biodiverzita – zemědělská produkce

18. 6. 2025

OPTIMALIZACE FUNGOVÁNÍ NEKTARODÁRNÝCH BIOPÁSŮ A ZEMĚDĚLSKÉ KRAJINY JAKO CELKU

WORKSHOP

Registrace ZDARMA:

Bohdanečská 264, Ctěnice – Vinoř, Praha 9

Program:

9:00–9:30	uvítání a kafíčko s Petrem Řebíčkem (VIN AGRO s.r.o.)
9:30–10:00	Michal Knapp (FŽP ČZU v Praze)
10:00–10:30	Alžběta Procházková (WWF)
10:30–11:00	koláček + diskuze
11:00–11:30	Michael Vrána (EKOFARMA PROBIO s.r.o.)
11:30–12:00	Martin Štrobl (FŽP ČZU v Praze)
12:00–13:30	oběd + diskuze
13:30–15:30	**terénní exkurze** přístupná i bez předchozí registrace a účasti na workshopu

Případné dotazy směřujte na email **knapp@fzp.czu.cz.**

Akce je součástí projektů TAČR SS07010296 a NAZV QL24010300 a je financována se státní podporou Ministerstva životního prostředí ČR a Ministerstva zemědělství ČR.

Czech University of Life Sciences Prague
Faculty of Environmental Sciences

Racionalizace zemědělské krajiny pomocí konceptu Ecologically-Informed Precision Conservation II

Michal KNAPP

TÝM EKOLOGIE HMYZU
INSECT ECOLOGY GROUP

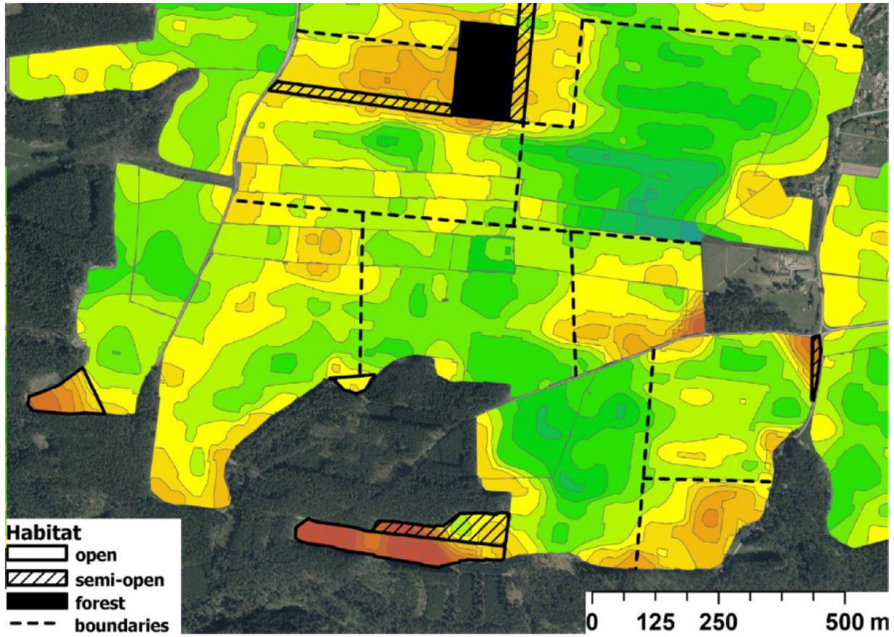
Česká zemědělská univerzita v Praze

PROJEKT

Racionalizace zemědělské krajiny za účelem skloubení produkčních funkcí s efektivní podporou biodiverzity (RACIOZEM)

ZEMĚ II

Program na podporu aplikovaného výzkumu Ministerstva zemědělství 2024–2032



Závazky a indikátory

- Zastavení poklesu populací opylovačů (a jejich nárůst)
- Navýšení krajinných prvků (lepší struktura krajiny)
- Index polních ptáků (zvrácení trendu)
- Obsah uhlíku v půdě (jeho navýšení)

pollinating insects – reversing the decline of pollinator populations by 2030, and achieving an increasing trend for pollinator populations, with a methodology for regular monitoring of pollinators

agricultural ecosystems – increasing grassland butterflies and farmland birds, the stock of organic carbon in cropland mineral soils, and the share of agricultural land with high-diversity landscape features; restoring drained peatlands under agricultural use

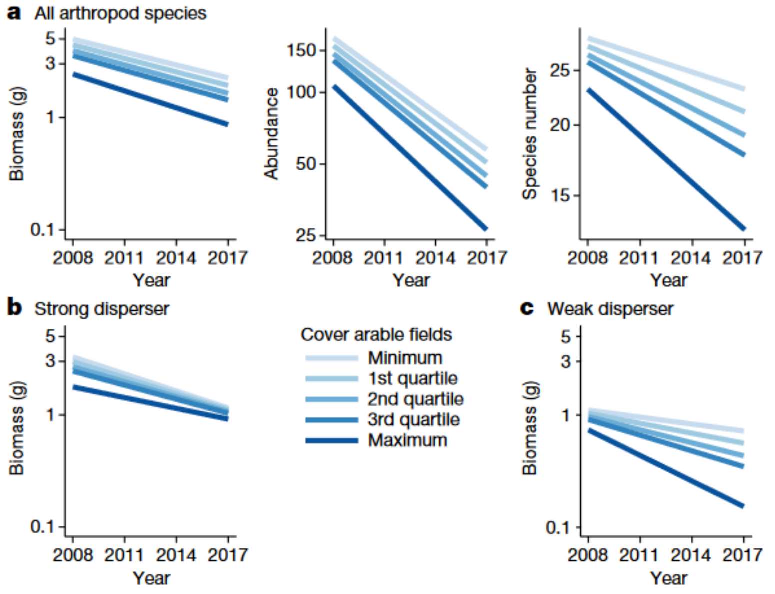


Fig. 3 | Landscape effects on arthropod decline in grasslands. a, Temporal changes in biomass, abundance and the number of species for all arthropod species. **b**, **c**, Temporal change in biomass of species with high (**b**) or low (**c**) dispersal ability, conditional on the cover of arable fields in the surrounding landscape (1-km radius). The decline in biomass increased significantly with the cover of arable fields for weak dispersers, but not for strong dispersers. Slopes were derived from models that included weather conditions and local land-use intensity as covariates. The *y* axes are log-scaled, but show untransformed values.

Article

Arthropod decline in grasslands and forests is associated with landscape-level drivers

https://doi.org/10.1038/s41586-019-1684-3
Received: 8 February 2019
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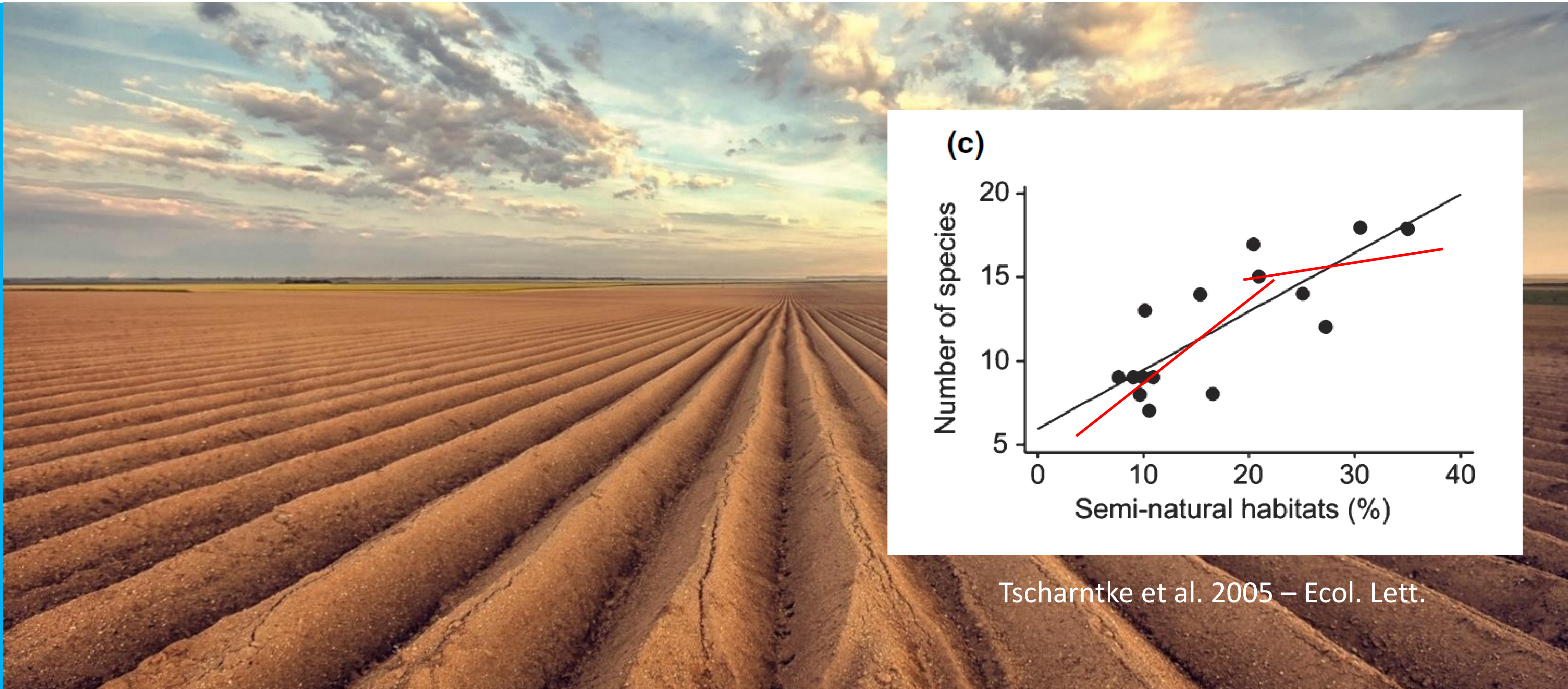
Published online: 30 October 2019

Sebastian Seibold[1,2*], Martin M. Gossner[3], Nadja K. Simons[1,4], Nico Blüthgen[4], Jörg Müller[2,5], Didem Ambarlı[1,6], Christian Ammer[7], Jürgen Bauhus[8], Markus Fischer[9], Jan C. Habel[1,10], Karl Eduard Linsenmair[11], Thomas Nauss[12], Caterina Penone[9], Daniel Prati[9], Peter Schall[7], Ernst-Detlef Schulze[13], Juliane Vogt[1], Stephan Wöllauer[12] & Wolfgang W. Weisser[1]

Všude by to mělo vypadat jako ve středohoří

Zatím to ale často vypadá takto



Tscharntke et al. 2005 – Ecol. Lett.

A přitom se musíme fakt snažit …

CellPress OPEN ACCESS

Trends in Ecology & Evolution

Opinion

Mixing on- and off-field measures for biodiversity conservation

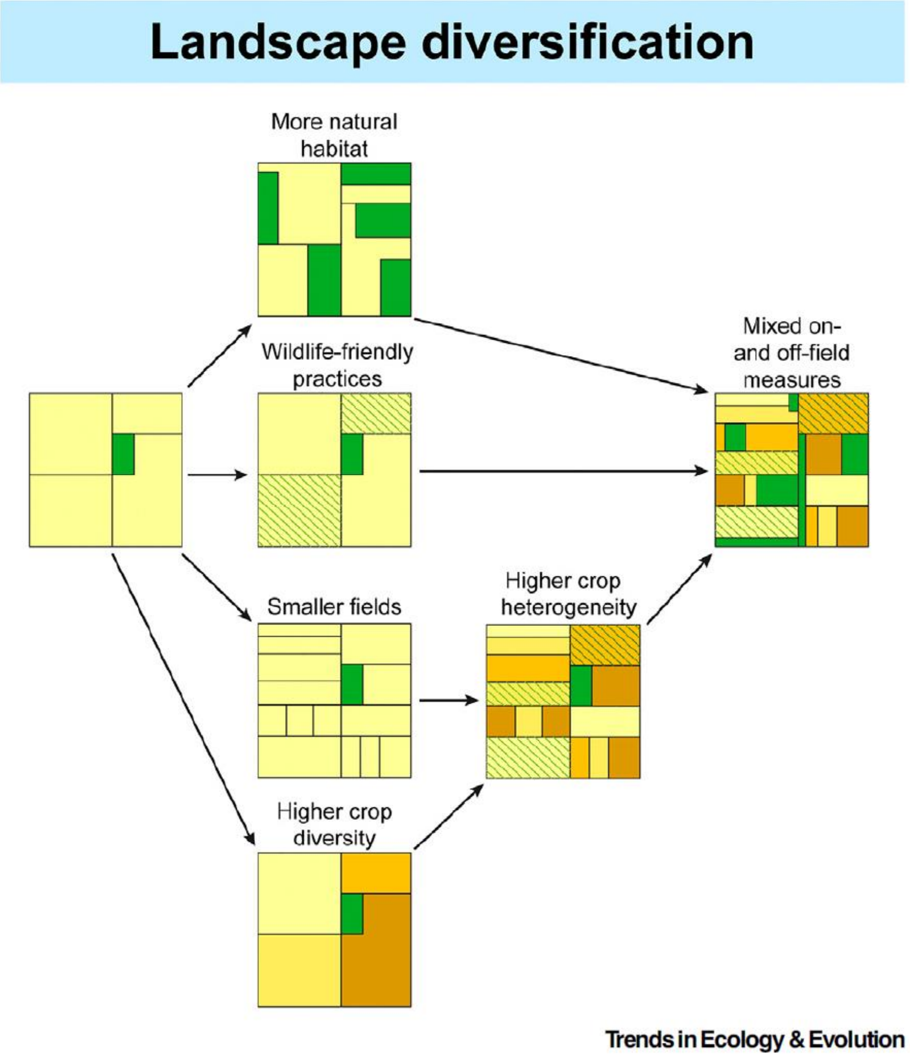
Teja Tscharntke[1,*], Péter Batáry[2,3], and Ingo Grass[4,5]

The continuing biodiversity losses through agricultural expansion and intensification are dramatic. We argue that a mix of on- and off-field measures is needed, overcoming the false dichotomy of the land sharing-sparing debate. Protected land is essential for global biodiversity, while spillover between farmed and natural land is key to reducing species extinctions. This is particularly effective in landscapes with small and diversified fields. Focusing only on protected land fails to conserve a wealth of species, which often provide major ecosystem services such as pest control, pollination, and cultural benefits. On-field measures must minimise yield losses to prevent increased demand for food imports from biodiversity-rich regions, requiring enforcement of high social–ecological land-use standards to ensure a good life for all.

Highlights

Agriculture is the main cause of the biodiversity crisis. Recent suggestions to narrow biodiversity conservation to land sparing are misguiding. Intensifying farming does not lead to sparing more biodiversity-rich land, because higher yields are a major incentive to expand agriculture.

Protected reserves are a cornerstone of global biodiversity, while enhancing spillover between on- and off-field habitats reduces extinctions and promotes a



Trvalejší mimoprodukční biotopy mohou být fakt dobré






Pro fanoušky vědecké angličtiny:

Biological Conservation 288 (2023) 110343

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

ELSEVIER

Perspective

Ecologically-Informed Precision Conservation: A framework for increasing biodiversity in intensively managed agricultural landscapes with minimal sacrifice in crop production

Michal Knapp [a,*], Tiit Teder [a,b], Vojtěch Lukas [c], Martin Štrobl [a], Jana Knappová [a], Douglas A. Landis [d], Ezequiel González [a,e]

[a] Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Praha, Suchdol 165 00, Czech Republic
[b] Department of Zoology, Institute of Ecology and Earth Sciences, University of Tartu, Liivi 2, Tartu EE-50409, Estonia
[c] Department of Agrosystems and Bioclimatology, Faculty of Agronomy, Mendel University, Zemědělská 1, Brno 613 00, Czech Republic
[d] Department of Entomology and Great Lakes Bioenergy Research Center, Michigan State University, 578 Wilson Road Rm. 204, East Lansing, MI 48824, USA
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ARTICLE INFO

Keywords:
Agri-environmental schemes
Agroecosystems
Ecosystem services
Land sparing
Landscape structure
Non-crop habitat creation
Landscape design
Precision agriculture
Set-aside

ABSTRACT

Conservation actions are urgently needed to tackle biodiversity loss in intensively managed agricultural landscapes. Production lands are usually heterogeneous and contain low-yield areas that can be set aside for biodiversity conservation without serious yield losses. Here, we introduce Ecologically-Informed Precision Conservation, a framework that integrates yield mapping and ecological theory to select the best areas to create new set-asides while ensuring high crop yields at the farm/landscape level. Long-term yield maps can be generated using globally available satellite data and basic information on field/farm crop yield from farmers. Ecological principles are then used to select the subset of areas with the highest potential for biodiversity conservation by prioritising those that increase connectivity, maximise habitat heterogeneity and decrease landscape grain size. The created non-crop habitats can be permanent and thus ensure biodiversity support over time. In addition, agricultural management efficiency can be enhanced by improving field shapes. The framework provides the basis for a practical, user-friendly tool that informs all interested stakeholders on how to rationalise existing agricultural landscapes using already-existing farming systems and available technologies. High cost-effectiveness from an economic and conservation perspective, along with the creation of heterogeneous non-crop habitats, make our framework a promising solution to re-design agricultural landscapes.

INSECT ECOLOGY GROUP · TÝM EKOLOGIE HMYZU

Abychom nepřišli o produkci, tak můžeme obětovat jen omezené množství orné půdy

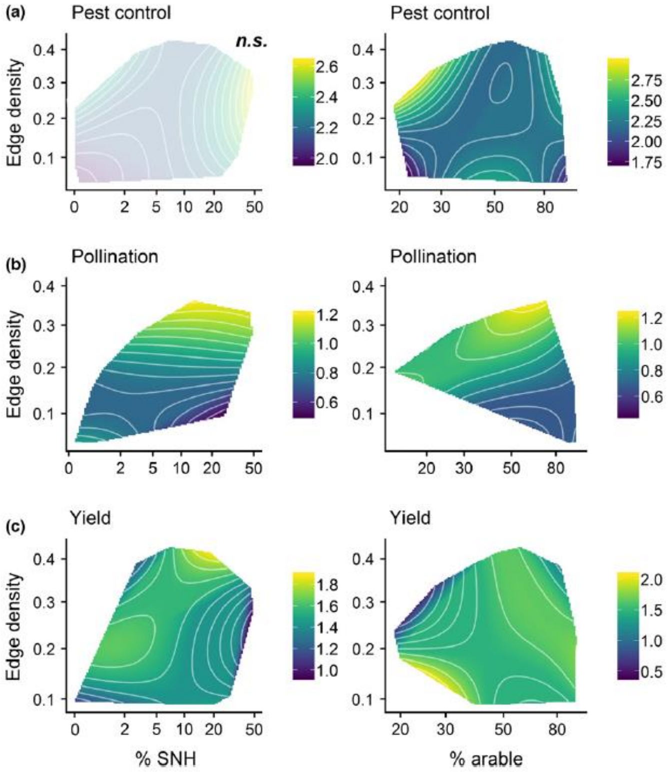
ECOLOGY LETTERS

Ecology Letters, (2019) doi: 10.1111/ele.13265

LETTER

The interplay of landscape composition and configuration: new pathways to manage functional biodiversity and agroecosystem services across Europe

Emily A. Martin,[1]* Matteo Dainese,[2] Yann Clough,[3] András Báldi,[4] Riccardo Bommarco,[5] Vesna Gagic,[6] Michael P.D. Garratt,[7] Andrea Holzschuh,[1] David Kleijn,[8]



Agriculture, Ecosystems and Environment 290 (2020) 106724

Contents lists available at ScienceDirect

Agriculture, Ecosystems and Environment

journal homepage: www.elsevier.com/locate/agee

ELSEVIER

Landscape complexity is associated with crop yields across a large temperate grassland region

Paul Galpern[a,*], Jess Vickruck[a,b], James H. Devries[c], Michael P. Gavin[a]

[a] *Department of Biological Sciences, University of Calgary, 2500 University Drive NW, Calgary, AB, T2N 1N4, Canada*
[b] *Agriculture and Agri-Food Canada, 850 Lincoln Road., Fredericton, NB, E3B 4Z7, Canada*
[c] *Ducks Unlimited Canada, P.O. Box 1160, Stonewall, MB, R0C 2Z0, Canada*

ARTICLE INFO

Keywords:
Crop yield
Ecosystem services
Landscape complexity
Semi-natural areas
Perennial vegetation
Canadian prairies

ABSTRACT

Establishing semi-natural areas within annual croplands can provide habitat for beneficial organisms and ecosystem services to crops through a spillover effect. However, this approach to increasing landscape complexity may have no effect on crops, or it may promote pests, weeds and other disservices that reduce productivity. An argument for changing landscape complexity may be more persuasive if it is associated with higher crop yields. Here, we examine regions that vary in their landscape complexity and, therefore, may also naturally differ in the potential for ecosystem services, disservices and crop yields. Specifically, we examine crop-growing districts in the Canadian province of Alberta to test whether the presence of more non-crop land covers has increased crop yields. Our dataset covered about one-quarter of the seeded area in Canada between 2012 and 2017 consisting of 10,069 records representing average field-level yields reported to a crop insurance provider. In total, we analyzed summary data for 250,000 km^2 of seeded area for seven grain crops. Using a functional regression approach, we found evidence for a plausibly positive association between yield and the non-crop land covers found within and near fields in four of seven crops. Landscape complexity, therefore, represented a measurable yield benefit for farmers, although the variance in yield explained by the landscape was small. These findings suggest there may be a low risk of disservices to crops from non-crop land covers in this region. Our study adds support at a broad geographic extent for initiatives that restore perennial and other semi-natural vegetation in annual cropping systems and suggests that, in this temperate grassland region, their promotion (e.g., as carbon stores or as biodiversity refugia) may have no adverse effects for crop production.

Pomohou nám moderní technologie?

comment

Check for updates

Digital agriculture to design sustainable agricultural systems

The global food system must become more sustainable. Digital agriculture — digital and geospatial technologies to monitor, assess and manage soil, climatic and genetic resources — illustrates how to meet this challenge so as to balance the economic, environmental and social dimensions of sustainable food production.

Bruno Basso and John Antle

Fifty years ago, many people doubted the ability of the world to feed itself. While food security remains a challenge for the poorest people, the global food system has been so successful in producing cheap food calories that today three-times more people in the world are obese than underweight due to malnutrition[1]. The current food system is able to do this largely because of crop and livestock production technologies that produce and deliver more food calories to more people than was previously thought possible. But agriculture's contributions to greenhouse gas emissions, water pollution and biodiversity loss show that major agricultural systems are on largely unsustainable trajectories[2]. As Schramski et al.[3] point out, changing the way we produce and use energy in agriculture as well as the rest of the economy must be an important part of meeting the sustainability challenge. However, it seems unlikely that a development pathway for a human population approaching 10 billion could be achieved with less total energy use. And since some environmental costs will be associated with increased energy use and a substantially larger human population, achieving a more sustainable development pathway will involve managing trade-offs in complex natural and human systems among economic, environmental and social dimensions of human well-being[4]. It now appears likely that moving agriculture towards a more sustainable development pathway will depend largely on crop agriculture, particularly if the sustainable human diet is to be largely based on plant-based foods. This will involve trade-offs associated with the demands such a pathway will place on land, water and genetic resources in many parts of the world[5].

The best hope for meeting the challenge of sustainable agricultural development lies in the ongoing process of innovation now taking place using modern genetic and information technologies to increase agricultural productivity while balancing economic, environmental and social outcomes associated with agriculture and the food system. Genetic improvement is a necessary but not sufficient part of this strategy, as we learned in the Green Revolution of the twentieth century, because environmental outcomes depend on how crop production is managed at the field scale as well as its interactions with ecosystems across the landscape. Much attention has been paid to the key role that data acquisition plays in improving crop management — but improvements in system performance will come about only when agricultural science can make effective use of these 'big data'. Improved data and analytics will need to be incorporated with agronomic science, that is, what we call digital agriculture (DA) — a set of digital and geospatial information technologies that integrates sensors, analytics and automation to monitor, assess and manage soil, climatic and genetic resources at field and landscape scales.

So-called precision agriculture (PA)[6] began to be implemented in the early 1990s ostensibly to increase profitability and reduce the environmental impact of crop-based systems by applying variable inputs according to spatial variability of crop growth[7]. However, there is little evidence as yet demonstrating widespread economic and environmental benefits of precision management technology[8]. Like many mechanical technologies, the economic benefits appear to be greatest for larger farms that can spread their fixed costs over many acres, and that can reduce labour costs through automation. Thus, profitability and adoption in the United States is highest among larger farms, with profitability only slightly higher on average among adopters, and input use only marginally lower on average, consistent with the finding of minimal environmental benefits from PA as currently implemented[8]. One explanation for the failure to achieve more substantial and widespread improvements in environmental performance is the lack of effective policies to incentivize the implementation of technologies such as PA in ways that achieve their promise of environmental improvement. For example, in the US Midwest, both surface and groundwater quality continue to be severely impacted by high levels of agricultural chemical use and pollution caused by surface runoff and leaching to groundwater, despite a variety of policies implemented since the 1980s to reduce soil erosion and runoff[9].

A related explanation for the failure of DA to deliver on its promises is that, thus far, algorithm developers for precision management have lacked the data and computational tools needed to convert complex geospatial information on soil and plant status into appropriate crop management actions. Misinterpretation and misuse of data appears to be a consequence. For example, many farmers utilize precision technology to apply more nitrogen (N) fertilizer to low-yielding portions of rain-fed fields in the hope of increasing yields, rather than less N to avoid fertilizer losses through leaching and runoff of N that crops cannot use. This tendency is compounded by apparent conflicts between farmers' goal to maximize economic returns, and the objective of input suppliers to maximize sales of inputs. Thus, ironically, precision management tools may result in lower economic and environmental sustainability if not used appropriately.

Recent research suggests that improvements in DA technology could transform these trade-offs into the win–win synergies that were envisioned for PA, and also help re-design agricultural landscapes for sustainability[10]. Given the inherent variability in climate, soil and topography, appropriate assessments of yield variability to make more informed decisions require at least several years of data[10]. New methods of analysing spatial-temporal data from satellites or yield-monitor data from farmer machinery can produce yield stability

NATURE SUSTAINABILITY | VOL 3 | APRIL 2020 | 254–256 | www.nature.com/natsustain

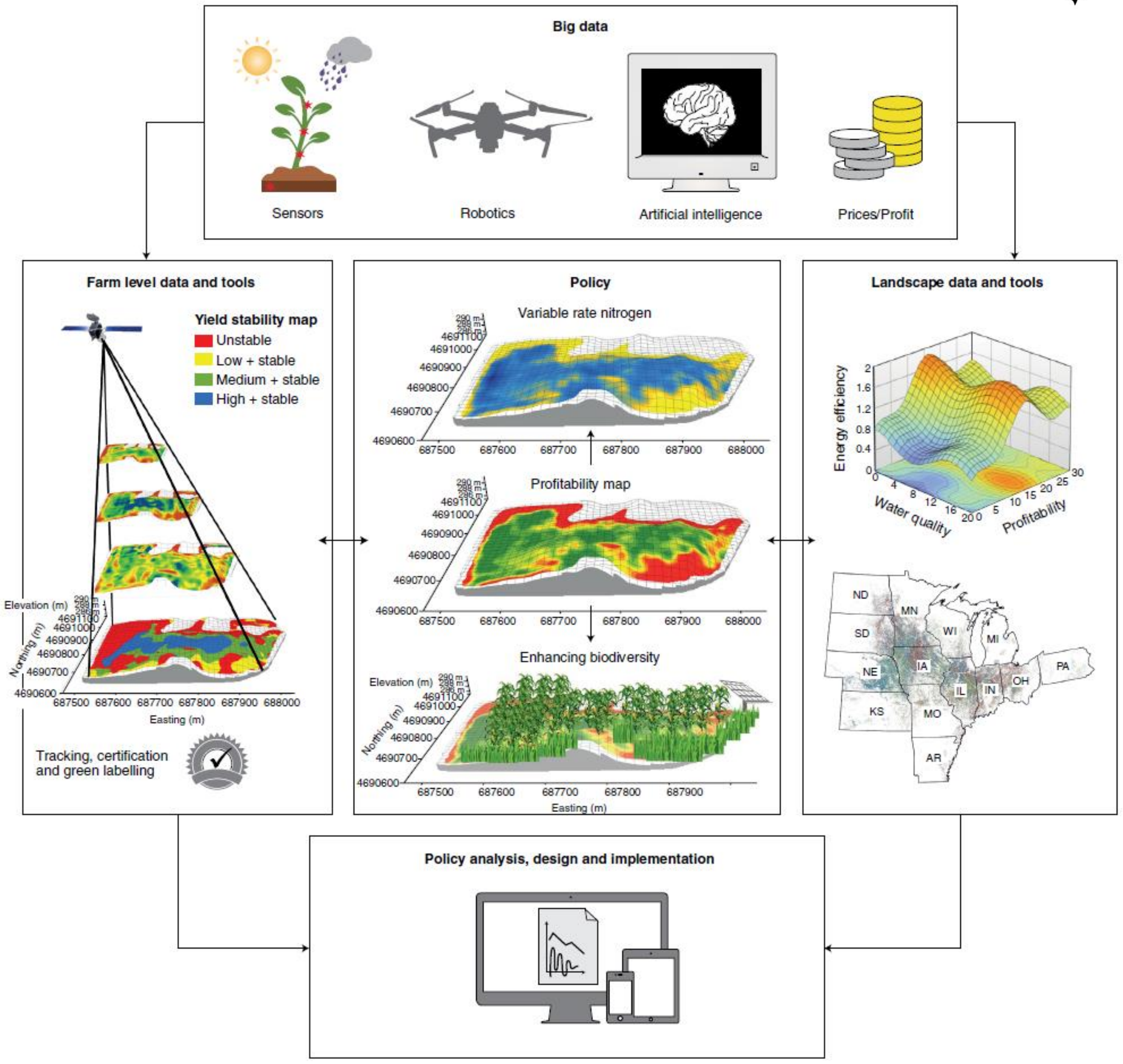
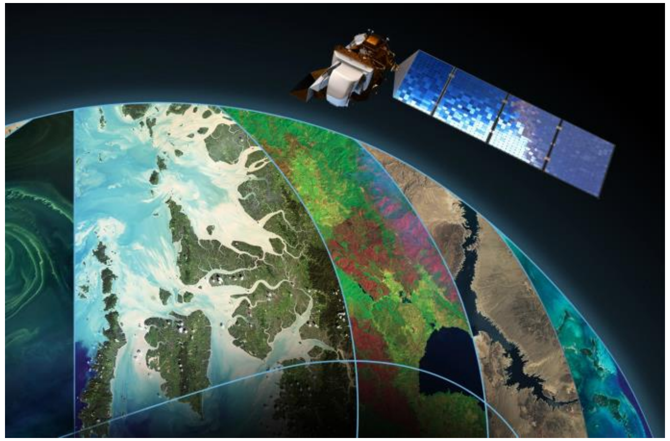
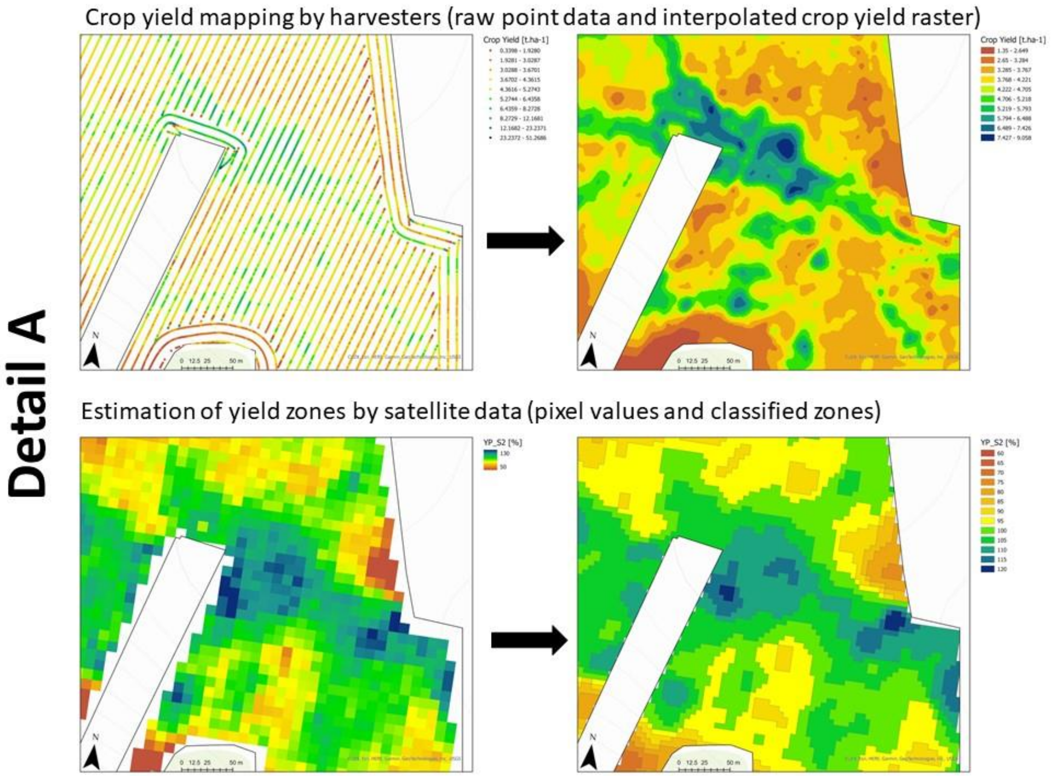


Fig. 1 | DA in agricultural systems. DA can be used to design and implement sustainable agricultural systems at farm and landscape scales.

Jak získat výnosové mapy





J.M. Deines et al. | Remote Sensing of Environment 253 (2021) 112174

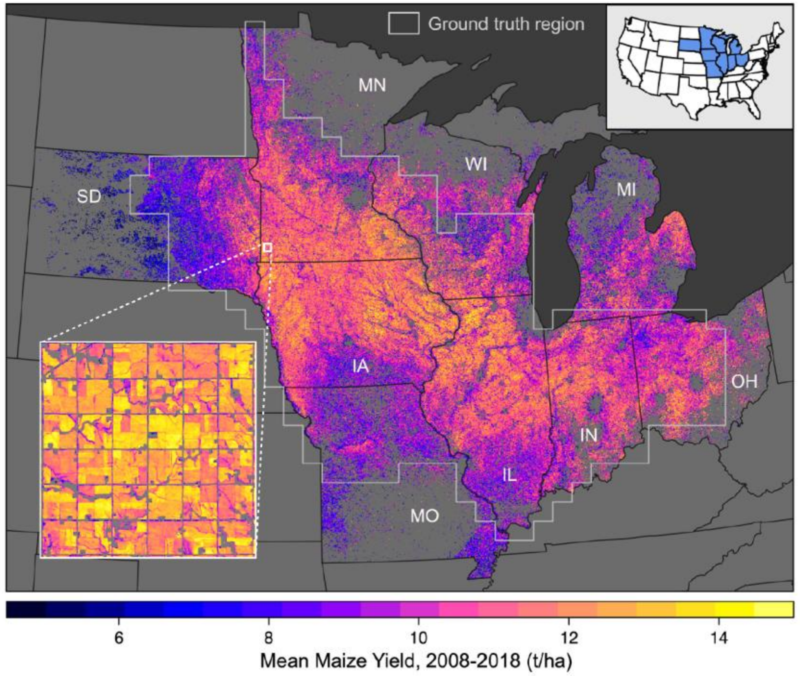


Fig. 1. Study area and mean 2008–2018 yields. The extent of the ground truth data from yield monitors used to evaluate alternative yield mapping approaches is outlined in gray (see also Fig. 2). Mean yields for the larger nine-state study region were generated by applying the preferred SCYM model to Landsat satellite data.

Ke spolupráci musíme získat především samotné zemědělce

- Předělat jen pár procent orné půdy
- Vylepšit tvary polí (produkční plochy) a usnadnit tak jejich obhospodařování
- Nové mimoprodukční biotopy vytvořit na místech, kde to má největší ekologický efekt

Received: 20 May 2020 | Revised: 25 August 2020 | Accepted: 11 September 2020
DOI: 10.1111/sum.12654

RESEARCH PAPER

Soil Use and Management WILEY

Infield optimized route planning in harvesting operations for risk of soil compaction reduction

Andrés Villa-Henriksen[1,2] | Nick Skou-Nielsen[1] | Lars Juhl Munkholm[3] | Claus A. G. Sørensen[2] | Ole Green[1,3] | Gareth T. C. Edwards[1]

[1]Agro Intelligence ApS, Aarhus, Denmark
[2]Aarhus University – Engineering, Aarhus, Denmark
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Funding information
Horizon 2020 Framework Programme, Grant/Award Number: 731884

Abstract
Soil compaction is a major problem in arable farming mainly caused by the intensive traffic of heavy machinery. It affects negatively soil and crop development. Even though the first wheeling is considered the most damaging, repeated traffic deteriorates further the soil and subsoil even up to irreversible conditions. Intelligent infield traffic planning in the form of optimized route planning is one key option to mitigate soil compaction. Currently, no comprehensive evaluation of the benefits of such methods exists. In this paper, a harvest logistics optimization system was employed to evaluate the effectiveness of optimized route planning in reducing traffic by generating simulated operational data and comparing it to a set of six recorded fields ranging in size (2–21 ha) and shape. For the evaluation, simulated and recorded data for each 12 × 12 m grid cell within the fields were compared by analysing three variables, that is, traffic occurrences, accumulated traffic load and maximum traffic load per grid cell. The results showed a reduction of the total number of traffic occurrences with a field size weighted mean of relative differences of 9.8%. A reduction of 5.6% for the accumulated traffic load, and an increase of 4.0% for the maximum traffic load. Repeated traffic was reduced in four of the six fields. Even though optimized route planning is not directly intended for traffic reduction, it can notably contribute to such mitigation efforts and adds an extra element to the overall farm strategy for soil compaction mitigation.

Základní ekologická pravidla

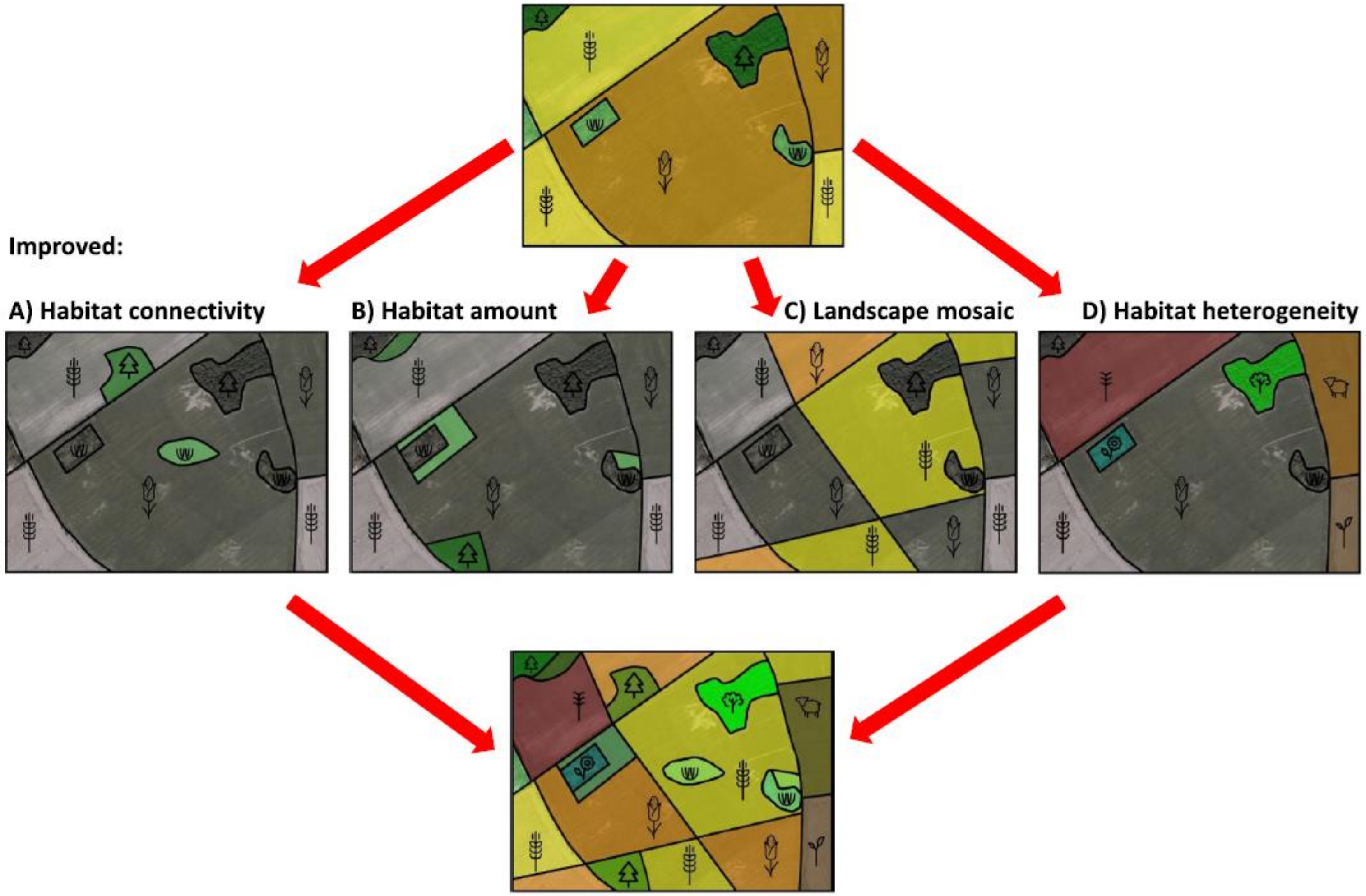


Fig. 1. Visualisation of the main ecological principles that can be applied to improve agricultural landscapes for biodiversity. The upper panel shows an original landscape where the biodiversity value can be enhanced by increasing habitat connectivity (A; adding new set-asides that act like stepping stones) or habitat amount (B; enlarging existing non-crop habitats), decreasing grain size (C; splitting cultivated fields, creating thereby more edges), or increasing habitat heterogeneity (D; new habitat types and crops are introduced to the landscape). Modifications made in panels A-D are highlighted in colour. The bottom panel represents an ideal scenario where all these principles are applied simultaneously.

Jak to všechno fachá dohromady (EIPC)

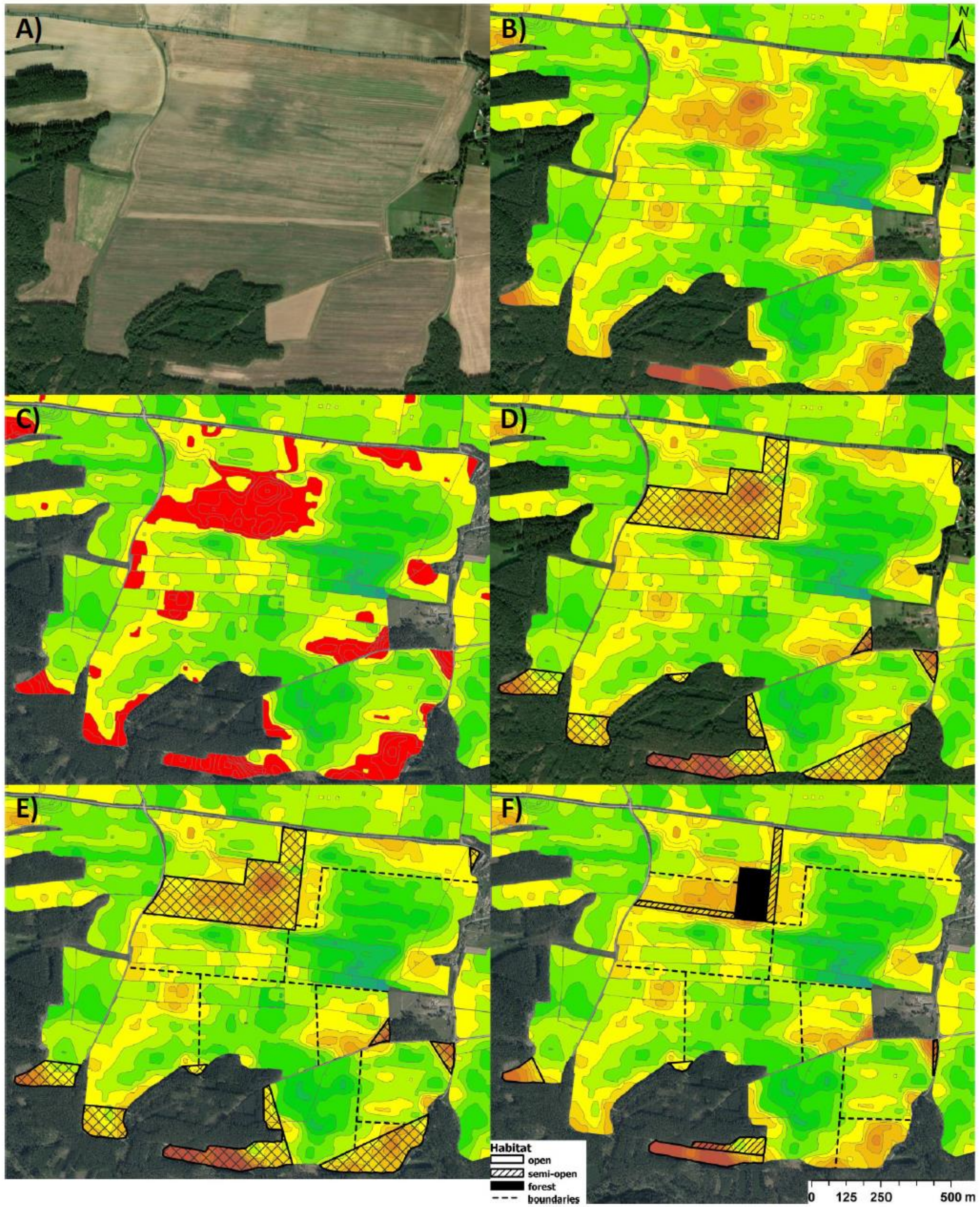
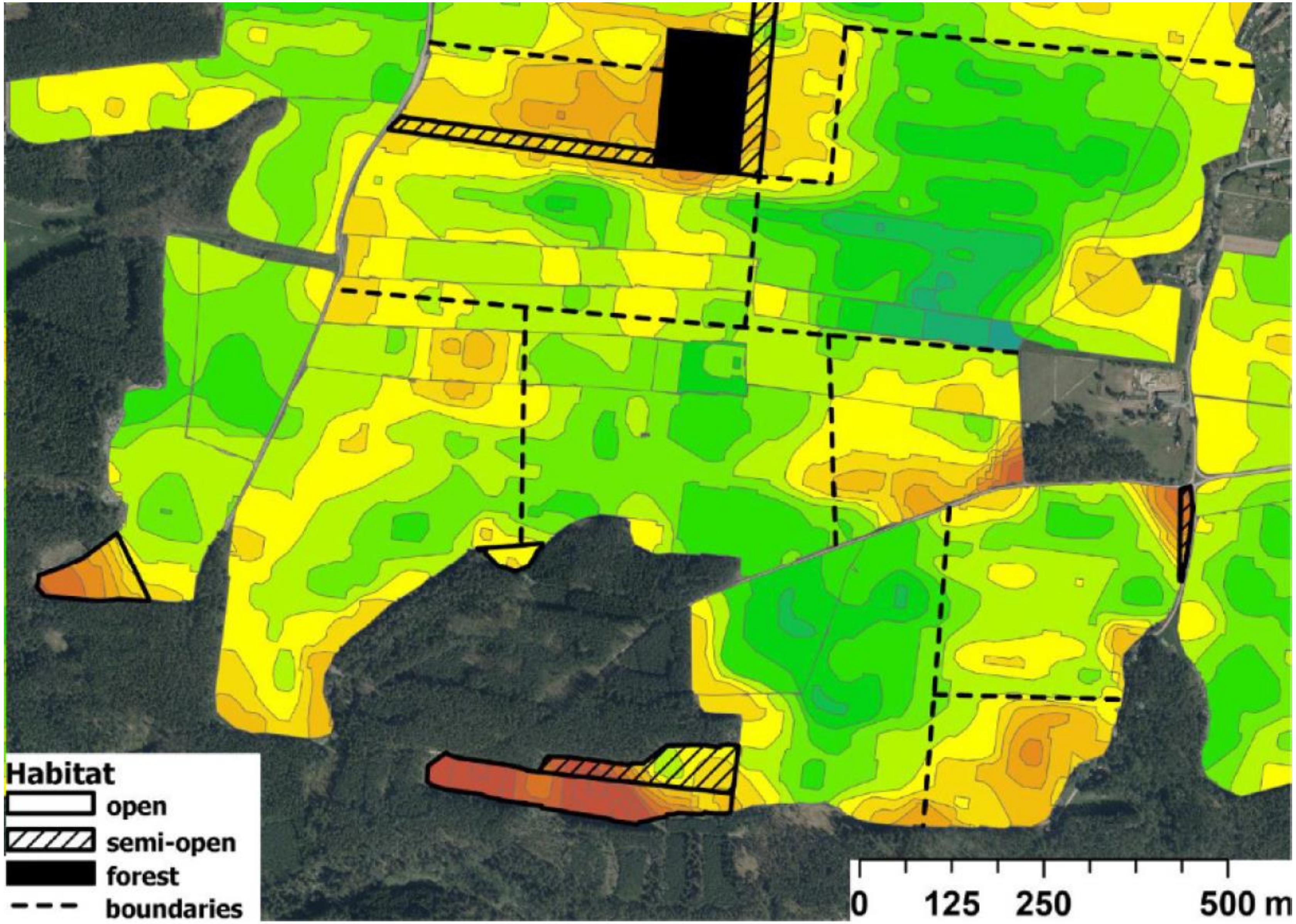


Fig. B2. Step-by-step example of landscape rationalisation using the Ecologically-Informed Precision Conservation (EIPC) framework. Panel A shows the current situation in a focal landscape (aerial photography). Panel F represents optimal solution generated for the focal landscape using the EIPC framework. Colours (green to brown) in panels B–F indicate yield distribution within the model landscape; darkest green equals to 140 % and darkest brown equals to 50 % of average yield. Red areas in panel C indicate 25 % of arable land with the lowest yield potential. See the text in Box 2 for more details on each step of the EIPC framework.

Výsledná optimalizace dané krajiny/lokality



Sen o LPISu …

ZEMĚ II
Program na podporu aplikovaného výzkumu
Ministerstva zemědělství 2024–2032

e-planner

- About E-Planner
- User guide
- E-Planner tool
- Next steps
- About UKCEH
- Acknowledgements

+ **Choose maps to display**

+ Basemap options

+ Layer transparency

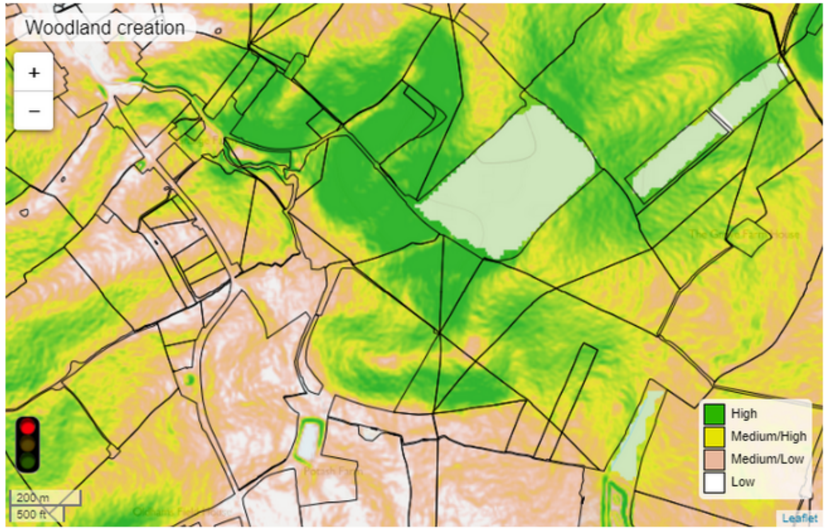
UK Centre for Ecology & Hydrology

e-planner

Welcome to E-Planner! E-Planner has been developed by UKCEH to help farmers and other land mangers identify the most suitable places for different environmental management options via easy to use, interactive maps. E-Planner is free to use and covers the majority of agricultural land in GB.

The tool uses environmental datasets to produce maps of the relative suitability of land for different environmental outcomes. E-Planner currently maps relative suitability for these options:

- **Water resource protection** (buffer strips and cover crops)
- **Woodland creation** (planting of trees on-farm)
- **Sown winter bird food** (wild bird seed margins)
- **Flower-rich pollinator habitats** (flower margins and grassland restoration)
- **Wet grassland restoration** (restoring wet grassland and floodplain meadows)



Suitability is based on topography, soils, nearby habitats, landscape features etc. Suitability is then presented as easy to explore 'heat maps' for a chosen area or farm, making it simple to compare the most suitable option for a given area or to identify the most suitable location for a specific option.

E-Planner is intended to support farmer decisions by presenting complex environmental data in an easy to interpret way. But it cannot take the place of local knowledge and therefore does not suggest an 'optimum' solution. We suggest the following workflow:

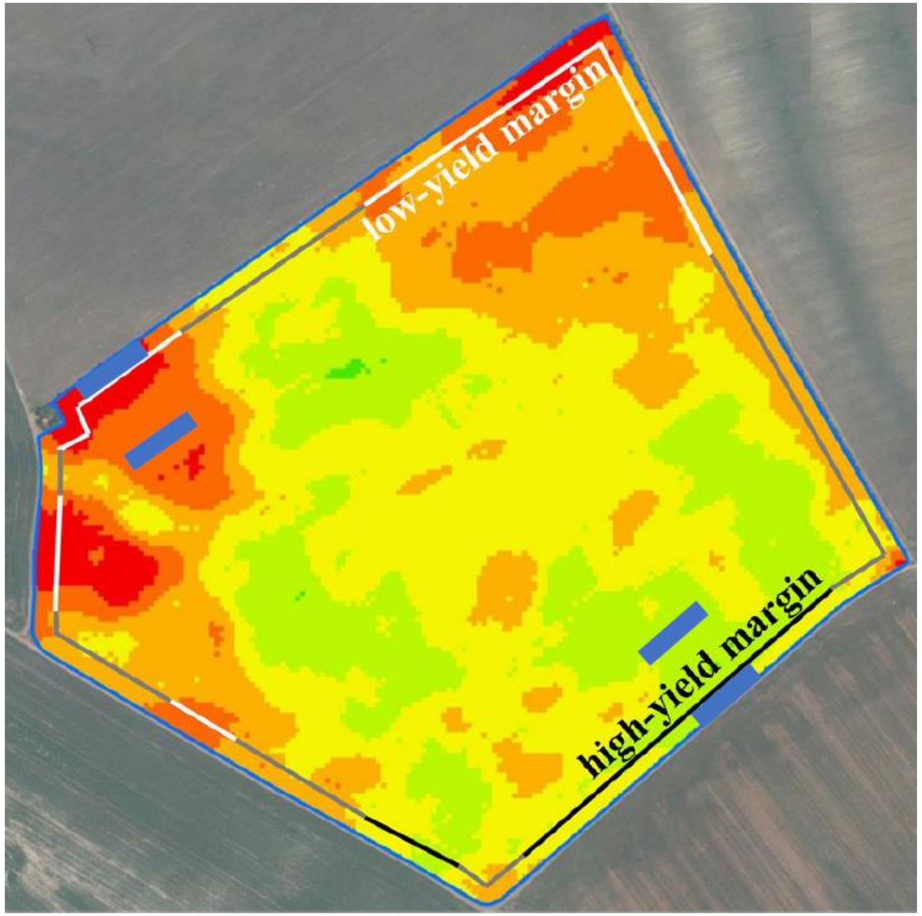
1 **Make an assessment**
Think about what you want to do. Use precision agriculture data (e.g. yield maps) or your own knowledge to identify less productive or difficult to farm areas. Consider options you might choose.

Terénní část projektu

Racionalizace zemědělské krajiny za účelem skloubení produkčních funkcí s efektivní podporou biodiverzity (RACIOZEM)

Úrodná vs. méně úrodná půda:

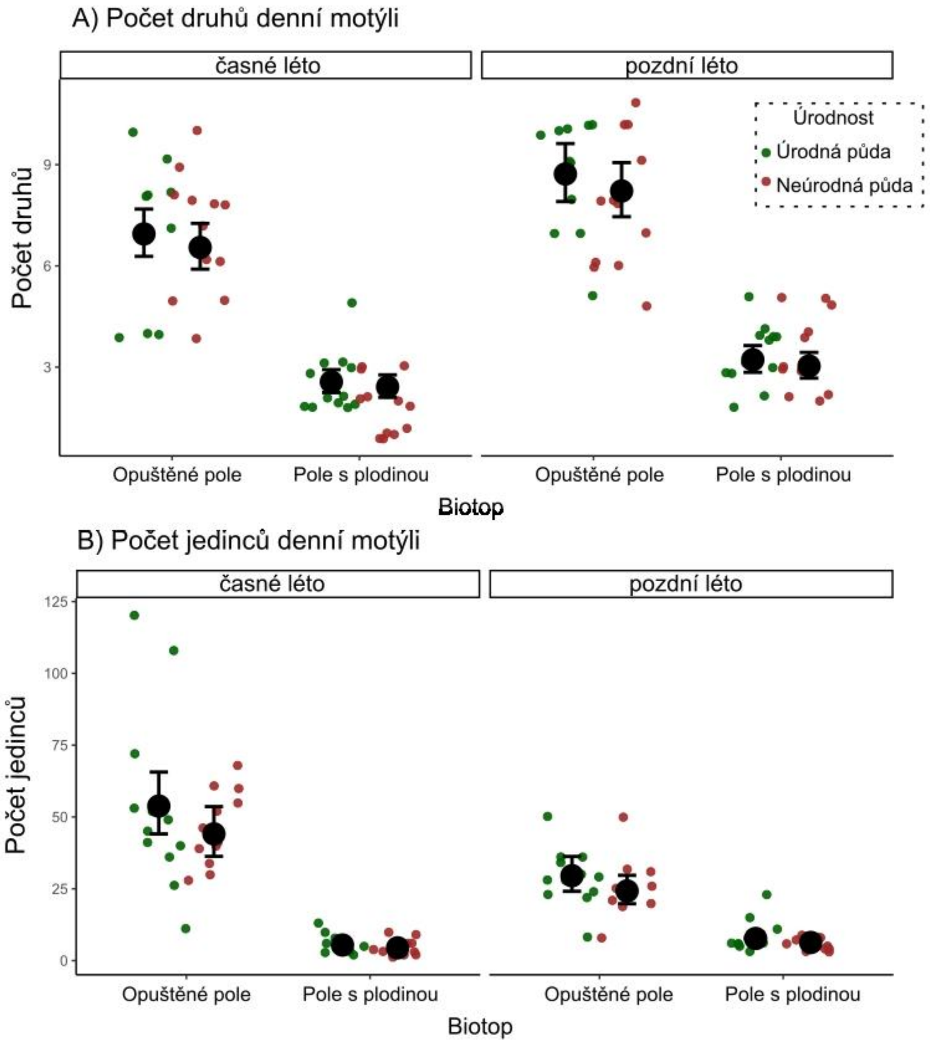
- Starší úhory / remízky (hotovo)
- Trvalé meze rozdělující půdní bloky (založeno)
- Biopásy uvnitř heterogenních polí (sbíráme letos)
- Mladé úhory (**hledáme spolupracovníky na rok 2026**)

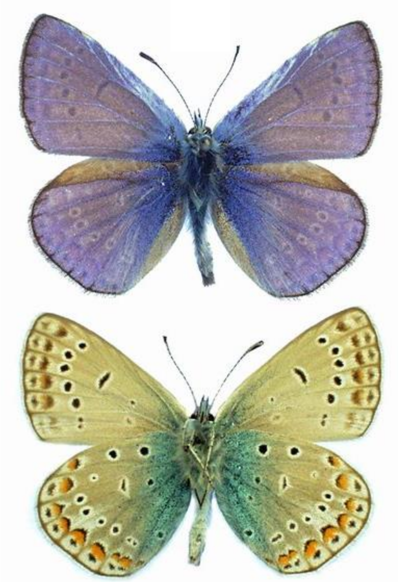


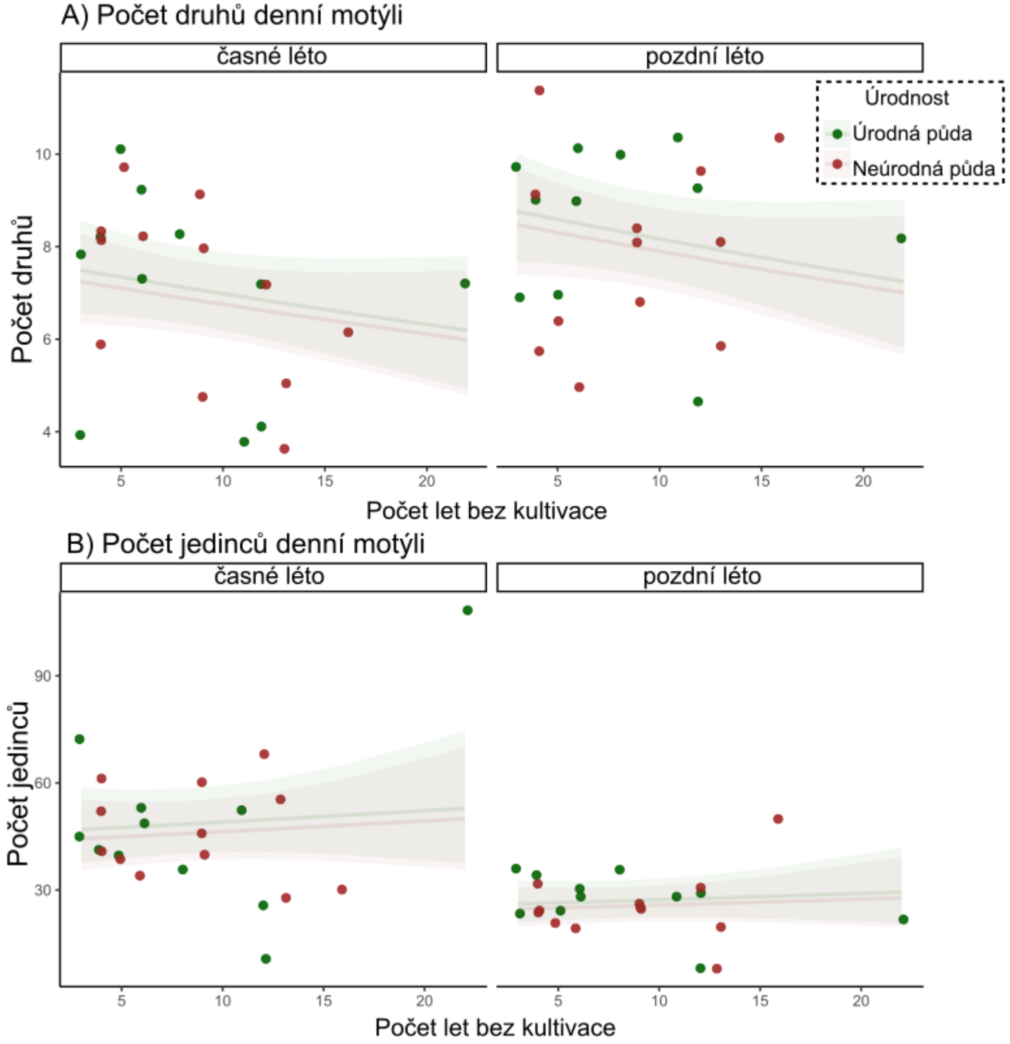
Starší úhory



Starší úhory

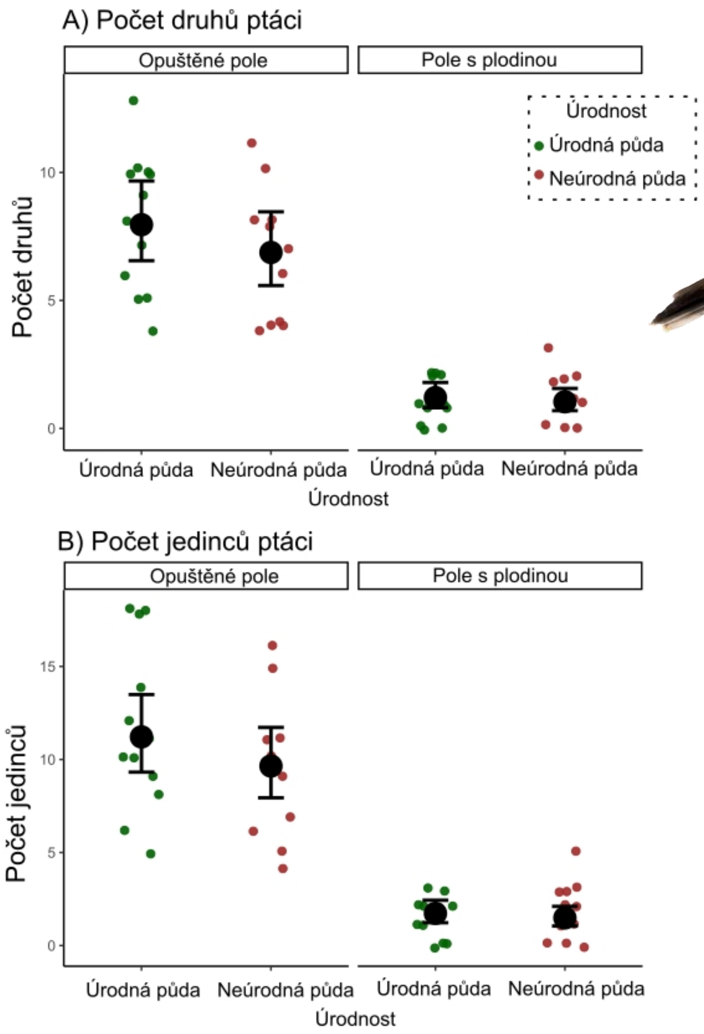


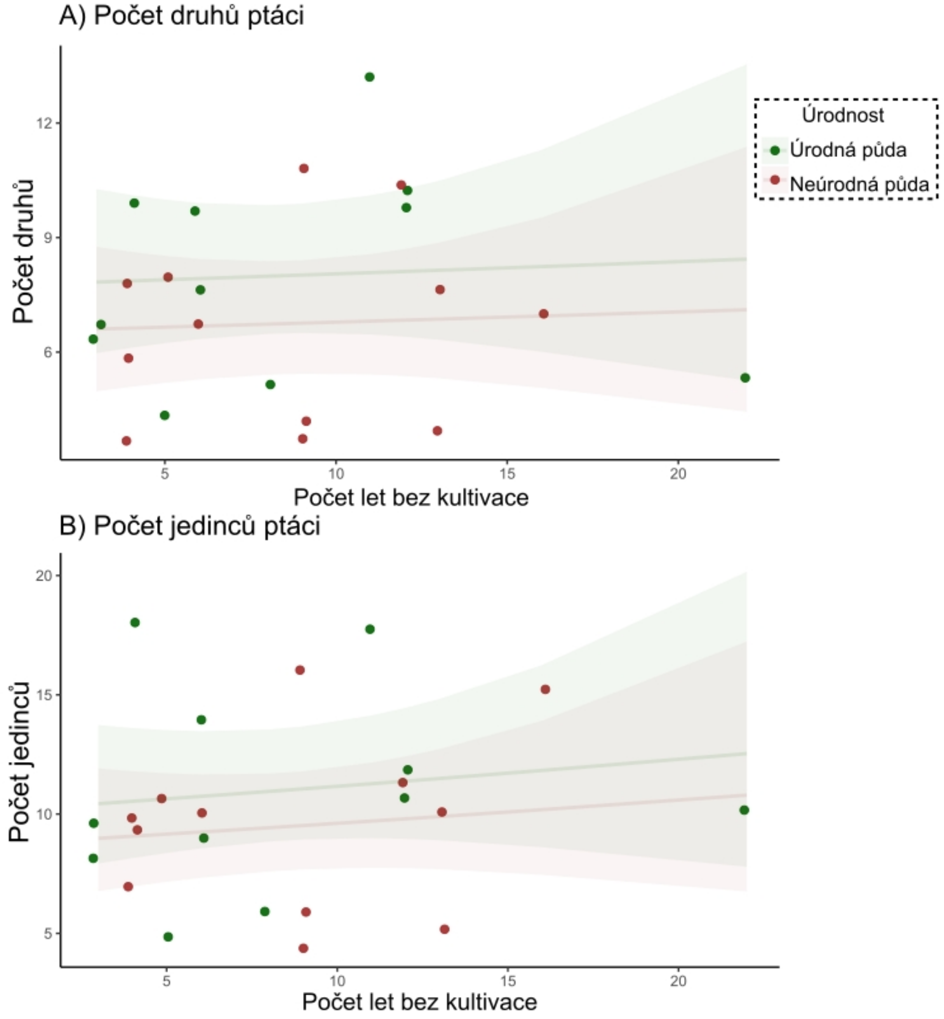




Starší úhory

ZEMĚ II
Program na podporu aplikovaného výzkumu
Ministerstva zemědělství 2024–2032





TÝM EKOLOGIE HMYZU
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Experimentální meze

ZEMĚ II
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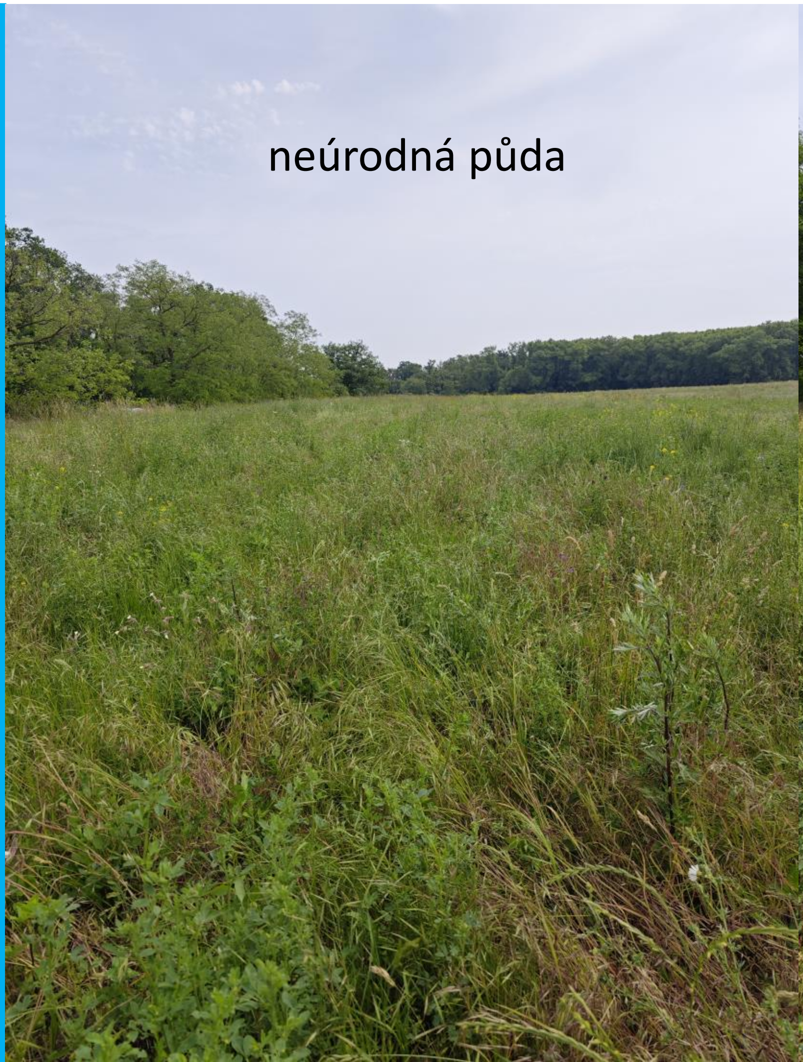
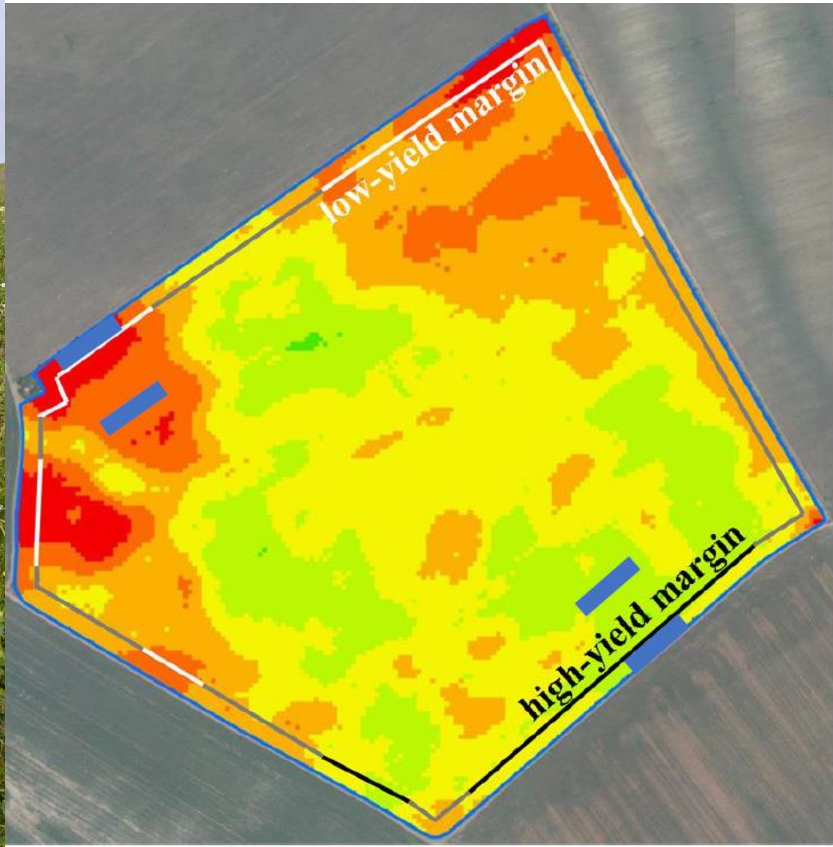
Ministerstva zemědělství 2024–2032

Biopásy v heterogenních polích





Nektarodárné úhory na vaší farmě?

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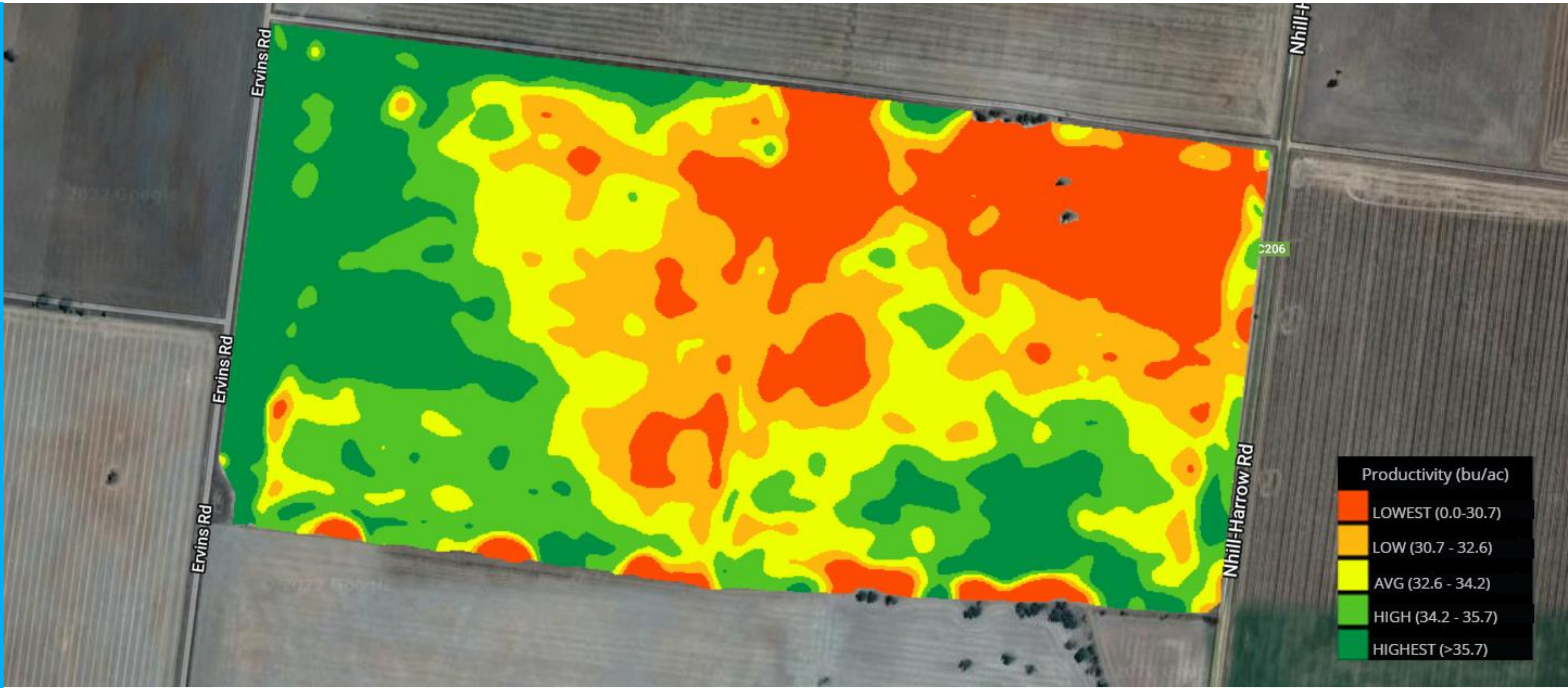


Jak optimalizovat tvary polí?

- Pásové obhospodařování … radši dlouhé obdélníky
- Zohlednění existující cestní sítě (plánování nových přístupových cest)
- Zohlednění optimální výměry půdního bloku (5 – 10 ha ???)

Foto: RenoFarmy

Jak využít mimoprodukční plochy

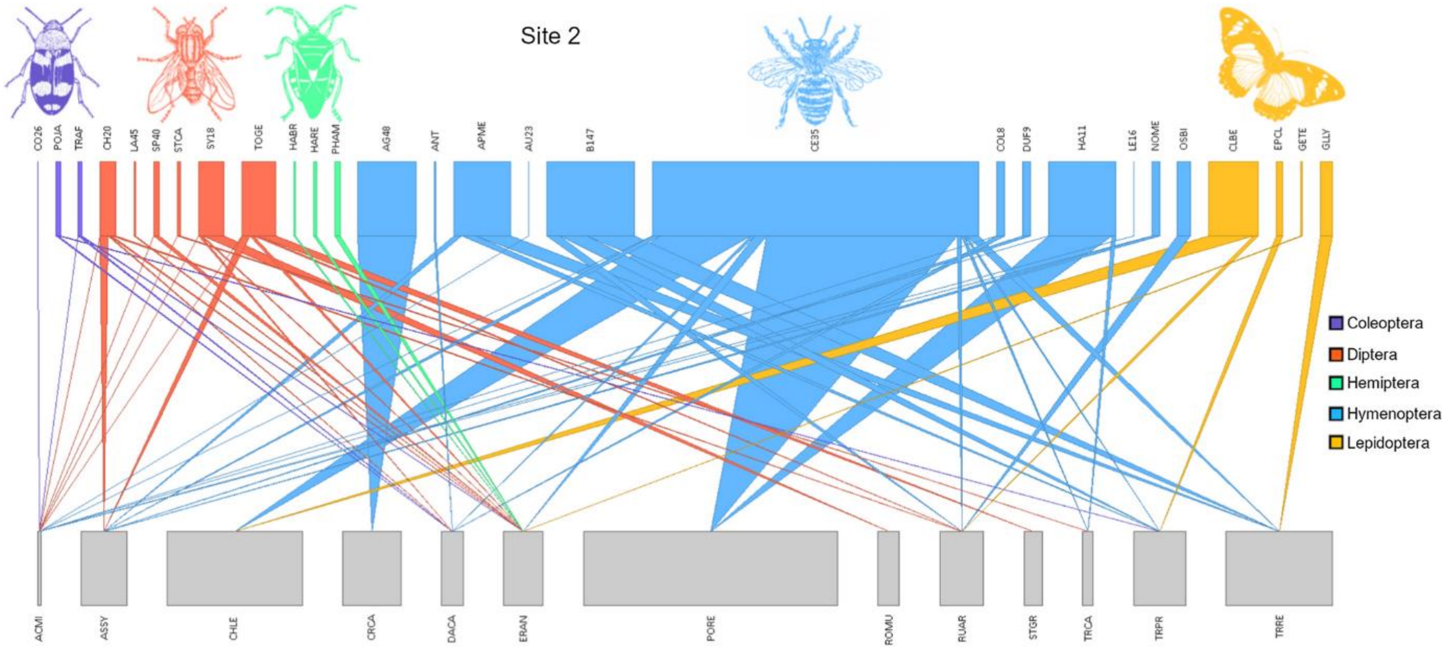
- Manipulační prostor pro techniku
- Zdroj přivýdělku (např. bioplynová stanice; jistota dotačního příjmu)
- „Odstínění“ konfliktních lokalit
- Co na to legislativa a dotační tituly?

Co s tím, když výnos je +- všude stejný (a navíc vysoký)?

Závazky a indikátory

- Zastavení poklesu populací opylovačů (a jejich nárůst)
- Navýšení krajinných prvků (lepší struktura krajiny)
- Index polních ptáků (zvrácení trendu)
- Obsah uhlíku v půdě (jeho navýšení)

Regenerativní zemědělství



TÝM EKOLOGIE HMYZU INSECT ECOLOGY GROUP

ČZU Česká zemědělská univerzita v Praze

Děkujeme všem, kdo na projektu pracují a především těm, kdo jej platí (= vám)

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VINY agro s.r.o.

Děkujeme vám za pozornost!