The nitrogen release from oilseed rape crop residues

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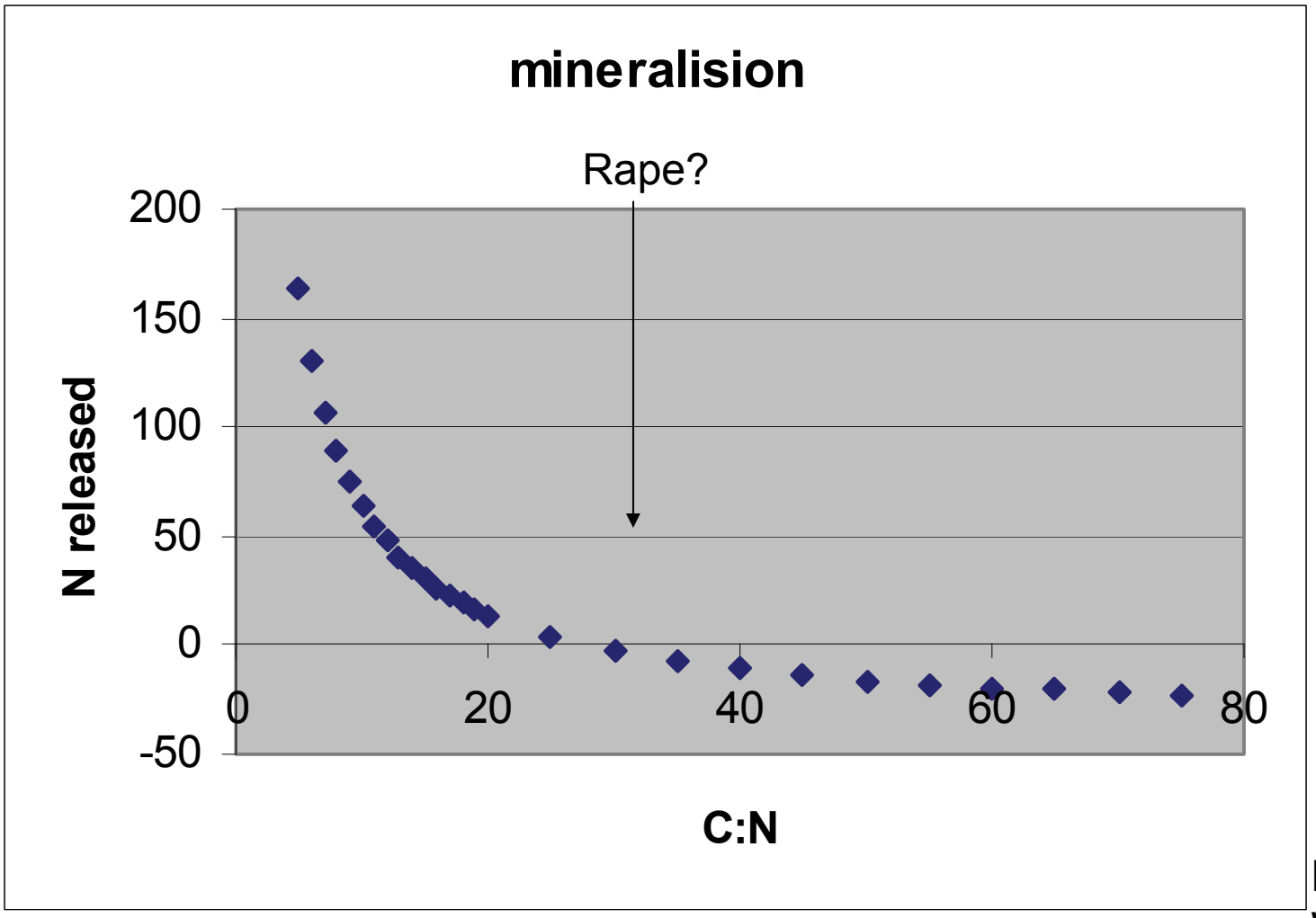
Plan:
Nitrogen release from residues

- Theory and modelling
- Evidence
- Fertiliser advice (RB209)
- Effect of reducing N content

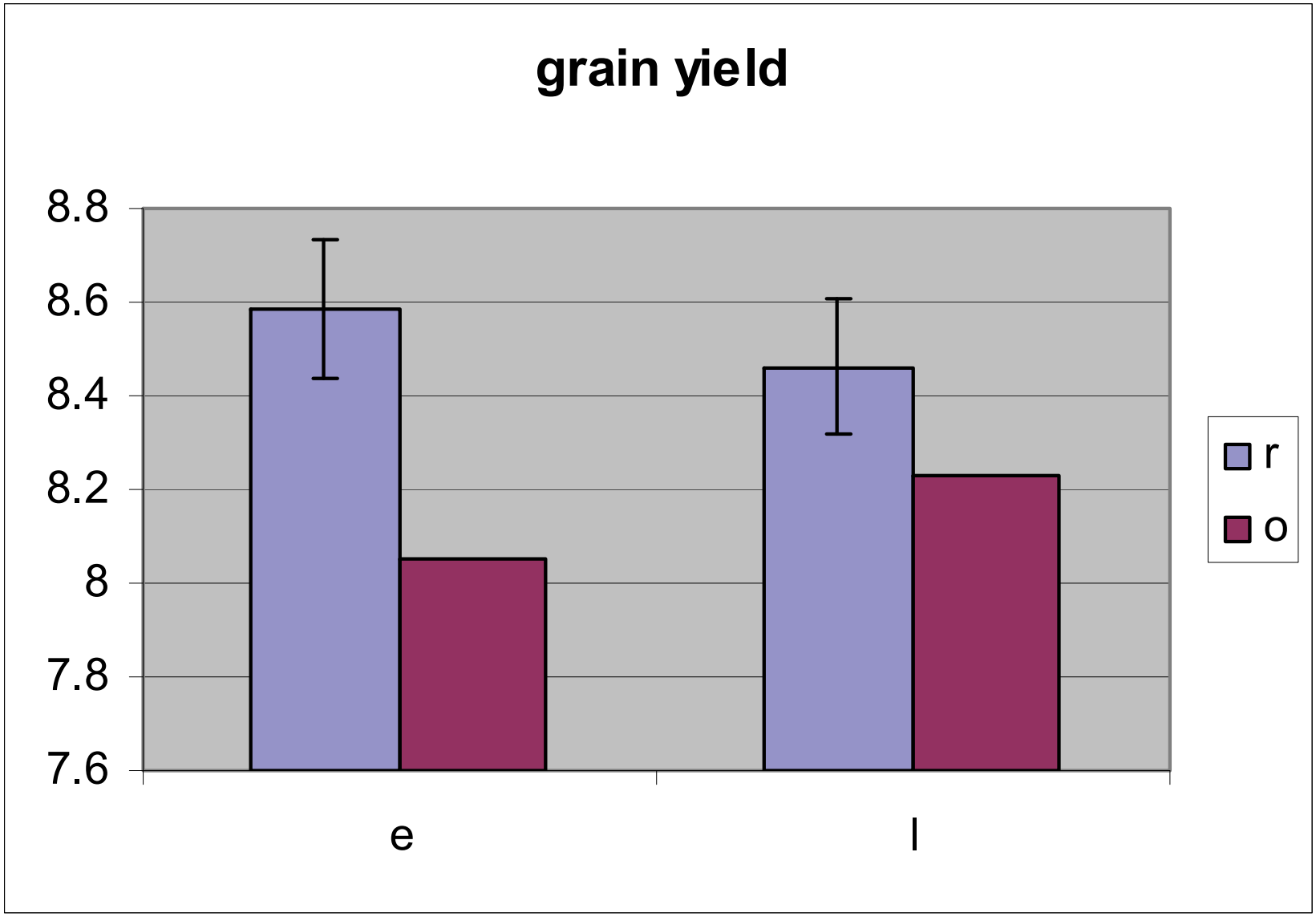


Handayanto & Whitmore, Driven By Nature pp337-48

$$N = C\left\{\frac{1}{C:Nrape} - \frac{e}{C:Nsoil}\right\} x\ extent\ of\ decomposition$$

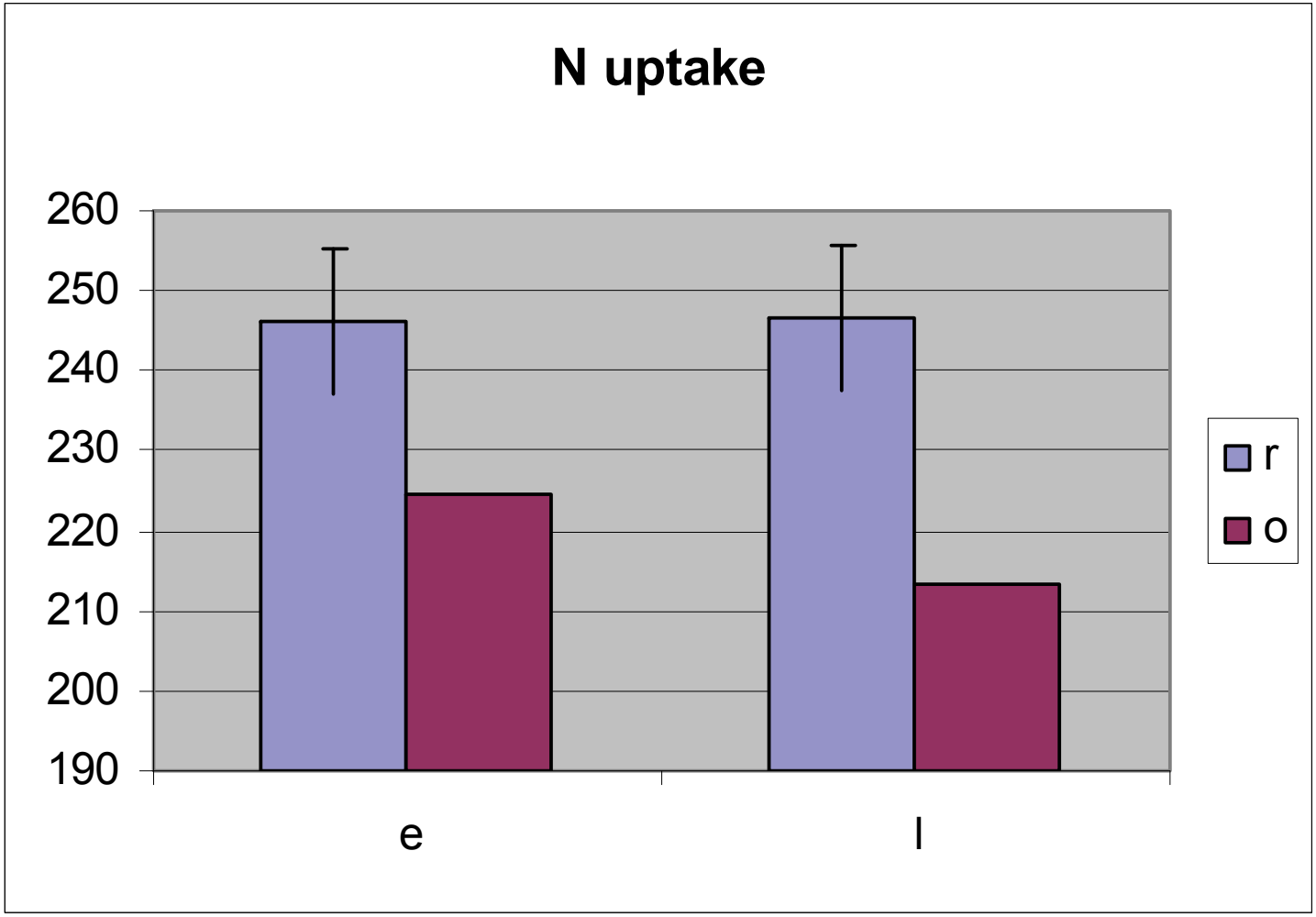
Where e is the efficiency of use by microbes of the Carbon in the residues

Benefit of rape as a break crop

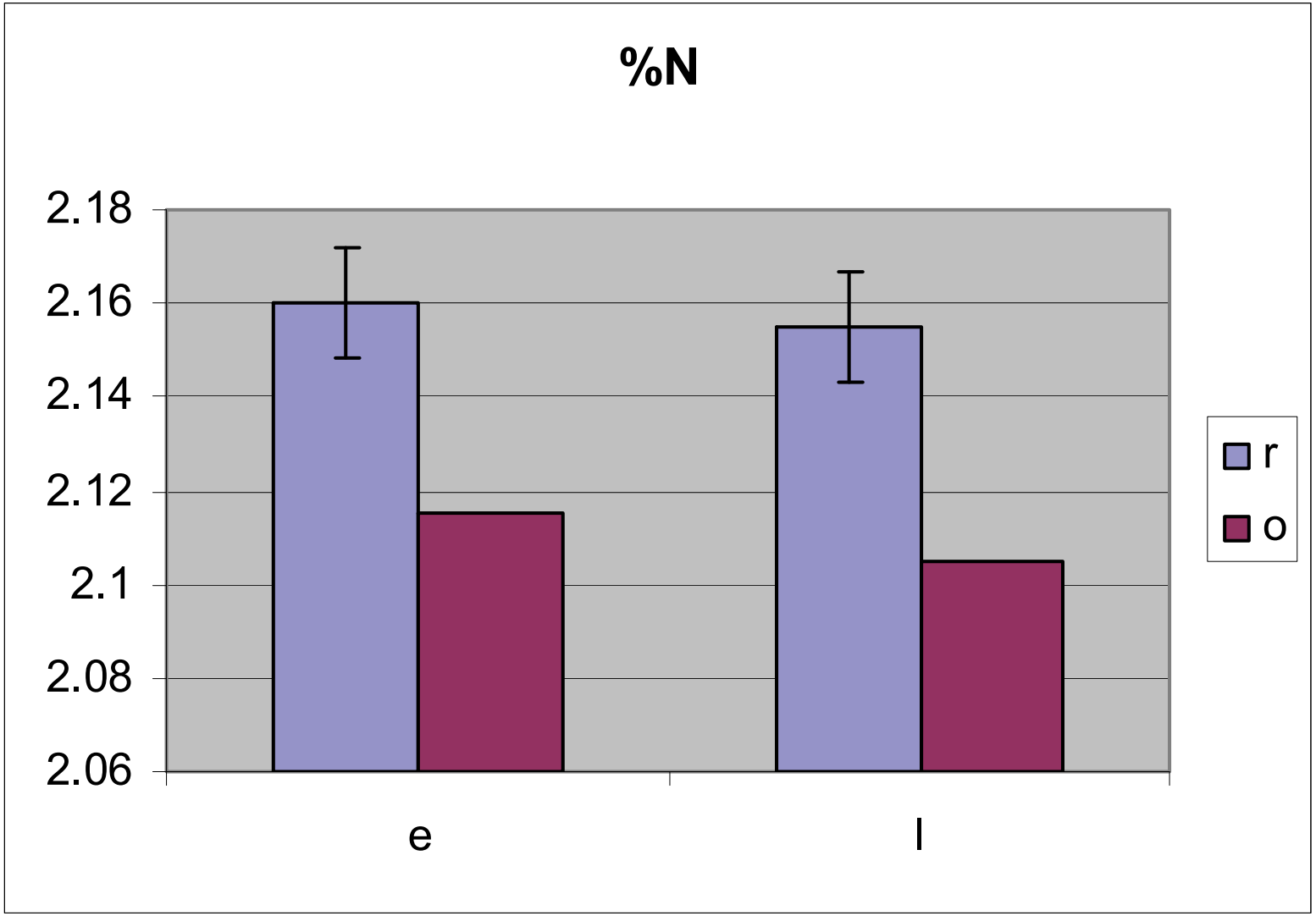


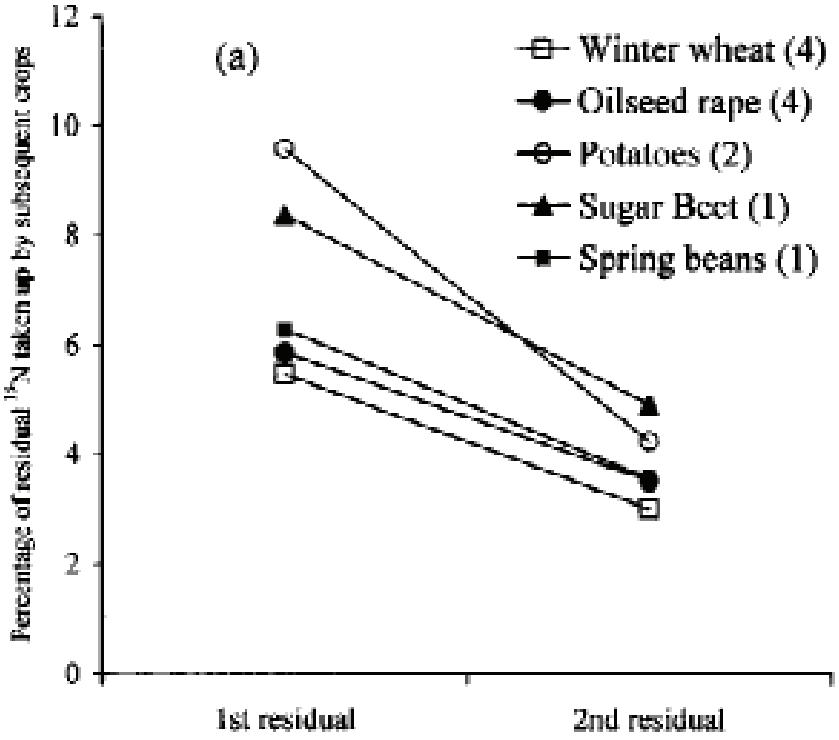
Milford et al JAS 1993

Benefit of rape as a break crop



Benefit of rape as a break crop





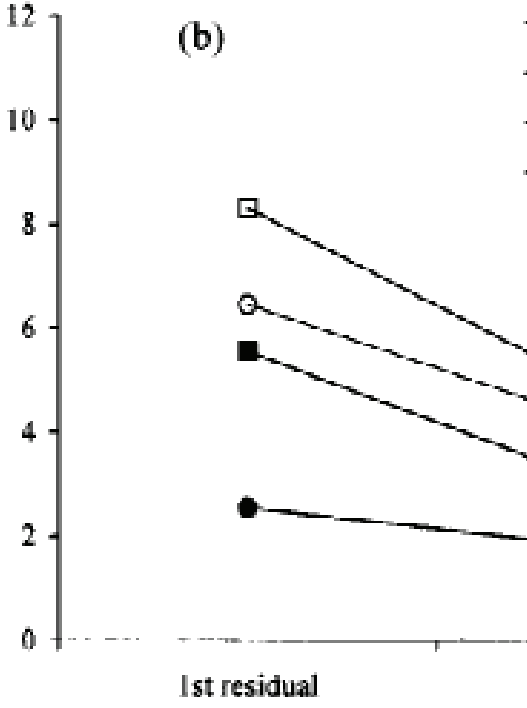
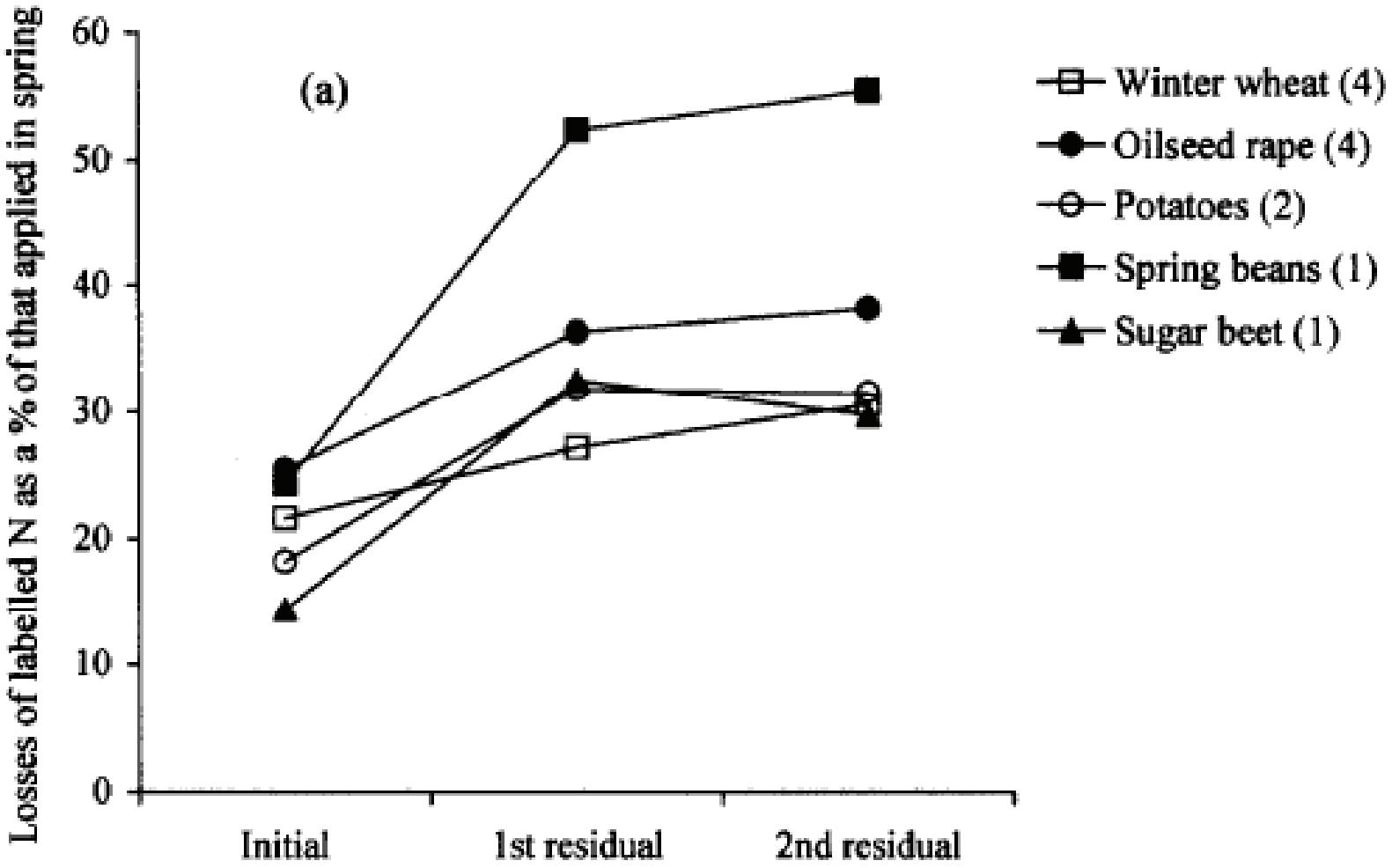


Figure 3. Availability of the residual ^{15}N in soil (0–23 cm) plus crop residues to subsequent crops. Uptake of ^{15}N by first crops are shown as percentages of that retained in soil (0–23 cm) plus crop residues at harvest of the initial and first residu Uptakes of residual ^{15}N are taken as the Series I and II means for both wheat and barley. (a) Means for individual crops: soils meaned in parentheses. (b) Means for individual soils following winter wheat and oilseed rape.

AJ Macdonald JAS

Losses



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RB209 (fertiliser advice)

- Uses Soil Nitrogen Supply index to estimate N from soil and previous crop
- Uses soil classification to estimate water availability
- Advice given in a matrix of these

RB209 winter wheat

Wheat, Autumn and Early Winter sown – Nitrogen

	SNS Index						
	0	1	2	3	4	5	6
	kg/ha						
Light sand soils	160	130	100	70	40	0-40	0
Shallow soils over chalk		240	200	160	110	40-80	0-40
Medium and deep clay soils, shallow soils over rock (not chalk)		220	180	150	100	40-80	0-40
Deep fertile silty soils		180	150	120	80	40-80	0-40
Organic soils				120	80	40-80	0-40
Peaty soils						0-60	

How to assess SNS?

Further Tables of N supply also against soil type

Separation of rainfall classes

High SNS means High supply

In the recent revision OSR has moved down a class in several instances

Other crops have moved down also

Based on experience and field observation

May reflect more careful use of N throughout the rotation

N supply from future rape?

- Residual N is a mixture of unused fertiliser (little if advice is followed) and N in crop residues
- Rape residues contain roughly the correct amount to fix the residue carbon in soil
- This happens in over time, some parts of the rape contain more N than others. Typically these will decompose first
- N supply and N leaching loss from rape are likely to variable, but on average small
- Over time, rape and similar crops have probably increased native soil fertility
- If rape and other residues start to contain less N per unit C (C:N), native soil fertility may decrease
- There seems to be some evidence that this is starting to happen
- Consider indirect effects also: improved soil structure, aeration, ecology