

Prof. Mark Emmerson

The effects of environmental context on biodiversity in agro-ecosystems: managing for biodiversity and ecosystem services.

WP1. Impacts of Energy Crops on Biodiversity and Ecosystem Functioning





WP1. Impacts of Energy Crops on Biodiversity and Ecosystem FunctioningWP1 Project Team



Dara Stanley Pollinators



Jesko Zimmerman *Carbon sequestration*



Erin O'Rourke *Biocontrol*



Rosalyn Thompson *Invasion resistance*



Lisa Dolan WP1 & 2 *Research Assistant*

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Jane Stout *Pollination TCD*



Padraig Whelan *Invasions UCC*



Mike Jones Carbon sequestration TCD

~20 Graduate and Undergraduate Research Assistants





Food?

Fuel?







Conventional crops



Novel Bioenergy Crop





Novel Bioenergy Crop

Miscanthus x giganteus

- High dry weight annual yield (25t/h).
 Rhizomatous perennial grass with a C₄ photosynthesis pathway.
- •Originates in Asia.
- •Adapted to temperate climates.
- •Introduction subsidised in Ireland.

Novel Bioenergy Crop





The role of Energy Crops in landscapes.



Sink for Biodiversity





Natural Enemies





Arable Plants





€535 Million UK Economy

€3.6 Billion US Economy

?Unknown?

€847 Million UK Economy

NEA (2011), Power (2010)





UBLIN





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- 1. Quantify the effects of novel energy crops on the biodiversity of agricultural ecosystems (O'Rourke et al., Stanley et al., Emmerson et al.)
- 2. Define the relationship between biodiversity and the delivery of ecosystem services in agricultural systems (Emmerson et al.)
- 3. Assess impacts of high and low intensity energy crop farming on diversity. (O'Rourke et al.)
- 4. Document landscape scale effects of intensification on biodiversity in energy crops. (Bourke et al.)

Experimental Design





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Study Area



Counties: Wexford Kilkenny Carlow Waterford Tipperary Cork



Pollination services

Dara Stanley TCD

• How do energy crops affect the *Biodiversity* of pollinators?







Pollination services

Dara Stanley TCD

• How do energy crops affect the *Biodiversity* of pollinators?







Biocontrol services

Erin O'Rourke UCC

• How do energy crops affect the *Biodiversity* of natural enemies?







Biocontrol services

Erin O'Rourke UCC

• How do energy crops affect the *Biodiversity* of natural enemies?







Production services

Rosalyn Thompson UCC

• How do energy crops affect the *Biodiversity* of arable plants?





Production services

Rosalyn Thompson UCC

• How do energy crops affect the *Biodiversity* of arable plants?







Information to inform policy

- 1. Different energy crops affect components of biodiversity differently.
- 2. We can account for these context dependencies.
- 3. Manage for directly for biodiversity and you manage for the delivery of associated ecosystem services indirectly.
- 4. Information to inform composition of bioenergy crops that maximise biodiversity.
- 5. Diversity of crop types at the landscape scale has positive effects on landscape diversity.





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