

Opportunities for Agroforestry in Ireland

Jim McAdam



irish
agroforestry
forum



An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine

MCKINNEY
AND
STERLING

GURTEEN COLLEGE - A

VENTURE OF FAITH

GURTEEN COLLEGE



STRULE
PRESS

J. Wesley McKinney, M.A., and W. Salters Sterling, M.A., Dip.Ed.

Gurteen College

Opened in 1947.

Opening statements of its aims:-

- The founders of the college are aware that a third of the world population is actually hungry and fully half has less than enough to eat
- They have learnt that it would be possible to increase temporarily food production substantially by soil exploitation and consequent impoverishment.
- This latter would only bring acute problems and suffering for future generations.

- The founders of this school want young people to be taught to approach the earth with reverent responsibility and skill.
- The soil is something to be respected.
- Soil is a wonderful mechanism of energy, wealth and life.
- One of Ireland's greatest needs is respect for the good earth.
- This will be achieved when farmers have acquired a more intimate knowledge and even love for the soil

One of the fundamental principles underlying agroforestry systems

Overview

- What do we mean by agroforestry
- Benefits of agroforestry
- Opportunities and challenges for introduction of trees onto farms

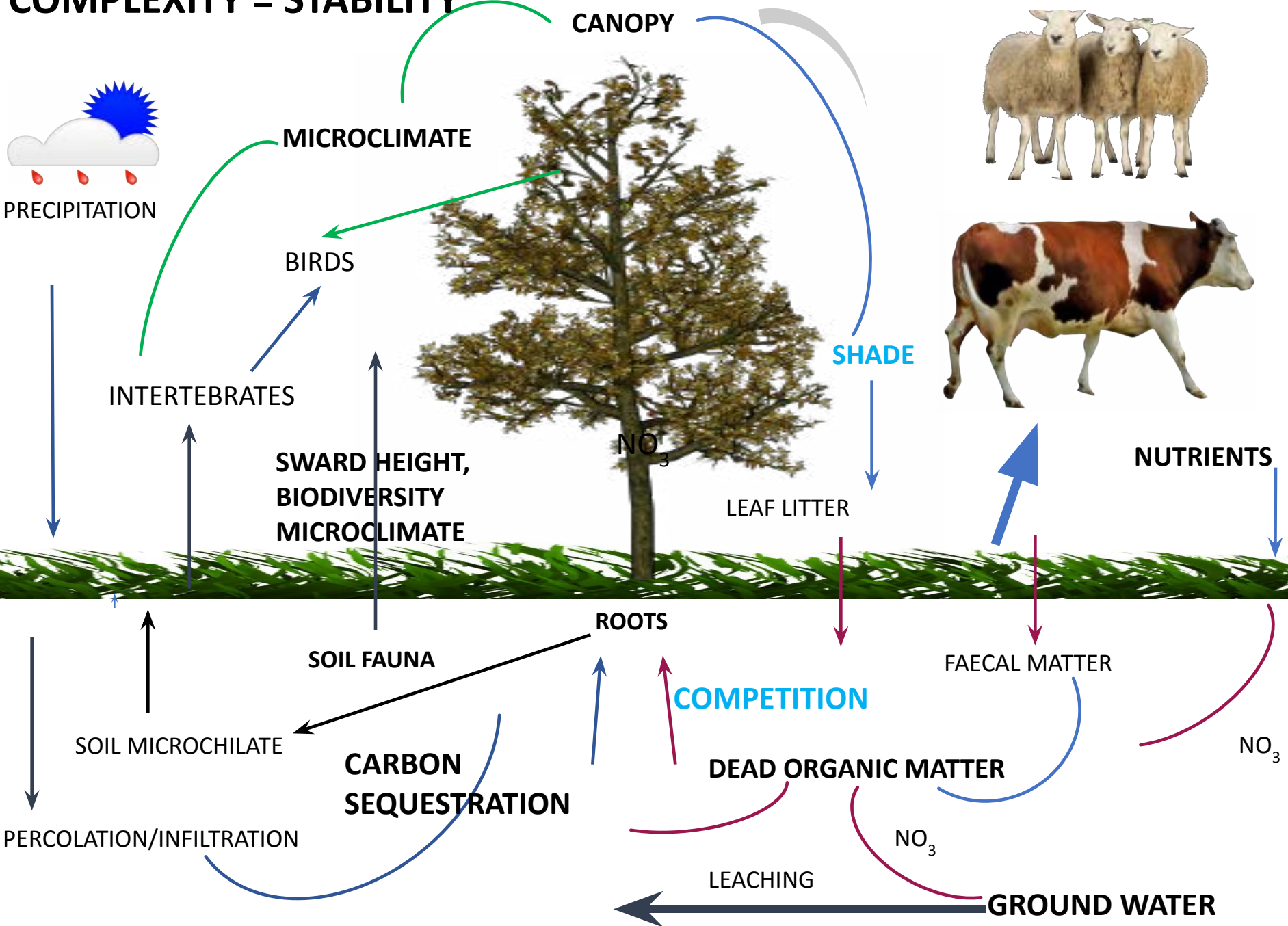
Challenge we face is how.....

to reduce the environmental footprint of farming systems without significantly compromising productivity and to achieve climate resilience for food production

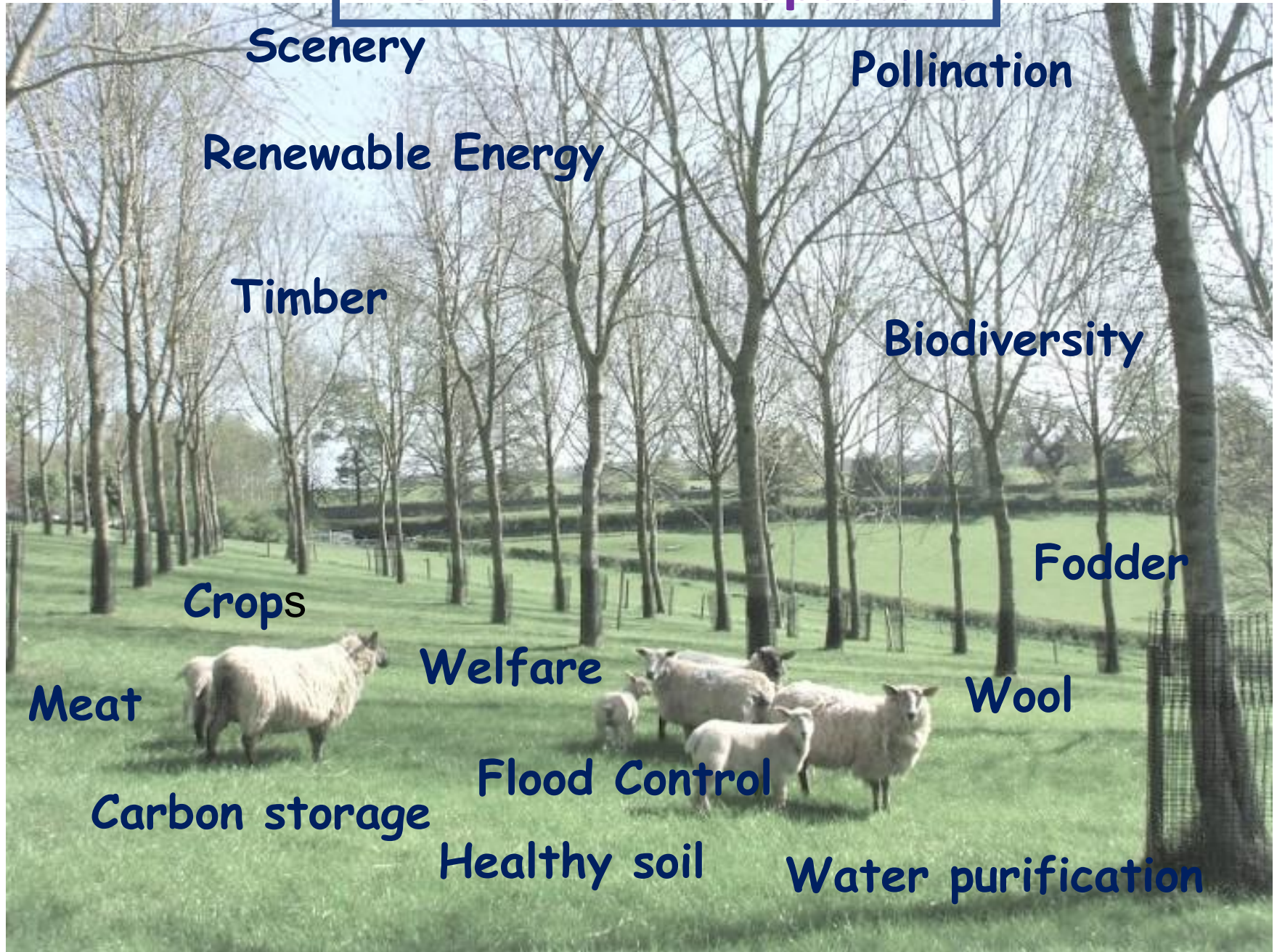
Agroforestry is one potential tool in our armoury

In **Agroforestry systems**, *trees are combined with crops and/or animals on the same unit of land* **and can deliver a range of ecosystem services** resulting from significant ecological, environmental and economic interactions between the components

COMPLEXITY = STABILITY



Benefits of Silvopasture



Scenery

Pollination

Renewable Energy

Timber

Biodiversity

Fodder

Crops

Welfare

Wool

Meat

Flood Control

Carbon storage

Healthy soil

Water purification

Benefits of agroforestry

- Soil health
- Biodiversity
- Tree fodder
- Herbage understorey
- Carbon storage
- Climate resilience
- Animal welfare

Soil health

- There is a lot of evidence worldwide for the benefits agroforestry brings to soil health
- Organic matter - carbon in particulate matter,
- Mycorrhizal fungi
- The understorey component can be a multi-species sward with legumes and deep rooting plants
- Soil physical structure - improved
- porosity, **earthworms**



Healthy soils are more climate - resilient

Earthworms-key biological indicator of soil health

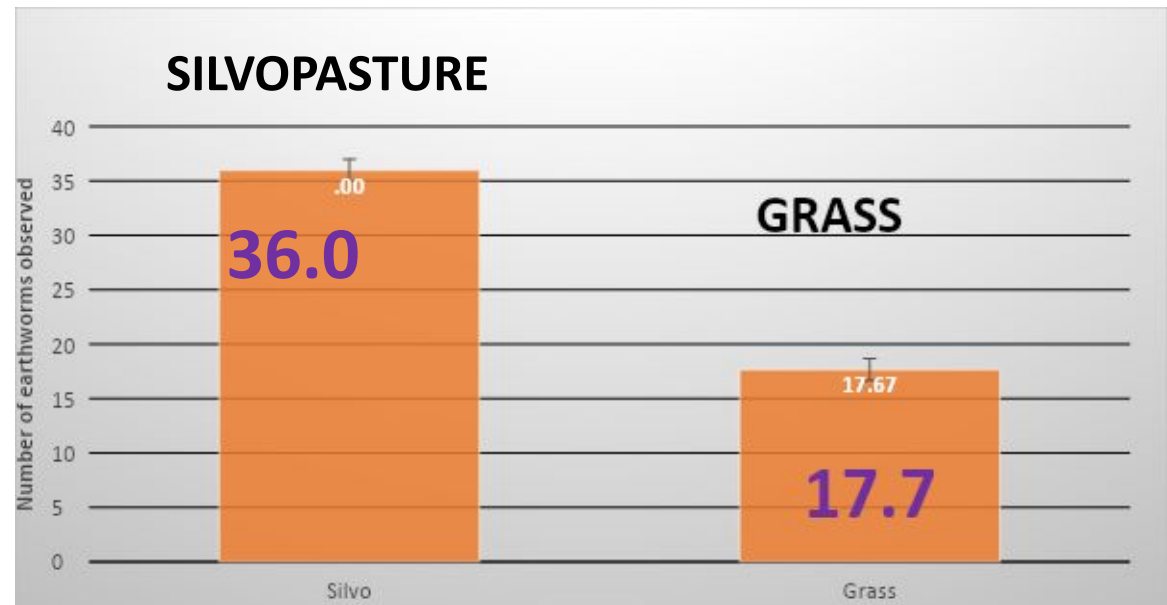
Evidence base from AFBI Loughgall trial –now running 32 yrs



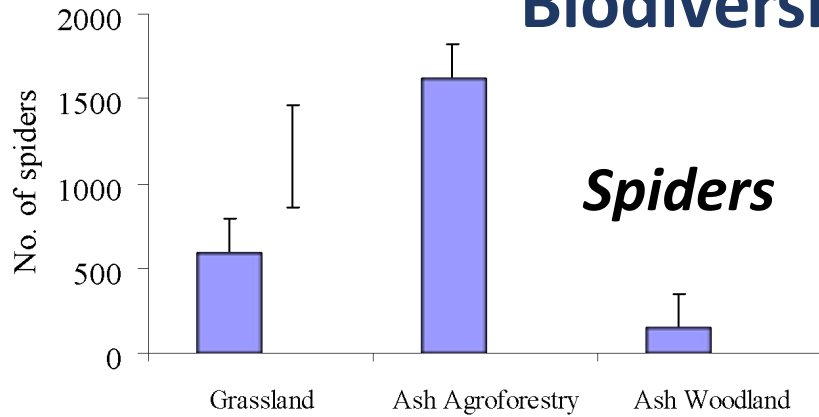
Rachel Connolly (2020)



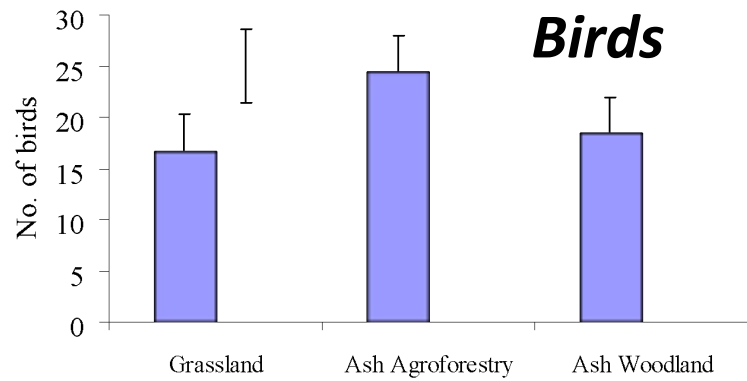
Twice as many earthworms in silvopasture than grassland



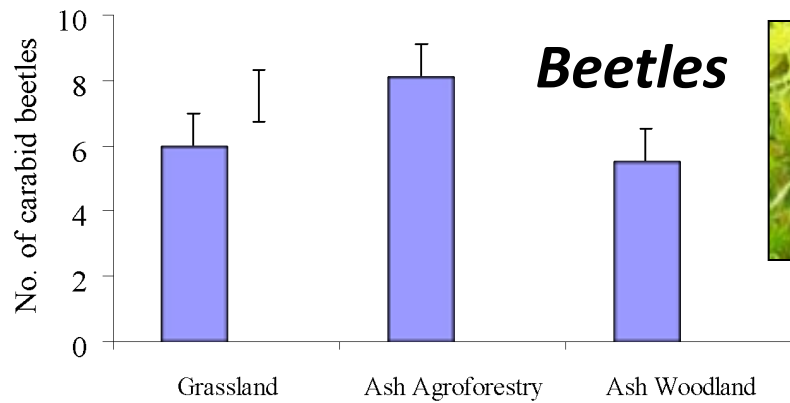
Biodiversity benefits



Earthworms



Flora



Pollinators

Tree fodder



A role for agroforestry in reducing ammonia and greenhouse gas emissions from ruminant livestock systems

By C STOATE¹, G FOX¹, J BUSSELL¹ and N R KENDALL²

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Table 2: Macro-elements of tree leaves.

Latin name	Date sampled	Ca (g/kg DM)	P (g/kg DM)	N (% w/w)	Mg (g/kg DM)	S (g/kg DM)	K (g/kg DM)
Willow	Aug-15	18.8	3	2.23	1.8	4.1	10.4
Alder	Aug-15	13.3	2.2	3.16	2.5	1.9	9.1
Fresh Ash	Jun-16	12.8	3.1	1.78	2.2	1.8	14.1
Dried Ash	Jun-16	16	3.7	2.21	2.7	2.3	20
Goat willow	Jun-16	10.2	4.2	2.66	1.9	2.1	13.9
GW-dried	Jun-16	14.5	5.5	2.16	2.7	2.6	19.0
Elm	Jun-16	11	2.3	2.23	1.9	1.3	14.7
Elm-dried	Jun-16	16.8	2.4	2.31	2.8	1.7	20.9

GRASS	2.8 - 3.5
SILAGE	2.0 - 4.0
HAY	1.5 - 3.5

There is evidence that eating twigs and leaves from trees can reduce methane emissions from ruminants



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Carbon storage

When the carbon stored in the wood, pasture and soil is added in, these systems have the potential to store “long term” and “short term” carbon

Carbon sequestration

Land Use Practice	Species	tC/ha/yr
Silvopasture	Ash /Mixed Species	2.4
Pasture	Perennial ryegrass	0.6-1.0
Forest plantation	Sitka Spruce	3.8

Resilience to extremes of weather

- **Rainfall** is expected to become more intense. Silvopasture increases soil permeability **REDUCED COMPACTION**
- **infiltration potential was significantly greater in the silvopasture than the grassland treatment down to 76cm (Sept-Nov)**

Results in-

- Extended grazing season under agroforestry (we measured 13-17 weeks)
- Greater levels of grass utilisation
- Reduced ammonia emissions from livestock
- Reduced N₂O emissions
- Improved animal health
- Increased resilience to flash flooding
- Improved biological soil health

Soils under silvopasture are more climate - resilient

August 2018



Animal welfare

How do we measure welfare?

Healthy; mixed diet; variety in surroundings; cope with weather change; contented, not stressed

In silvopasture:

- Animals have a more varied diet, tree fodder, suits MSS, - healthier
- Extension of grazing season - animals have reduced incidence of respiratory diseases.
- Variation in habitat structure. Reduces boredom?
- Sheep seek out shade and shelter

Welfare (cont'd)

HEALEY, M., McADAM, J.H., HOPPÉ, G.M and WATSON, S. (1998). Behaviour of sheep grazing in a developing silvopastoral system. Agricultural Research Forum Irish Grassland & Animal Production Association Meeting, Dublin, pp 149-150.



Marketing opportunity?



**Farm Week April
1996**

"The trouble is, he seems to have lost his concentration since we introduced this agroforestry."

SYSTEM OPTIONS and OPPORTUNITIES

Examples of local agroforestry systems



Trees can be incorporated into farms in a range of scenarios







Elms with Shropshire sheep (Eugene Curran, DAFM)

Dexters and Cactus guards-
Co Antrim



Innovation in tree protection.



Poultry systems



Hens can run under trees-
they perform better and
ammonia is absorbed

Trees and eggs do mix

BY RICHARD HALLERON

MODERN living has run true over generations back to countries who preferred a woodland environment.

The trees gave the birds improved levels of shelter from the elements and provided them, on shade, with enhanced opportunities to hide from predators. It would make sense then for the egg companies of today to consider tree planting on ground available to free range hens as a way of providing essential habitats for the birds.

A case in point is Stone Eggs, The Co-Tyne based company is in the throes of completing a unique tree planting project which will see the inclusion of up to 20 per cent wood-land cover on all its current free-range units.

"We saw just over 22 months into the project," confirmed Stone's Harold Richmond.

"There is a growing demand for this type of egg. At one level this is a good business opportunity. But there is no doubt that managing the hens in this way provides them with a much more wildlife friendly environment in which to live.

"The birds have access to food and water indoors. However, when the weather is outside they will seek to head outside. And although the trees recently planted are still quite small, there is already evidence to show that the hens find the shade so often highly attractive."

Raymond Watt farms close to Broughouse in Co Tyrone. He manages just over 1,500 birds for Stone, all of which have access to the wooded habitat now on offer as a result of the recently completed tree planting initiative.

"The birds arrive with me at 16 weeks of age. They are kept indoors for a week until they are familiar with the feed, water, and nesting boxes," he explains.

"After that, the doors of the site opened and the birds themselves often take over the maintenance of the ground. It's still early days. Stone birds are attracted to the shade, particularly on sunny days. Harold Richmond says on his free range production is lower but birds with access to outdoor contained with the



Stone Eggs' Harold Richmond, Premier Woodlands' Stephen Warren and Donaghmore producer Raymond Watt show that eggs and trees really do mix.

hatchery.

"Hens kept indoors are maintained in a controlled environment at all times. Birds with access to range are not."

have continued with the project in a systematic manner throughout the 2009 planting season. The design of each site reflects the emphasis on using native trees. Species planted

Stephen went on to explain that a tree spacing of 2 by 2 metres was selected for all of the sites planted out this year.

"This allows for easier vegetation

Harold Richmond believes that the growing consumer demand for welfare friendly production systems will encourage egg companies to further invest in the concept of habitat



Establishing agroforestry

- Plant a mixture of species to suit the site, deliver a range of environmental benefits and give resilience to disease etc
- Plant in a configuration to suit your farming system. Eg contour planting, rows, clumps
- Consider mixing systems-e.g. if using cattle



Silvoarable

Silvopasture

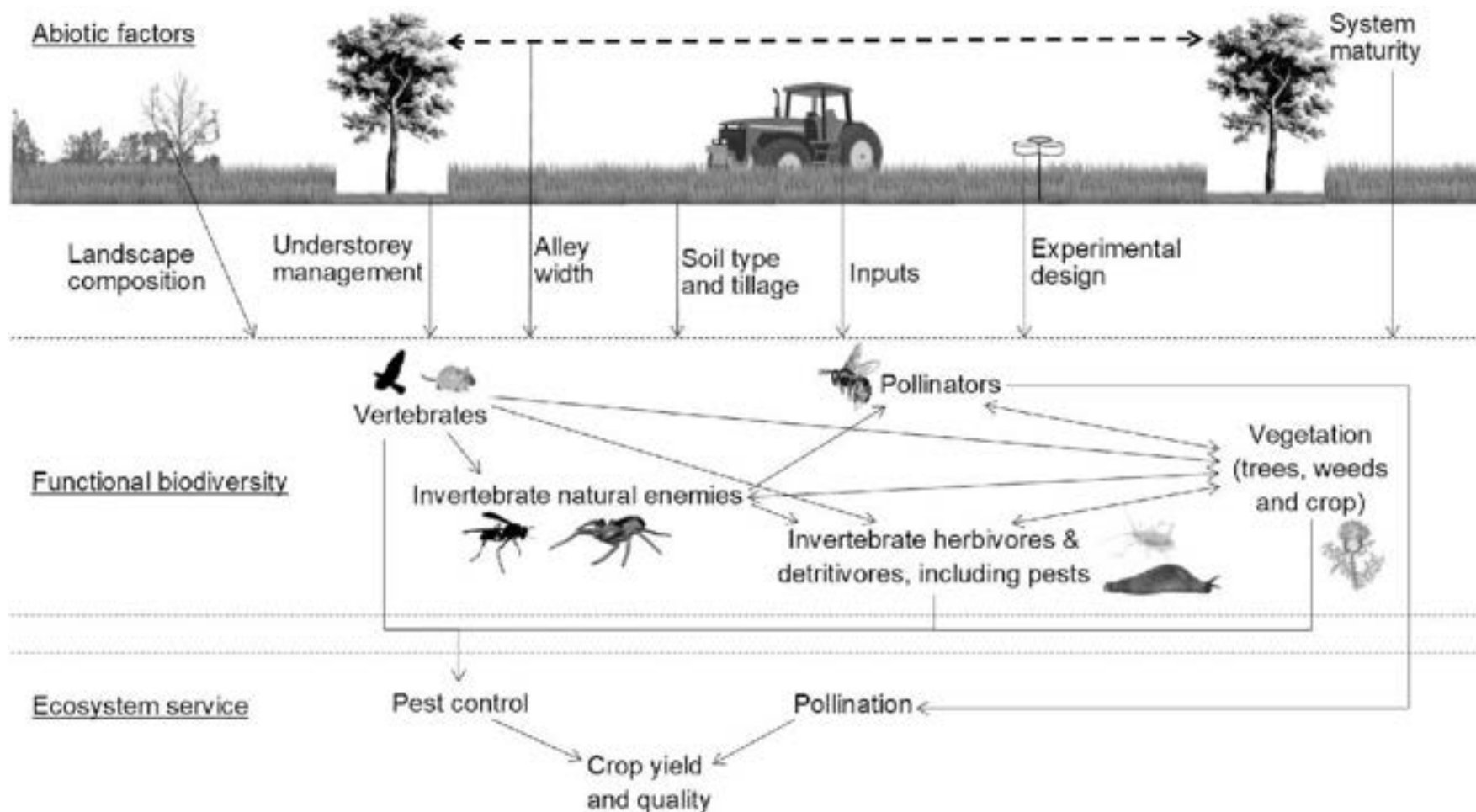
- Remember the forage value of the foliage.



Review

Evaluating the effects of integrating trees into temperate arable systems on pest control and pollination

Tom Staton^{a,*}, Richard J. Walters^{b,c}, Jo Smith^d, Robbie D. Girling^a





Conclusions

- Agroforestry improves soil health
- Agroforestry gives increased climate resilience to farming and forestry systems
- Agroforestry lends itself very well to organic and low-input systems, brings welfare benefits
- Agroforestry can sequester rates of carbon which approach those of equivalent afforestation
- By integrating trees **into farms** in a range of spatial options we can deliver carbon neutral livestock systems and reduce GHG emissions, **improve soil health**, carbon storage capacity, biodiversity enhancement, flood mitigation and cleaner water-***all climate positive***

Support..



An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine



- Act as a coordinated voice-very dispersed interest
- Educate
- Disseminate research
- Train practitioners
- Advise policy
- Promote on farms

www.irishagroforestry.ie

Thank you

