Energy inputs and greenhouse gas emissions in UK strawberry crop production

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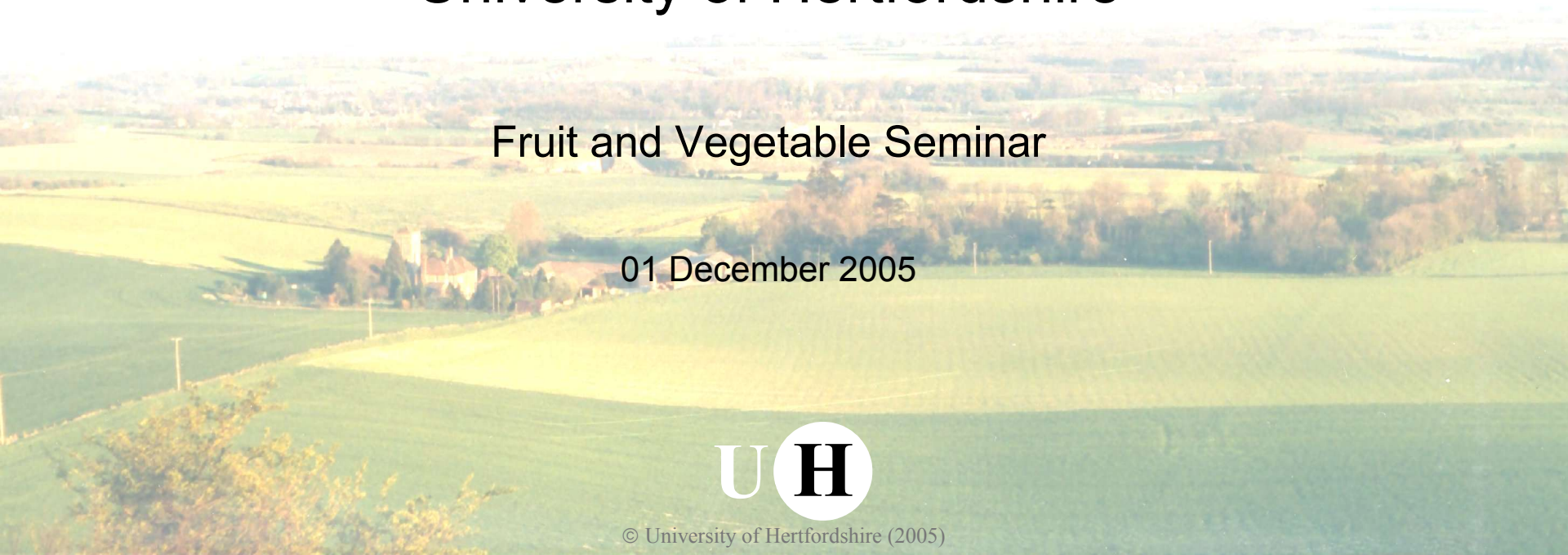


Overview

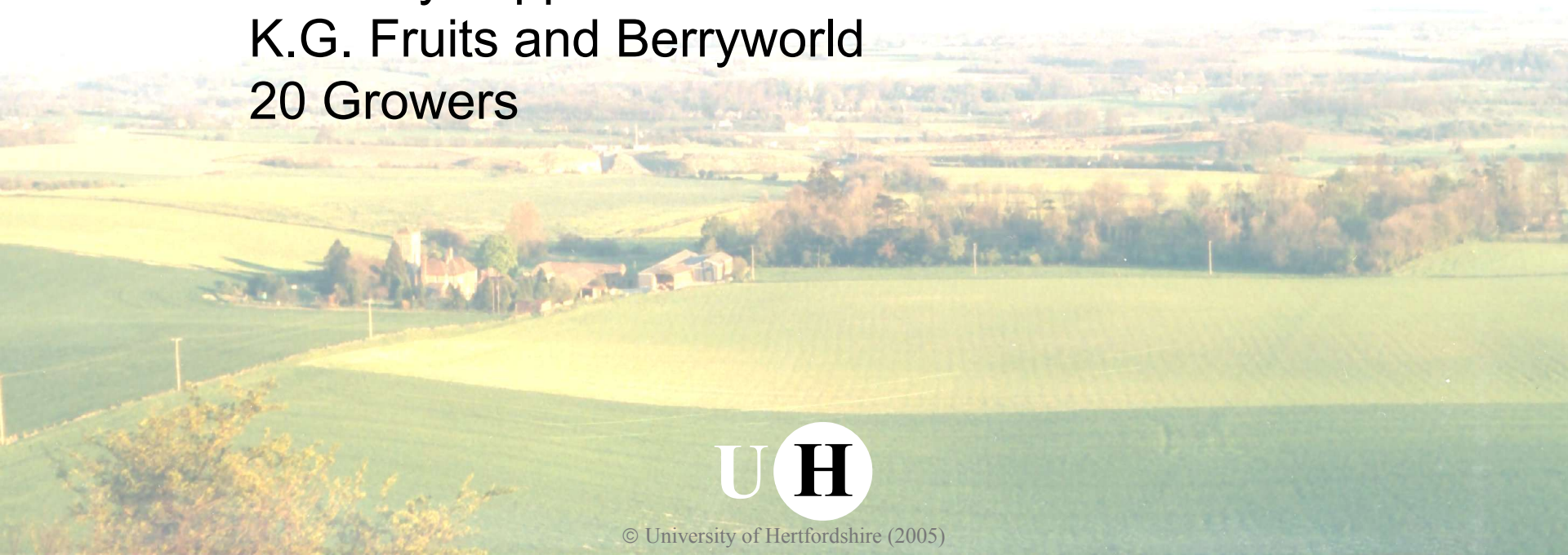
Defra funded research project

Collaboration between the University of Hertfordshire and East Malling Research

In kind industry support from

K.G. Fruits and Berryworld

20 Growers



Strawberry production systems in the UK

spring or summer planted

ICM or organic

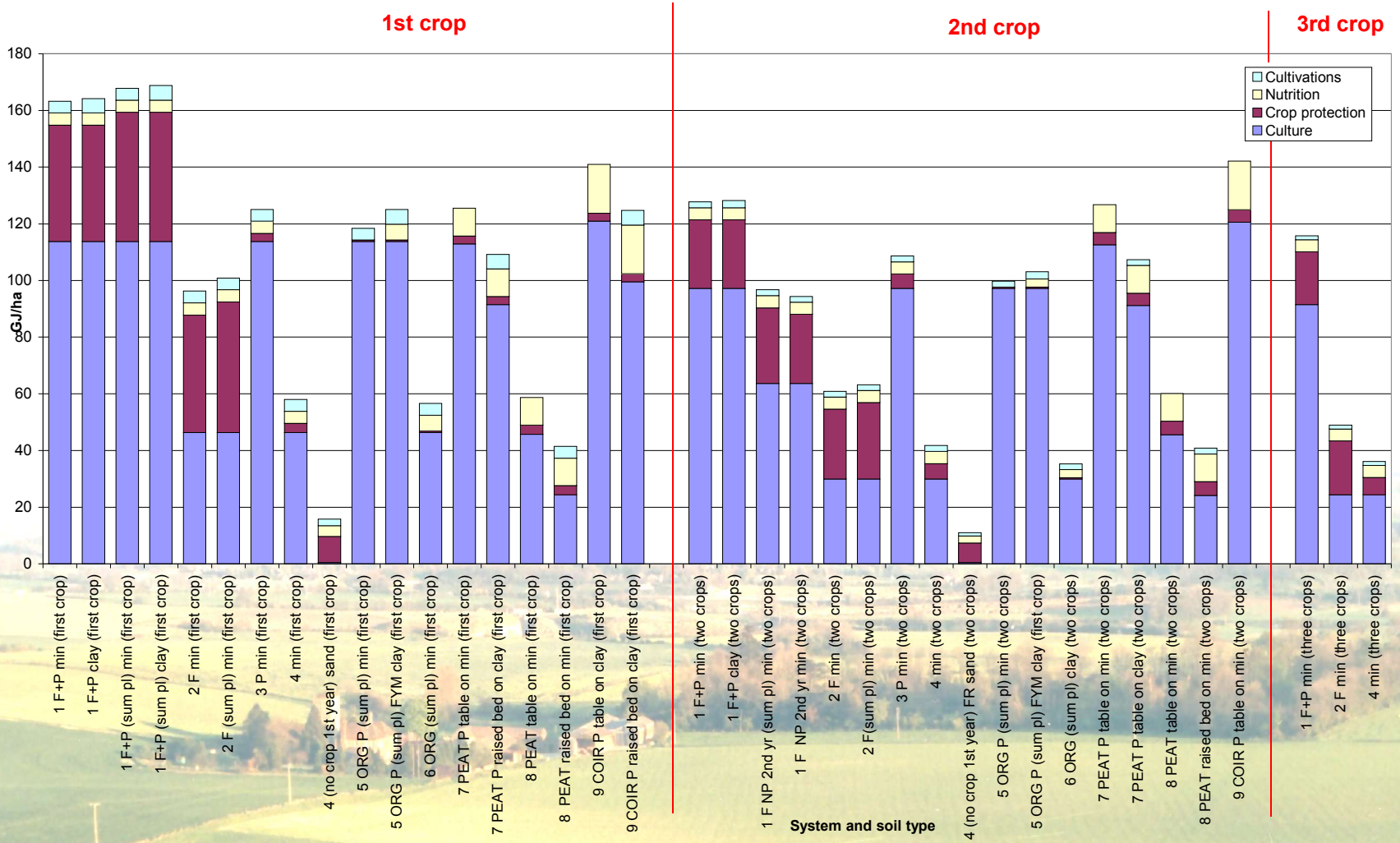
protection or no protection

soil or container

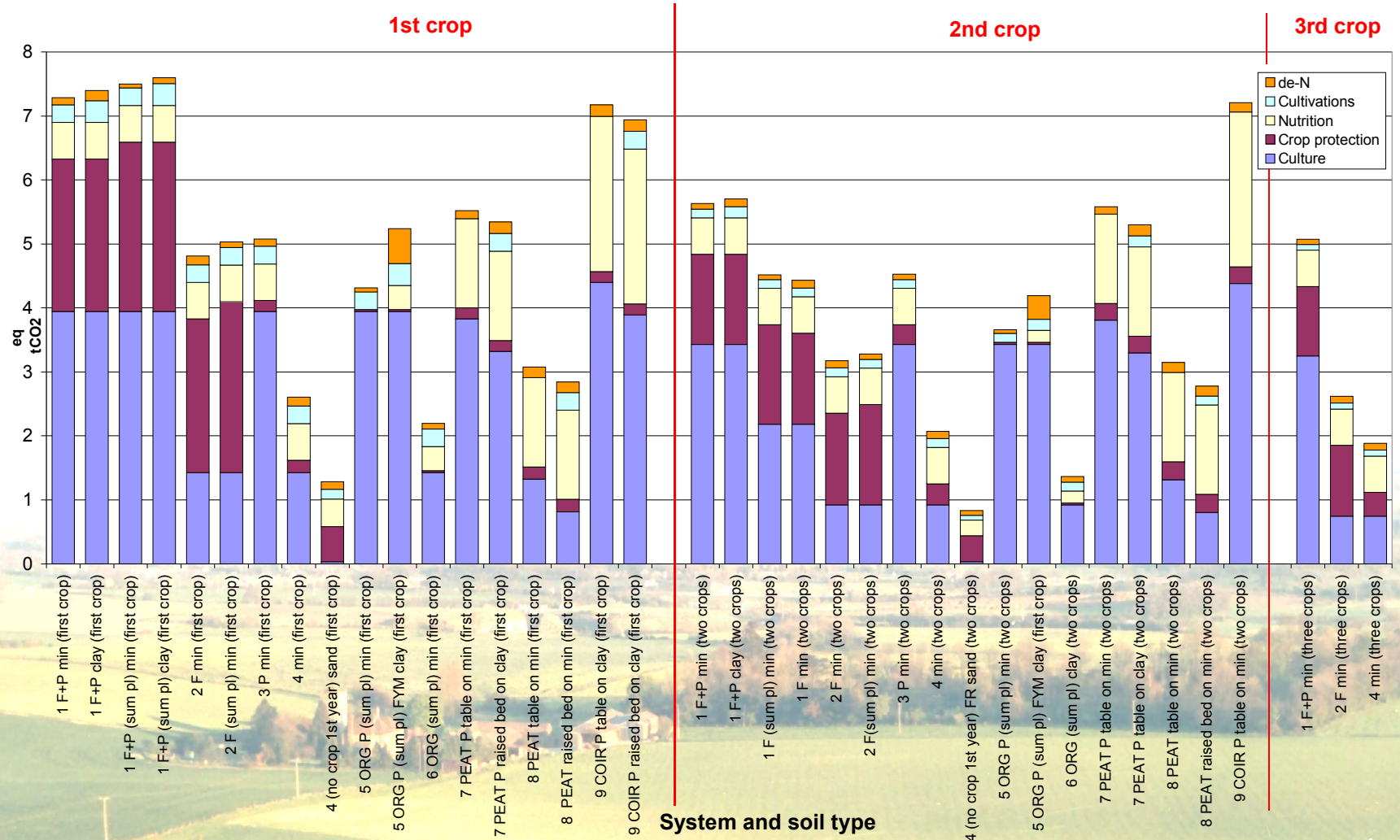
fumigation or no fumigation **peat or coir**

grown for between 1 and 3 years

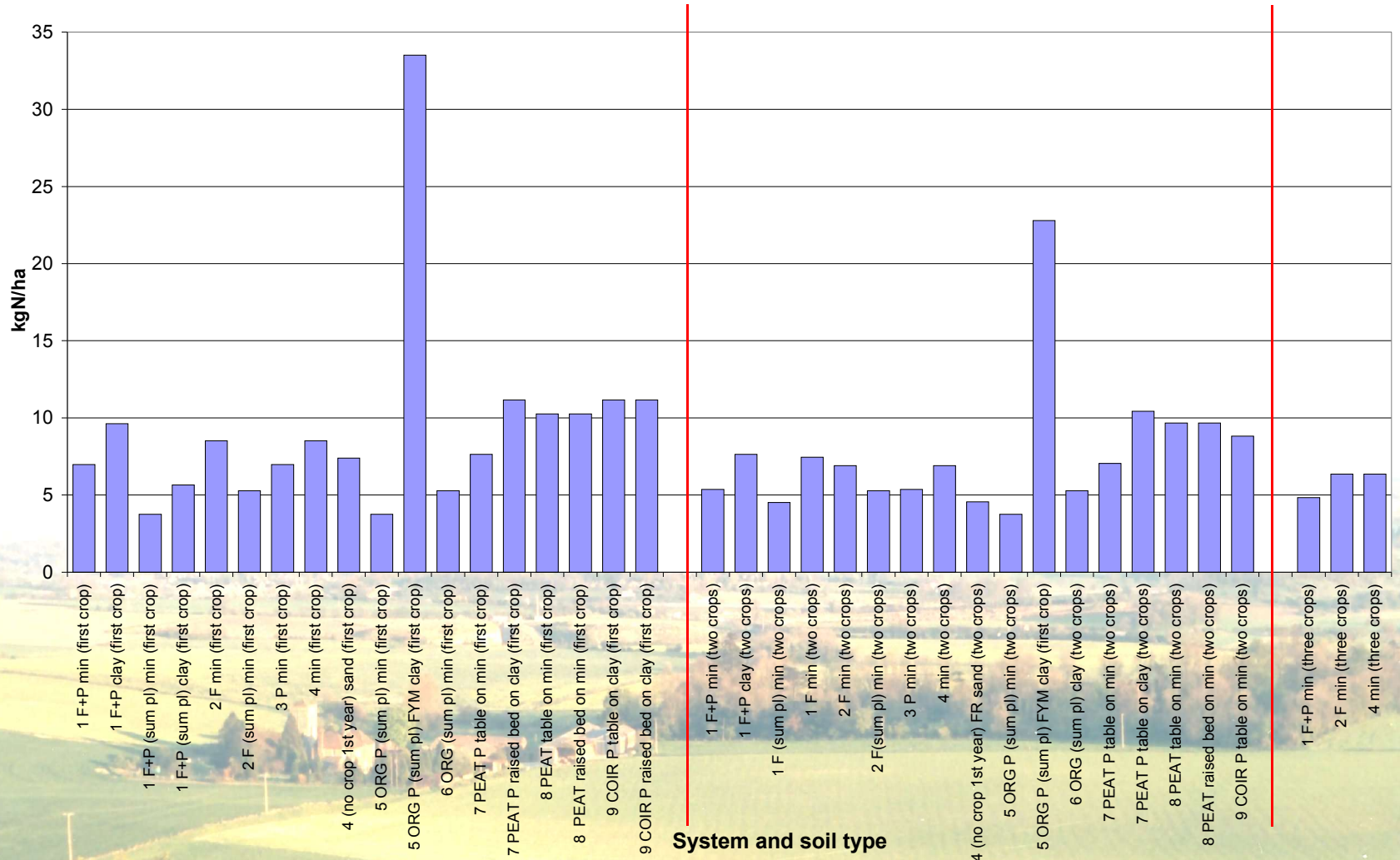
Energy (GJ/ha) Junebearer crops



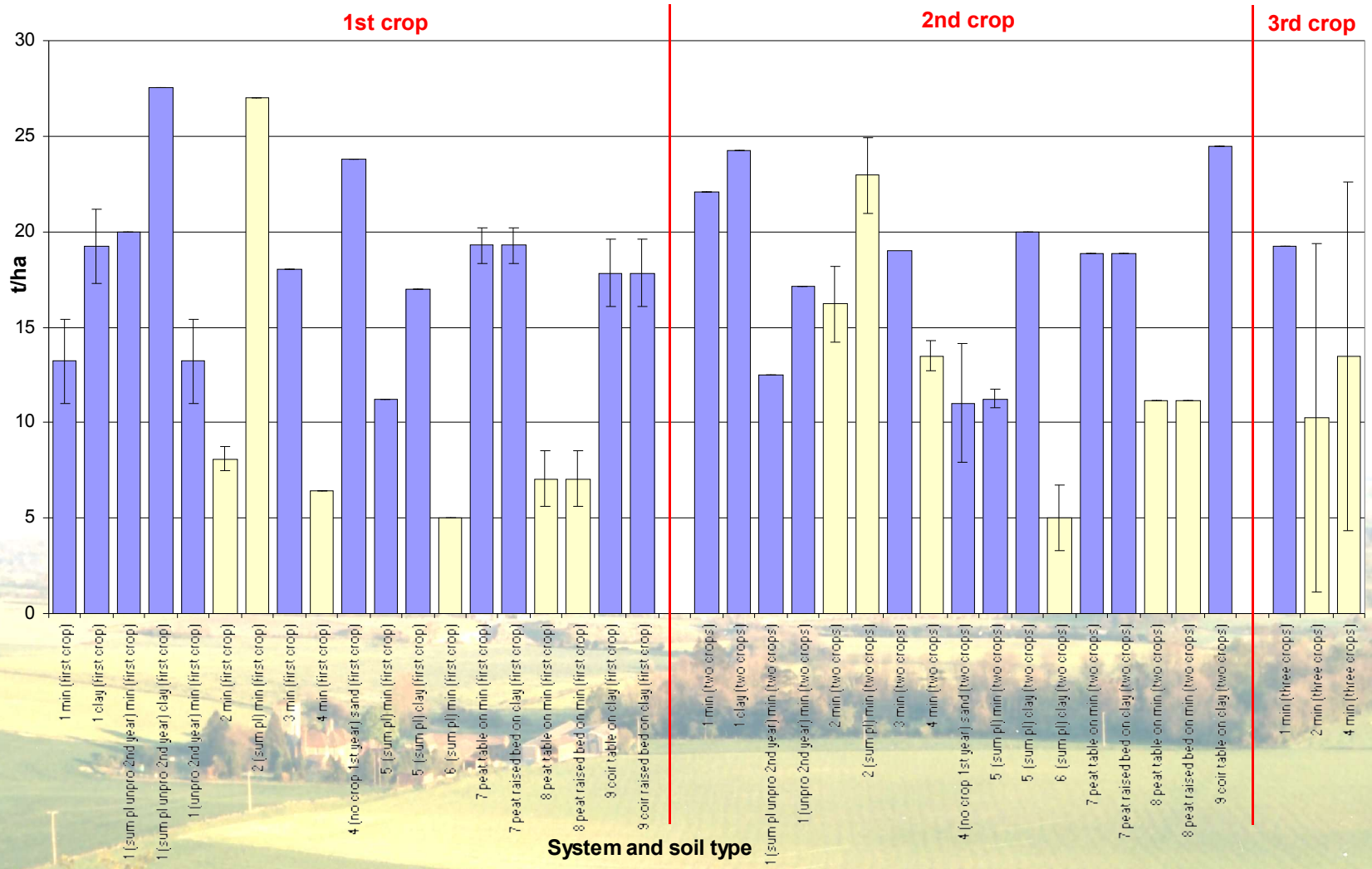
GWP (eq tCO_2/ha) Junebearer crops



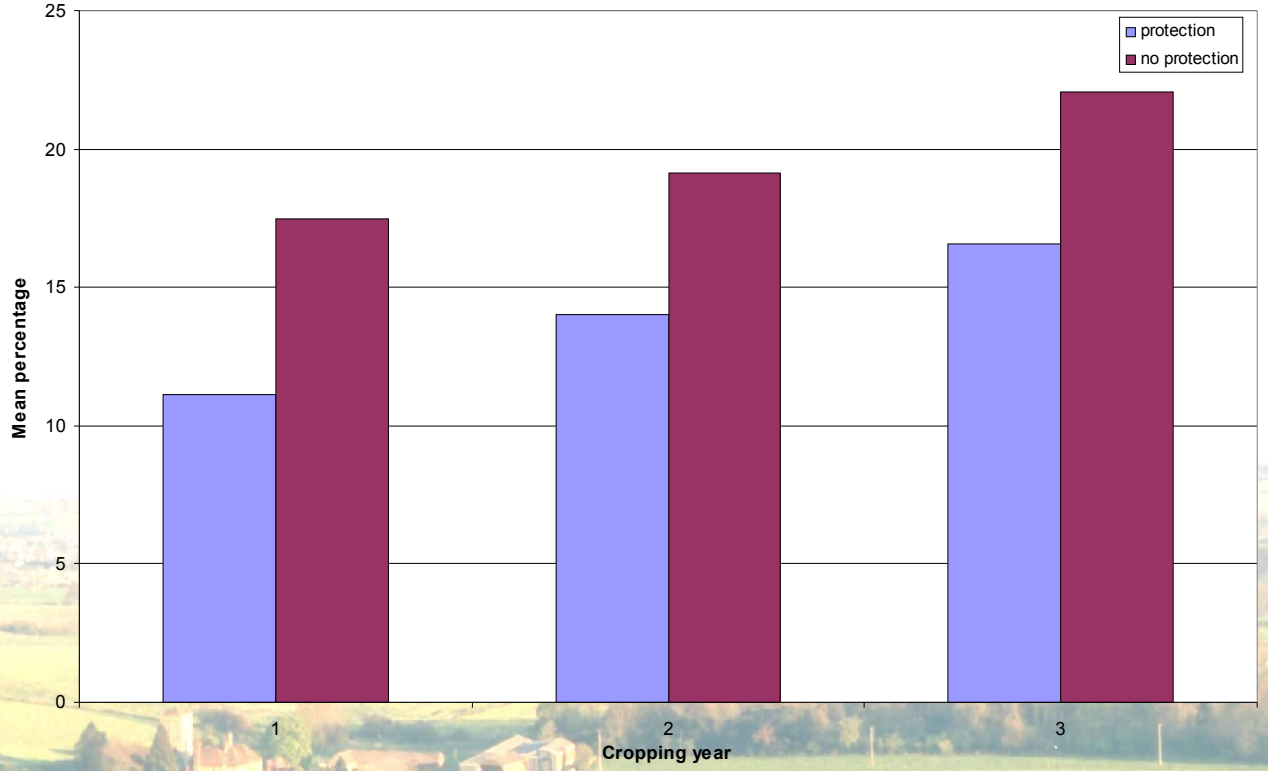
De-nitrification (kgN/ha)



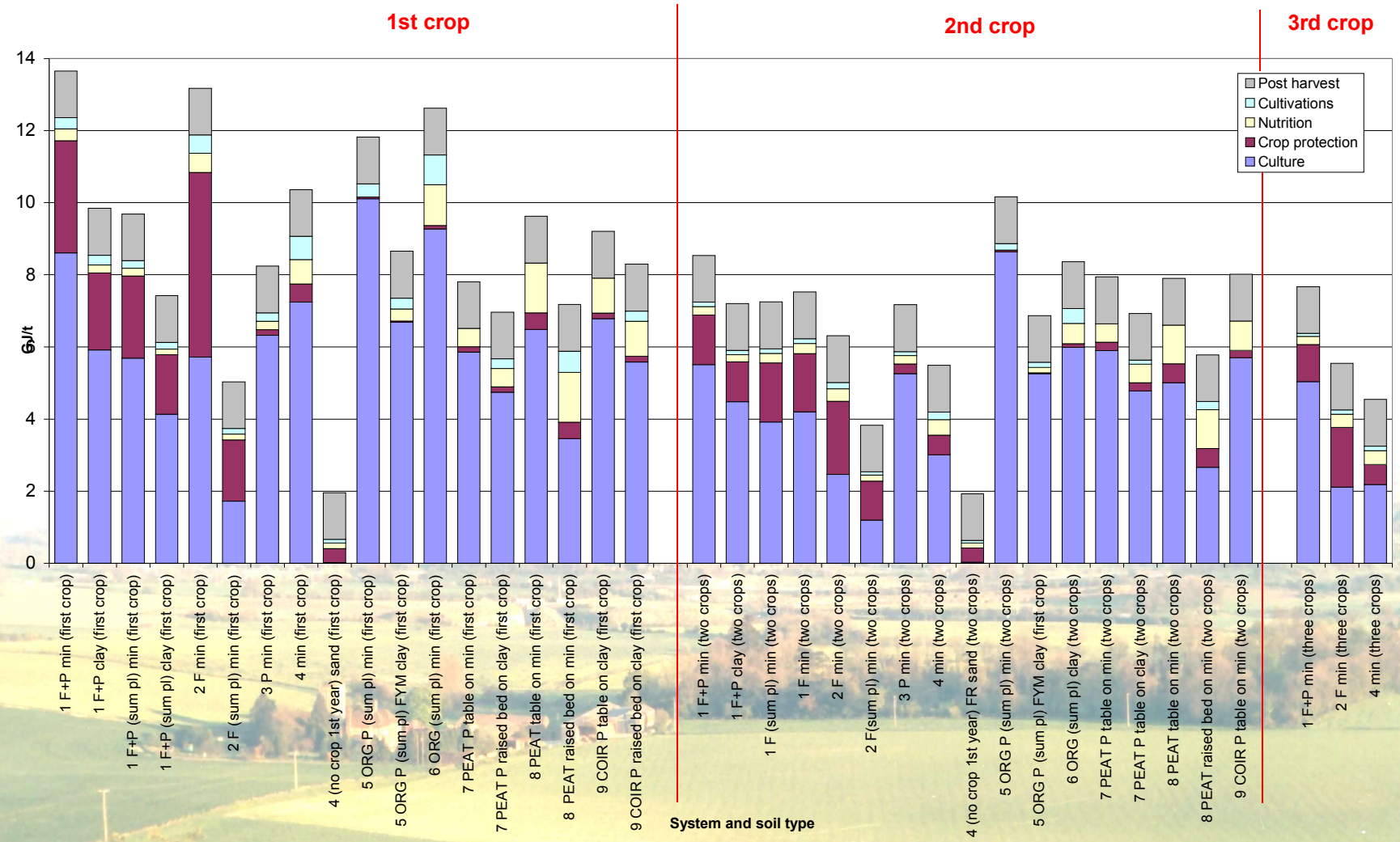
Class 1 fruit (t/ha)



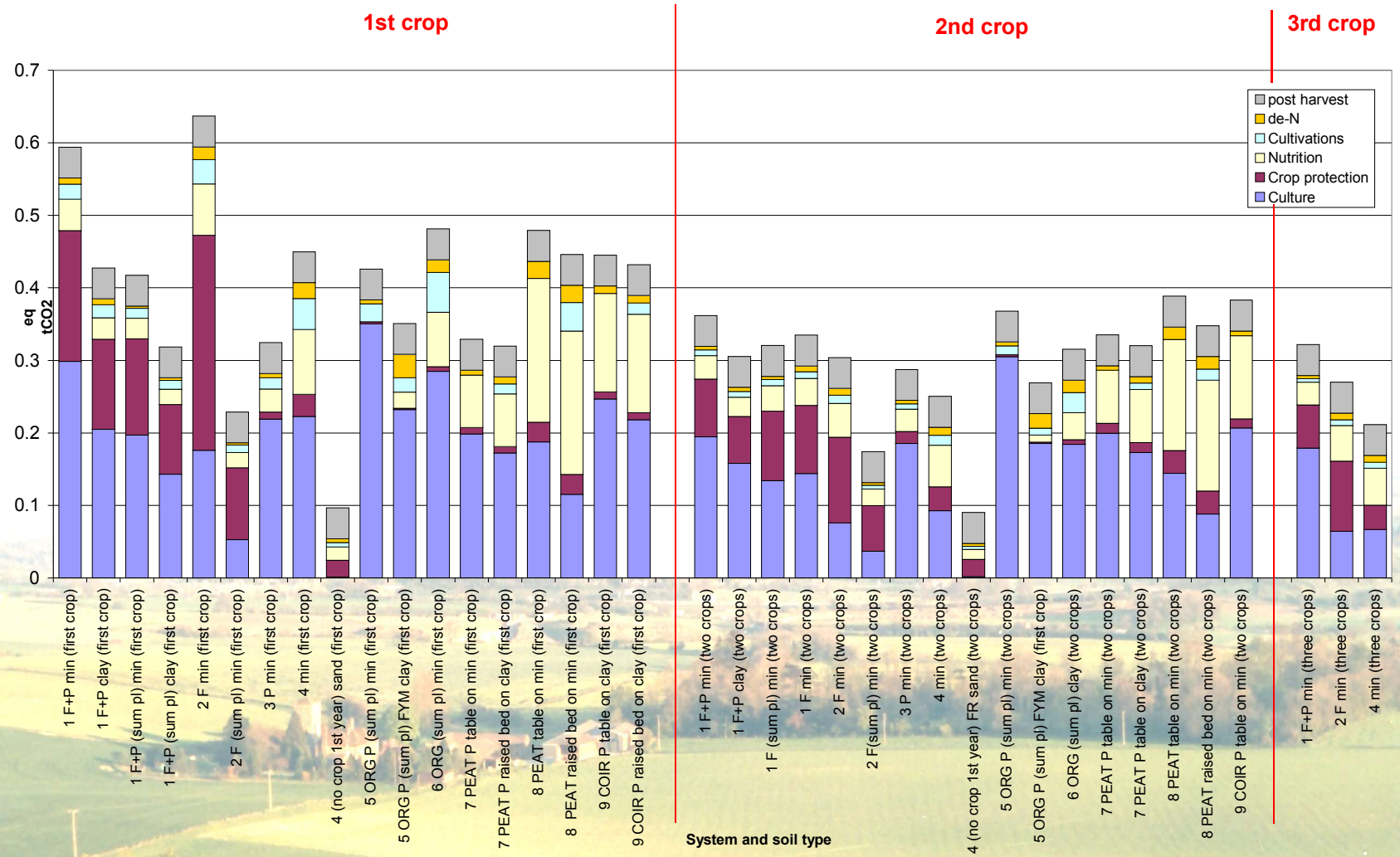
Percent Class 2 fruit



Energy (GJ) /t class 1 fruit



GWP (eq tCO_2) /t class 1 fruit



Key energy and GHG sources

Nitrate fertiliser (Jenssen & Kongshaug, 2003)

Plastics (mulch, polytunnel covers, container bags, irrigation pipe) (Bousted, 2003; British Plastics Industry; Eggels, 2001)

Pesticides (in particular soil fumigants) (Green, 1987; Pimentel, 1980)

Diesel use for field operations(mostly bed preparation)
(Carbon Trust, 2004; Donaldson *et al*., 1994; Hulsbergen & Kalk, 2002; Hunt, 1995)

De-nitrification (mostly from FYM) (deVries, 2003; Smith *et al*., 1996)

Nitrate fertiliser

Low N requirements relative to other crops:

Soil analysis before planting and leaf analysis during growth

Improvements in irrigation efficiency

Media that require less N

Plastics

Many growers stated supermarkets specify must be grown under protection

Maximise number of years the crop is grown to extend life of mulch between 2 or 3 crops.

Recycle plastics as many times as possible -

- easily separable waste stream
- energy requirements and emissions heavily dependent upon level of soiling (polytunnel uses virgin plastic and relatively clean so low costs)
- increased availability to growers and minimise transport distance
- final end use - landfill or incineration for heat generation

Pesticides

Mainly soil fumigants

maximise number of years the crop is grown

soil tests for *Verticilium,* target fumigant applications

land available to the grower maximise rotation

Large number of spray applications, particularly fungicides - crop monitoring

Diesel use for field operations

Mainly bed preparation

maximise number of years the crop is grown

De-nitrification

Mainly from FYM in organic systems (but recycling nutrients)

current use 40 t/ha,

latest recommendations 25t/ha

Margins

Protection: £4840/ha increase compared to no protection

Fumigation £3810 /ha increase compared to no fumigation

Summary

Strawberries have a high energy input and associated GHG emissions relative to, for example, combinable crops.

Possible to reduce energy and GHG emissions by:

- maximising the period for which the crop is grown (3 years)
- recycling plastics
- targeting inputs, in particular soil fumigants.