

AGROFORESTRY AS A SUSTAINABLE PRODUCTION SYSTEM

ANDREA VITYI

INTERNATIONAL CONFERENCE ON SUSTAINABLE ECONOMY AND AGRICULTURE
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EFOP-3.6.2-16-2017-00018 - TERMELJÜNK EGYÜTT A TERMÉSZETTEL

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SZÉCHENYI  2020



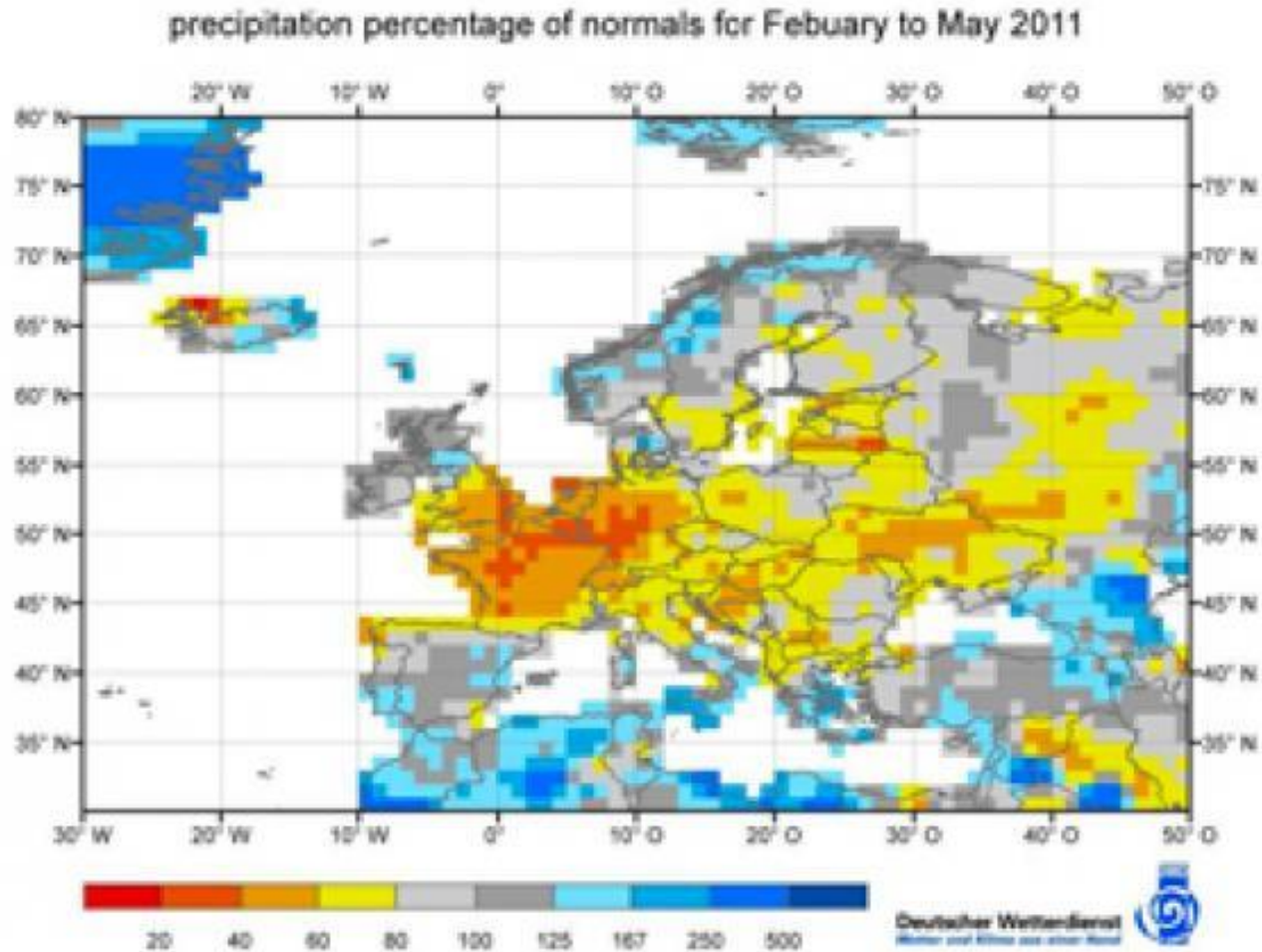
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Drought conditions in Europe 2011



Source: WMO



Europe's long drought has created severe conditions like this at the Loire River, near the Anjou-Bretagne Bridge in western France.

Credit: Stephane Mahe/Reuters



Corn field in the Great
Plain, June, 2012

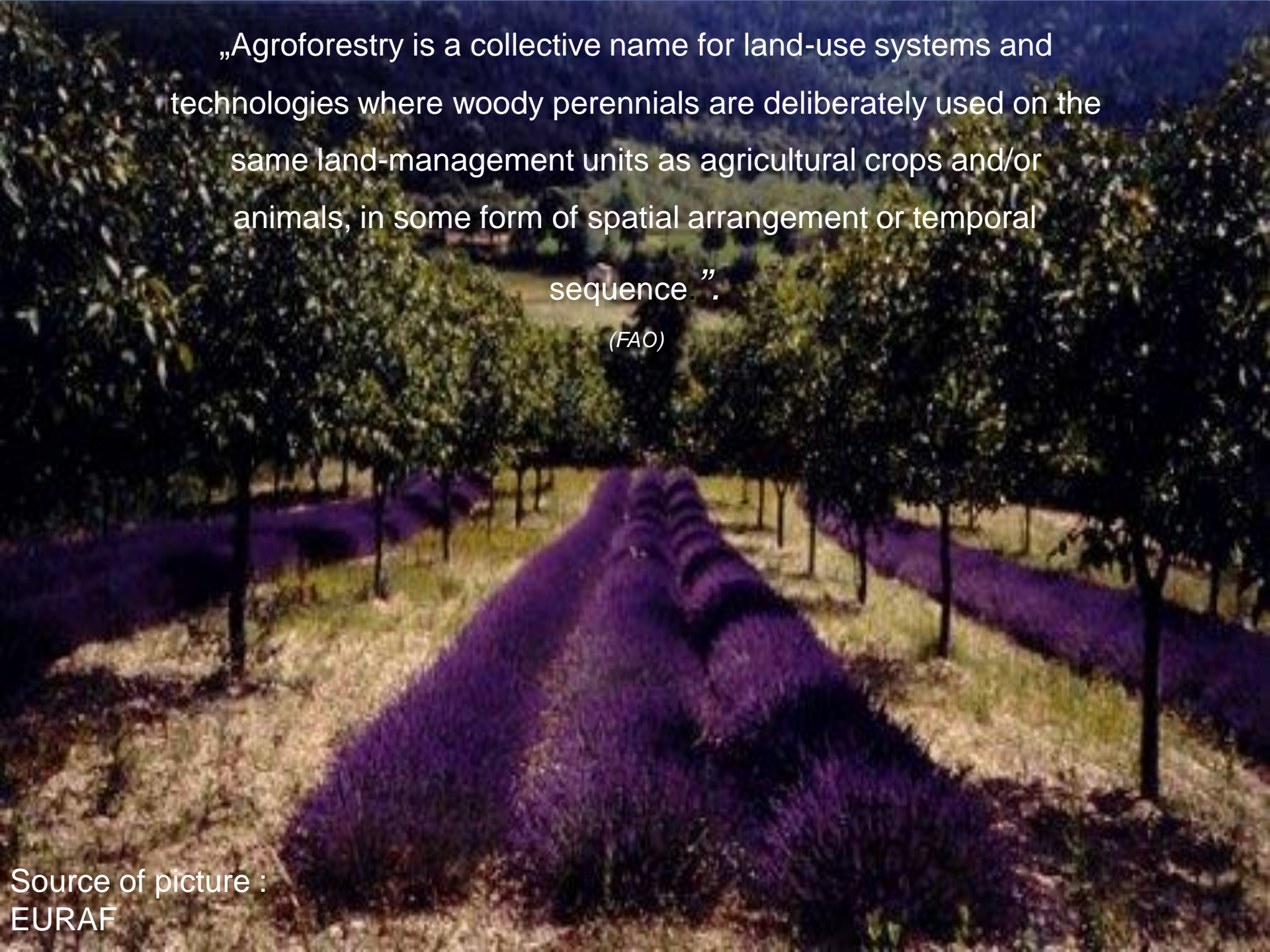


Poor yield due to
severe drought

„Agroforestry is a collective name for land-use systems and technologies where woody perennials are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence.”

(FAO)

Source of picture :
EURAF





(Vézénobres, France) (SAFE project)



Hérault, France (EURAF)

I. Agrisilvicultural systems (trees combined with crops)
- Alley cropping



England (<http://www.agroforestry.ac.uk>)



Riparian Buffer Strips



Field windbreaks in North Dakota
(Wikipedia)



I. Agrisilvicultural systems – Shelterbelts and windbreaks, live hedges



Bocage in Normandy, France

Source: Association Sauvons le Bocage



Shelterbelt system of Canterbury Plains, New Zealand



England

(<http://www.agroforestry.ac.uk/>)



Homer, USA (AFTA)

II. Silvopastoral systems (trees and pastures or animals)
- Trees on rangeland or pastures, plantation crops and animals



Hungary (A. Varga)



Spain

Hereford cattle browsing in a mixed-species hedgerow in 2014, Hereford, UK L. Whistance (AFINET)



Multipurpose woody hedgerows: woody hedges for browse, mulch, green manure, soil conservation, etc.

III. Agrosilvopastoral systems (animals, trees and crops)

Apiculture with trees



Source: TourdeFarm
<https://tourdefarm.in/blog/5-reasons-why-a-visit-to-a-honey-bee-farm-is-an-enlightening-and-exciting-experience/>

Soil protection functions

- Increasing soil biodiversity
- Erosion control
- Improving groundwater management
- Improving nutrient flow
- Reduce leaching



Environmental functions

- Preserving biodiversity
- More favorable microclimate
- Increasing resource efficiency
- Carbon Sequestration
- Reduction of GHG emissions

Economic functions

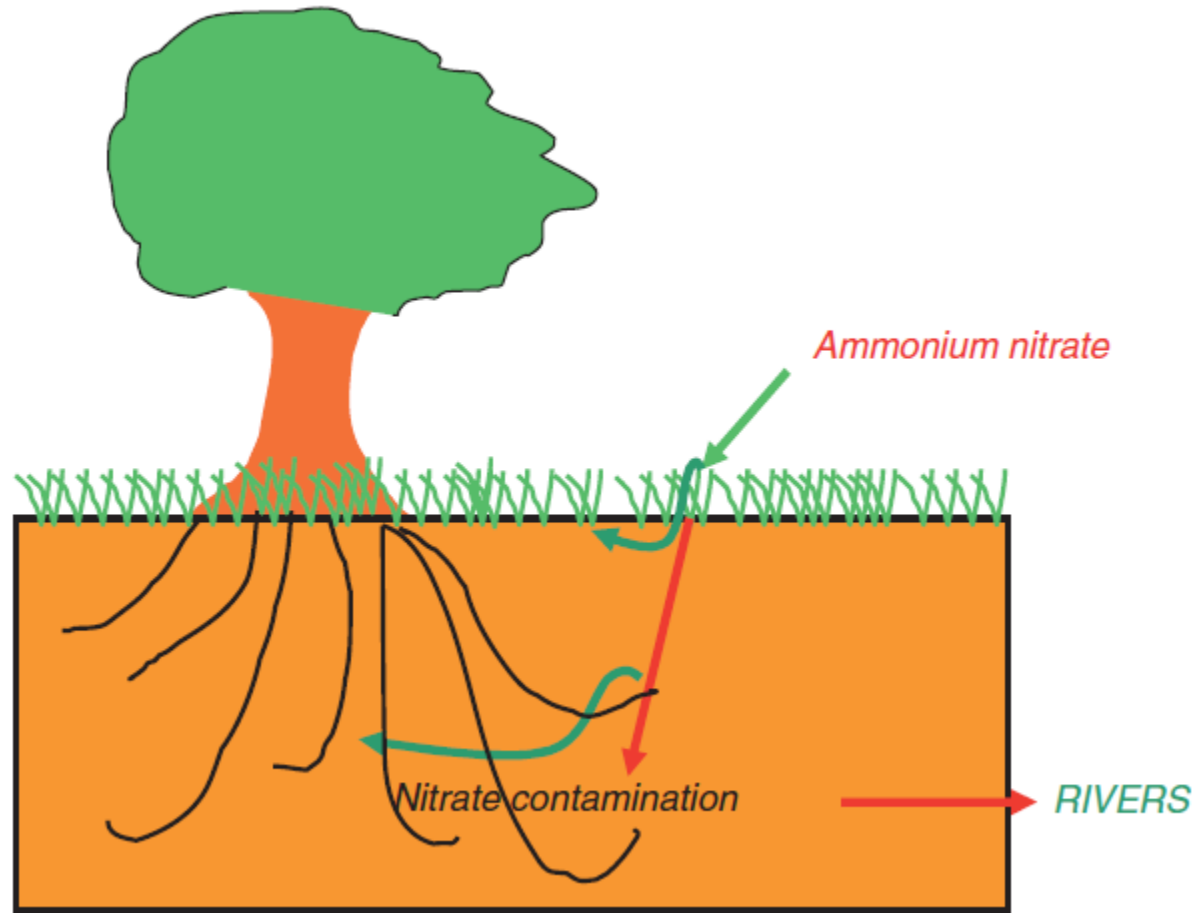
- A range of diff. products: agricultural products, quality timber, firewood, feed..
- Carbon-trading
- Better living space, multifunctionality
- Reduce production costs



Dry period in Dehesa: grass remains green under trees

Santiago-Freijanes, J.J., Mosquera-Losada, M.R., Rois-Díaz, M. et al. *Agroforest Syst* (2018).
<https://doi.org/10.1007/s10457-018-0215-9>

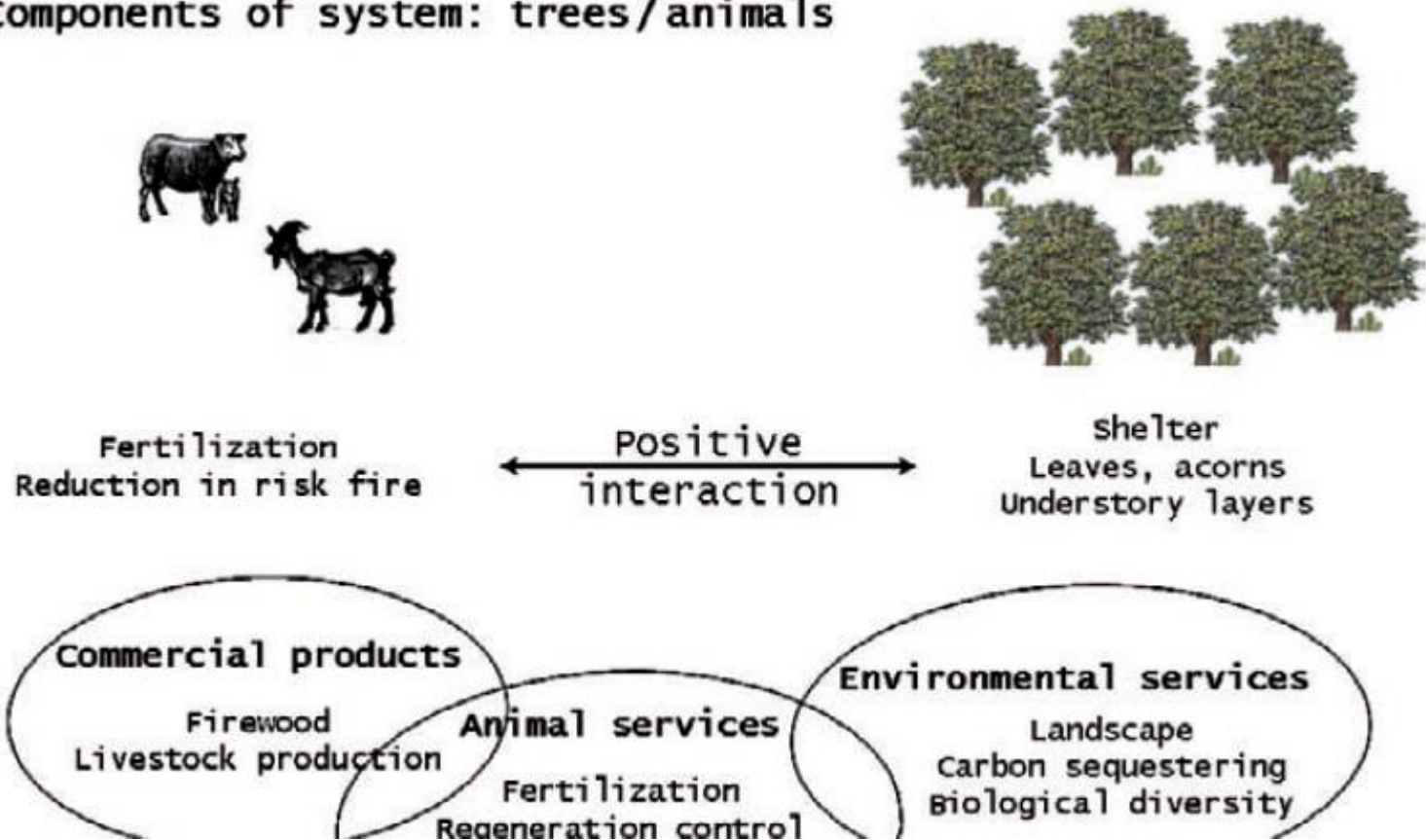
Use of nitrate by tree and pasture roots (green lines) and nitrate leaching (red lines)



Introduction of trees into pastures could reduce nitrate leaching and improve water quality.

Products and services offered by the Pyrenean oak silvopastoral system and interactions between the two components

Components of system: trees/animals



Source: Antonio Rigueiro-Rodríguez • Jim McAdam, María Rosa Mosquera-Losada (Editors): **Agroforestry in Europe. Chapter 6. Silvopastoral Systems in Portugal: Current Status and Future Prospects (by M Castro)**

Trees in grazed arable land provide also environmental benefits such as protection for livestock



Here an oak tree in Italy (Maremma grossetana, Southern Toscana) (SAFE project)



Alley cropping system,
Hungary (Photo by A. Vityi)

Variety of high value products from agroforestry systems: fodder, fuelwood, timber



Alley cropping, USA, corn
between walnuts (USDA)



Grazed orchard

Source: Compassion in World Farming

Variety of high value products from agroforestry systems
crops, cork, fruits, meat, milk, egg....



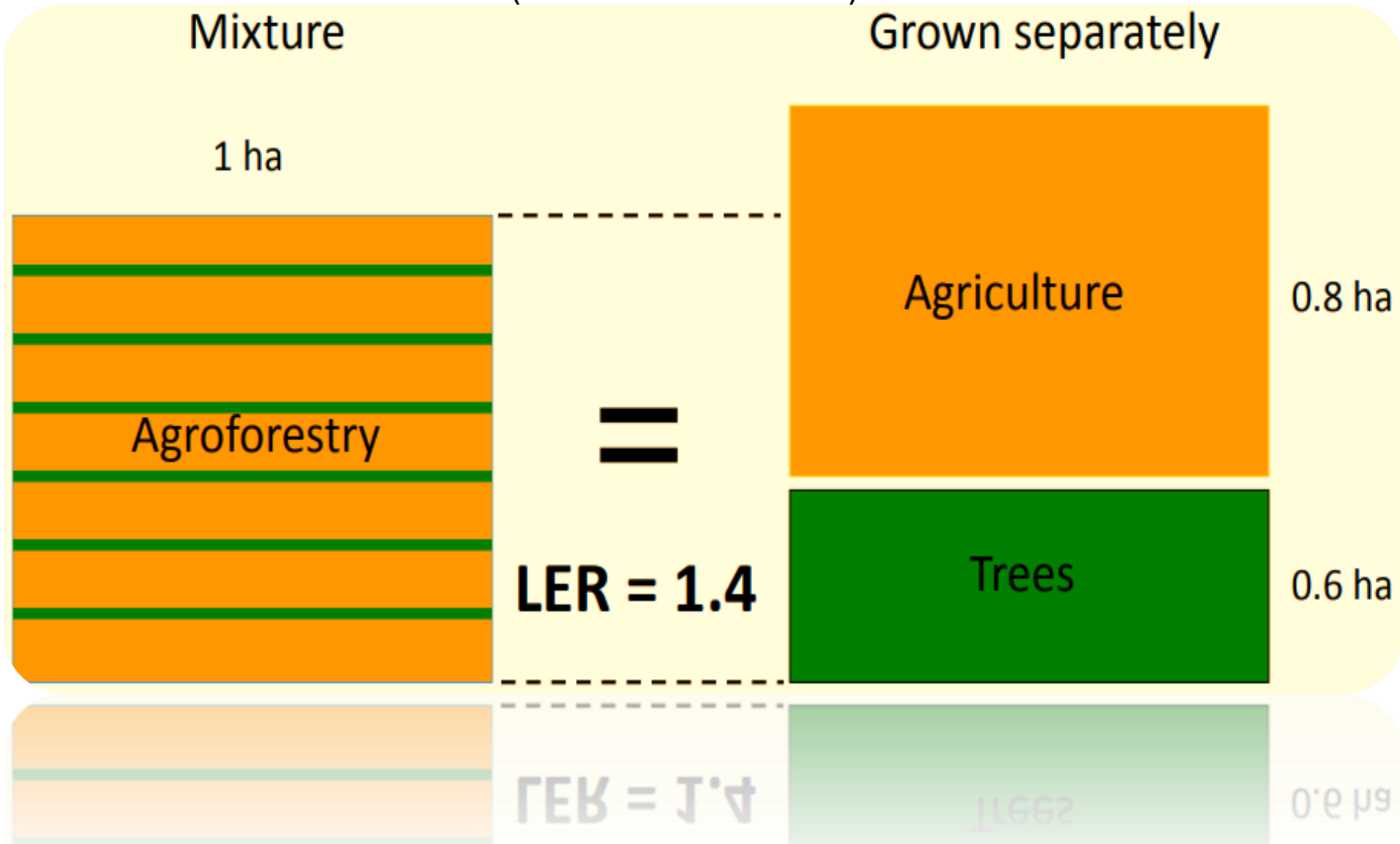
Montado + cattle, SouthEast Portugal. Photo by João HN Palma
agforward



Holm oak, pasture + turkey. Photo taken by João HN Palma
agforward

Predicted interactions between relative tree yield and crop yield within selected agroforestry systems

(Graves et al. 2007b)





Shelterbelts and windbreaks: protection against snow drifts on the roads and snow accumulation on agricultural lands



(source: OEE)



Natural plant
protection

Agroforestry for remediation purposes



Welzo Sud, Northeastern Germany. Alley Cropping on former lignite mining area

Agroforestry helps regenerate soil and ecosystems in
mining area in Germany

(Source: D. Freese, Technical University of Cottbus)

HOW CAN AGROFORESTRY SUPPORT SUSTAINABLE LAND USE?

- Habitat diversification
- Provides protection for plants and animals (shade and shelter against strong sun, heat, wind, snow) and helps migration
- Improve micro-climate
- Improve water and nutrient balance
- Improve organic matter content of soil
- Diversified economic systems that are more resilient to risk



INCREASE THE SECURITY and RESILIENCE OF AGRICULTURAL PRODUCTION -> ADAPTATION

+

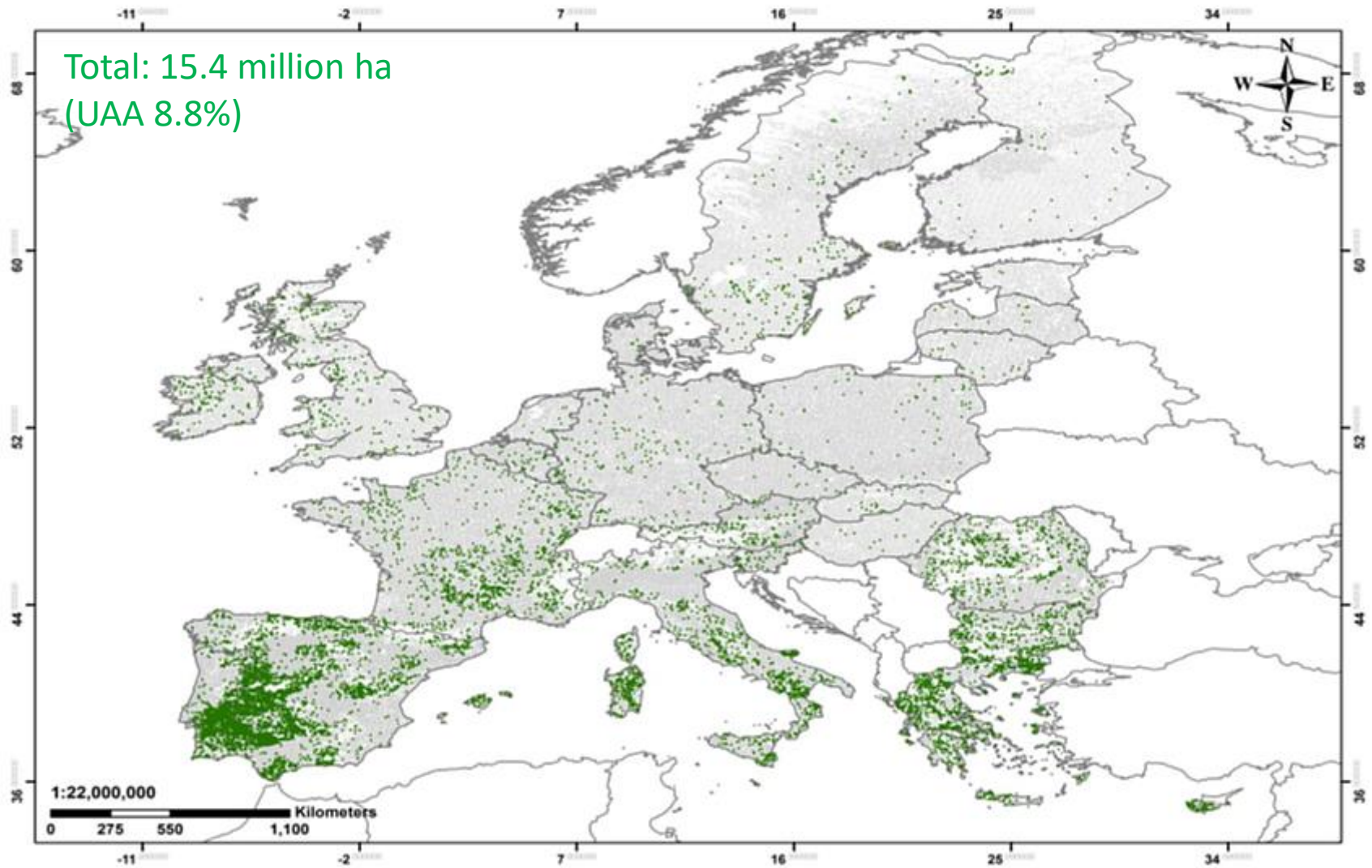
MAINTAIN AND PROTECT NATIONAL RESOURCE SERVICES



- AF has been implemented in the policies worldwide
- In the new CAP agroforestry receives support through Pillar II. (Art. 23, new Rural Development [Regulation 1305/2013](#))

AGROFORESTRY IN EUROPE

Total extent of agroforestry in Europe based on LUCAS data



(Source: Current extent and trends of agroforestry in the EU27. Deliverable 1.2: AGFORWARD (613520))

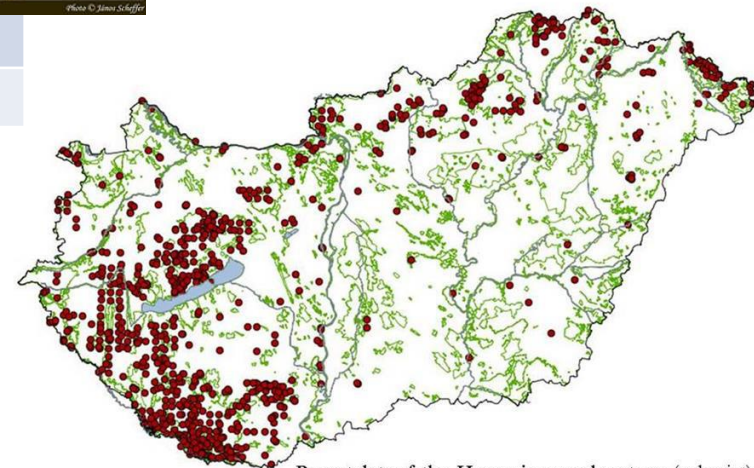
ESTIMATED EXTENT OF AREA COVERED BY AGROFORESTRY IN HUNGARY (AGFORWARD)



Type of agroforestry system	Area (ha)
High value tree agroforestry: Intercropped fruit (including nuts)	2 000
Livestock agroforestry:	36 100
woodland	2 000
grassland with sparse tree cover	22 100
shrubland with sparse tree cover	2 000
Sum	38 100

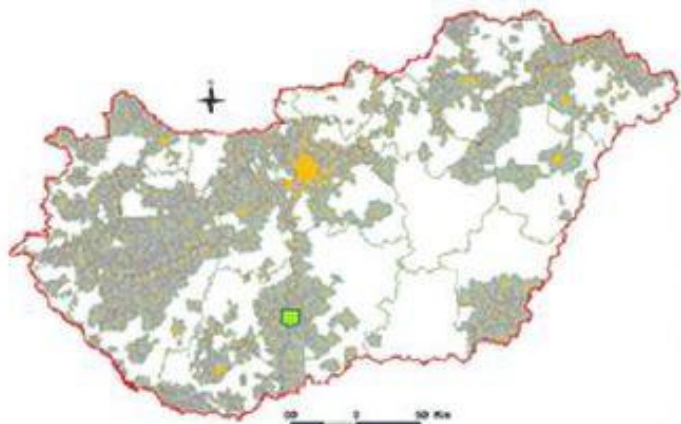
Based on the LUCAS land cover maps, the estimated total area covered by agro-forestry systems is 0.4% of the country's territory and 0.8% of the areas under agricultural cultivation.

Forrás: Michel den Herder et al. (2016)
Current extent and trends of agroforestry in the EU27
Deliverable 1.2: AGFORWARD (613520)

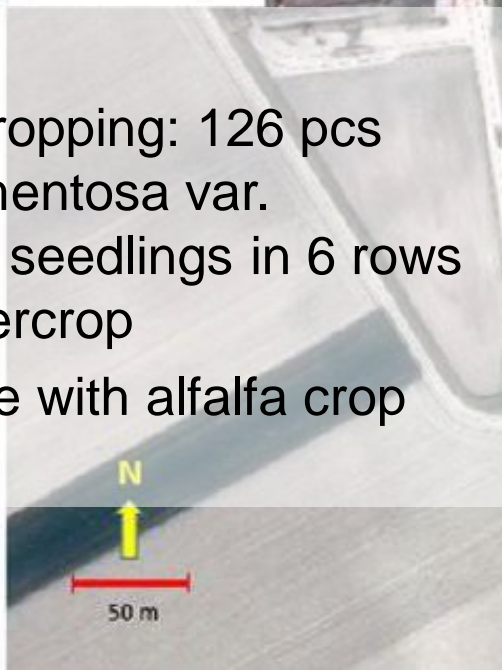


Recent data of the Hungarian wood pastures (red point)
Green line: Natura 2000 area
latest update: 31.01.2014.
Anna Varga (MTA ÖK ÖBI)

SOIL MICROCLIMATE EXPERIMENT IN ALLEY CROPPING



- Area size: 2ha
- 1 ha of alley cropping: 126 pcs *Paulownia tomentosa* var. Continental E. seedlings in 6 rows with alfalfa intercrop
- 1ha control site with alfalfa crop



Substations:

Soil temperature and moisture

- 0-10 cm
- 10-20 cm
- 20-40cm
- 40-60cm

Leaf surface moisture

- 30cm
- 60cm

Control

Agro-meteorological main station:

- Air temperature and moisture
- Precipitation volume
- Wind direction and speed
- Global Radiation, UVA, UVB
- Air pressure



Photo by A. Vityi

FINDINGS

- Distinct difference between the agroforestry and the control area in soil moisture and soil temperature, from the age of 2 years of trees.
- The presence of trees resulted in a reduction of mean soil temperature, the variation of temperature values, and the frequency of extreme values occurrence.
- In hot and dry periods, soil water conditions were more favourable in the agroforestry system.
- The presence of trees reduced significantly soil temperature variability in the upper 10 cm layer.



The use of trees in alley cropping improved soil moisture for shallow-rooted crops (eg. cereals and vegetables) and also reduced the extreme changes in soil temperature during periods of drought or in extreme cold weather conditions.

EXAMPLES OF AGROFORESTRY RESEARCH ACTIVITIES IN HUNGARY

Leading institution (L) / Hungarian partner (P)	Program / Date	Subject
University of Sopron, Faculty of Forestry (L)	State financed , 1960's From the 90's	The effect of shelterbelts on crop yields; development of shelterbelt systems Survey of shelterbelt systems, develop guidelines of establishment and sustainable management Introduction of woody elements (SRC) in arable systems
Hungarian Academy of Sciences, Ecology MTA Centre for Ecological Research (L)	2006-	Survey of traditional forest-pasture systems
Szent István University, Faculty of Horticulture (L)	2010 -	Establishment and examination of pilot forest garden system
University of Debrecen (P)	EU Leonardo 2013-2015	AGROFE – Transfer of agroforestry knowledge by transforming research results into pedagogical material
University of Sopron, Co-operational Research Centre (P)	FP7 2014-2017	AGFORWARD -Promote agroforestry practices in Europe that will advance rural development

EXAMPLES OF AGROFORESTRY RESEARCH ACTIVITIES IN HUNGARY

University of Debrecen (P)	ERASMUS+ 2015-2018	AgrofMM – Training in agroforestry
University of Sopron, Co-operational Research Centre (P)	H2020 2017-2019	AFINET – Agroforestry Innovation Networks
University of Miskolc (L) University of Sopron (P), University of Pécs (P), University of Szeged (P)	Széchenyi 2020 EFOP-3.6.2-16 Thematic research networks 2017-2020	Sustainable raw material management thematic network development - RING 2017 (Agroforestry involved)
University of Sopron (L) University of Kaposvár (P), University of Dunaújváros (P)	Széchenyi 2020 EFOP-3.6.2-16 - 2017-00018 Thematic research networks 2017-2020	Grow together with nature – agroforestry as a new breakout opportunity

Synergies between national and international activities

AFINET:

Farmers experienced the benefits of agroforestry share their knowledge, innovations and best practices ...

<http://www.eurafagroforestry.eu/afinet>



Synergies between national and international activities

AGFOSY

..aims to raise awareness of the sustainable opportunities provided by Agroforestry, and the benefits this offers our environment

<https://www.facebook.com/AGFOSY/>



Synergies between national and international activities..



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🌿 Cette semaine, c'est le Congrès Mondial d'Agroforesterie ➡ Une bonne occasion de savoir si vous connaissez bien cette pratique !
Testez vos idées reçues grâce au guide réalisé par les #ChambAgri.
👉 Prêt à vous lancer, c'est par ici chambres-agriculture.fr/publications/t...

May 21, 2019

EURAF Retweeted 🐦

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Featured Farm

"Darliner" farm (Italy): toward self-sustaining production of food and energy



Agricultural fields are usually alternated with wooded lands with oaks, ash, maple, etc. managed as coppice to produce fuelwood destined to local energy market.

Agroforestry initiatives in Flanders (Belgium)



Eric Avermaete is a farmer in the neighborhood of Tienen, about 50 km east of Brussels. He grows cereals, sugar beets, potatoes and corn.

San Bartolomeo farm in the Lazio Region



The farm started this activity only few years ago with a handful of chickens.

Introduction of a Hungarian farmer family, Tüzkövesbörc Farm



Wakelyns Agroforestry - a diverse organic silvoarable system in the UK



Agroforestry on municipally owned sites - example Donzdorf (Germany)



Between 2007 and 2010 the city established five agroforestry plots

THANK YOU FOR YOUR ATTENTION!

EFOP-3.6.2-16-2017-00018 - TERMELJÜNK EGYÜTT A TERMÉSZETTEL
- AZ AGRÁRERDÉSZET, MINT ÚJ KITÖRÉSI LEHETŐSÉG



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