

# Sown Biodiverse Pastures

A nature-based approach to reverse the degradation of Mediterranean ecosystems

*Presented by:*  
**Ricardo Teixeira**  
Terraprima



# Contributing to societal challenges with triple-win solutions

Climate change  
Adaptation  
Mitigation

...with better farm  
management

Soil protection

...with an increase in  
soil organic matter

Green growth

...with economic value  
added and more  
productive systems

2020

- reduced tillage
- no harrowing for shrub control
- adequate grassland management
- higher grassland productivity
- lower chemical inputs

- higher resistance to erosion
- higher water retention and infiltration
- healthier biotic communities
- higher soil biodiversity

- less pollution
- higher biodiversity levels
- healthier trees
- higher biomass production
- higher stocking rate

Soil Thematic  
Strategy

Strategy for  
Biodiversity

Mitigation and  
adaptation to  
climate change

# Sown Biodiverse Permanent Pastures Rich in Legumes

## A Biodiversity Engineering innovation by David Crespo



**Permanent**, because they are self-maintained during at least 10 years (in some cases, 25 years)

**Sown**, because improved and selected seeds are introduced (by sowing)

**Biodiverse**, because up to 20 species or varieties are sown

**Rich in Legumes**, because many plants are legumes, which are a “natural factory” of nitrogen, avoiding the use of synthetic fertilizers





# Sown Biodiverse Pastures: a nature-based approach?



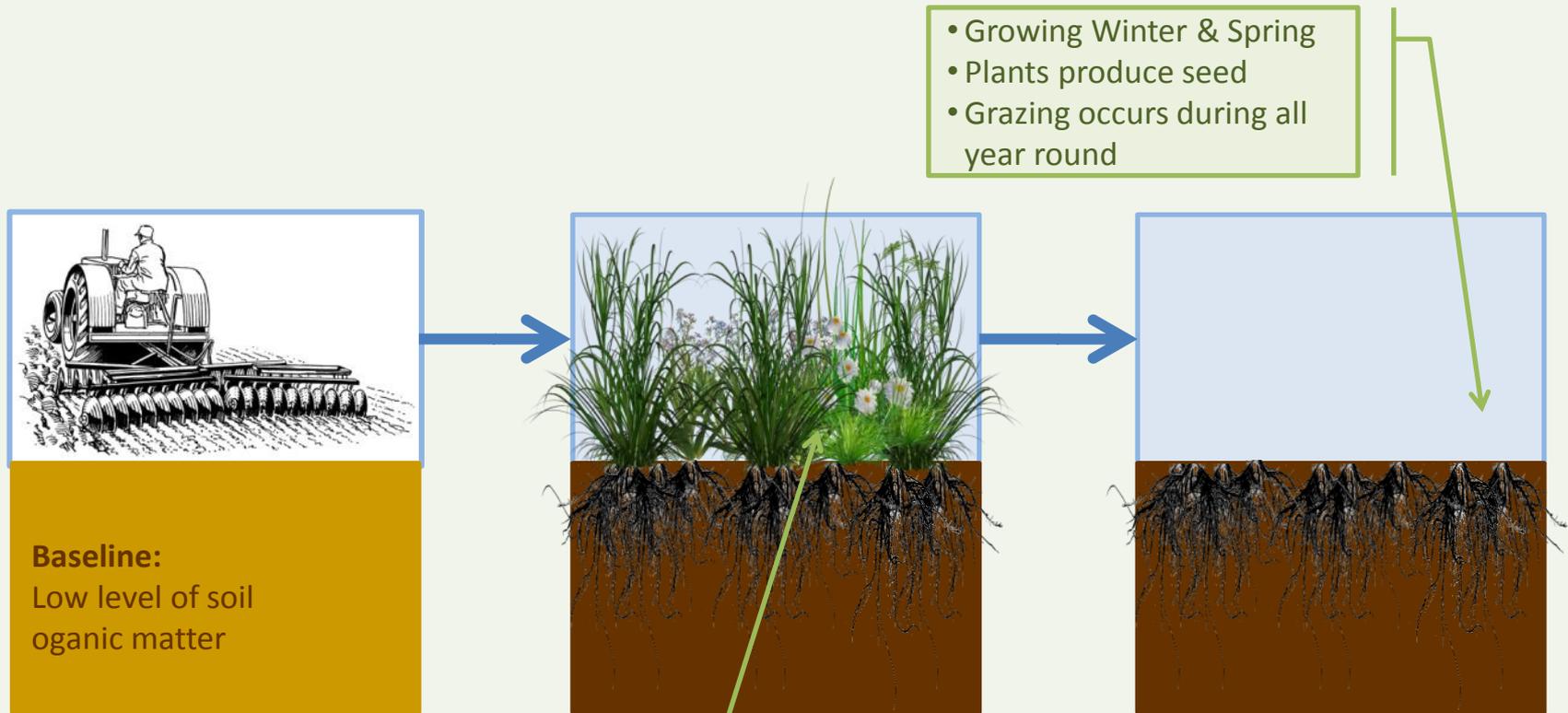
+ concentrate feeds

1 million ha

90,000 ha



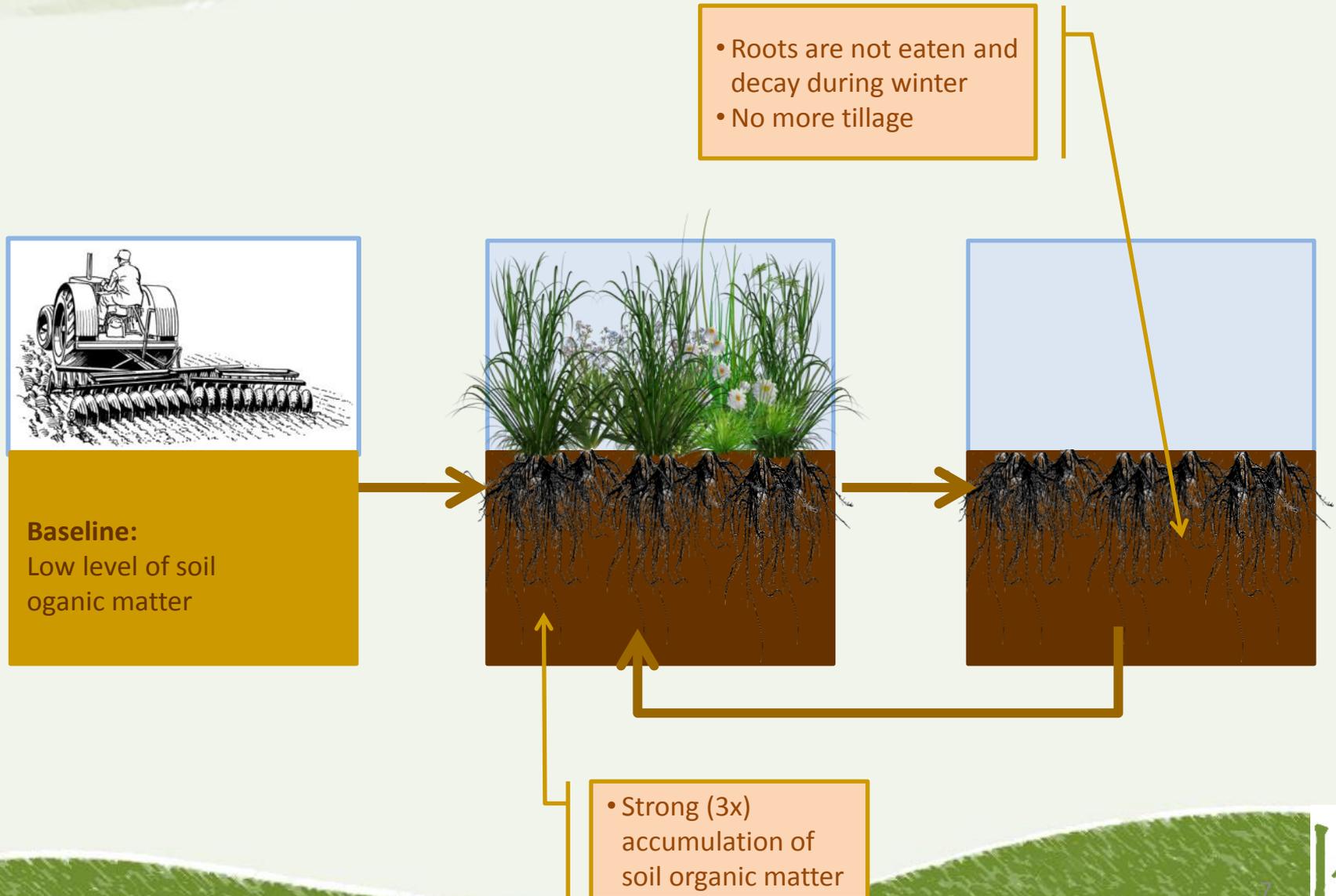
# Sown Biodiverse Pastures as a nature-based approach



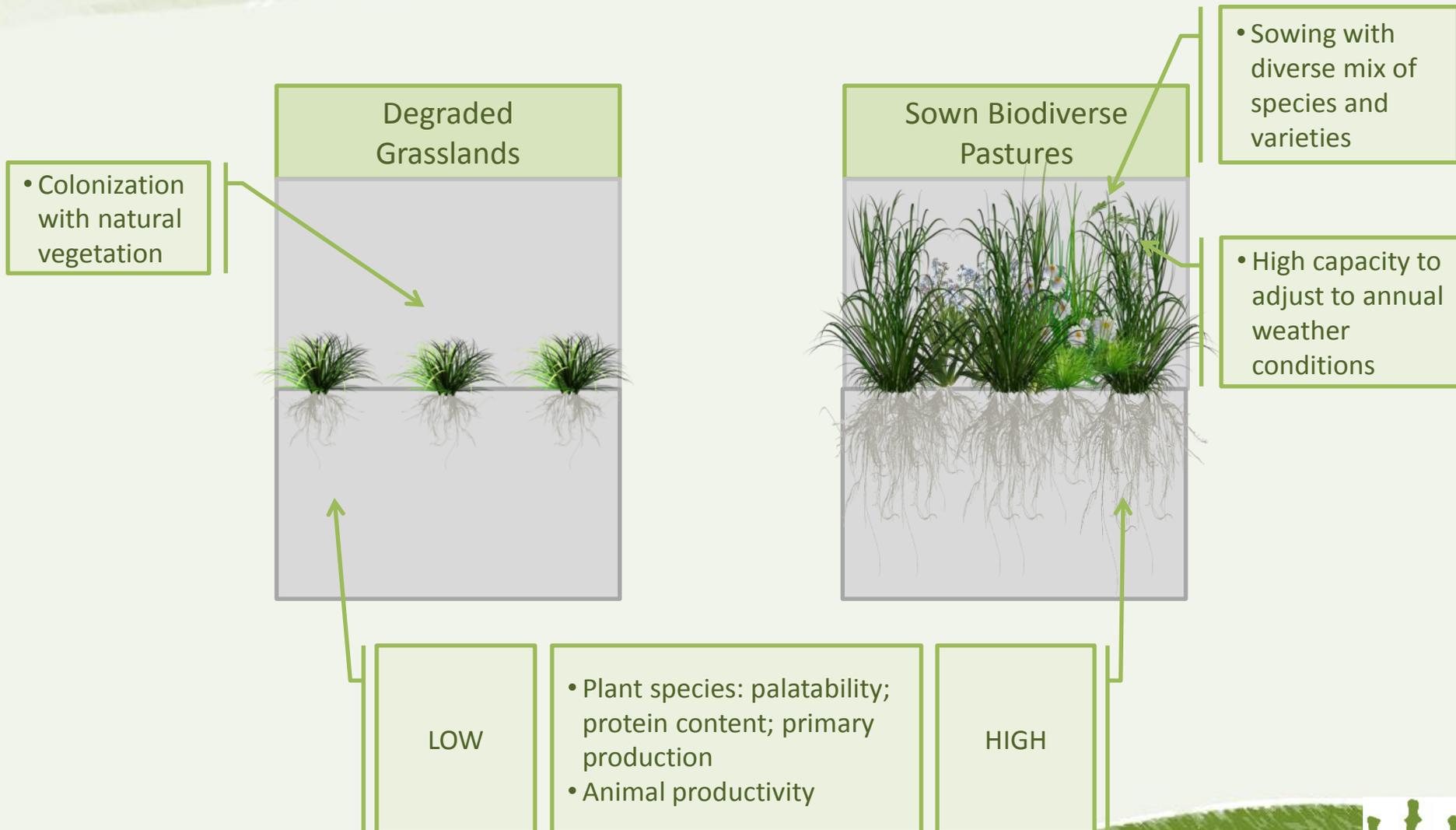
• Seeds germinate in Autumn and Winter  
• Grassland is re-established

Teixeira, R.F.M., Proença, V., Crespo, D., Valada, T., Domingos, T. (2015). The use of biodiversity in engineered pastures in designing win-win solutions for arid and semi-arid ecosystems: a conceptual framework. *Ecological Engineering*, 77, 85-97.

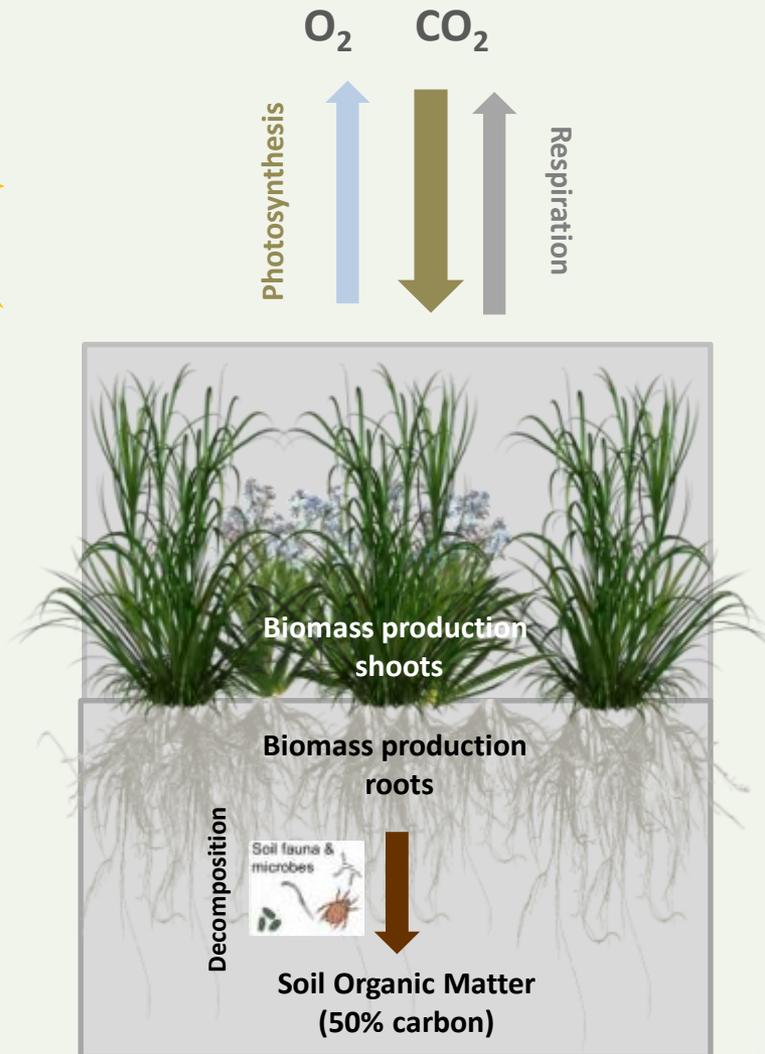
# Sown Biodiverse Pastures as a nature-based approach



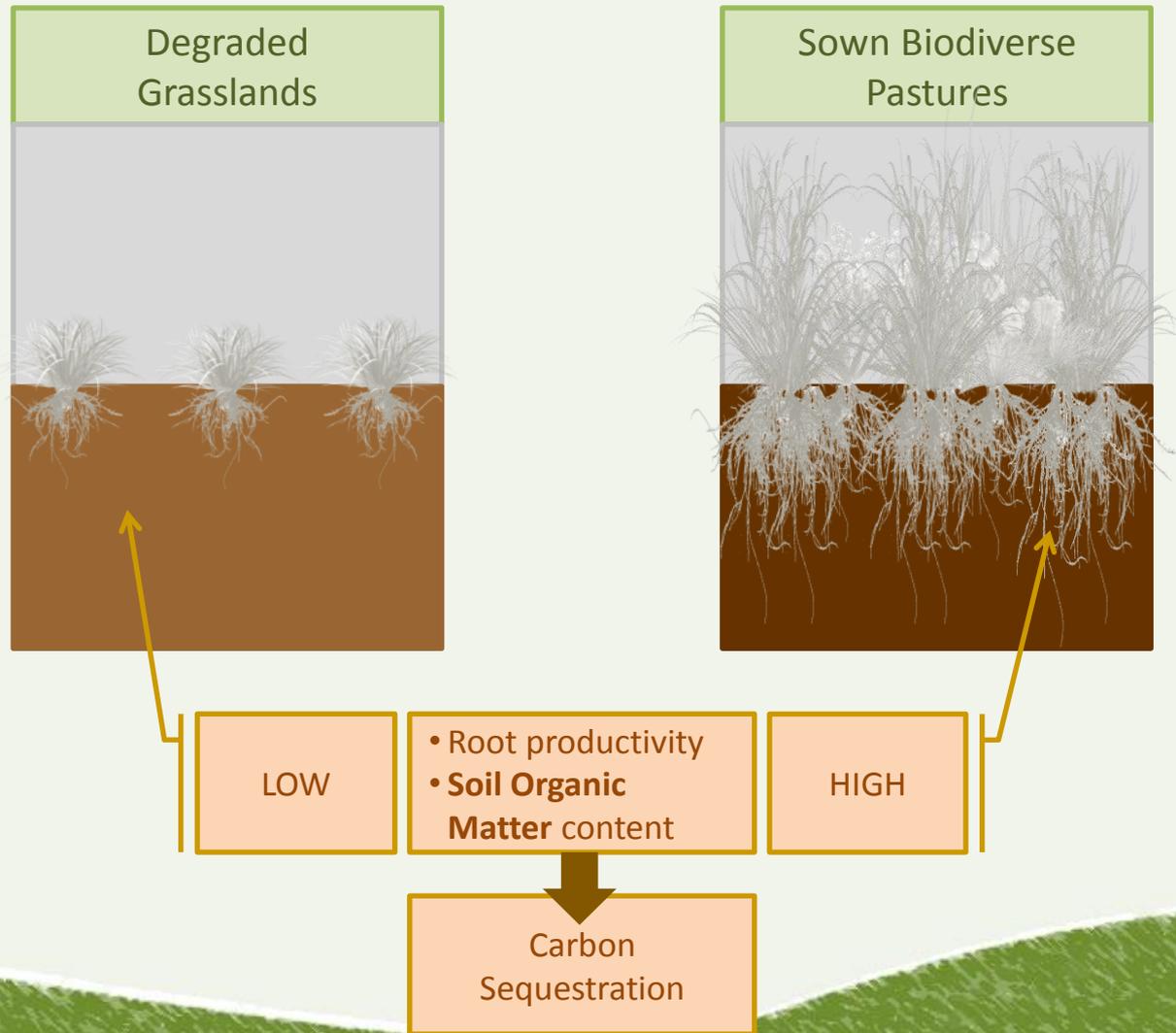
# Comparing Systems: Productivity



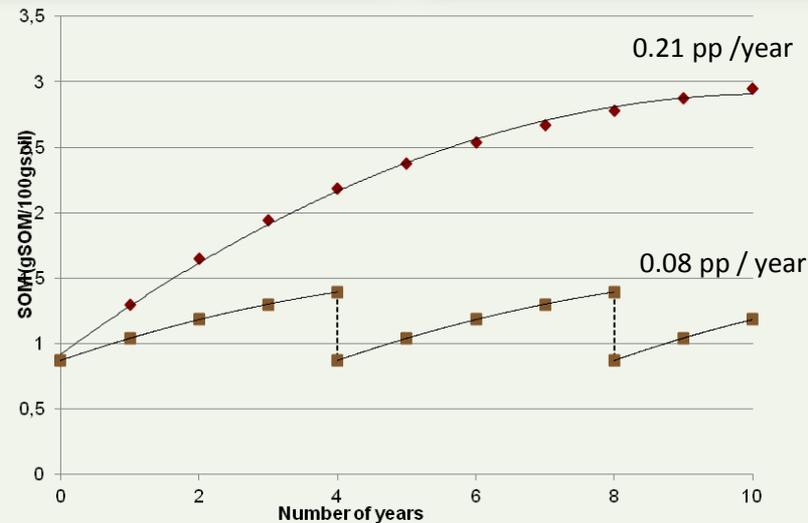
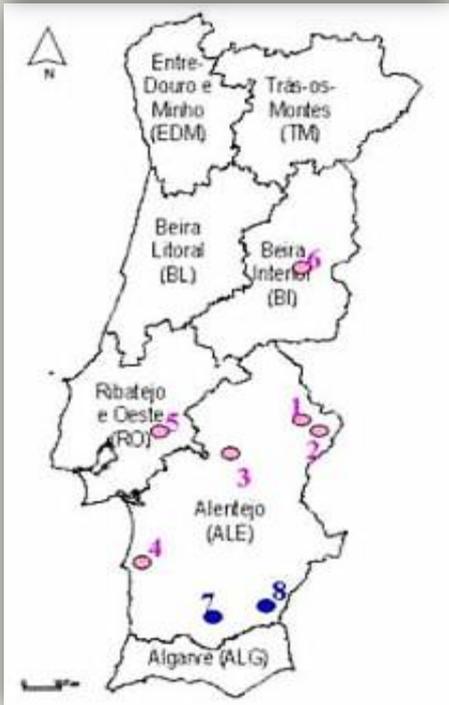
# Managing soil organic matter is the key to carbon sequestration and soil protection



# Comparing Systems: Carbon Sequestration



# Calculation of the Carbon Sequestration Factor



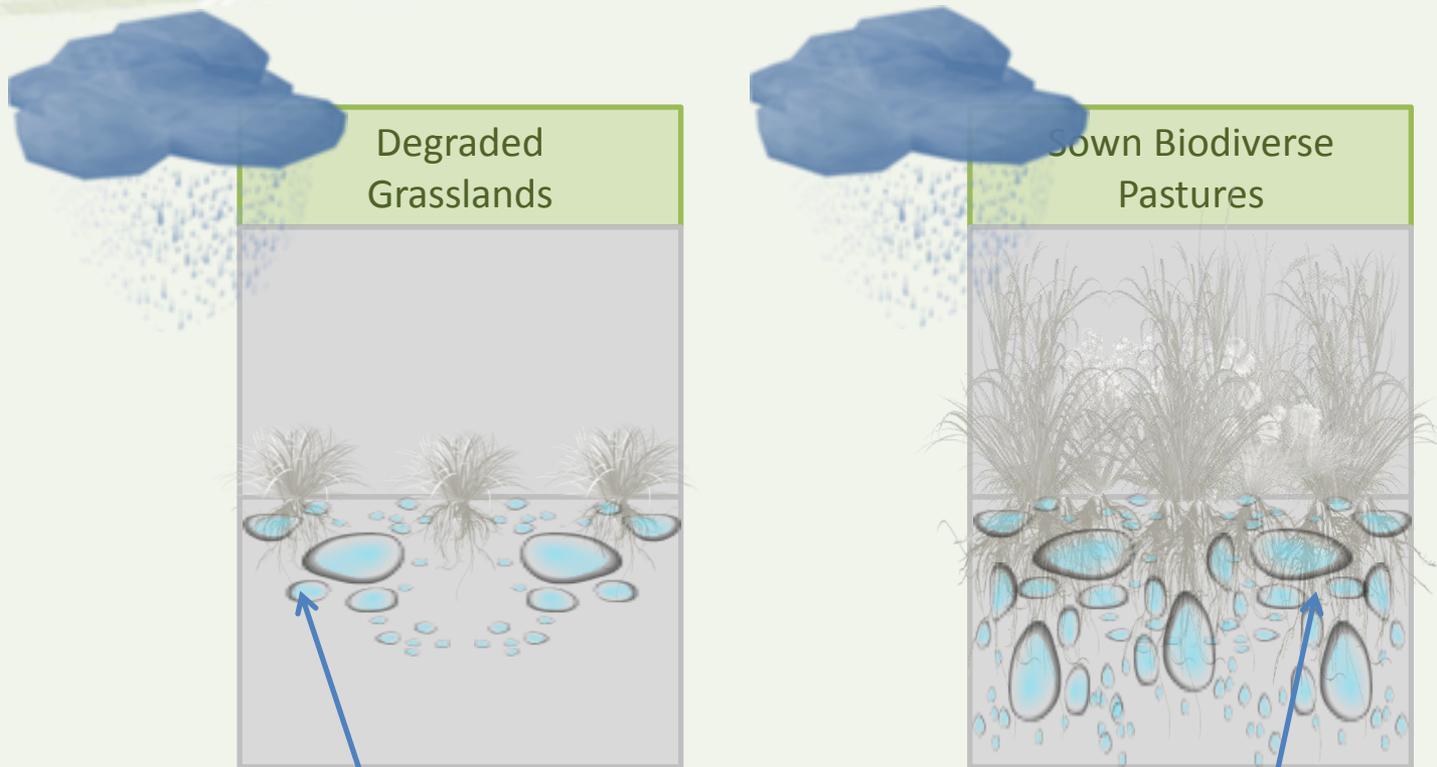
Sown Biodiverse Pastures

Degraded Grassland

Teixeira, R., Domingos, T., Costa, A.P.S.V., Oliveira, R., Farropas, L., Calouro, F., Barradas, A.M., Carneiro, J.P.B.G. (2011). Soil organic matter dynamics in Portuguese natural and sown grasslands. *Ecological Modelling* 222: 993-1001

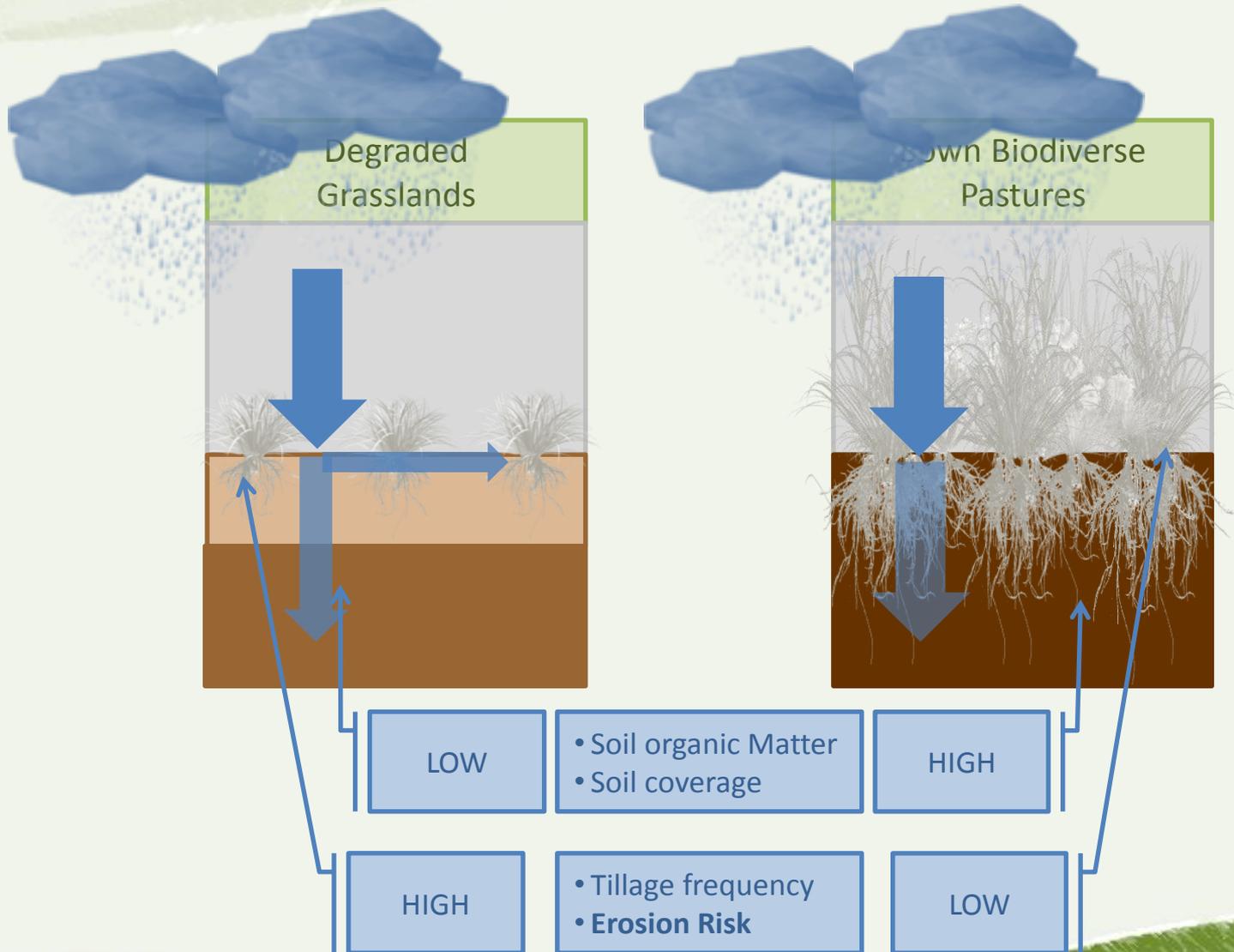
**10 year average  
6,5 tCO<sub>2</sub>/ha/y**

# Comparing Systems: Water Retention Capacity

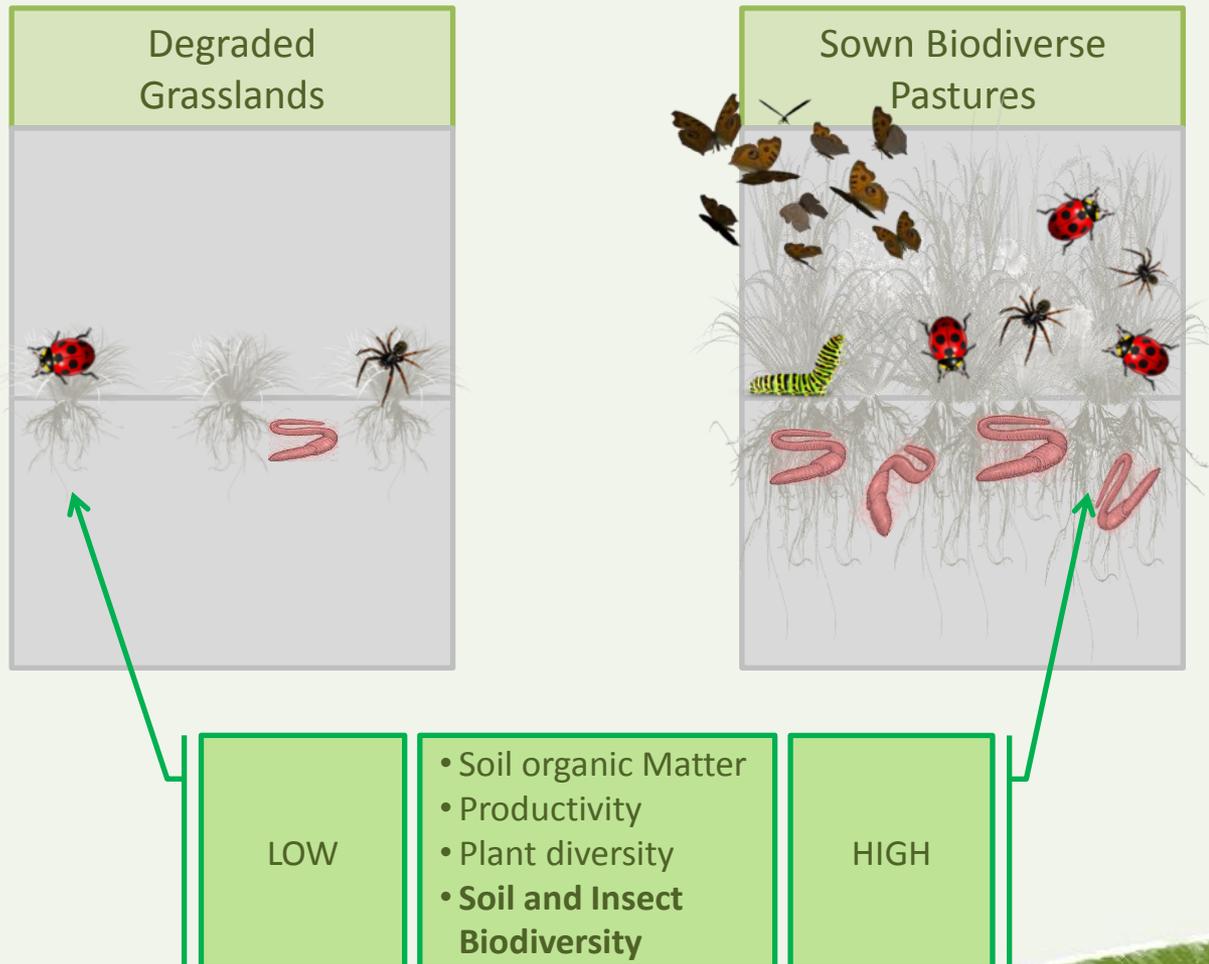


LOW	<ul style="list-style-type: none"><li>• Soil organic Matter</li><li>• <b>Water retention capacity</b></li><li>• Capacity to deal with drought</li></ul>	HIGH
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# Comparing Systems: Erosion Risk



# Comparing Systems: Biodiversity



# Measuring biodiversity (on-farm)

## Insects



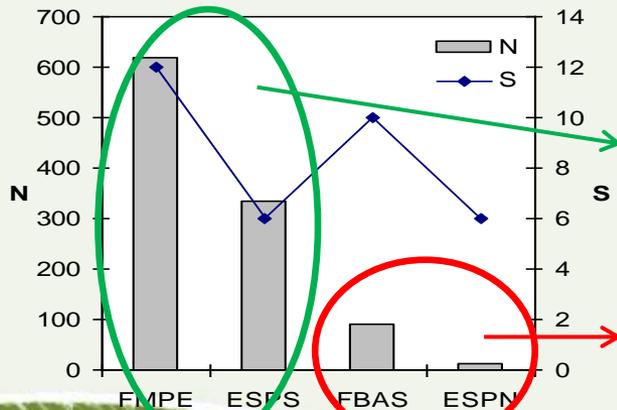
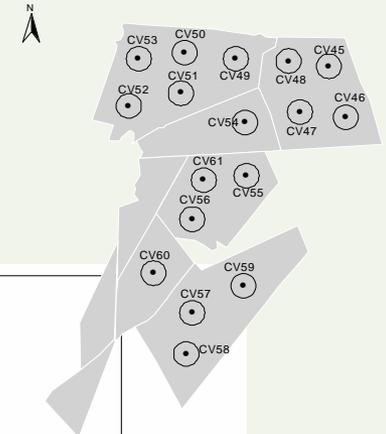
- Arthropods
- Coleoptera (Beetles)
- Carabidae (Ground beetles)



## Birds

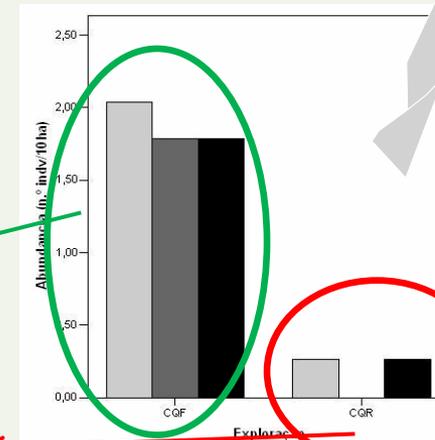


- Birds typical of agro-forestry systems



Sown AND organic pastures

Natural AND conventional pastures



# Measuring biodiversity (off-farm)

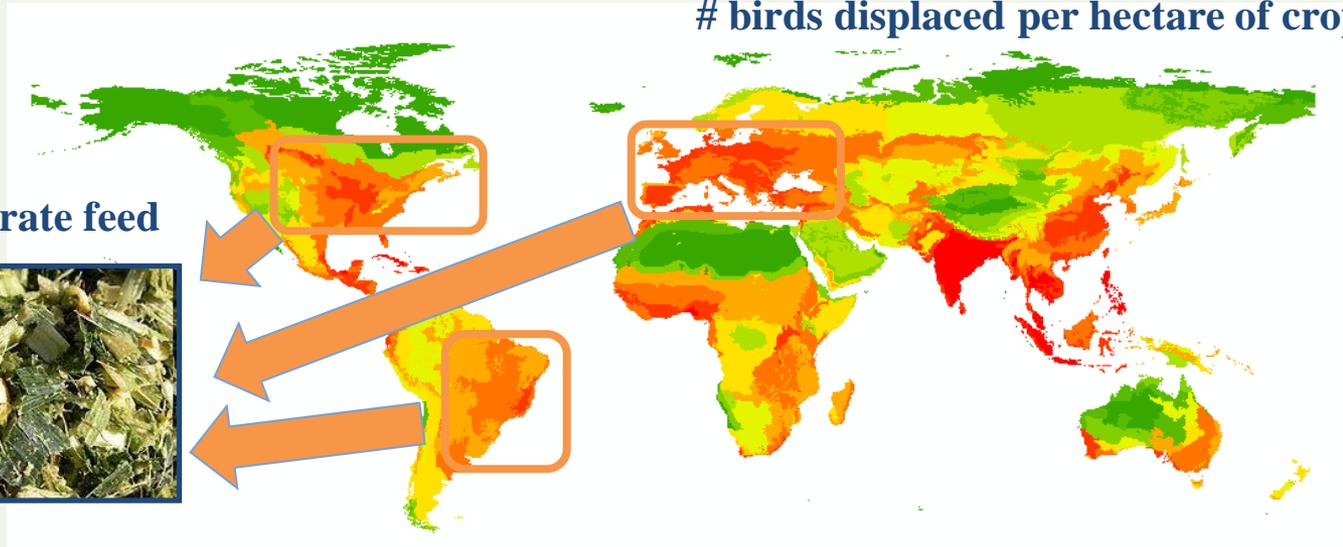


# birds displaced per hectare of cropland

Concentrate feed



More damage from crop production



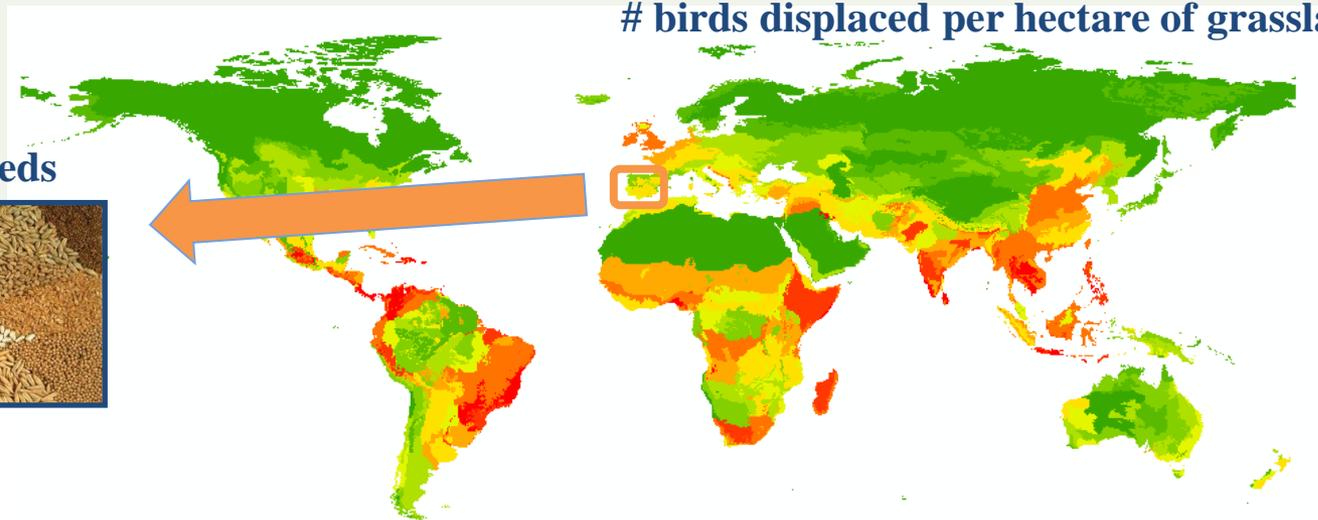
Vs.

# birds displaced per hectare of grassland

Pasture seeds



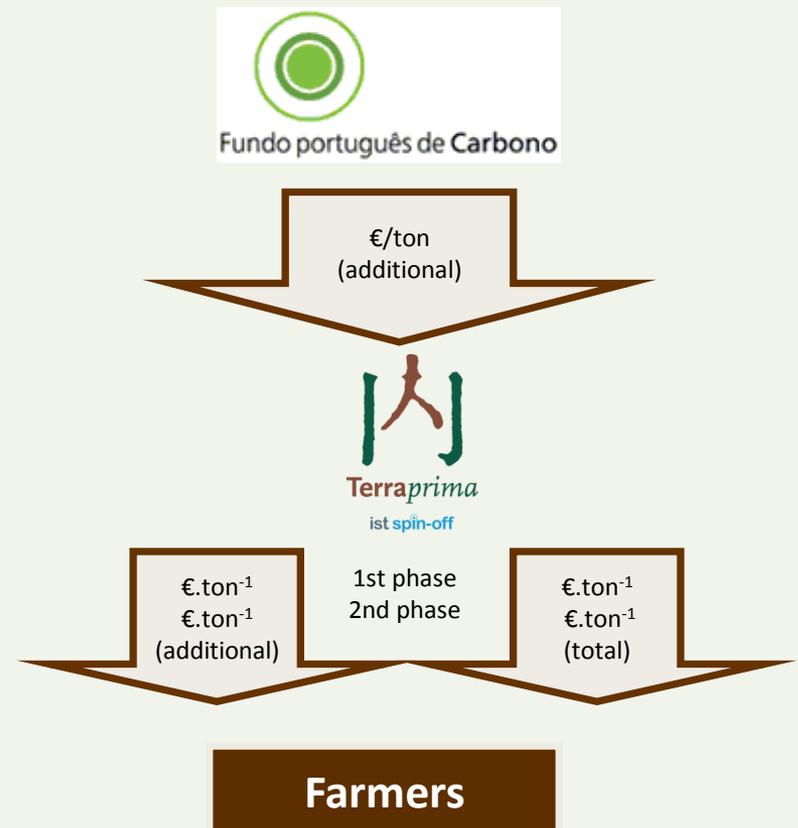
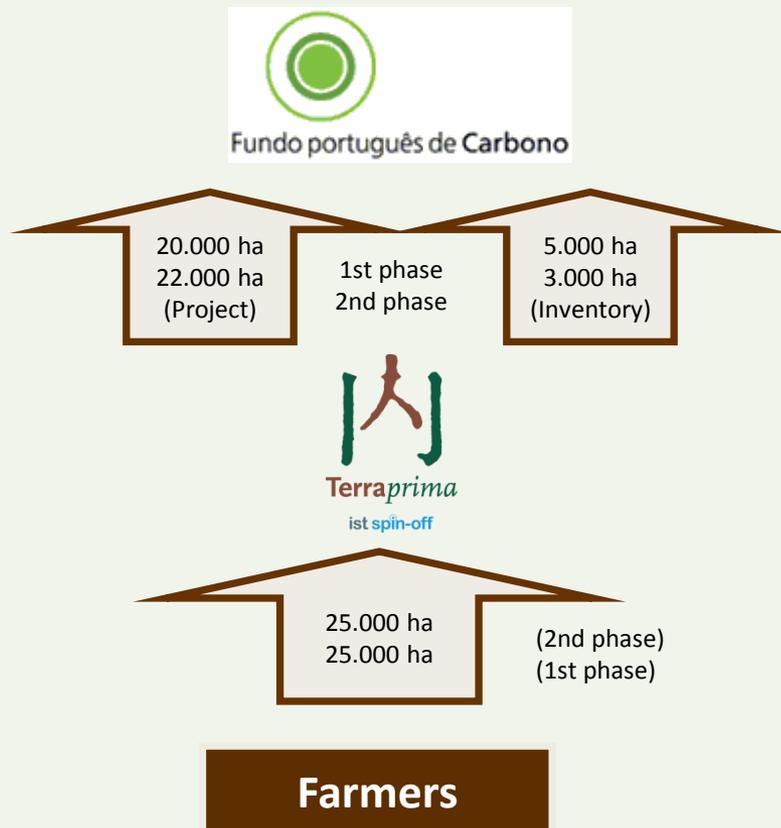
Less damage from seed production



# From research to innovation to adoption

## Area paid

## Money flow

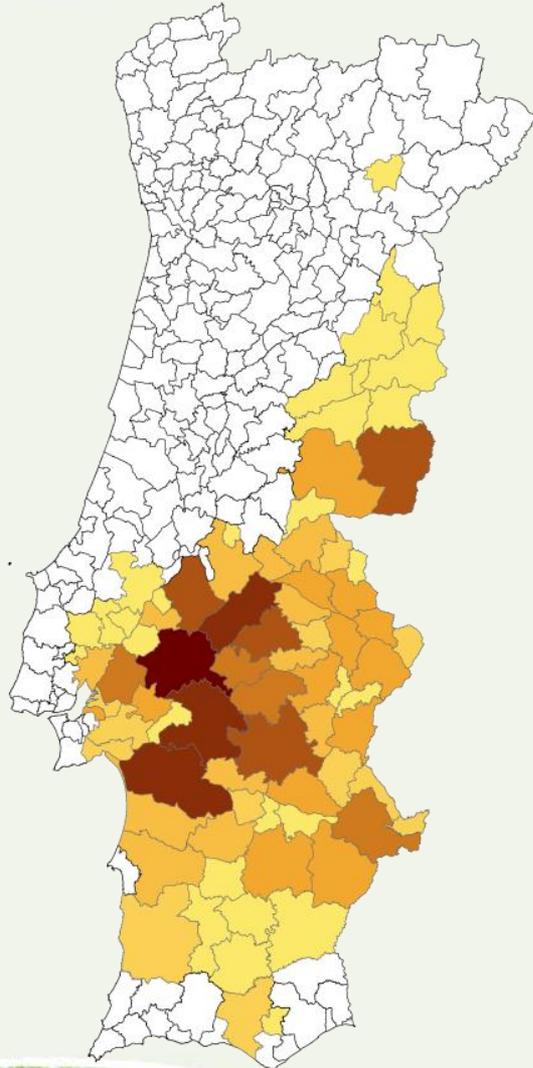


Some area is not additional, so it doesn't count for the Project, but is still paid  
That not additional area is still monitored and counts for the National Inventory

Farmers are paid directly around 80% of the total sum  
The rest goes to project management, technical support and monitoring

# Project Sown Biodiverse Pastures

## Project Terraprima/FPC 2009-2014



Sown Biodiverse Pastures

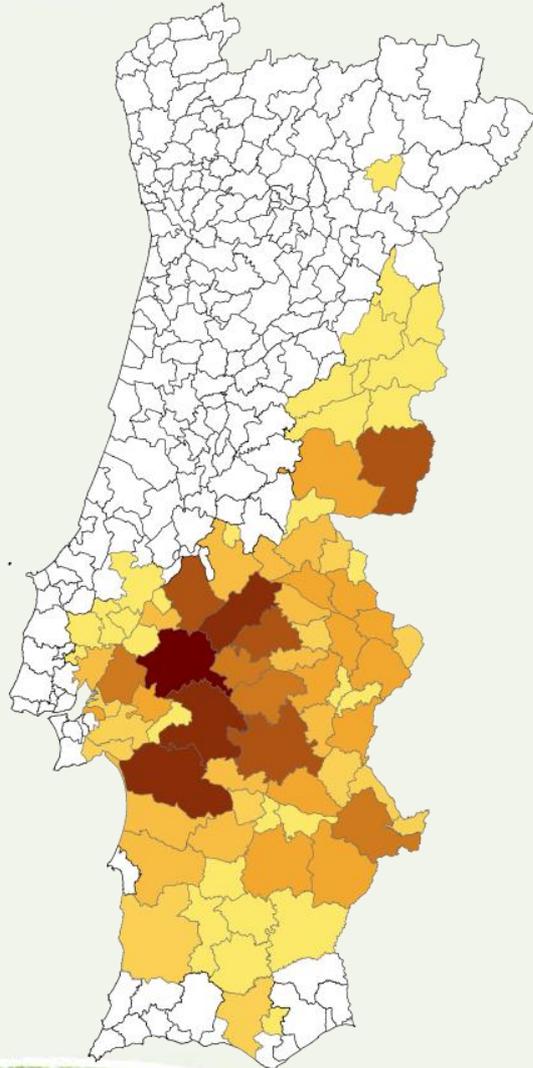
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# Farmers	1 000
Area	50 000 ha
CO <sub>2</sub> sold to Portuguese Carbon Fund	1 Mton

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# Project Sown Biodiverse Pastures

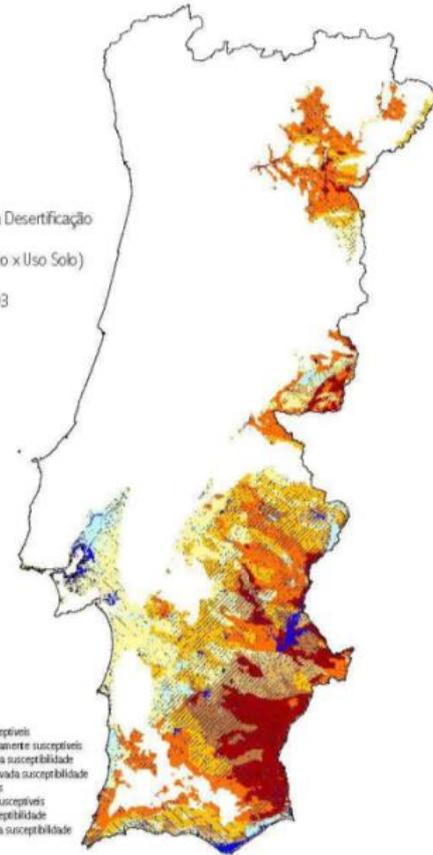
## Project Terraprima/FPC 2009-2014



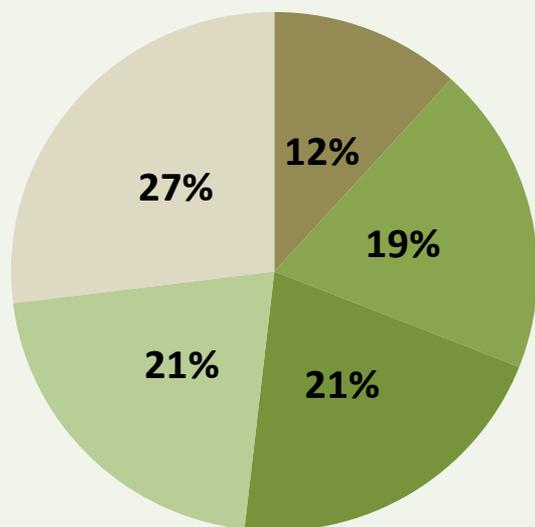
### High susceptibility to desertification

PANCD  
Carta da Susceptibilidade à Desertificação  
(Clima x Solos x Vegetação x Uso Solo)  
Junho de 2003

- Limites Portugal Continental
- Uso do Solo
- Áreas sociais existentes
- Áreas sociais projectadas
- Zonas húmidas
- Regadios
- Vegetação
- Grande susceptibilidade
- Evada susceptibilidade
- susceptibilidade Clima x Solos
- Não susceptíveis
- Subúmido seco solos não susceptíveis
- Subúmido seco solos moderadamente susceptíveis
- Subúmido seco solos c/ elevada susceptibilidade
- Subúmido seco solos muita elevada susceptibilidade
- Semiarido solos não susceptíveis
- Semiarido solos moderadamente susceptíveis
- Semiarido solos c/ elevada susceptibilidade
- Semiarido solos c/ muita elevada susceptibilidade

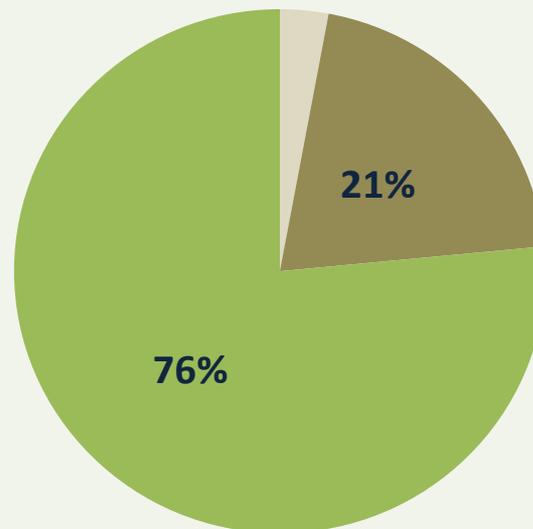


## The advantages of SBP as perceived by farmers



- Landscape improvement
- Nitrogen fixation
- Carbon sequestration
- Soil conservation
- Food for livestock

## Farmers see themselves as providers of an environmental service



- Agri-environment measure
- Subsidy
- Payment of an environmental service

# Soil carbon sequestration as an environmental service

António Mendes D' Oliveira, (Herdeiros)

AGRICULTURA E PECUÁRIA

Contribuinte n.º 900 606 657

Tel. 045 / 52298 - 52351 - Herdade do Rebôlo

MOSTEIROS - 7340 Arronches

FACTURA

N.º 102

Data 24/09/2010

Ex.º Sr. TERRAPRIMA SERVIÇOS AMBIENTAIS, SOCIEDADE UNIPESSOAL, LDA

Morada QUINTA DA FRANÇA

CONTR. N.º 508759790 VEÍCULO CARIA

Quant.	DESIGNAÇÃO	Preço Unit.	IVA Taxa	Importância
	<u>SEQUESTRO DE CARBONO EM</u>			
	<u>PASTAGENS SEMEADAS BIODIVERSAS</u>			
	<u>RIEAS EM LEGUMINOSAS - PROGRAMA</u>			
	<u>DE APOIO A PROJECTOS NO PAIS.</u>			
<u>19,08</u>	<u>HECTARES</u>	<u>50,72</u>		<u>967,74</u>
			<u>21%</u>	<u>203,22</u>
				<u>1170,96</u>
	<u>TOTAL</u>			

Local de carga

Data / /

Hora saída

Local de descarga

Data / /

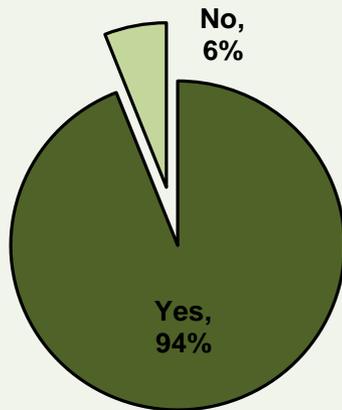
Hora prov.

# Sown Biodiverse Pastures add value to farm products

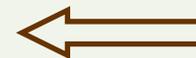
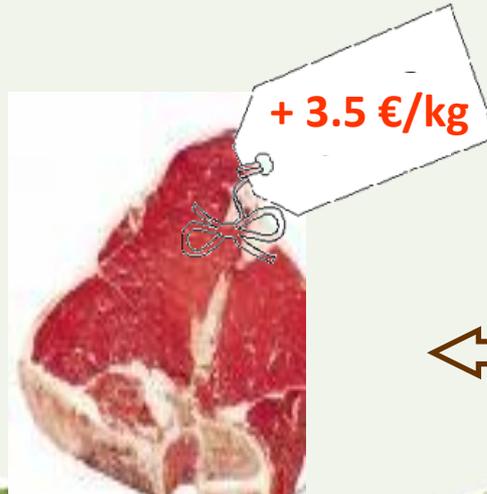
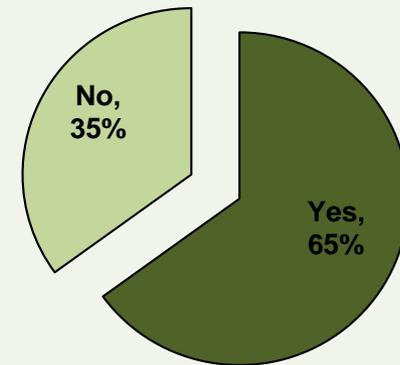
SBPPRL yield public (environmental) goods; is there any increase in the quality of private goods?

- Surveys show that consumers value meat produced in SBPPRL and are willing to pay more for it – “Guaranteed Sustainability” Norm

Potential consumer



Willingness to pay more?



How much?

# An award winning project

Energy Globe 2014: National Award



<http://www.energyglobe.info/>

EU World you like Challenge 2013: Award for Best Portuguese Project



<http://world-you-like.europa.eu/en/>

UNCCD Dryland Champions 2013: Award winner



<http://www.unccd.int/en/programmes/Event-and-campaigns/Dryland%20Champions/Dryland%20Champions2013/Pages/default.aspx>

UNCCD Land for Life Competition 2012: Semi-finalist



<http://www.unccd.int/en/programmes/Event-and-campaigns/LandForLife/Pages/Land-for-Life-Award-Semi-Finalists.aspx>

# More About Terraprima and the Project



<http://www.terraprima.pt/>



**PME Líder '12**

Recognised by  
IAPMEI as a SME  
Leader in Portugal

Terraprima is present on Facebook



<https://www.facebook.com/Terraprima.Protecting.Land>

Terraprima is present on Youtube



<http://www.youtube.com/user/terraprimaambiental>

**This presentation was made in collaboration with the Terraprima team:**



**Tiago Domingos**



**Helena Martins**



**Oriana Rodrigues**



**Miguel Alves**



**Ivo Gama**



**Sara Manso**



**Ricardo Vieira**



**Paulo Canaveira**