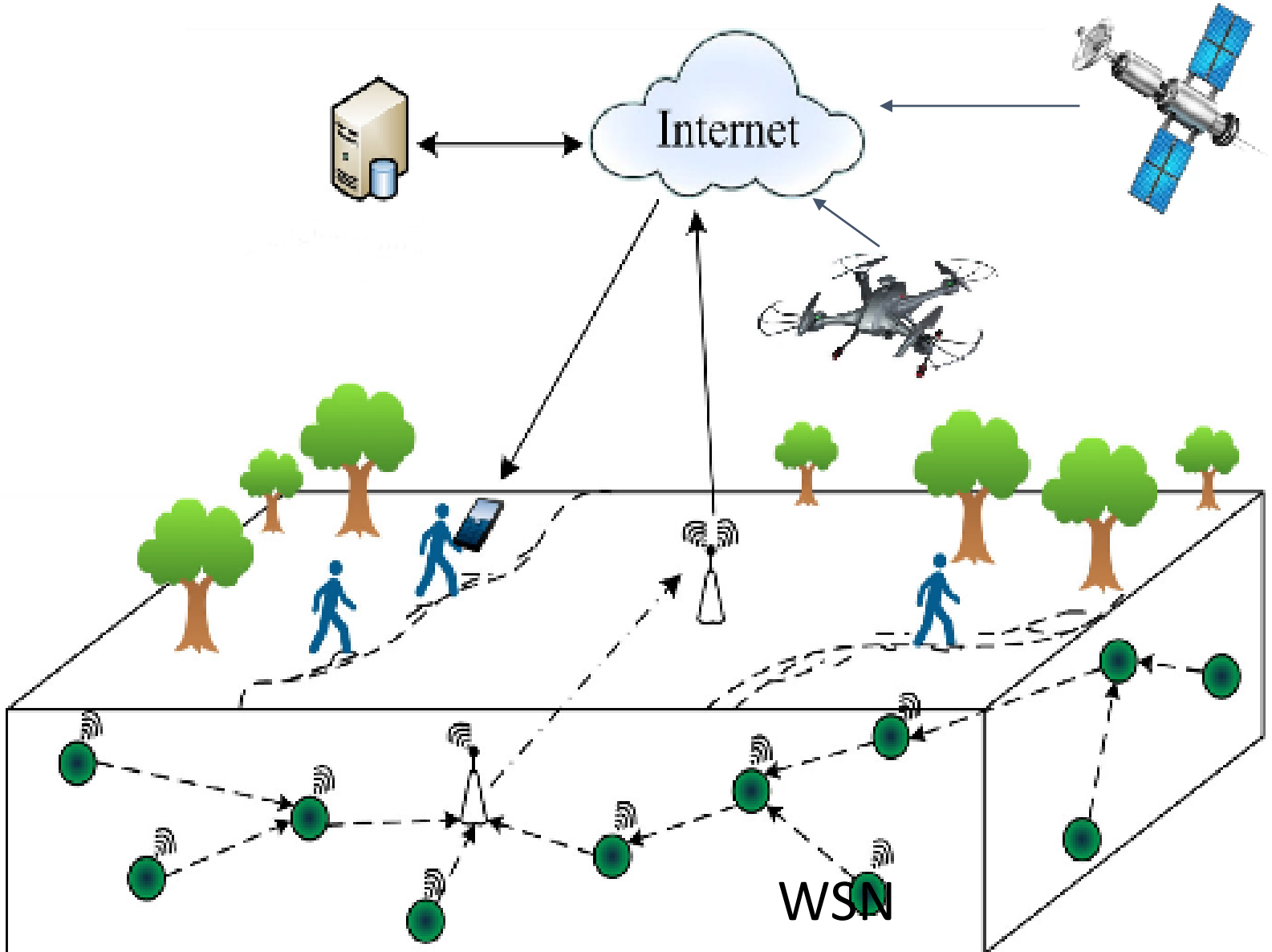
Volume 4 | Issue 4 | Oct 2013

Cite this Article

Measuring Farmland Biodiversity

They tested BioBio biodiversity indicators on 237 farms in 15 case study regions across Europe, Northern, and subSaharan Africa

Internet of Things (IoT), WSN (Wireless Sensor Network, deployed)



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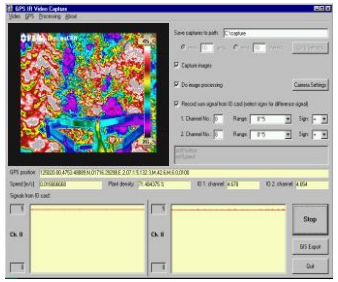
The 3th Green revolution:
Integration of PA and IoT with WSN, BIG DATA, AI and Cloud computing

The **Mosonmagyaróvár Agro -IoT** (A-IoT:Internet of Things) with **WSN (Wireless Sensor Network**

Deployed sensors
in the surraundings of arable land

IoT base station

Meteorological station



Deployed sensors

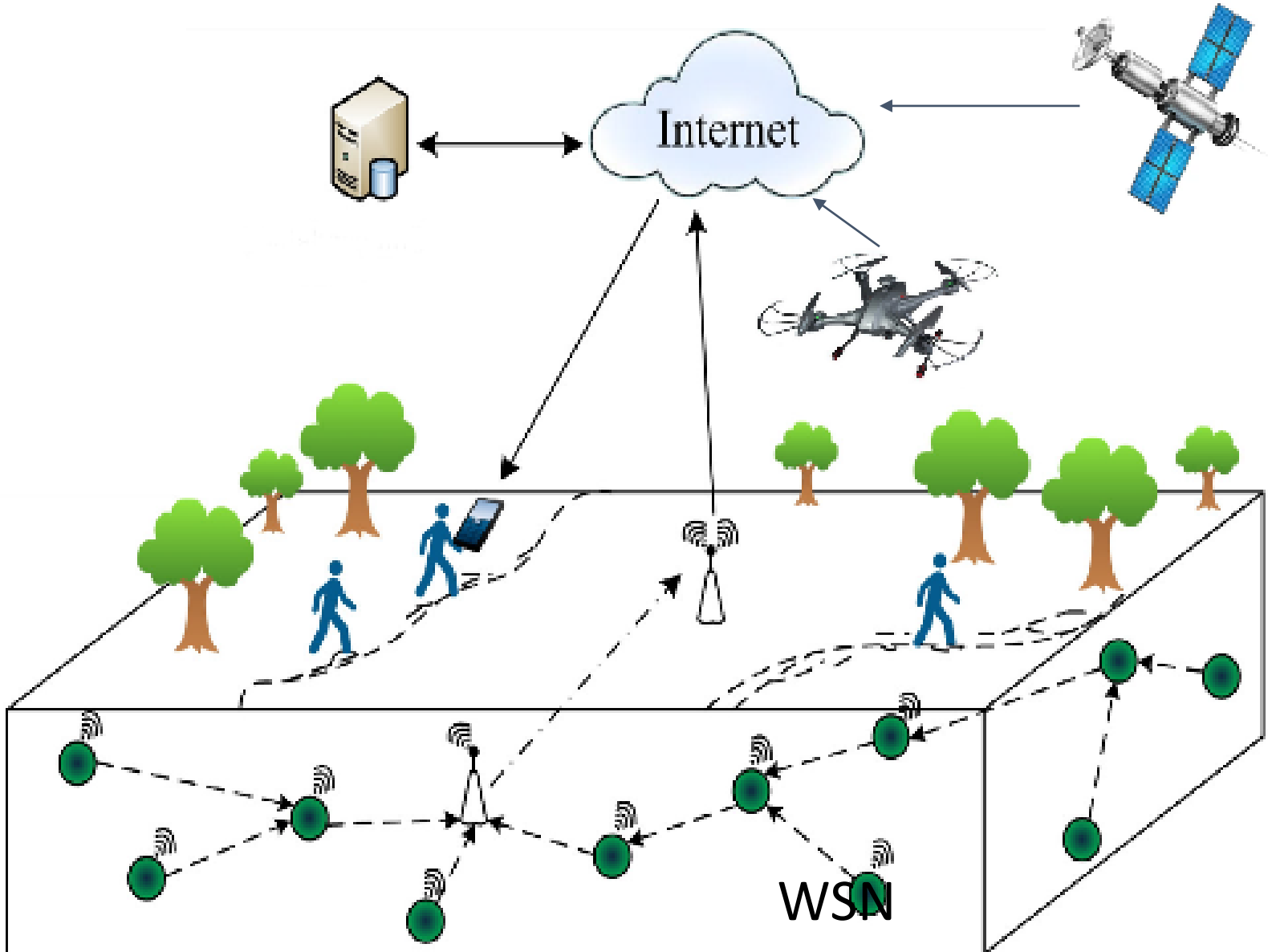
air temperature, humidity, pressure, CO_2 and ammonia

air temperature, humidity, wind speed, precipitation and global radiation

soil temperature, EC, moisture, oxygen and stalk diameter

Insect traps. A computer program analyzes the images and indicates the appearance of new species.

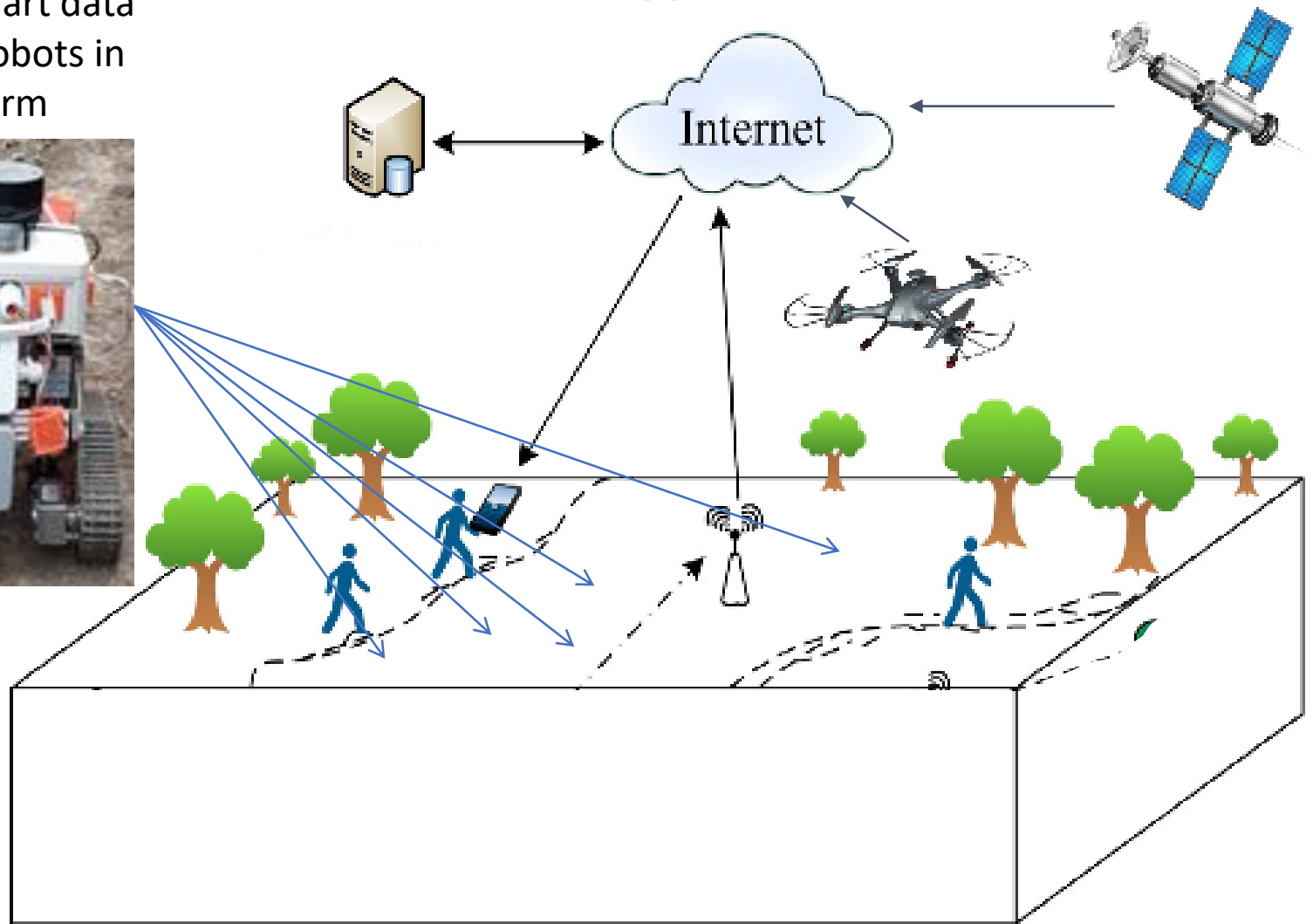
Internet of Things (IoT), WSN (Wireless Sensor Network, deployed)



Internet of Things (IoT)

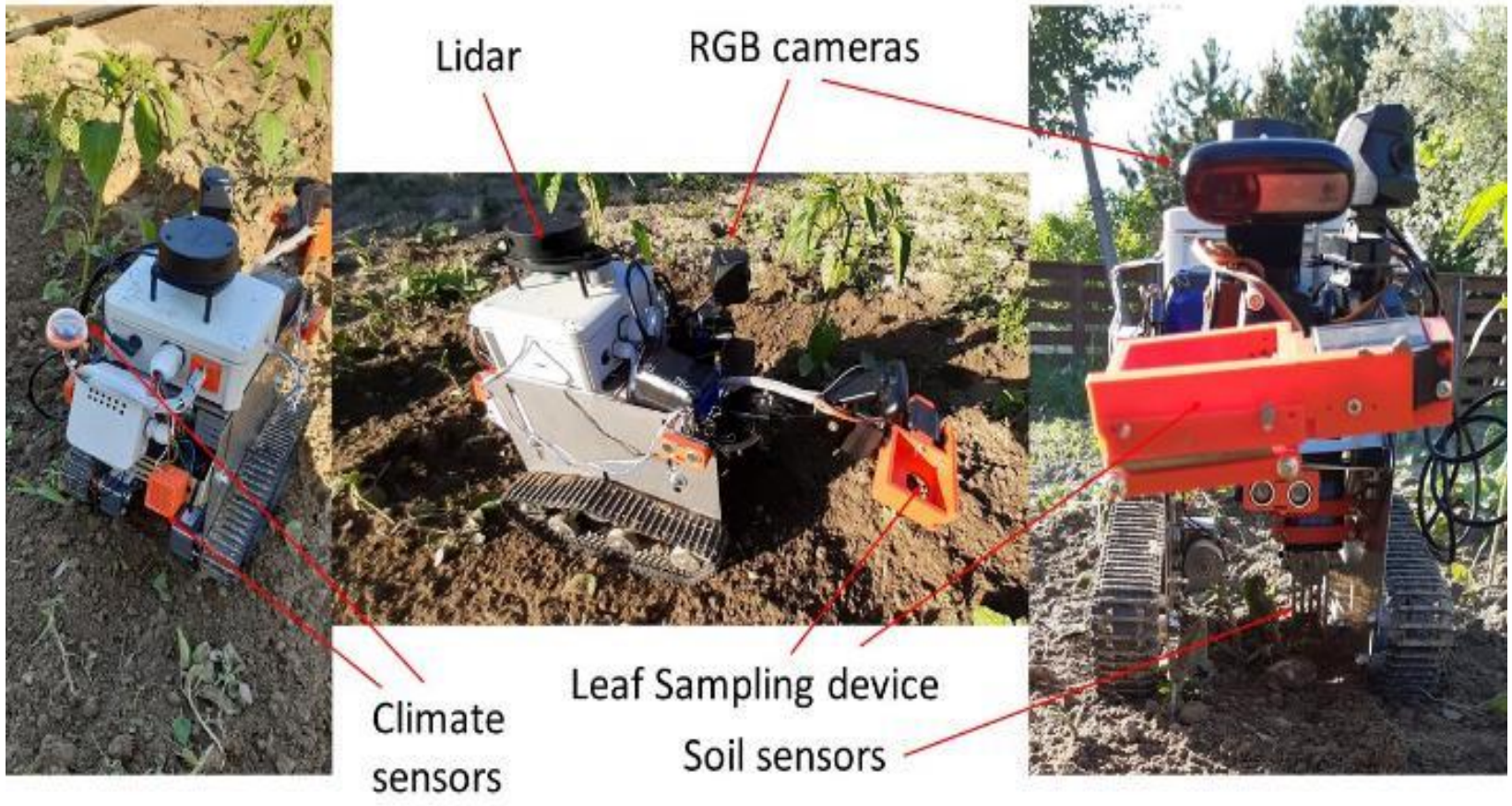
Small-smart data logger robots in swarm

Subtitution of deployed sensor network by small data logger robots in farm

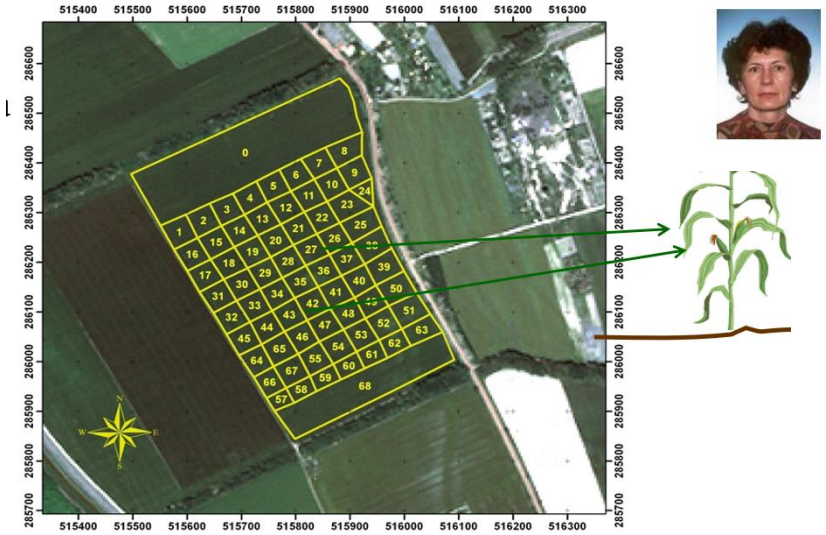


Development of small-smart data logger and controller robots

Main parts of the developed robot



The use of artificial intelligence in the evaluation of cultivation data



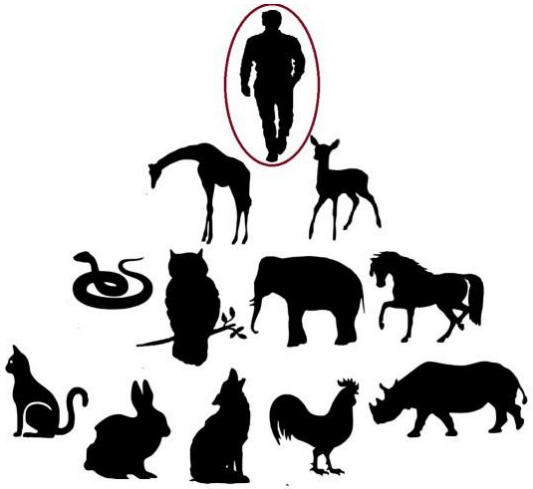
Phd Thesis (**2006**): using artificial intelligence and fuzzy logic. The conclusion: the size of the databases must be increased

2019

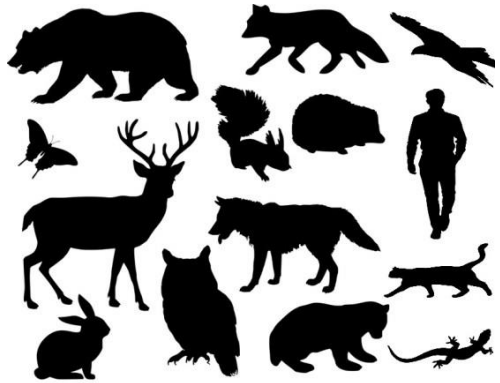
Machine learning prediction of maize yield using spatio-temporal data

A. Nyéki[1*], C. Kerepesi[2*], B. Daróczy[2], A. Benczúr[2], G. Milics[1], A.J. Kovács[1] M. Neményi[1].

What is Anthropocentrism?

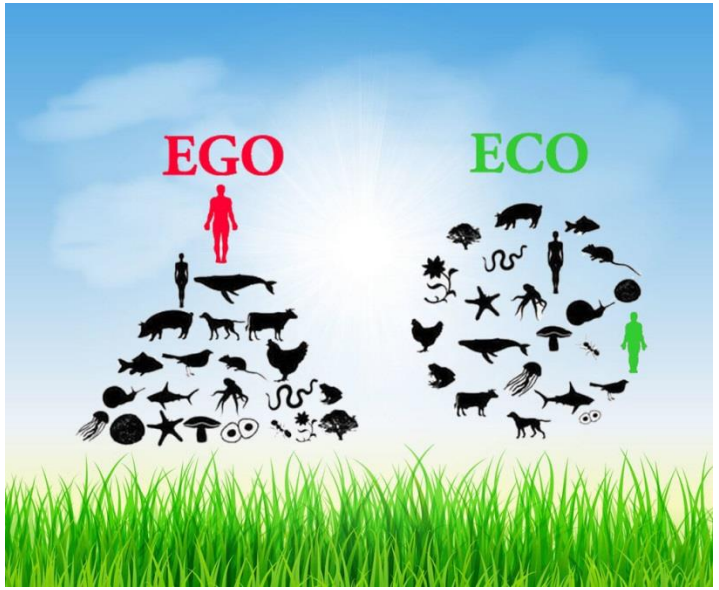


What is Biocentrism?



What is Ecocentrism?

However, unlike biocentrism and anthropocentrism, ecocentrism tends to include abiotic factors in the ecosystems



According to the authors' opinions, one of the main prerequisites for the widespread adoption of environmentally friendly practices is the development of an ecocentric mindset. What is ecocentric intelligence? EI consists of six pillars:

1.Individuals possess adequate knowledge to assess whether their actions meet the criteria of sustainable development.

2.Individuals can judge how their actions impact global changes beyond local effects.

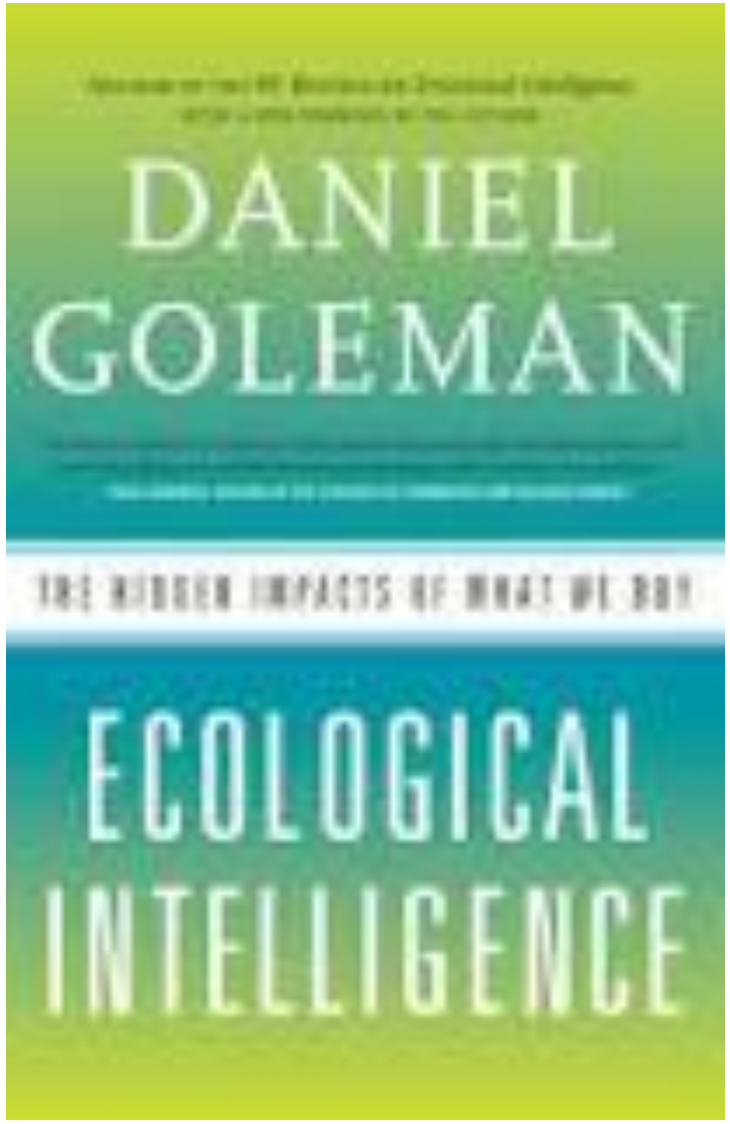
3.Individuals, striving for collaboration, can evaluate societal (political) concepts and projects, expressing their opinions to decision-makers.

4.Individuals aim to expand their experiences at events, organizations, and programs, discussing their opinions and experiences related to sustainable ecological development.

5.All of this can only be achieved if through ICT, the transparency of the production-distribution chain (From Soil to Fork) and the changes in biodiversity in natural and semi-natural areas around cultivated land are continuously monitored.

6.The increasing transparency and monitoring of natural areas contribute to resolving di’strust among the public, professionals, and decision-makers.

However, it's also true that the general acceptance of this mindset is influenced by education (from preschool to university), various short- and long-term societal efforts, legislation, etc.



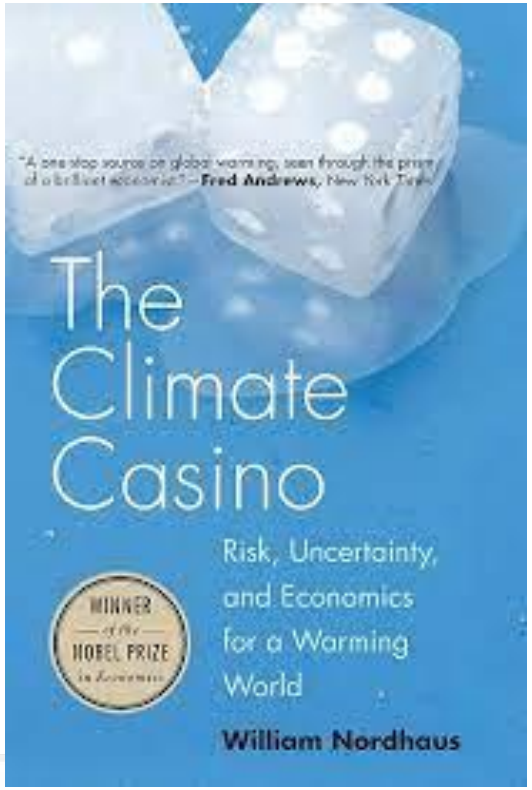
What is the concept of ecological intelligence?

In this thought-provoking book, author Daniel Goleman defines "ecological intelligence" as individuals' ability to apply what they learn about their impact on the environment to make changes in their behavior and live more sustainably.

„…sustainability, when a village can survive in its ecosystems fot thausend years."

The consequences of climate change caused by the environmentally damaging lifestyle of wealthy countries are primarily borne by poorer countries. W.D. Nordhaus, winner of the Nobel Prize: 2018, The Climate Casino.

GW Debate



Global warming is a hysteria, hoax , air bubble…….

VS

The American Physical Society:
The evidence is ***incontrovertible***. Global warming is occurring. If no mitigating actions are taken, significant disruptions in the Earth's physical and ecological systems, social systems, security and human health are likely to occur. We must reduce emissions of greenhouse gases beginning now.

2014

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Aimal breeding in poor countries, ammonia emission

Developing countries only produce a part of their food needs, but there are also large losses during storage. Animals are also food storage

IAEA
International Atomic Energy Agency

Early floods threaten Mekong rice fields

Ammonia emissions from flooded rice fields could be eliminated by growing "dry" rice varieties that require intensive irrigation. Who pays for the technology?

In connection with the above, I would like to note that it is misleading to compare emissions from agricultural production that ensures people's food supply with activities that are unnecessary, such as the transportation of goods between continents or even within a country, when all the necessary conditions for producing the product are present at the given location.

Conclusions

If we don't take advantage of the continuously expanding opportunities offered by ICT, we have no chance of solving the tasks outlined in the expectations.

The system, including sensors on drones and satellite data, can continuously expand, accommodating a wider range of biodiversity and soil sustainability indicators. Through AI-based analyses, the size of these databases can be significantly increased. The 3rd Green Revolution enables the broader emergence of ecological intelligence.

We can only meet the expectations of new challenges by increasingly fulfilling the requirements of ecological intelligence.

McGuire (2018) :It seems unlikely that Regenerative Agriculture can deliver all of the positive environmental benefits as well as the increase in global food production that is required.

Reflective engagement by research agronomists is now critically important.

Selected references/1:

Ambrus, B. (2021). Application possibilities of robot technique in arable plant protection. Acta Agronomica Óváriensis, 62: 67–97.

Ambrus, B., Teschner, G., Kovács, A.J., and Neményi, M. (2022). Development of small smart data logger robots embedded in IoT system for crop production. In: International scientific conference „agricultural mechanization and technology in europe and perspectives" May 27–28 2022. Tbilisi, Georgia

Mouazen A. M.; Neményi M.; Horváth B. (1998): Investigation of forestry deep subsoiling by the finite element method. Hungarian Agricultural Engineering. No. 11. 47-49. p.

Mouazen A. M.; Neményi M. (1999): Finite Element Modelling of Soil- Tool Interaction from the Point of View of Education and Research. Hungarian Agricultural Research, Vol. 8, No. 1. March 1999. 4-7. p.

Mouazen A. M.; Neményi M. (1999): Finite element analysis of subsoiler cutting in non-homogeneous sandy loam soil. Soil & Tillage Research, Elsevier Science, Amsterdam, the Netherlands. 51. 1-15. p. Mouazen A. M.; Neményi M. (1999): Tillage tool design by the finite element method: Part 1. Finite element modelling of soil plastic behaviour. Journal of Agricultural Engineering Research, (1999) 72, 37-51. p..

Mouazen A. M.; Neményi M.; Schwanghart H.; Rempfert M. (1999): Tillage tool design by the finite element method: Part 2. Experimental validation of the finite element results with soil bin test. Journal of Agricultural Engineering Research, (1999) 72, 53-58. p. Neményi M. et al. (2003): The role of of GIS and GPS in precision agriculture. Computers and electronics in agriculture. Volume 40, October, 45-55 p.

Selected references/2:

Nagy, V….Neményi.M. et al. (2013):Continuous field soil moisture content mapping by means of apparent electrical conductivity (Eca) measurment.J. of Hydrol and Hydromech.61.305-312.DOI: 10.2478/johh-2013-0039
Neményi, M., Kovács, A. J., Oláh, J., Popp, J., Erdei, E., Harsányi, E., ... & Nyéki, A. (2022). Challenges of sustainable agricultural development with special regard to Internet of Things: Survey. Progress in Agricultural Engineering Sciences, 18(1), 95-114. doi.org/10.1556/446.2022.00053
Neményi, M., Kovács, A. J., Oláh, J., Popp, J., Erdei, E., Harsányi, E., ... & Nyéki, A. (2022). Challenges of sustainable agricultural development with special regard to Internet of Things: Survey. Progress in Agricultural Engineering Sciences, 18(1), 95-114. doi.org/10.1556/446.2022.00053
Neményi, M. (2020). Az Agrárium És Az Ökológiai Fenntarthatóság I. Rész: Globális Megközelítés, a Gazdagok Felelőssége • Agricultural and ecological sustainability part 1: global approach, responsibility of the rich. Magyar Tudomány. https://doi.org/10.1556/2065.181.2020.12.10.
Neményi, M. (2020). Az Agrárium És Az Ökológiai Fenntarthatóság II. Rész: A Harmadik Zöld Forradalom és a Dolgok Internete • Agricultural and ecological sustainability part 2: the third green revolution and the internet of things. Magyar Tudomány. https://doi.org/10.1556/2065.181.2020.12.11.
Neményi, M. (2022):Gondolatok „A regeneratív mezőgazdaság Európában” stratégiáról és a célkitűzések megvalósíthatóságának feltételrendszeréről. Digitalizációs paradigmaváltás az agráriumban. Thoughts on the Strategy for Regenerative Agriculture in Europe and the Conditions for Achieving the Objectives. Digitization Paradigm Shift in Agriculture. Magyar Tudomány, DOI: 10.1556/2065.183.2022.10.6.

Selected references/3:

Nyéki, A., Neményi, M., Teschner, G., Milics, G., & Kovács, A. J. (2020). Application Possiblities and Benefits of IOT (Internet of Things) in Agricultural Practice. Quo Vadis IOT?. Hungarian Agricultural Engineering, (37), 90-96. DOI: 10.17676/HAE.2020.37.90.

Nyéki, A., Kerepesi, C., Daróczy, B., Benczúr, A., Milics, G., Nagy, J., ... Neményi, M. (2021). Application of spatio-temporal data in site-specific maize yield prediction with machine learning methods. Precision Agriculture, 22, 1397–1415. doi.org/10.1007/s11119-021-09833-8

Nyéki, A., & Neményi, M. (2022). Crop Yield Prediction in Precision Agriculture. Agronomy, 12(2460). doi.org/10.3390/agronomy12102460.

Nyéki, A., Daróczy, B., Kerepesi, C., Neményi, M., Kovács, A. J. (2022). Spatial Variability of Soil Properties and Its Effect on Maize Yields within Field—A Case Study in Hungary. Agronomy, 12, 395. doi.org/10.3390/agronomy12020395.

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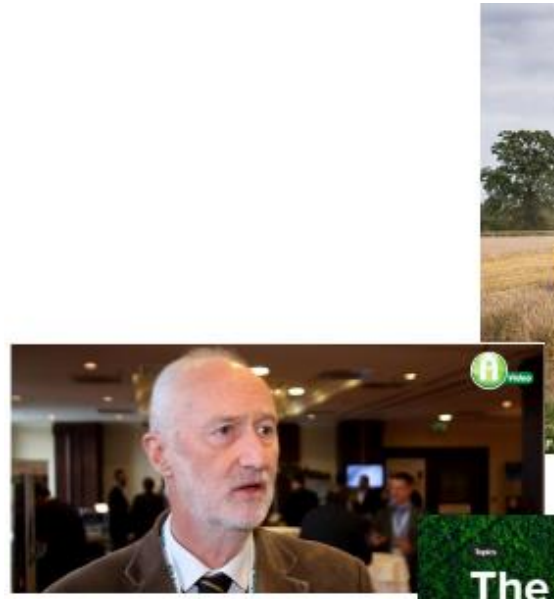

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Thank you for your attention