agri benchmark Cash Crop Conference 2010

GHG Balance for Biodiesel
Strategic Issues for Rapeseed Production

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The UK Renewable Energy Strategy

The UK government will implement RED by amending the current Road Transport Fuel Obligation (RTFO) Order. This is expected by March 2011.

The Renewable Fuels Agency (RFA) have responsibility for reporting RED performance in the UK.
RED Technical Standards: Carbon Intensity

Source: RFA
UK Rapeseed Biodiesel Infrastructure

Biofuels Corporation
Teesside

Greenergy
Humberside
Raw Material for UK Biodiesel

Source: RFA April 2009 to January 2010
Origin of Rapeseed for UK Biodiesel

Source: RFA April 2009 to January 2010
The Current UK Market

The UK currently sources only 2% of its biodiesel requirement from domestic rapeseed production, so the incentive to introduce low CO₂ production methods for rapeseed is limited.
Typical GHG Balance: UK Biodiesel from Rapeseed

Crop Production, 28.9
Oil extraction, refining & esterification, 15.3
Drying, storage & transport, 0.6
Fuel transport & sale, 1.2

Total = 45.9 g CO$_2$e /MJ biodiesel
→ 45% saving compared to fossil reference

Source: RFA
Rapeseed: Share of Energy Inputs

Five year average yield in England: 3.3 tonnes per hectare

Source: HGCA
UK Nitrogen Use by Rapeseed

- Average nitrogen application: 194kgN/ha* (range 75kgN/ha to 275kgN/ha)
- Genetic variation in economic optimum: 60kgN/ha**
- Average nitrogen uptake: 96kgN/ha**

* British Survey of Fertiliser Practice 2008
** The potential to increase productivity of wheat and oilseed rape in the UK, ADAS
Fertiliser Practice: Stabilised Nitrogen Fertiliser

Stabilised nitrogen fertiliser to reduce volatilisation of urea
Fertiliser Practice: Efficient Use of Livestock Waste

Recent fertiliser price increases have provided an incentive for improved management of plant nutrients from waste.
Improvements in Farm Practice

Some producers could improve farm practice:

• Assess N supply from soil
• Canopy management – seed and nitrogen
• Base fertiliser requirements on crop potential
• Use agronomic guidance to calculate N requirement

1 HGCA Pulses and Oilseeds Conference 2009
Research: Strategies for CO$_2$ Reduction$^1$

**Husbandry**
- Improved nitrogen management according to genotype
- Management of disease (and therefore yield loss) after fertiliser application

**Genetic**
- Improvement in N uptake efficiency
  - Identify heritable plant characteristics associated with low N requirement
  - Carry out rapid assessment
  - Seek novel sources of genes

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$^1$ The potential to increase productivity of wheat and oilseed rape in the UK, ADAS
Fuel Use in Rapeseed Production

Based on original work by Levington Agriculture Ltd, 2000
Conclusions

Farmers adapt rapidly to markets – but RED requirements are perhaps clearer to farmers in Germany than to other EU farmers (e.g. UK)

In UK, RED standards will be important when more biodiesel is sourced from rapeseed

Basic science provides evidence that rapeseed can be produced with lower CO$_2$ emissions but farm-level research is less well developed

Low CO$_2$ production technology will not be the same in every country