ORS

teagasc

Agriculture and Food Development Authority

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Willow Research Completed in Teagasc Oak Park

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Who is ORS?

- ORS is a prominent Irish multi-disciplinary building consultancy
- Founded in 1991 – Dublin & Mullingar
- Consulting Engineers, Surveyors and Construction specialists
- Supported by expert guidance in Energy efficiency
- Six pillar services

Teagasc Research Centre

Bioenergy Research within Teagasc encompasses a diverse range of subject areas including Energy Crops and Combustion (Oak Park), Anaerobic Digestion (Grange) and Carbon Sequestration (Johnstown Castle)

- Bioenergy Crop Agronomy Services
- Feasibility Studies
- ISO 50001 Energy Management Standards
- S.I. 426 Energy Audits
- NZEB and Part L Compliance
- Energy Project Management
- Energy Master Plans
- Energy Monitoring and Analysis

Why Willow in Ireland?

Willow Agronomy

- Willow - Pioneering crop
  a) Willow crops have a C3 pathway which enables plants to photosynthesis at lower temperatures compared to C4 plants
  b) Highest Transpiration Rates of any Tree or Agricultural Crop
  c) High Bark to Wood Ratio = High Nutrient Removal Rates
  d) High Rate of Cutting = Nutrient Removal
- Ireland – Growing Conditions Suitability to Willow Crops
- Non-food crop

Willow Establishment

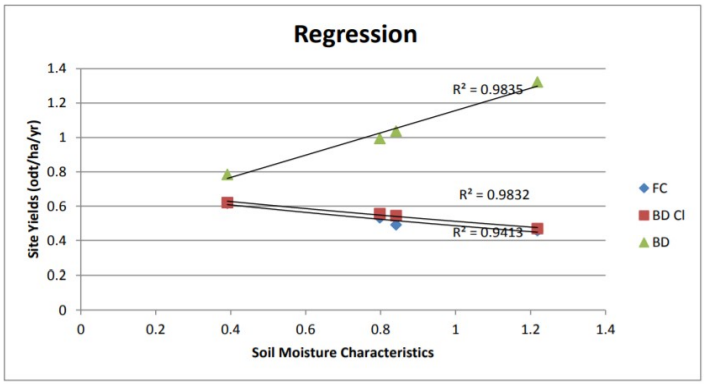
- Good Early Establishment Important
- Soil Type Important
- Careful Planting with Good Planting Material
- Survival
- Weed Competition

Soil Type Important

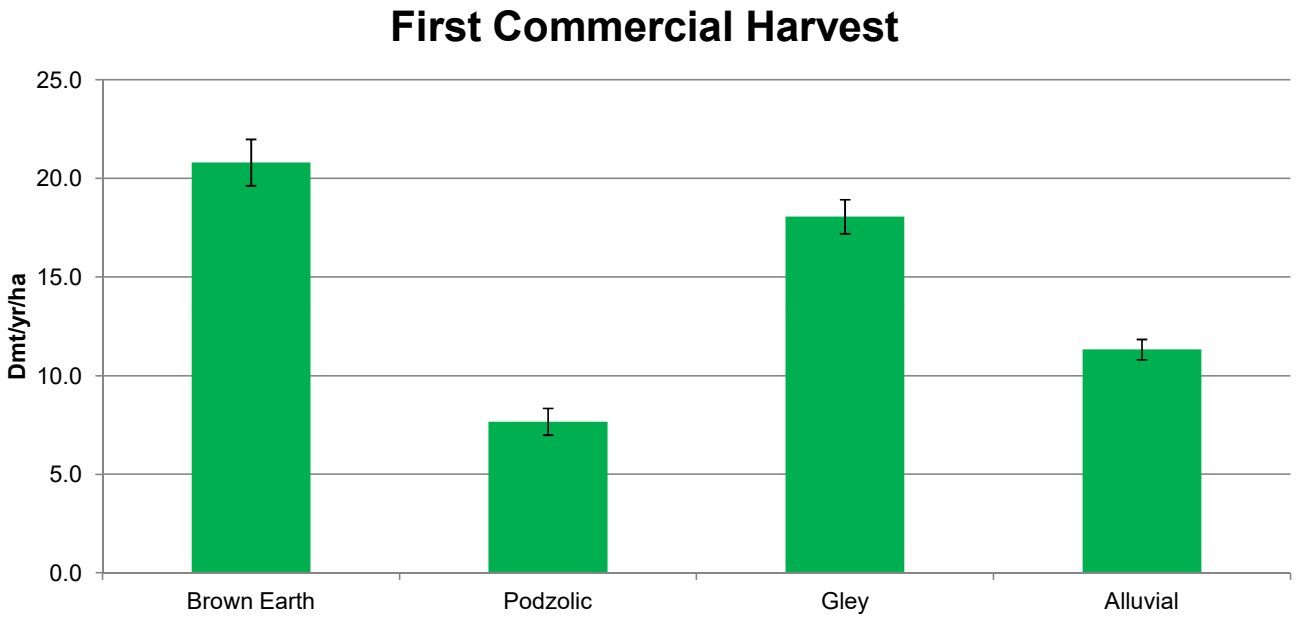
- Lack of knowledge around soil and yields to aid planning of crops
- What soil characteristics can help identify potential yields?
  1. Bulk density
  2. OM, Sand, Silt and Clay
  3. Saturation point, field capacity, wilting point

Soil Types and Willow Yield

- Soil Composition
- Acid Brown Earths
- Prolonged periods of flooding
- Soil Moisture Characteristics Important



Results from Research Plots



Results from Commercial Plots

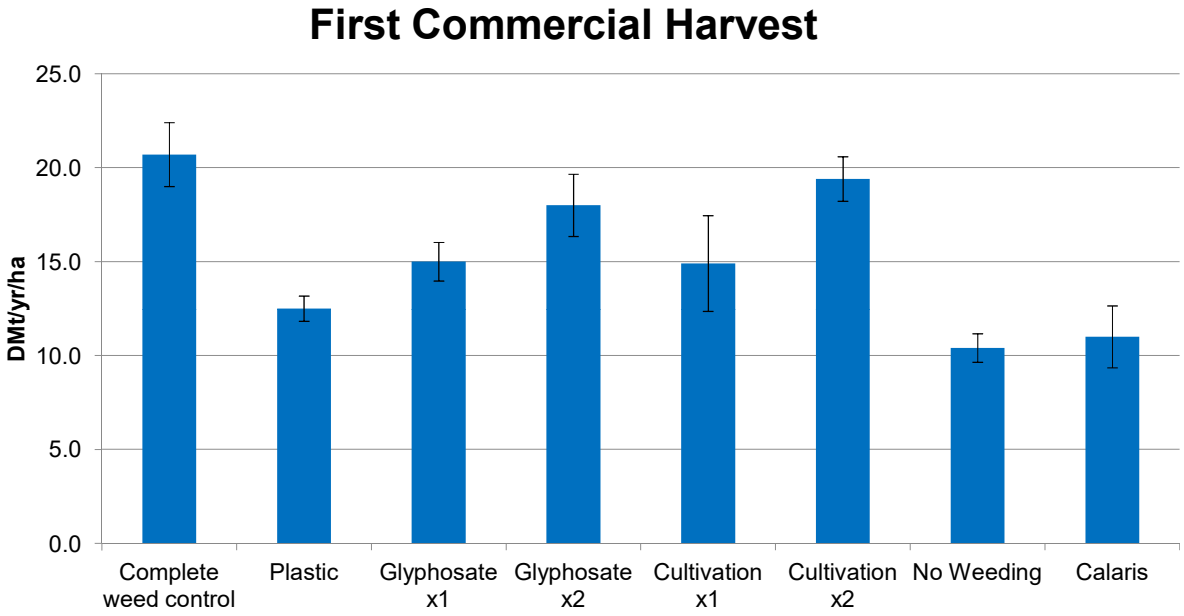
	Average Yields from Estimates (DMTonnes/Hec/Yr)	Reported Yields from Landowners (DMTonnes/Hec/Yr)
Luvisol	9.3	8.0
Brown Earth	8.5	7.9
Peat	5.4	5.7
Podzolic	5.1	5.5
Gley	4.3	2.4

Weed Competition

- Significant Yield Reductions from Weed Competition
- Competition in Establishment Year
- Increased Yields and Stem Numbers Without Weed Competition

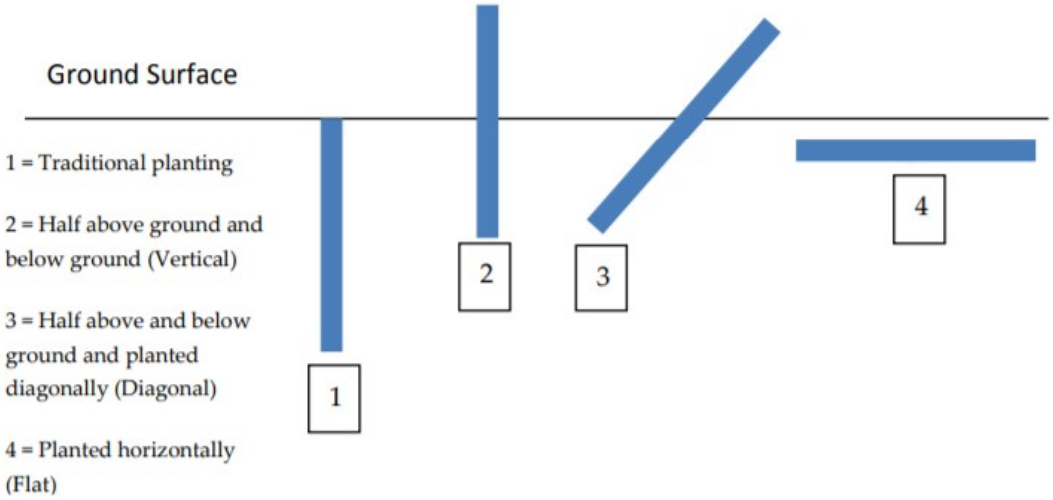
Examples

2013 planted trials harvested in 2015



Willow Establishment

- Good Early Establishment Important
- Altering Planting Orientation



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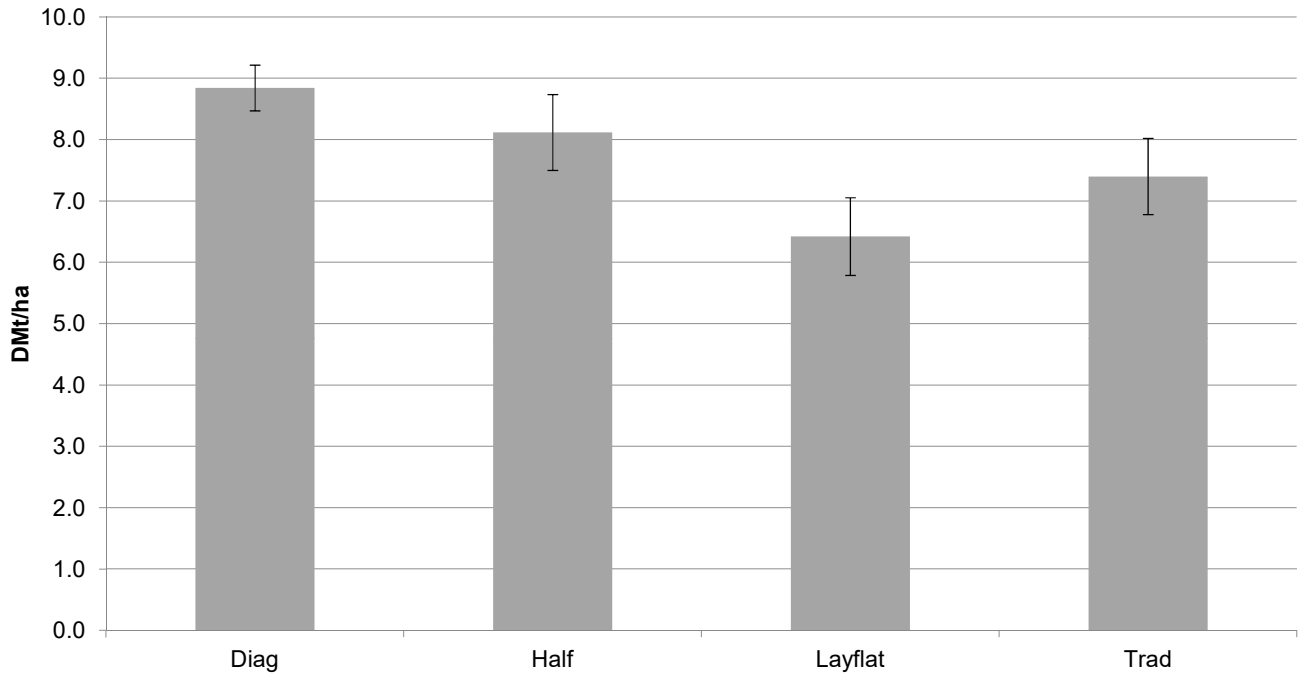

Conclusion

- Higher Growth Rate and Yield = Higher Evapotranspiration Rates
- Establishment and management of the crop in first year important
- Application of sewage sludge to willow and miscanthus crops does not result in significant build up of soil pathogens provided sufficient lime is incorporated
- Pathogens are retained and de-activated by soil
- Enhanced Greenhouse Gas Mitigation

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THANK YOU

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