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Supplementary Materials

Long-term evidence for ecological intensification as a pathway to sustainable agriculture

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Contents

Supplementary Materials – Part 1

Long-term evidence for ecological intensification as a pathway to sustainable agriculture

Details of participating LTEs and their treatments

Supplementary Table 1.1: Details of all LTEs included in the study. Note there is no column showing the total from multiplying crops x blocks x years to indicate total replicates from each LTE, because in some cases there are not the same number of replicates for each treatment (e.g. the test crop occurs less often in a rotation than a monoculture).

Code	Institute	LTE name	Key researchers	Country	EI treatment categories	Test crops	Number of years (or seasons[1]) of data	Blocks (spatial replicates)	Notes
CHI	CIMMYT	Chitedze	Christian Thierfelder	Malawi	CD, TT	maize	13	4	
DOM	CIMMYT	Domboshawa	Christian Thierfelder	Zimbabwe	CD, TT, OM	maize	11	4	
HEN	CIMMYT	Henderson	Christian Thierfelder	Zimbabwe	CD, TT	maize	16	5	
MON	CIMMYT	Monze	Christian Thierfelder	Zambia	CD, TT	maize	15	4	
MSE	CIMMYT	Msekera	Christian Thierfelder	Zambia	CD, TT	maize	9	4	
SUS	CIMMYT	Sussundenga	Christian Thierfelder	Mozambique	CD, TT	maize	9	4	
D2	IITA	D2	Generose Nziguheba, Bernard Vanlauwe	Nigeria	OM, NF	maize	16	5	
KSA	IITA/ETH	SOM Aludeka	Johan Six, Bernard Vanlauwe	Kenya	OM, NF	maize	26	3	Control treatment which did not receive P not included
KSE	IITA/ETH	SOM Embu	Johan Six, Bernard Vanlauwe	Kenya	OM, NF	maize	34[1]	3	Control treatment which did not receive P not included
KSM	IITA/ETH	SOM Machanga	Johan Six, Bernard Vanlauwe	Kenya	OM, NF	maize	36[1]	3	Control treatment which did not receive P not included
KSS	IITA/ETH	SOM Sidada	Johan Six, Bernard Vanlauwe	Kenya	OM, NF	maize	28[1]	3	Control treatment which did not receive P not included
HOO	RRES	Hoosfield Spring Barley	-	England	OM, NF	barley	24[1]	3	Silicate treatments not included
BRB	RRES	Broadbalk Continuous Wheat	-	England	CD, OM, NF	wheat	49	1	Treatments with sub-optimal P and K fertilisation were not included, nor were treatments not receiving herbicides or fungicides. Data from years in which plots transitioned between rotation systems were not included (see 'Broadbalk Cropping 1968-2018', available for download from Rothamsted Electronic Archive, www.era.rothamsted.ac.uk).

WOB	RRES	Woburn Ley-Arable	-	England	CD, FF, NF	wheat	36	5	'Historical manure' plots not included. Plots transitioning from long ley to short ley treatments during 2007-2010 were not included. Data from before 1982 was not used, and data from block 2 in 1984 was excluded, as arable rotations in these years/blocks did not include legumes while all other arable rotations did, and the short ley treatments included two wheat years instead of wheat and a different cereal. Fertiliser quantities changed slightly over time within the experiment, so these values were averaged (weighted by the years in which each amount was applied) to provide the N fertiliser value for each treatment.
SCE	SLU	Spring cereals (R4-0906)	Ortrud Jäck	Sweden	CD, OM, NF	wheat, oats, barley	38	2	Data from before 1974 not included, as the fertiliser regime changed between 1973 and 1974.
PSP	SLU	Production specialisations (R4-0002)	Ortrud Jäck	Sweden	FF	winter wheat, spring wheat, sugarbeet	48	2	
RLS	SLU	Crop rotations with and without leys (R4-1103) - Säby	Ortrud Jäck	Sweden	FF, NF	oats, wheat	40[2]	6	
RLT	SLU	Crop rotations with and without leys (R4-1103) - Stenstugu	Ortrud Jäck	Sweden	FF, NF	oats, wheat	45[2]	6	
RLL	SLU	Crop rotations with and without leys (R4-1103) - Lanna	Ortrud Jäck	Sweden	FF, NF	oats, wheat	36[2]	6	
NTR	SLU	No till and residue management (R2-4017)	Ararso Etana, Thomas Keller, Åsa Myrbeck	Sweden	TT, OM	wheat, oats, barley	7[2,3]	2	
TIR	SLU	Tillage intensity and crop rotation (R2-4140)	Ararso Etana, Thomas Keller, Åsa Myrbeck	Sweden	TT	wheat	7[3]	3	

OLD	SRUC	Old Rotation (Woodland)	Kairsty Topp, Christine Watson, Robin Walker	Scotland	NF	oats, barley	48	1	Treatments lacking P and K fertilisation not included. Barley was undersown ryegrass and with clover.
TUL	SRUC	Tulloch Organic Rotations	Kairsty Topp, Christine Watson, Robin Walker	Scotland	FF	oats	28	2	Data from oats undersown with ryegrass and clover used as this was common to all treatments (data from non-undersown oats not included).
LCR	WCGDA	Langgewens Long-Term Crop Rotation Systems Trial	Johann Strauss	South Africa	CD, FF	wheat	23	4	
TCR	WCGDA	Tygerhoek Long-Term Crop Rotation Systems Trial	Johann Strauss	South Africa	CD, FF	wheat	18	2	Treatments that did not consistently contain wheat not included
LTF	WCGDA	Tillage frequency for soil quality and plant productivity (8.PS/SR/S/JL7)	Johan Labuschagne, Flackson Tshuma, Pieter Swanepoel	South Africa	CD, TT	wheat	31	4	
SQL	WCGDA	Long- and short-term strategies for for soil quality (4.PS/SR/S/JL3) - Langgewens	Johan Labuschagne	South Africa	CD, TT	wheat	13	4	
SQT	WCGDA	Long- and short-term strategies for for soil quality (4.PS/SR/S/JL3) - Tygerhoek	Johan Labuschagne	South Africa	CD, TT	wheat	13	4	
BAS	WUR	BASIS	Derk van Balen, Wiepie Haagsma	The Netherlands	TT	potato	8[3]	4	
BKZ	WUR	Soil Quality (BKZ)	Janjo de Haan, Marie Wesselink, Harry Verstegen	The Netherlands	OM, TT, NF	potato	15	6	

[1]KSE, KSS, KSM and KSA had two seasons per year

[2]This is the minimum for these LTEs (some crops had more years)

[3]These LTEs have a long rotation, so although the experiment is > 10 years old, potatoes only occur in 8 years
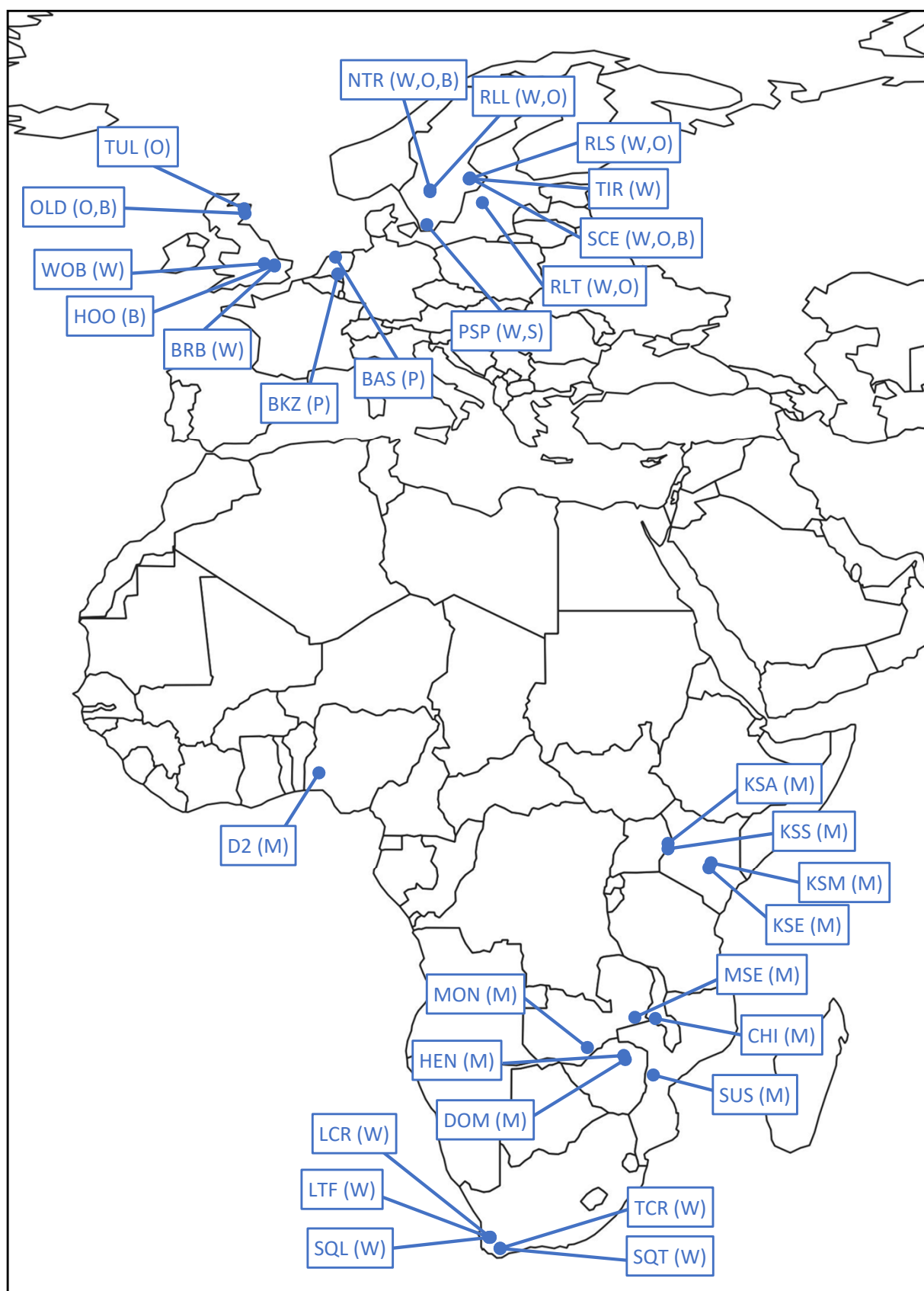
Figure S1.1: The geographic locations of all LTEs included in this study. The blue circles indicate the location, the codes in the labels identify the LTE (see Table S1.1), and the letters in parentheses indicate test crops in each LTE. W = wheat, O = oats, B = barley, P = potato, S = sugarbeet, M = maize. The basemap is sourced from Natural Earth, www.naturalearthdata.com.

Supplementary Table 1.2: All treatments included in the study, classified according to the common focal variables (F) and context variable (C) indices.

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
CHI CIMMYT Chitedze	maize	Maize monoculture with ridge/furrow soil preparation (residues removed)	1	monoculture	none	none (monoculture)	none	69	< 100kg N	none	none	residues removed	ridgefurrow	reduced
		Maize monoculture with basin planting	1	monoculture	none	none (monoculture)	none	69	< 100kg N	none	none	residues kept	basin	reduced
		Maize monoculture planted by dibble stick	1	monoculture	none	none (monoculture)	none	69	< 100kg N	none	none	residues kept	zero-till	no-till
		Maize rotated with either cowpea or groundnuts, planted by dibble stick	2	rotation	legumes	arable legumes	none	69	< 100kg N	none	none	residues kept	zero-till	no-till
		Maize intercropped with pigeon pea, planted by dibble stick	2	intercrop	legumes	arable legumes	none	69	< 100kg N	none	none	residues kept	zero-till	no-till
		Maize intercropped with cowpea, planted by dibble stick	2	intercrop	legumes	arable legumes	none	69	< 100kg N	none	none	residues kept	zero-till	no-till
		Maize intercropped with velvetbean, planted by dibble stick	2	intercrop	legumes	arable legumes	none	69	< 100kg N	none	none	residues kept	zero-till	no-till
DOM CIMMYT Domboshawa	maize	Maize monoculture, soil prepared by plough (residues removed)	1	monoculture	none	none (monoculture)	none	80.5	< 100kg N	manure	manure applied	residues removed	deep inversion (plough)	plough
		Maize monoculture planted by animal-drawn direct seeder	1	monoculture	none	none (monoculture)	none	80.5	< 100kg N	manure	manure applied	residues kept	no-till	no-till
		Maize monoculture with basin planting	1	monoculture	none	none (monoculture)	none	80.5	< 100kg N	manure	manure applied	residues kept	basin	reduced
		Maize monoculture planted by jab planter or dibble stick	1	monoculture	none	none (monoculture)	none	80.5	< 100kg N	manure	manure applied	residues kept	zero-till	no-till
		Maize monoculture planted by animal-drawn direct seeder, biochar added	1	monoculture	none	none (monoculture)	none	80.5	< 100kg N	manure + plant-based amendments	manure applied	residues kept	no-till	no-till
		Maize intercropped with either pigeon pea or cowpea, planted by animal-drawn direct seeder	2	intercrop	legumes	arable legumes	none	80.5	< 100kg N	manure	manure applied	residues kept	no-till	no-till

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Maize rotated with groundnuts, planted by animal-drawn direct seeder	2	rotation	legumes	arable legumes	none	80.5	< 100kg N	manure	manure applied	residues kept	no-till	no-till
		Maize rotated with sunflower, planted by animal-drawn direct seeder (until 2015)	2	rotation	none	none (arable w/o legumes)	none	80.5	< 100kg N	manure	manure applied	residues kept	no-till	no-till
		Maize rotated with cowpea, planted by animal-drawn direct seeder (from 2015)	2	rotation	legumes	arable legumes	none	80.5	< 100kg N	manure	manure applied	residues kept	no-till	no-till
HEN CIMMYT Henderson	maize	Maize monoculture, soil prepared by plough (residues removed)	1	monoculture	none	none (monoculture)	none	80.5	under 100 kg N	none	none	residues removed	deep inversion (plough)	plough
		Maize rotated with sunnhemp, soil prepared by plough (residues removed)	2	rotation	legumes	arable legumes	none	80.5	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Maize monoculture, planted by ripper planter	1	monoculture	none	none (monoculture)	none	80.5	< 100kg N	none	none	residues kept	no-till	no-till
		Maize rotated with sunnhemp, planted by ripper planter	2	rotation	legumes	arable legumes	none	80.5	< 100kg N	none	none	residues kept	no-till	no-till
		Maize monoculture planted by dibble stick	1	monoculture	none	none (monoculture)	none	80.5	< 100kg N	none	none	residues kept	zero-till	no-till
		Maize rotated with sunnhemp, planted by dibble stick	2	rotation	legumes	arable legumes	none	80.5	< 100kg N	none	none	residues kept	zero-till	no-till
		Maize monoculture with basin planting	1	monoculture	none	none (monoculture)	none	80.5	< 100kg N	none	none	residues kept	basin	reduced
		Maize rotated with sunnhemp, with basin planting	2	rotation	legumes	arable legumes	none	80.5	< 100kg N	none	none	residues kept	basin	reduced
		Maize intercropped with cowpea, velvet bean or pigeon pea, planted by ripper planter	2	intercrop	legumes	arable legumes	none	80.5	< 100kg N	none	none	residues kept	no-till	no-till
		Maize intercropped with cowpea, velvet bean or pigeon pea, and rotated with sunnhemp, planted by ripper planter	2.67	intercrop	legumes	arable legumes	none	80.5	< 100kg N	none	none	residues kept	no-till	no-till
MON CIMMYT Monze	maize	Maize monoculture, soil prepared by plough (residues removed)	1	monoculture	none	none (monoculture)	none	80.5	> 100kg N	none	none	residues removed	deep inversion (plough)	plough

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Maize monoculture, planted by animal-drawn direct seeder	1	monoculture	none	none (monoculture)	none	108.5	> 100kg N	none	none	residues kept	no-till	no-till
		Maize monoculture with basin planting	1	monoculture	none	none (monoculture)	none	108.5	> 100kg N	none	none	residues kept	basin	reduced
		Maize rotated with cotton, planted by animal-drawn direct seeder	2	rotation	none	none (arable w/o legumes)	none	108.5	> 100kg N	none	none	residues kept	no-till	no-till
		Miaze rotated with cotton and sunnhemp, planted by animal-drawn direct seeder	3	rotation	legumes	arable legumes	none	108.5	> 100kg N	none	none	residues kept	no-till	no-till
		Maize rotated with cotton, soil prepared by plough	2	rotation	none	none (arable w/o legumes)	none	108.5	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Maize rotated with sunnhemp, planted by animal-drawn direct seeder	2	rotation	legumes	arable legumes	none	108.5	> 100kg N	none	none	residues kept	no-till	no-till
MSE CIMMYT Msekera	maize	Maize monoculture, soil prepared by plough (residues removed)	1	monoculture	none	none (monoculture)	none	108.5	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Maize monoculture with ridge/furrow soil preparation	1	monoculture	none	none (monoculture)	none	108.5	> 100kg N	none	none	residues kept	ridgefurrow	reduced
		Maize monoculture with basin planting	1	monoculture	none	none (monoculture)	none	108.5	> 100kg N	none	none	residues kept	basin	reduced
		Maize monoculture planted by dibble stick	1	monoculture	none	none (monoculture)	none	108.5	> 100kg N	none	none	residues kept	zero-till	no-till
		Maize monoculture planted by animal-drawn direct seeder	1	monoculture	none	none (monoculture)	none	108.5	> 100kg N	none	none	residues kept	no-till	no-till
		Maize intercropped with cowpea, planted by animal-drawn direct seeder	2	intercrop	legumes	arable legumes	none	108.5	> 100kg N	none	none	residues kept	no-till	no-till
		Maize rotated with cowpea, planted by animal-drawn direct seeder	2	rotation	legumes	arable legumes	none	108.5	> 100kg N	none	none	residues kept	no-till	no-till
		Maize rotated with soybean, planted by animal-drawn direct seeder	2	rotation	legumes	arable legumes	none	108.5	> 100kg N	none	none	residues kept	no-till	no-till

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
SUS CIMMYT Sussundenga	maize	Maize monoculture, soil prepared by plough (residues removed)	1	monoculture	none	none (monoculture)	none	112	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Maize monoculture planted by animal-drawn direct seeder	1	monoculture	none	none (monoculture)	none	112	> 100kg N	none	none	residues kept	no-till	no-till
		Maize monoculture with basin planting	1	monoculture	none	none (monoculture)	none	112	> 100kg N	none	none	residues kept	basin	reduced
		Maize monoculture planted by jab planter	1	monoculture	none	none (monoculture)	none	112	> 100kg N	none	none	residues kept	zero-till	no-till
		Maize intercropped with pigeon pea, planted by animal-drawn direct seeder	2	intercrop	none	none (arable w/o legumes)	none	112	> 100kg N	none	none	residues kept	no-till	no-till
		Maize intercropped with sunflower, planted by animal-drawn direct seeder	2	intercrop	legumes	arable legumes	none	112	> 100kg N	none	none	residues kept	no-till	no-till
		Maize rotated with sunflower, planted by animal-drawn direct seeder	2	rotation	none	none (arable w/o legumes)	none	112	> 100kg N	none	none	residues kept	no-till	no-till
		Maize rotated with sunflower and beans or cowpea, planted by animal-drawn direct seeder	3	rotation	legumes	arable legumes	none	112	> 100kg N	none	none	residues kept	no-till	no-till
D2 IITA D2	maize	Maize-cowpea rotation, no organic matter added, no fertiliser	2	rotation	legumes	arable legumes	none	0	none	none	none	residues kept	shallow non-inversion	reduced
		Maize-cowpea rotation, no organic matter added, high fertiliser	2	rotation	legumes	arable legumes	none	120	> 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Maize-cowpea rotation, Leucaena leucocephala cuttings added, no fertiliser	2	rotation	legumes	arable legumes	none	0	none	plant-based amendments	plant-based amendments only	residues kept	shallow non-inversion	reduced
		Maize-cowpea rotation, Leucaena leucocephala cuttings added, high fertiliser	2	rotation	legumes	arable legumes	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues kept	shallow non-inversion	reduced
		Maize-cowpea rotation, Senna siamea cuttings added, no fertiliser	2	rotation	legumes	arable legumes	none	0	none	plant-based amendments	plant-based amendments only	residues kept	shallow non-inversion	reduced

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
LTE and treatment description			**Crop diversity (CD)**			**Fertility and forage crops**		**Nitrogen fertiliser (NF)**		**Organic matter management (OM)**			**Tillage (TT)**	
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Maize-cowpea rotation, Senna siamea cuttings added, high fertiliser	2	rotation	legumes	arable legumes	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues kept	shallow non-inversion	reduced
		Maize-cowpea-maize-velvet bean rotation, no additional organic matter, no fertiliser	2.67	rotation	legumes	arable legumes	none	0	none	none	none	residues kept	shallow non-inversion	reduced
		Maize-cowpea-maize-velvet bean rotation, no additional organic matter, high fertiliser	2.67	rotation	legumes	arable legumes	none	120	> 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Maize-cowpea rotation, no organic matter added, mid fertiliser	2	rotation	legumes	arable legumes	none	60	< 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Maize-cowpea rotation, Leucaena leucocephala cuttings added, mid fertiliser	2	rotation	legumes	arable legumes	none	60	< 100kg N	plant-based amendments	plant-based amendments only	residues kept	shallow non-inversion	reduced
		Maize-cowpea rotation, Senna siamea cuttings added, mid fertiliser	2	rotation	legumes	arable legumes	none	60	< 100kg N	plant-based amendments	plant-based amendments only	residues kept	shallow non-inversion	reduced
		Maize-cowpea-maize-velvet bean rotation, no additional organic matter, mid fertiliser	2.67	rotation	legumes	arable legumes	none	60	< 100kg N	none	none	residues kept	shallow non-inversion	reduced
KSA IITA/ETH SOM Aludeka	maize	Maize monoculture, no added organic matter + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	none	none	residues removed	shallow non-inversion	reduced
		Maize monoculture, no added organic matter - N	1	monoculture	none	none (monoculture)	none	0	none	none	none	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	manure	manure applied	residues removed	shallow non-inversion	reduced

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
LTE and treatment description			**Crop diversity (CD)**			**Fertility and forage crops**		**Nitrogen fertiliser (NF)**		**Organic matter management (OM)**			**Tillage (TT)**	
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Maize monoculture, farmyard manure added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttings added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttings added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttingsadded 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttings added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amend-ments	OM category	Residue treat-ment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Maize monoculture, sawdust added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
KSE IITA/ETH SOM Embu	maize	Maize monoculture, no added organic matter + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	none	none	residues removed	shallow non-inversion	reduced
		Maize monoculture, no added organic matter - N	1	monoculture	none	none (monoculture)	none	0	none	none	none	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttings added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amend-ments	OM category	Residue treat-ment	Tillage type	Tillage category
LTE and treatment description			**Crop diversity (CD)**			**Fertility and forage crops**		**Nitrogen fertiliser (NF)**		**Organic matter management (OM)**			**Tillage (TT)**	
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Maize monoculture, Calliandra calothyrsus cuttings added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttingsadded 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttings added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced

Institute and LTE name	test crop	Treatment name and description	Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
			Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Maize monoculture, Tithonia diversifolia cuttings added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
KSM IITA/ETH SOM Machanga	maize	Maize monoculture, no added organic matter + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	none	none	residues removed	shallow non-inversion	reduced
		Maize monoculture, no added organic matter - N	1	monoculture	none	none (monoculture)	none	0	none	none	none	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttings added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttings added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttingsadded 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced

	LTE and treatment description		Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amend-ments	OM category	Residue treat-ment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Maize monoculture, Calliandra calothyrsus cuttings added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Maize monoculture, Tithonia diversifolia cuttings added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
KSS IITA/ETH SOM Sidada	maize	Maize monoculture, no added organic matter + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	none	none	residues removed	shallow non-inversion	reduced
		Maize monoculture, no added organic matter - N	1	monoculture	none	none (monoculture)	none	0	none	none	none	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, farmyard manure added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	manure	manure applied	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttings added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttings added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttingsadded 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Calliandra calothyrsus cuttings added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced

		LTE and treatment description	Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Maize monoculture, maize stover added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, maize stover added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, sawdust added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 1.2 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 1.2 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 4 + N	1	monoculture	none	none (monoculture)	none	120	> 100kg N	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
		Maize monoculture, Tithonia diversifolia cuttings added 4 - N	1	monoculture	none	none (monoculture)	none	0	none	plant-based amendments	plant-based amendments only	residues removed	shallow non-inversion	reduced
HOO RRES Hoosfield Spring Barley	spring barley	Barley monoculture, no N, manure	1	monoculture	none	none (monoculture)	none	0	none	manure	manure applied	residues kept	deep inversion (plough)	plough

		LTE and treatment description	Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Barley monoculture, N1, manure	1	monoculture	none	none (monoculture)	none	48	< 100kg N	manure	manure applied	residues kept	deep inversion (plough)	plough
		Barley monoculture, N2, manure	1	monoculture	none	none (monoculture)	none	96	< 100kg N	manure	manure applied	residues kept	deep inversion (plough)	plough
		Barley monoculture, N3, manure	1	monoculture	none	none (monoculture)	none	144	> 100kg N	manure	manure applied	residues kept	deep inversion (plough)	plough
		Barley monoculture, no N, no manure	1	monoculture	none	none (monoculture)	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Barley monoculture, N1, no manure	1	monoculture	none	none (monoculture)	none	48	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Barley monoculture, N2, no manure	1	monoculture	none	none (monoculture)	none	96	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Barley monoculture, N3, no manure	1	monoculture	none	none (monoculture)	none	144	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
BRB RRES Broadbalk Continuous Wheat	wheat	Wheat monoculture, no N, residues kept, manure added	1	monoculture	none	none (monoculture)	none	0	none	manure	manure applied	residues kept	deep inversion (plough)	plough
		Wheat monoculture, no N, residues kept, no manure	1	monoculture	none	none (monoculture)	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Wheat monoculture, no N, residues removed, manure added	1	monoculture	none	none (monoculture)	none	0	none	manure	manure applied	residues removed	deep inversion (plough)	plough
		Wheat monoculture, no N, residues removed, no manure	1	monoculture	none	none (monoculture)	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Wheat monoculture, 144kg N, residues kept, manure added	1	monoculture	none	none (monoculture)	none	144	> 100kg N	manure	manure applied	residues kept	deep inversion (plough)	plough

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
LTE and treatment description			**Crop diversity (CD)**			**Fertility and forage crops**		**Nitrogen fertiliser (NF)**		**Organic matter management (OM)**			**Tillage (TT)**	
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Wheat monoculture, 144kg N, residues kept, no manure	1	monoculture	none	none (monoculture)	none	144	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Wheat monoculture, 144kg N, residues removed, manure added	1	monoculture	none	none (monoculture)	none	144	> 100kg N	manure	manure applied	residues removed	deep inversion (plough)	plough
		Wheat monoculture, 144kg N, residues removed, no manure	1	monoculture	none	none (monoculture)	none	144	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat monoculture, 192kg N, residues kept, no manure	1	monoculture	none	none (monoculture)	none	192	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Wheat monoculture, 192kg N, residues removed, no manure	1	monoculture	none	none (monoculture)	none	192	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat monoculture, 240kg N, residues kept, no manure	1	monoculture	none	none (monoculture)	none	240	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Wheat monoculture, 240kg N, residues removed, no manure	1	monoculture	none	none (monoculture)	none	240	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat monoculture, 288kg N, residues kept, no manure	1	monoculture	none	none (monoculture)	none	288	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Wheat monoculture, 288kg N, residues removed, no manure	1	monoculture	none	none (monoculture)	none	288	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat monoculture, 48kg N, residues kept, no manure	1	monoculture	none	none (monoculture)	none	48	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Wheat monoculture, 48kg N, residues removed, no manure	1	monoculture	none	none (monoculture)	none	48	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat monoculture, 96kg N, residues kept, manure added	1	monoculture	none	none (monoculture)	none	96	< 100kg N	manure	manure applied	residues kept	deep inversion (plough)	plough

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops (F)	Diversity type (F)	Legumes (F & C)	Fertility and forage crop type (F)	Grazing (F)	Nitrogen fertiliser applied (F)	Nitrogen fertiliser category (C)	OM amendments (F)	OM category (C)	Residue treatment (F)	Tillage type (F)	Tillage category (C)
		Wheat monoculture, 96kg N, residues kept, no manure	1	monoculture	none	none (monoculture)	none	96	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Wheat monoculture, 96kg N, residues removed, manure added	1	monoculture	none	none (monoculture)	none	96	< 100kg N	manure	manure applied	residues removed	deep inversion (plough)	plough
		Wheat monoculture, 96kg N, residues removed, no manure	1	monoculture	none	none (monoculture)	none	96	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (FPWWW), no N, residues removed, manure added	1.6	rotation	none	none (arable w/o legumes)	none	0	none	manure	manure applied	residues removed	deep inversion (plough)	plough
		Wheat in rotation (FPWWW), no N, residues removed, no manure	1.6	rotation	none	none (arable w/o legumes)	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (FPWWW), 144kg N, residues removed, no manure	1.6	rotation	none	none (arable w/o legumes)	none	144	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (FPWWW), 192kg N, residues removed, no manure	1.6	rotation	none	none (arable w/o legumes)	none	192	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (FPWWW), 240kg N, residues removed, no manure	1.6	rotation	none	none (arable w/o legumes)	none	240	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (FPWWW), 288kg N, residues removed, no manure	1.6	rotation	none	none (arable w/o legumes)	none	288	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (FPWWW), 48kg N, residues removed, no manure	1.6	rotation	none	none (arable w/o legumes)	none	48	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (FPWWW), 96kg N, residues removed, manure added	1.6	rotation	none	none (arable w/o legumes)	none	96	< 100kg N	manure	manure applied	residues removed	deep inversion (plough)	plough
		Wheat in rotation (FPWWW), 96kg N, residues removed, no manure	1.6	rotation	none	none (arable w/o legumes)	none	96	< 100kg N	none	none	residues removed	deep inversion (plough)	plough

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Wheat in rotation (OMWWW), no N, residues removed, manure added	2.3	rotation	none	none (arable w/o legumes)	none	0	none	manure	manure applied	residues removed	deep inversion (plough)	plough
		Wheat in rotation (OMWWW), no N, residues removed, no manure	2.3	rotation	none	none (arable w/o legumes)	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (OMWWW), 144kg N, residues removed, manure added	2.3	rotation	none	none (arable w/o legumes)	none	144	> 100kg N	manure	manure applied	residues removed	deep inversion (plough)	plough
		Wheat in rotation (OMWWW), 144kg N, residues removed, no manure	2.3	rotation	none	none (arable w/o legumes)	none	144	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (OMWWW), 192kg N, residues removed, no manure	2.3	rotation	none	none (arable w/o legumes)	none	192	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (OMWWW), 240kg N, residues removed, no manure	2.3	rotation	none	none (arable w/o legumes)	none	240	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (OMWWW), 288kg N, residues removed, no manure	2.3	rotation	none	none (arable w/o legumes)	none	288	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (OMWWW), 48kg N, residues removed, no manure	2.3	rotation	none	none (arable w/o legumes)	none	48	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (OMWWW), 96kg N, residues removed, manure added	2.3	rotation	none	none (arable w/o legumes)	none	96	< 100kg N	manure	manure applied	residues removed	deep inversion (plough)	plough
		Wheat in rotation (OMWWW), 96kg N, residues removed, no manure	2.3	rotation	none	none (arable w/o legumes)	none	96	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (PBW), no N, residues removed, manure added	3	rotation	legumes	arable legumes	none	0	none	manure	manure applied	residues removed	deep inversion (plough)	plough
		Wheat in rotation (PBW), no N, residues removed, no manure	3	rotation	legumes	arable legumes	none	0	none	none	none	residues removed	deep inversion (plough)	plough

		LTE and treatment description	Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	**test crop**	**Treatment name and description**	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Wheat in rotation (PBW), 144kg N, residues removed, no manure	3	rotation	legumes	arable legumes	none	144	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (PBW), 192kg N, residues removed, no manure	3	rotation	legumes	arable legumes	none	192	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (PBW), 48kg N, residues removed, no manure	3	rotation	legumes	arable legumes	none	48	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Wheat in rotation (PBW), 96kg N, residues removed, manure added	3	rotation	legumes	arable legumes	none	96	< 100kg N	manure	manure applied	residues removed	deep inversion (plough)	plough
		Wheat in rotation (PBW), 96kg N, residues removed, no manure	3	rotation	legumes	arable legumes	none	96	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
WOB RRES Woburn Ley-Arable	wheat	Arable rotation (AB or ABe), no N	3	rotation	legumes	arable legumes	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (AF or AM), no N	3*	rotation	legumes	arable legumes	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year mixed ley, no N	3.5*	rotation	legumes	ley containing legumes	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year grass ley, no N	2*	rotation	none	ley, grass only	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Rotation with eight year mixed ley, no N	1.5*	rotation	legumes	ley containing legumes	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Rotation with eight year grass ley, no N	2.9*	rotation	none	ley, grass only	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (plots previously in rotation with eight year ley), no N	3.5*	rotation	legumes	arable legumes	none	0	none	none	none	residues removed	deep inversion (plough)	plough

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Arable rotation (plots previously in rotation with eight year ley), no N	3.5*	rotation	legumes	arable legumes	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year mixed ley (plots previously in rotation with eight year ley), no N	3.8*	rotation	legumes	ley containing legumes	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year grass ley (plots previously in rotation with eight year ley), no N	2.3*	rotation	none	ley, grass only	none	0	none	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (AB or ABe), low N	3*	rotation	legumes	arable legumes	none	72.8	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (AF or AM), low N	3.5*	rotation	legumes	arable legumes	none	72.8	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year mixed ley, low N	2*	rotation	legumes	ley containing legumes	none	72.8	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year grass ley, low N	1.5*	rotation	none	ley, grass only	none	72.8	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with eight year mixed ley, low N	2.9*	rotation	legumes	ley containing legumes	none	72.8	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with eight year grass ley, low N	3.5*	rotation	none	ley, grass only	none	72.8	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (plots previously in rotation with eight year ley), low N	3.5*	rotation	legumes	arable legumes	none	72.8	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (plots previously in rotation with eight year ley), low N	3.8*	rotation	legumes	arable legumes	none	72.8	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year mixed ley (plots previously in rotation with eight year ley), low N	2.3*	rotation	legumes	ley containing legumes	none	72.8	< 100kg N	none	none	residues removed	deep inversion (plough)	plough

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Rotation with three year grass ley (plots previously in rotation with eight year ley), low N	3*	rotation	none	ley, grass only	none	72.8	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (AB or ABe), mid N	3.5*	rotation	legumes	arable legumes	none	145.6	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (AF or AM), mid N	2*	rotation	legumes	arable legumes	none	145.6	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year mixed ley, mid N	1.5*	rotation	legumes	ley containing legumes	none	145.6	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year grass ley, mid N	2.9*	rotation	none	ley, grass only	none	145.6	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with eight year mixed ley, mid N	3.5*	rotation	legumes	ley containing legumes	none	145.6	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with eight year grass ley, mid N	3.5*	rotation	none	ley, grass only	none	145.6	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (plots previously in rotation with eight year ley), mid N	3.8*	rotation	legumes	arable legumes	none	145.6	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (plots previously in rotation with eight year ley), mid N	2.3*	rotation	legumes	arable legumes	none	145.6	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year mixed ley (plots previously in rotation with eight year ley), mid N	3*	rotation	legumes	ley containing legumes	none	145.6	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year grass ley (plots previously in rotation with eight year ley), mid N	3.5*	rotation	none	ley, grass only	none	145.6	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (AB or ABe), high N	2*	rotation	legumes	arable legumes	none	218.4	> 100kg N	none	none	residues removed	deep inversion (plough)	plough

	LTE and treatment description		Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Arable rotation (AF or AM), high N	1.5*	rotation	legumes	arable legumes	none	218.4	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year mixed ley, high N	2.9*	rotation	legumes	ley containing legumes	none	218.4	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year grass ley, high N	3.5*	rotation	none	ley, grass only	none	218.4	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with eight year mixed ley, high N	3.5*	rotation	legumes	ley containing legumes	none	218.4	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with eight year grass ley, high N	3.8*	rotation	none	ley, grass only	none	218.4	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (plots previously in rotation with eight year ley), high N	2.3*	rotation	legumes	arable legumes	none	218.4	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Arable rotation (plots previously in rotation with eight year ley), high N	3.5	rotation	legumes	arable legumes	none	218.4	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year mixed ley (plots previously in rotation with eight year ley), high N	3.8	rotation	legumes	ley containing legumes	none	218.4	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with three year grass ley (plots previously in rotation with eight year ley), high N	2.3	rotation	none	ley, grass only	none	218.4	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
SCE SLU Spring cereals (R4-0906)	oats	Monoculture, no N, straw burnt	1	monoculture	none	none (monoculture)	none	35	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Monoculture, N1, straw burnt	1	monoculture	none	none (monoculture)	none	70	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Monoculture, N2, straw burnt	1	monoculture	none	none (monoculture)	none	105	> 100kg N	none	none	residues removed	deep inversion (plough)	plough

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Monoculture, N3, straw burnt	1	monoculture	none	none (monoculture)	none	140	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Monoculture, no N, straw ploughed	1	monoculture	none	none (monoculture)	none	35	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Monoculture, N1, straw ploughed	1	monoculture	none	none (monoculture)	none	70	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Monoculture, N2, straw ploughed	1	monoculture	none	none (monoculture)	none	105	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Monoculture, N3, straw ploughed	1	monoculture	none	none (monoculture)	none	140	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, no N, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	35	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, N1, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	70	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, N2, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	105	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, N3, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	140	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
SCE SLU Spring cereals (R4-0906)	spring wheat	Monoculture, no N, straw burnt	1	monoculture	none	none (monoculture)	none	35	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Monoculture, N1, straw burnt	1	monoculture	none	none (monoculture)	none	70	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Monoculture, N2, straw burnt	1	monoculture	none	none (monoculture)	none	105	> 100kg N	none	none	residues removed	deep inversion (plough)	plough

			Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	**test crop**	**Treatment name and description**	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amend-ments	OM category	Residue treat-ment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Monoculture, N3, straw burnt	1	monoculture	none	none (monoculture)	none	140	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Monoculture, no N, straw ploughed	1	monoculture	none	none (monoculture)	none	35	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Monoculture, N1, straw ploughed	1	monoculture	none	none (monoculture)	none	70	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Monoculture, N2, straw ploughed	1	monoculture	none	none (monoculture)	none	105	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Monoculture, N3, straw ploughed	1	monoculture	none	none (monoculture)	none	140	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, no N, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	35	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, N1, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	70	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, N2, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	105	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, N3, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	140	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
SCE SLU Spring cereals (R4-0906)	barley	Monoculture, no N, straw burnt	1	monoculture	none	none (monoculture)	none	35	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Monoculture, N1, straw burnt	1	monoculture	none	none (monoculture)	none	70	< 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Monoculture, N2, straw burnt	1	monoculture	none	none (monoculture)	none	105	> 100kg N	none	none	residues removed	deep inversion (plough)	plough

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Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
LTE and treatment description			**Crop diversity (CD)**			**Fertility and forage crops**		**Nitrogen fertiliser (NF)**		**Organic matter management (OM)**			**Tillage (TT)**	
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Monoculture, N3, straw burnt	1	monoculture	none	none (monoculture)	none	140	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Monoculture, no N, straw ploughed	1	monoculture	none	none (monoculture)	none	35	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Monoculture, N1, straw ploughed	1	monoculture	none	none (monoculture)	none	70	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Monoculture, N2, straw ploughed	1	monoculture	none	none (monoculture)	none	105	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Monoculture, N3, straw ploughed	1	monoculture	none	none (monoculture)	none	140	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, no N, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	35	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, N1, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	70	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, N2, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	105	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation, N3, straw ploughed	5	rotation	none	none (arable w/o legumes)	none	140	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
PSP SLU Production specialisations (R4-0002)	winter wheat	Rotation with leys	6.4	rotation	legumes	ley containing legumes	none	125 then 120	> 100kg N	manure	manure applied	residues removed	deep inversion (plough)	plough
		Cash crop rotation	4.6	rotation	none	none (arable w/o legumes)	none	125 then 120	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with fertility crops	6.4	rotation	legumes	annual non-arable legumes	none	125 then 120	> 100kg N	none	none	residues kept	deep inversion (plough)	plough

	LTE and treatment description		Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amend-ments	OM category	Residue treat-ment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
PSP SLU Production specialisations (R4-0002)	spring wheat	Rotation with leys	6.4	rotation	legumes	ley containing legumes	none	100 then 160	> 100kg N	manure	manure applied	residues removed	deep inversion (plough)	plough
		Cash crop rotation	4.6	rotation	none	none (arable w/o legumes)	none	100 then 160	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with fertility crops	6.4	rotation	legumes	annual non-arable legumes	none	100 then 160	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
PSP SLU Production specialisations (R4-0002)	sugarbeet	Rotation with leys	6.4	rotation	legumes	ley containing legumes	none	140 then 120	> 100kg N	manure	manure applied	residues removed	deep Inversion (plough)	plough
		Cash crop rotation	4.6	rotation	none	none (arable w/o legumes)	none	140 then 120	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Rotation with fertility crops	6.4	rotation	legumes	annual non-arable legumes	none	140 then 120	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
RLS SLU Crop rotations with and without leys (R4-1103) - Säby	oats	No ley, no N	5	rotation	none	none (arable w/o legumes)	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		No ley, N1	5	rotation	none	none (arable w/o legumes)	none	40	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N2	5	rotation	none	none (arable w/o legumes)	none	80	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N3	5	rotation	none	none (arable w/o legumes)	none	120	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, no N	6	rotation	legumes	ley containing legumes	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N1	6	rotation	legumes	ley containing legumes	none	40	< 100kg N	none	none	residues kept	deep inversion (plough)	plough

		LTE and treatment description	Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Mixed ley, N2	6	rotation	legumes	ley containing legumes	none	80	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N3	6	rotation	legumes	ley containing legumes	none	120	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, no N	4.5	rotation	none	ley, grass only	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N1	4.5	rotation	none	ley, grass only	none	40	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N2	4.5	rotation	none	ley, grass only	none	80	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N3	4.5	rotation	none	ley, grass only	none	120	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
RLS SLU Crop rotations with and without leys (R4-1103) - Säby	wheat	No ley, no N	5	rotation	none	none (arable w/o legumes)	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		No ley, N1	5	rotation	none	none (arable w/o legumes)	none	45	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N2	5	rotation	none	none (arable w/o legumes)	none	90	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N3	5	rotation	none	none (arable w/o legumes)	none	135	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, no N	6	rotation	legumes	ley containing legumes	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N1	6	rotation	legumes	ley containing legumes	none	45	< 100kg N	none	none	residues kept	deep inversion (plough)	plough

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Mixed ley, N2	6	rotation	legumes	ley containing legumes	none	90	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N3	6	rotation	legumes	ley containing legumes	none	135	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, no N	4.5	rotation	none	ley, grass only	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N1	4.5	rotation	none	ley, grass only	none	45	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N2	4.5	rotation	none	ley, grass only	none	90	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N3	4.5	rotation	none	ley, grass only	none	135	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
RLT SLU Crop rotations with and without leys (R4-1103) - Stenstugu	oats	No ley, no N	5	rotation	none	none (arable w/o legumes)	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		No ley, N1	5	rotation	none	none (arable w/o legumes)	none	40	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N2	5	rotation	none	none (arable w/o legumes)	none	80	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N3	5	rotation	none	none (arable w/o legumes)	none	120	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, no N	6	rotation	legumes	ley containing legumes	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N1	6	rotation	legumes	ley containing legumes	none	40	< 100kg N	none	none	residues kept	deep inversion (plough)	plough

	LTE and treatment description		Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Mixed ley, N2	6	rotation	legumes	ley containing legumes	none	80	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N3	6	rotation	legumes	ley containing legumes	none	120	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, no N	4.5	rotation	none	ley, grass only	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N1	4.5	rotation	none	ley, grass only	none	40	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N2	4.5	rotation	none	ley, grass only	none	80	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N3	4.5	rotation	none	ley, grass only	none	120	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
RLT SLU Crop rotations with and without leys (R4-1103) - Stenstugu	wheat	No ley, no N	5	rotation	none	none (arable w/o legumes)	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		No ley, N1	5	rotation	none	none (arable w/o legumes)	none	45	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N2	5	rotation	none	none (arable w/o legumes)	none	90	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N3	5	rotation	none	none (arable w/o legumes)	none	135	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, no N	6	rotation	legumes	ley containing legumes	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N1	6	rotation	legumes	ley containing legumes	none	45	< 100kg N	none	none	residues kept	deep inversion (plough)	plough

	LTE and treatment description			Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Mixed ley, N2	6	rotation	legumes	ley containing legumes	none	90	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N3	6	rotation	legumes	ley containing legumes	none	135	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, no N	4.5	rotation	none	ley, grass only	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N1	4.5	rotation	none	ley, grass only	none	45	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N2	4.5	rotation	none	ley, grass only	none	90	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N3	4.5	rotation	none	ley, grass only	none	135	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
RLL SLU Crop rotations with and without leys (R4-1103) - Lanna	oats	No ley, no N	5	rotation	none	none (arable w/o legumes)	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		No ley, N1	5	rotation	none	none (arable w/o legumes)	none	40	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N2	5	rotation	none	none (arable w/o legumes)	none	80	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N3	5	rotation	none	none (arable w/o legumes)	none	120	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, no N	6	rotation	legumes	ley containing legumes	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N1	6	rotation	legumes	ley containing legumes	none	40	< 100kg N	none	none	residues kept	deep inversion (plough)	plough

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			LTE and treatment description → **Crop diversity (CD)** → **Fertility and forage crops** → **Nitrogen fertiliser (NF)** → **Organic matter management (OM)** → **Tillage (TT)**											
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Mixed ley, N2	6	rotation	legumes	ley containing legumes	none	80	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N3	6	rotation	legumes	ley containing legumes	none	120	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, no N	4.5	rotation	none	ley, grass only	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N1	4.5	rotation	none	ley, grass only	none	40	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N2	4.5	rotation	none	ley, grass only	none	80	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N3	4.5	rotation	none	ley, grass only	none	120	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
RLL SLU Crop rotations with and without leys (R4-1103) - Lanna	wheat	No ley, no N	5	rotation	none	none (arable w/o legumes)	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		No ley, N1	5	rotation	none	none (arable w/o legumes)	none	45	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N2	5	rotation	none	none (arable w/o legumes)	none	90	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		No ley, N3	5	rotation	none	none (arable w/o legumes)	none	135	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, no N	6	rotation	legumes	ley containing legumes	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N1	6	rotation	legumes	ley containing legumes	none	45	< 100kg N	none	none	residues kept	deep inversion (plough)	plough

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		LTE and treatment description	Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Mixed ley, N2	6	rotation	legumes	ley containing legumes	none	90	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Mixed ley, N3	6	rotation	legumes	ley containing legumes	none	135	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, no N	4.5	rotation	none	ley, grass only	none	0	none	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N1	4.5	rotation	none	ley, grass only	none	45	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N2	4.5	rotation	none	ley, grass only	none	90	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Grass ley, N3	4.5	rotation	none	ley, grass only	none	135	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
NTR SLU No till and residue management (R2-4017)	winter wheat	Crop rotation (mostly cereals), conventional tillage (plough), residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation (mostly cereals), conventional tillage (plough), residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Crop rotation (mostly cereals), conventional tillage (plough) + stubble cultivation, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation (mostly cereals), conventional tillage (plough) + stubble cultivation, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Crop rotation (mostly cereals), occasional tillage, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	infrequent tillage	reduced

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Crop rotation (mostly cereals), occasional tillage, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	infrequent tillage	reduced
		Crop rotation (mostly cereals), occasional tillage + stubble cultivation, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	infrequent tillage	reduced
		Crop rotation (mostly cereals), occasional tillage + stubble cultivation, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	infrequent tillage	reduced
		Crop rotation (mostly cereals), no-till tillage, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	no-till	no-till
		Crop rotation (mostly cereals), no-till tillage, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	no-till	no-till
		Crop rotation (mostly cereals), no-till tillage + stubble cultivation, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	shallow non-inversion	reduced
NTR SLU No till and residue management (R2-4017)	oats	Crop rotation (mostly cereals), conventional tillage (plough), residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation (mostly cereals), conventional tillage (plough), residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Crop rotation (mostly cereals), conventional tillage (plough) + stubble cultivation, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation (mostly cereals), conventional tillage (plough) + stubble cultivation, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Crop rotation (mostly cereals), occasional tillage, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	infrequent tillage	reduced

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	**F**	**F & C**	**F**	**F**	**F**	**C**	**F**	**C**	**F**	**F**	**C**
		Crop rotation (mostly cereals), occasional tillage, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	infrequent tillage	reduced
		Crop rotation (mostly cereals), occasional tillage + stubble cultivation, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	infrequent tillage	reduced
		Crop rotation (mostly cereals), occasional tillage + stubble cultivation, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	infrequent tillage	reduced
		Crop rotation (mostly cereals), no-till tillage, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	no-till	no-till
		Crop rotation (mostly cereals), no-till tillage, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	no-till	no-till
		Crop rotation (mostly cereals), no-till tillage + stubble cultivation, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Crop rotation (mostly cereals), no-till tillage + stubble cultivation, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	shallow non-inversion	reduced
NTR SLU No till and residue management (R2-4017)	barley	Crop rotation (mostly cereals), conventional tillage (plough), residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation (mostly cereals), conventional tillage (plough), residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	deep inversion (plough)	plough
		Crop rotation (mostly cereals), conventional tillage (plough) + stubble cultivation, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation (mostly cereals), conventional tillage (plough) + stubble cultivation, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	deep inversion (plough)	plough

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amend-ments	OM category	Residue treat-ment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Crop rotation (mostly cereals), occasional tillage, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	infrequent tillage	reduced
		Crop rotation (mostly cereals), occasional tillage, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	infrequent tillage	reduced
		Crop rotation (mostly cereals), occasional tillage + stubble cultivation, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	infrequent tillage	reduced
		Crop rotation (mostly cereals), occasional tillage + stubble cultivation, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	infrequent tillage	reduced
		Crop rotation (mostly cereals), no-till tillage, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	no-till	no-till
		Crop rotation (mostly cereals), no-till tillage, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	no-till	no-till
		Crop rotation (mostly cereals), no-till tillage + stubble cultivation, residue kept	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Crop rotation (mostly cereals), no-till tillage + stubble cultivation, residue removed	2.67*	rotation	none	none (arable w/o legumes)*	none	150 to 160	> 100kg N	none	none	residues removed	shallow non-inversion	reduced
TIR SLU Tillage intensity and crop rotation (R2-4142)	winter wheat	More diverse rotation, ploughed to 23cm	2.27*	rotation	legumes	arable legumes	none	150 to 160	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		More diverse rotation, ploughed to 12cm	2.27*	rotation	legumes	arable legumes	none	150 to 160	> 100kg N	none	none	residues kept	shallow inversion	reduced
		More diverse rotation, 'Kultivator' 10-22cm	2.27*	rotation	legumes	arable legumes	none	150 to 160	> 100kg N	none	none	residues kept	shallow non-inversion	reduced
		More diverse rotation, deep cultivation to 20cm	2.27*	rotation	legumes	arable legumes	none	150 to 160	> 100kg N	none	none	residues kept	deep non-inversion	reduced

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		More diverse rotation, 'carrier' 5-7cm	2.27*	rotation	legumes	arable legumes	none	150 to 160	> 100kg N	none	none	residues kept	shallow non-inversion	reduced
		More diverse rotation, no-till	2.27*	rotation	legumes	arable legumes	none	150 to 160	> 100kg N	none	none	residues kept	no-till	no-till
		Less diverse rotation, ploughed to 23cm	1.92*	rotation	none	none (arable w/o legumes)	none	150 to 160	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Less diverse rotation, ploughed to 12cm	1.92*	rotation	none	none (arable w/o legumes)	none	150 to 160	> 100kg N	none	none	residues kept	shallow inversion	reduced
		Less diverse rotation, 'Kultivator' 10-22cm	1.92*	rotation	none	none (arable w/o legumes)	none	150 to 160	> 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Less diverse rotation, deep cultivation to 20cm	1.92*	rotation	none	none (arable w/o legumes)	none	150 to 160	> 100kg N	none	none	residues kept	deep non-inversion	reduced
		Less diverse rotation, 'carrier' 5-7cm	1.92*	rotation	none	none (arable w/o legumes)	none	150 to 160	> 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Less diverse rotation, no-till	1.92*	rotation	none	none (arable w/o legumes)	none	150 to 160	> 100kg N	none	none	residues kept	no-till	no-till

The crop rotations in the RRES Woburn Ley-Arable LTE sometimes varied slightly, so they diversity indices here are averages for each rotation

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
OLD SRUC Old Rotation (Woodland)	oats	Rotation with leys, low fertiliser - pre 1991 (with superphosphate)	4.5	rotation	legumes	ley containing legumes	none	26	< 100kg N	none	manure applied	residues kept	deep inversion (plough)	plough
		Rotation with leys, low fertiliser - pre 1991 (with GM phosphate)	4.5	rotation	legumes	ley containing legumes	none	26	< 100kg N	none	manure applied	residues kept	deep inversion (plough)	plough
		Rotation with leys, no N fertiliser (P + K only)	4.5	rotation	legumes	ley containing legumes	none	0	none	none	manure applied	residues kept	deep inversion (plough)	plough
		Rotation with leys, high fertiliser - post 1991 (with superphosphate)	4.5	rotation	legumes	ley containing legumes	none	80	< 100kg N	none	manure applied	residues kept	deep inversion (plough)	plough

	LTE and treatment description		Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Rotation with leys, high fertiliser - post 1991 (with GM phosphate)	4.5	rotation	legumes	ley containing legumes	none	80	< 100kg N	none	manure applied	residues kept	deep inversion (plough)	plough
OLD SRUC Old Rotation (Woodland)	spring barley	Rotation with leys, low fertiliser - pre 1991 (with superphosphate)	4.5	rotation	legumes	ley containing legumes	none	26	< 100kg N	none	manure applied	residues kept	deep inversion (plough)	plough
		Rotation with leys, low fertiliser - pre 1991 (with GM phosphate)	4.5	rotation	legumes	ley containing legumes	none	26	< 100kg N	none	manure applied	residues kept	deep inversion (plough)	plough
		Rotation with leys, no N fertiliser (P + K only)	4.5	rotation	legumes	ley containing legumes	none	0	none	none	manure applied	residues kept	deep inversion (plough)	plough
		Rotation with leys, high fertiliser - post 1991 (with superphosphate)	4.5	rotation	legumes	ley containing legumes	none	80	< 100kg N	none	manure applied	residues kept	deep inversion (plough)	plough
		Rotation with leys, high fertiliser - post 1991 (with GM phosphate)	4.5	rotation	legumes	ley containing legumes	none	80	< 100kg N	none	manure applied	residues kept	deep inversion (plough)	plough
TUL SRUC Tulloch Organic Rotations	oats	Rotation with a four year ley, grazed by sheep (T67)	2.6	rotation	legumes	ley containing legumes	sheep	0	none	none	manure applied	residues kept	deep inversion (plough)	plough
		Rotation with a three year ley, grazed by sheep (T50)	2	rotation	legumes	ley containing legumes	sheep	0	none	none	manure applied	residues kept	deep inversion (plough)	plough
		Arable rotation with annual cover/hay crops (TO)	6	rotation	legumes	arable legumes	none	0	none	none	none	residues kept	deep inversion (plough)	plough
LCR WCGDA Langgewens Long-Term Crop Rotation Systems Trial	wheat	Wheat monoculture	1	monoculture	none	none (monoculture)	none	70-100*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Wheat with canola break crop every fourth year (wheat-wheat-wheat-canola)	1.6	rotation	none	none (arable w/o legumes)	none	70-100*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Wheat rotated with canola and lupins (wheat-canola-wheat-lupin)	2.67	rotation	legumes	arable legumes	none	65-95*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Wheat rotated with canola and lupins (wheat-wheat-canola-lupin)	2.67	rotation	legumes	arable legumes	none	70-100*	< 100kg N	none	none	residues kept	no till then zero till	no-till

			LTE and treatment description	Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Wheat rotated with annual medics, grazed by sheep (wheat-medics-wheat-medics)	2	rotation	legumes	annual non-arable legumes	sheep	50-75*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Wheat rotated with annual medic/clover mix, grazed by sheep (wheat-medics/clover-wheat-medics/clover)	2.67	rotation	legumes	annual non-arable legumes	sheep	50-75*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Wheat rotated with canola and with annual medics, grazed by sheep (wheat-medics-canola-medics)	2.67	rotation	legumes	annual non-arable legumes	sheep	50-75*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Wheat rotated with annual medics, grazed by sheep (reduced grazing pressure with additional saltbush pasture)	2.67	rotation	legumes	annual non-arable legumes	sheep	50-75*	< 100kg N	none	none	residues kept	no till then zero till	no-till
TCR WCGDA Tygerhoek Long-Term Crop Rotation Systems Trial	wheat	One year of wheat, two years of medic/clover pastures grazed by sheep	3	rotation	legumes	ley containing legumes	sheep	50-60*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Alternating wheat and medic/clover pastures each year, grazed by sheep	2.67	rotation	legumes	annual non-arable legumes	sheep	50-60*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Wheat - medic/clover pasture - oats - medic/clover pasture, pastures grazed by sheep	4	rotation	legumes	annual non-arable legumes	sheep	50-60*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Wheat - medic/clover pasture - barley - medic/clover pasture, pastures grazed by sheep	4	rotation	legumes	annual non-arable legumes	sheep	50-60*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Wheat - medic/clover pasture - canola - medic/clover pasture, pastures grazed by sheep	4	rotation	legumes	annual non-arable legumes	sheep	50-60*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Two years of wheat alternating with two years of medic/clover pastures, grazed by sheep	2.67	rotation	legumes	ley containing legumes	sheep	50-60*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Oats - wheat - two years of medic/clover pastures, grazed by sheep	4	rotation	legumes	ley containing legumes	sheep	50-60*	< 100kg N	none	none	residues kept	no till then zero till	no-till

		LTE and treatment description	Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	*F*	*F & C*	*F*	*F*	*F*	*C*	*F*	*C*	*F*	*F*	*C*
		Wheat - barley - two years of medic/clover pastures, grazed by sheep	4	rotation	legumes	ley containing legumes	sheep	50-60*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Canola - wheat - two years of medic/clover pastures, grazed by sheep	4	rotation	legumes	ley containing legumes	sheep	50-60*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Arable rotation (no grazing): wheat - barley - wheat - lupins	2.67	rotation	legumes	arable legumes	none	50-60*	< 100kg N	none	none	residues kept	no till then zero till	no-till
		Arable rotation (no grazing): wheat - barley - canola - wheat - barley - lupins	3.6	rotation	legumes	arable legumes	none	50-60*	< 100kg N	none	none	residues kept	no till then zero till	no-till
LTF WCGDA Tillage frequency for soil quality and plant productivity (8.PS/SR/S/JL7)	wheat	Crop rotation with conventional tillage (plough)	2.67	rotation	legumes	arable legumes	none	65	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Crop rotation with tine tillage	2.67	rotation	legumes	arable legumes	none	65	< 100kg N	none	none	residues kept	deep non-inversion	reduced
		Crop rotation with shallow tine tillage	2.67	rotation	legumes	arable legumes	none	65	< 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Crop rotation with alternating shallow tine tillage or no-till each year	2.67	rotation	legumes	arable legumes	none	65	< 100kg N	none	none	residues kept	infrequent tillage	reduced
		Crop rotation with one year of shallow tine tillage then two years of no-till	2.67	rotation	legumes	arable legumes	none	65	< 100kg N	none	none	residues kept	infrequent tillage	reduced
		Crop rotation with one year of shallow tine tillage then three years of no-till	2.67	rotation	legumes	arable legumes	none	65	< 100kg N	none	none	residues kept	infrequent tillage	reduced
		Crop rotation, no-till	2.67	rotation	legumes	arable legumes	none	65	< 100kg N	none	none	residues kept	no-till	no-till
		Wheat monoculture with conventional tillage (plough)	1	monoculture	none	none (monoculture)	none	65	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Wheat monoculture with tine tillage	1	monoculture	none	none (monoculture)	none	65	< 100kg N	none	none	residues kept	deep non-inversion	reduced

	LTE and treatment description		Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Wheat monoculture with shallow tine tillage	1	monoculture	none	none (monoculture)	none	65	< 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Wheat monoculture with alternating shallow tine tillage or no-till each year	1	monoculture	none	none (monoculture)	none	65	< 100kg N	none	none	residues kept	infrequent tillage	reduced
		Wheat monoculture with one year of shallow tine tillage then two years of no-till	1	monoculture	none	none (monoculture)	none	65	< 100kg N	none	none	residues kept	infrequent tillage	reduced
		Wheat monoculture with one year of shallow tine tillage then three years of no-till	1	monoculture	none	none (monoculture)	none	65	< 100kg N	none	none	residues kept	infrequent tillage	reduced
		Wheat monoculture, no-till	1	monoculture	none	none (monoculture)	none	65	< 100kg N	none	none	residues kept	no-till	no-till
SQL WCGDA Long- and short-term strategies for for soil quality (4.PS/SR/S/JL3) - Langgewens	wheat	Wheat monoculture, zero-till	1	monoculture	none	none (monoculture)	none	65	< 100kg N	none	none	residues kept	zero-till	no-till
		Wheat monoculture, no-till	1	monoculture	none	none (monoculture)	none	65	< 100kg N	none	none	residues kept	no-till	no-till
		Wheat monoculture, minimum till (tine harrow)	1	monoculture	none	none (monoculture)	none	65	< 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Wheat monoculture, conventional till (plough)	1	monoculture	none	none (monoculture)	none	65	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Wheat rotated with annual medics (hay crop), zero-till	2	rotation	legumes	annual non-arable legumes	none	65	< 100kg N	none	none	residues kept	zero-till	no-till
		Wheat rotated with annual medics (hay crop), no-till	2	rotation	legumes	annual non-arable legumes	none	65	< 100kg N	none	none	residues kept	no-till	no-till
		Wheat rotated with annual medics (hay crop), minimum till (tine harrow)	2	rotation	legumes	annual non-arable legumes	none	65	< 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Wheat rotated with annual medics (hay crop), conventional till (plough)	2	rotation	legumes	annual non-arable legumes	none	65	< 100kg N	none	none	residues kept	deep inversion (plough)	plough

		LTE and treatment description	Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Wheat rotated with canola and lupins, zero-till	2.67	rotation	legumes	arable legumes	none	65	< 100kg N	none	none	residues kept	zero-till	no-till
		Wheat rotated with canola and lupins, no-till	2.67	rotation	legumes	arable legumes	none	65	< 100kg N	none	none	residues kept	no-till	no-till
		Wheat rotated with canola and lupins, minimum till (tine harrow)	2.67	rotation	legumes	arable legumes	none	65	< 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Wheat rotated with canola and lupins, conventional till (plough)	2.67	rotation	legumes	arable legumes	none	65	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
SQT WCGDA Long- and short-term strategies for for soil quality (4.PS/SR/S/JL3) - Tygerhoek	wheat	Wheat monoculture, zero-till	1	monoculture	none	none (monoculture)	none	55	< 100kg N	none	none	residues kept	zero-till	no-till
		Wheat monoculture, no-till	1	monoculture	none	none (monoculture)	none	55	< 100kg N	none	none	residues kept	no-till	no-till
		Wheat monoculture, minimum till (tine harrow)	1	monoculture	none	none (monoculture)	none	55	< 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Wheat monoculture, conventional till (plough)	1	monoculture	none	none (monoculture)	none	55	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Wheat rotated with annual medics (hay crop), zero-till	2	rotation	legumes	annual non-arable legumes	none	55	< 100kg N	none	none	residues kept	zero-till	no-till
		Wheat rotated with annual medics (hay crop), no-till	2	rotation	legumes	annual non-arable legumes	none	55	< 100kg N	none	none	residues kept	no-till	no-till
		Wheat rotated with annual medics (hay crop), minimum till (tine harrow)	2	rotation	legumes	annual non-arable legumes	none	55	< 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Wheat rotated with annual medics (hay crop), conventional till (plough)	2	rotation	legumes	annual non-arable legumes	none	55	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Wheat rotated with canola and lupins, zero-till	2.67	rotation	legumes	arable legumes	none	55	< 100kg N	none	none	residues kept	zero-till	no-till
		Wheat rotated with canola and lupins, no-till	2.67	rotation	legumes	arable legumes	none	55	< 100kg N	none	none	residues kept	no-till	no-till

Institute and LTE name	test crop	Treatment name and description	Crop diversity (CD)			Fertility and forage crops		Nitrogen fertiliser (NF)		Organic matter management (OM)			Tillage (TT)	
			Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Wheat rotated with canola and lupins, minimum till (tine harrow)	2.67	rotation	legumes	arable legumes	none	55	< 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Wheat rotated with canola and lupins, conventional till (plough)	2.67	rotation	legumes	arable legumes	none	55	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
BAS WUR BASIS	potato	Conventional management, conventional tillage (plough)	4	rotation	none	none (arable w/o legumes)	none	100	< 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Conventional management, reduced tillage	4	rotation	none	none (arable w/o legumes)	none	100	< 100kg N	none	none	residues kept	shallow non-inversion	reduced
		Conventional management, reduced tillage with subsoiling	4	rotation	none	none (arable w/o legumes)	none	100	< 100kg N	none	none	residues kept	deep non-inversion	reduced
		Organic management, conventional tillage (plough)	6	rotation	legumes	annual non-arable legumes*	none	0	none	manure	manure applied	residues kept	deep inversion (plough)	plough
		Organic management, reduced tillage	6	rotation	legumes	annual non-arable legumes*	none	0	none	manure	manure applied	residues kept	shallow non-inversion	reduced
		Organic management, reduced tillage with subsoiling	6	rotation	legumes	annual non-arable legumes*	none	0	none	manure	manure applied	residues kept	deep non-inversion	reduced
BKZ WUR Soil Quality	potato	Conventional mangement, low organic matter (no manure) (no manure), ploughed	8.2	rotation	legumes	arable legumes	none	200	> 100kg N	none	none	residues kept	deep inversion (plough)	plough
		Conventional mangement, low organic matter (no manure), non-inversion tillage	8.2	rotation	legumes	arable legumes	none	200	> 100kg N	none	none	residues kept	deep non-inversion	reduced
		Conventional mangement, low organic matter (no manure), ploughed, compost added	8.2	rotation	legumes	arable legumes	none	200	> 100kg N	plant-based amendments	plant-based amendments only	residues kept	deep inversion (plough)	plough
		Conventional mangement, low organic matter (no manure), non-inversion tillage, compost added	8.2	rotation	legumes	arable legumes	none	200	> 100kg N	plant-based amendments	plant-based amendments only	residues kept	deep non-inversion	reduced

Institute and LTE name	test crop	Treatment name and description	Simpson's diversity of crops	Diversity type	Legumes	Fertility and forage crop type	Grazing	Nitrogen fertiliser applied	Nitrogen fertiliser category	OM amendments	OM category	Residue treatment	Tillage type	Tillage category
			F	F	F & C	F	F	F	C	F	C	F	F	C
		Conventional mangement, standard organic matter (manure added), ploughed	8.2	rotation	legumes	arable legumes	none	100	< 100kg N	manure	manure applied	residues kept	deep inversion (plough)	plough
		Conventional mangement, standard organic matter (manure added), non-inversion tillage	8.2	rotation	legumes	arable legumes	none	100	< 100kg N	manure	manure applied	residues kept	deep non-inversion	reduced
		Conventional mangement, standard organic matter (manure added), ploughed, compost added	8.2	rotation	legumes	arable legumes	none	100	< 100kg N	both plant-based and manure	manure applied	residues kept	deep inversion (plough)	plough
		Conventional mangement, standard organic matter (manure added), non-inversion tillage, compost added	8.2	rotation	legumes	arable legumes	none	100	< 100kg N	both plant-based and manure	manure applied	residues kept	deep non-inversion	reduced
		Organic management, standard organic matter (manure added), ploughed	7.4	rotation	legumes	arable legumes	none	0	none	manure	manure applied	residues kept	deep inversion (plough)	plough
		Organic management, standard organic matter (manure added), non-inversion tillage	7.4	rotation	legumes	arable legumes	none	0	none	manure	manure applied	residues kept	deep non-inversion	reduced
		Organic management, standard organic matter (manure added), ploughed, compost added	7.4	rotation	legumes	arable legumes	none	0	none	both plant-based and manure	manure applied	residues kept	deep inversion (plough)	plough
		Organic management, standard organic matter (manure added), non-inversion tillage, compost added	7.4	rotation	legumes	arable legumes	none	0	none	both plant-based and manure	manure applied	residues kept	deep non-inversion	reduced

Supplementary Materials – Part 2

Long-term evidence for ecological intensification as a pathway to sustainable agriculture

Simpson's index for cropping system diversity

Supplementary Materials 2: Simpson's Index for cropping system diversity

What is Simpson's diversity index?

Simpson's diversity index is usually calculated based on the number of individuals of each species, or the proportion of ground covered by each species, or similar, to assess the richness and evenness of species present in a given space (e.g. a quadrat). When using proportions, the formula is:

$$D = 1/sum(p_i^2)$$

Where p_i = the proportion of individuals at a site belonging to each species.

How do we use this in the context of crop rotation?

We can substitute 'proportion of individuals of a species' for 'proportion of time occupied by a given species'. In the traditional use of the index, a quadrat might be found to contain 50% of species A, 25% of species B and 25% of species C, resulting in:

$$D = 1/sum(0.5^2 + 0.25^2 + 0.25^2)$$

$$D = 2.667$$

In a crop rotation of four years, e.g. wheat-beans-wheat-OSR, then crop A (wheat) occupies two out of four years, 50%, while crop B (beans) and crop C (OSR) occupy one out of four, 25%. This results in the same index as above.

This approach assumes any fallow period in the year to be part of the "crop", i.e. a year of winter wheat is roughly a full year of wheat, while a year of spring wheat would include a ~6 months winter fallow + ~6 months spring wheat crop.

One could potentially include that fallow time as a separate 'crop', and include it in the index. So, if the rotation is spring wheat – beans – spring wheat – OSR, but 'spring wheat' = 6 months of wheat and 6 months of fallow, then spring wheat would only occupy 25% of the rotation: half of two out of four years.

This approach can also be used if there are multiple crops in a year, e.g. maize in the long rains followed by cowpeas in the short rains in sub-Saharan Africa for example. One could treat the seasons as equal (0.5) of a year each, or reflect their relative lengths e.g. 5 months in the long rains vs. 3 months in the short could be included as 0.625 and 0.375 of the rotation respectively.

If intercrops are present, and assumed to be present in equal proportions, simply divide that portion of the rotation by two. So if a rotation alternates between wheat and beans intercropped with clover, then wheat would take up 50% of the rotation and beans and clover would take up 25% respectively (again resulting in D = 2.667).

Why is Simpson's the best?

- It is a proven and well-known diversity index.
- It has the convenient feature that for a monoculture, D = 1, for a two-year two-crop rotation, D = 2, and for a three-year three crop rotation, D = 3, etc. This makes it an intuitive

means of representing crop rotation diversity. Shannon's index does not have this nice feature, but otherwise behaves similarly to Simpson's.

- The diversity index put forward by Bowles et al (2020) is similar, but weights the length of the rotation too greatly. Their index is:

$$\sqrt{(\text{Number of crops in rotation} * \text{number of years in rotation})}$$

This has the same property that a monoculture = 1, a two-crop two rotation = 2 etc. However, a wheat-wheat-wheat-bean rotation would receive a higher score than a wheat-bean rotation (the square root of 2 *4 vs the square root of 2 * 2) unless it is expressed as wheat-bean-wheat-bean (the square root of 2 * 4) … which doesn't seem right.

- If we want to look at anything other than crop species – e.g. crop type in terms of legumes, cereals etc, this is easy to substitute into the calculation as the proportion of the system occupied by each crop type.

Examples

Table S3.1 demonstrates that Simpson's index provides an intuitive measure of crop diversity in rotation.

Supplementary Table S2.1: Examples of calculating Simpson's diversity index for different cropping systems. Different crops are represented by letters A through E, while / indicates a rotation and – indicates an intercrop.

	Proportion of rotation occupied by each crop							
Rotation	**A**	**B**	**C**	**D**	**E**	**Simpson**	**Shannon**	**Bowles**
A	1	0	0	0	0	1	0	1
A-B	0.5	0.5	0	0	0	2	0.301	1.41
A/A/A/C	0.75	0	0.25	0	0	1.6	0.244	2.83
A/B	0.5	0.5	0	0	0	2	0.301	2
A/B/A/C	0.5	0.25	0.25	0	0	2.67	0.452	3.46
A/B/C/D	0.25	0.25	0.25	0.25	0	4	0.602	4
A/B/C-D	0.333	0.333	0.167	0.167	0	3.6	0.577	3.46
A/A/B/C/D	0.4	0.2	0.2	0.2	0	3.57	0.579	4.47
A/B/C/D/E	0.2	0.2	0.2	0.2	0.2	5	0.699	5

References

Bowles, T. M., Mooshammer, M., Socolar, Y., Calderón, F., Cavigelli, M. A., Culman, S. W., … Grandy, A. S. (2020). Long-term evidence shows that crop-rotation diversification increases agricultural resilience to adverse growing conditions in North America. *One Earth*, *2*, 1–10. https://doi.org/10.1016/j.oneear.2020.02.007

Supplementary Materials – Part 3

Long-term evidence for ecological intensification as a pathway to sustainable agriculture

Meta-analysis model results and supporting information

Meta-analysis model results and supporting information

Here we provide the results and supporting information for the meta-analysis models. As described in the Methods, separate meta-analyses were undertaken for each EI practice and input, each involving a model selection process to arrive at a final meta-analysis model.

The aim of model selection process was to identify the role of the context variables in moderating the effect of each EI practice or input, and the process involved identifying the best-fitting model from a series of models of different complexities that included the focal and context variables and their interactions to different extent. Table S3.1 provides model fit statistics for the model selection process. Model fit statistics include the QE (heterogeneity not explained by the moderators in the meta-analysis model), the QM (heterogeneity explained by the moderators) and the AIC (a measure of goodness of model fit). Table S3.2 provides the same information to compare models for CD and NF with simple linear rather than polynomial terms.

The model for each EI practice and input with the lowest AIC, highest QM and lowest QE was selected as the final model (with AIC given priority). Table S3.3 lists the terms included in each final model, and provides significance tests. The models shown in this table were used to estimate the yield ratios and confidence intervals shown in Figures 1-4 in the main text.

To support the model results in Table S3.3 and Figures 1-4, we provide Tables S3.4-10 to indicate which LTEs provided data for each model term in the final models. To estimate the effects of the focal and context variables on the yield ratio, the meta-analysis models drew on information about differences between treatments within LTEs (the same LTE is compared across different cells in the table), but also differences between LTEs within treatments (comparisons are made across LTEs within each cell in the table). The latter is used to inform the overall estimate of the effect of each treatment, so for example, if only a single LTE represents a particular treatment combination, the model uses information from other shared treatments about how similarly this LTE behaves to other LTEs to inform how confidently it estimates the yield ratio for the unique treatment combination.

Figures S3.1-5 are forest plots that illustrate the contribution of data from different treatments in different LTEs to the overall yield ratio estimates shown in Figures 1-4 in the main text. These plots were constructed by generating fixed effect estimates from each meta-analysis model for the original dataset (using function *predict.rma* in metafor) and random effect predictions for each crop type in each LTE (using function *ranef*). These fixed and random effects (and their standard errors) were then summed and then exponentiated to calculate the BLUPs shown in the plots. Yield ratios were only calculated between treatments within different levels of the context variables, and within crop types and LTEs (y axes). Where the final meta-analysis model did not include context variables (i.e. for tillage, Tables S3.1 and S3.3) then BLUPs are averaged across all levels of context variables within a given LTE and crop type. Where context variables were included in the model, context variables are illustrated by different colours, symbols and panels.

Table S3.1: The meta-analysis models fitted for each EI focal variable, the moderators included and their interpretation. All models were fitted to a pre-selected dataset containing log yield ratios for a treatment change in a particular direction and starting point, i.e. an increase in CD from a monoculture, the addition of FF crops to an arable rotation, the addition of OM, a reduction in tillage or a reduction in mineral N fertilisation. See Table 1 in the main text for a description of the focal and context variables for each EI variable. The meta-analyses for each EI treatment indicated that all EI strategies had a significant effect on crop yields, and that CD, FF, OM and NF (but not TT) were influenced by the context in which they were implemented (indicated by a significant QM and a lower AIC for the intermediate and/or full models). The relationships between crop diversity increase and nitrogen fertiliser reduction (the two continuous variables) were best described by models containing a second order polynomial term, so results for models containing the polynomial terms are shown here (see Table S3.2 for a comparison between models with and without polynomials).

		Null model	Base model	Intermediate model	Full model
Moderators (fixed terms)			the focal variable(s) as moderators	containing the focal variable(s) and their interaction with each context variable	focal variables and context variables and all interactions
Interpretation		A directional change in the focal variable has a significant effect on yield	The amount and/or class by which the focal variable changes influences the effect of the focal variable on yield	The effect of the focal variable on yield depends on the level of the context variables	The effect of the focal variable at a given level of one context variable depends on the level of other context variables
CD	QE	1306.59*	1139.33*	959.91*	957.25*
	QM	-	121.90*	298.88*	300.69*
	AIC	418.85	337.92	240.52	251.30
FF	QE	1334.61*	1181.08*	727.77*	714.79*
	QM	-	59.24*	512.56*	531.87*
	AIC	425.50	295.72	-82.58	-90.5
OM	QE	3665.98*	2297.31*	973.91*	826.77*
	QM	-	1020.14*	2338.01*	2482.41*
	AIC	2462.22	1480.07	274.89	160.57
TT	QE	278.66	228.54	154.64	154.36
	QM	-	50.07*	98.26*	97.79*
	AIC	-450.43	-426.23	-301.31	-287.13
NF	QE	18600.09*	9222.45*	4588.36*	4401.21*
	QM	-	11059.26*	13798.06*	13868.89*
	AIC	136308.4	2596.24	17.26	-11.67

Table S3.2: Results for CD and NF models without polynomial terms. This table shows the equivalent information presented in Table S3.2 for models without polynomial terms for the continuous moderators Simpson's index (CD) and initial N fertiliser and proportional N fertiliser reduction (NF) (the null models are not shown as these do not contain any moderators). For both CD and NF, the models with polynomials were used as the final model. In both cases, moderators containing the polynomial terms were significant in the model (Table S3.3). Furthermore, for CD, removing the polynomials decreased the QM (explanatory power of the moderators) and did not substantially affect the AIC. For NF, removing the polynomial terms reduced the QM and increased the AIC.

		Base model	**Intermediate model**	**Full model**
Moderators (fixed terms)		the focal variable(s) as moderators	containing the focal variable(s) and their interaction with each context variable	focal variables and context variables and all interactions
CD	*QE*	1148.51*	971.59*	964.55*
	QM	85.66*	246.26*	253.42*
	AIC	353.61	241.71	241.92
NF	*QE*	10455.47*	6423.28*	6126.27*
	QM	10081.03*	12128.43*	12163.23*
	AIC	3546.28	1578.22	1590.97

Table S3.3: Significance tests for moderators (focal and context variables) in each final meta-analysis model, based on a QM test. Asterisks highlight terms significant at the 5% significance level (P < 0.05). The results presented here are from the final models selected based on the information in Table S3.1, with the total model QM and QE values (for which 'df' = degrees of freedom). Where QE P<0.05, this indicates significant remaining heterogeneity that has not been explained by the moderators included (this remaining heterogeneity may be due to factors not considered in this study, such as crop type, soil type and climate). The formulas shown (in R syntax) on the left-hand column indicate the maximum possible complexity of each model, while the terms listed in the 'parameters' column indicate the actual terms included in the models (interactions for which there were insufficient data were dropped).

Model	Parameters	QM	P	
Crop diversity (CD)	simpsons	3.329	0.189	
	legumes	0.588	0.443	
Intermediate model :	system	0.074	0.785	
simpsons*legumes*system*N_level+	N_level	2.546	0.111	
simpsons*legumes*system*till_level+	till_level	1.493	0.474	
(1|LTE/crop_type)	OM_level	0.083	0.774	
	simpsons : legumes	1.819	0.403	
QE = 959.91, P < 0.05, df = 235	simpsons : system	0.001	0.974	
QM = 298.88, P < 0.05, df = 26	legumes : system	0.207	0.649	
	simpsons : N_level	**27.992**	**<0.001**	*
LTEs included = 12	legumes : N_level	0.714	0.398	
	system : N_level	0.068	0.794	
	simpsons : till_level	1.850	0.604	
	legumes : till_level	0.778	0.378	
	simpsons : OM_level	0.094	0.954	
	legumes : OM_level	0.022	0.883	
	simpsons : legumes : N_level	**5.690**	**0.017**	*
	simpsons : legumes : till_level	0.655	0.418	
	simpsons : legumes : OM_level	0.014	0.905	
Fertility crops (FC)	FC_reference	1.502	0.220	
	FC_comparison	**61.939**	**<0.001**	*
Full model :	grazing	3.722	0.054	
FC_reference*FC_comparison*grazing*	**N_level**	**306.932**	**<0.001**	*
N_level*till_level+(1|LTE/crop_type)	**till_level**	**22.729**	**<0.001**	*
	FC_reference : FC_comparison	**24.925**	**<0.001**	*
QE = 714.79, P < 0.05, df = 209	**FC_reference : grazing**	**4.270**	**0.039**	*
QM = 531.87, P < 0.05, df = 25	**FC_comparison : grazing**	**4.140**	**0.042**	*
	FC_reference : N_level	5.373	0.068	
LTEs included = 15	**FC_comparison : N_level**	**191.280**	**<0.001**	*
	grazing : N_level	0.561	0.454	
	FC_reference : till_level	**8.530**	**0.014**	*
	N_level : till_level	**12.134**	**<0.001**	*
	FC_reference : FC_comparison : N_level	0.263	0.877	
Organic matter management (OM)	**OM_reference**	**140.355**	**<0.001**	*
	OM_comparison	**64.902**	**<0.001**	*

Model	Variable			
Full model : OM_reference*OM_comparison*res_mgm* div_level*N_level*till_level + (1|LTE/crop_type)	res_mgm	2.517	0.284	
	N_level	1.116	0.572	
	till_level	**68.207**	**<0.001**	*
QE = 804.85, P < 0.05, df = 330	**div_level**	**15.317**	**<0.001**	*
QM = 2563.76, P < 0.05, df = 37	OM_comparison : res_mgm	1.702	0.192	
	OM_reference : N_level	**68.619**	**<0.001**	*
LTEs included = 11	**OM_comparison : N_level**	**71.574**	**<0.001**	*
	res.mgm : N_level	2.037	0.729	
	OM_reference : till_level	**13.981**	**<0.001**	*
	OM_comparison : till_level	2.506	0.474	
	N_level : till_level	**73.983**	**<0.001**	*
	N_level : div_level	13.813	0.008	
Tillage reduction (TI)	till_reference	6.281	0.280	
Base model : till_reference*till_comparison+(1|LTE/crop_type)	**till_comparison**	**18.180**	**0.006**	*
	till_reference*till_reduce	4.421	0.110	
QE = 228.54, P > 0.05, df = 253				
QM = 50.07, P < 0.05, df = 18				
LTEs included = 13				
Nitrogen fertiliser reduction (NF)	**N_reduce**	**10.874**	**0.004**	*
	N_reference	**24.854**	**0.000**	*
Full model : N_reference*N_diff*div_level* OM_level*till_level + (1|LTE/crop_type)	div_level	5.756	0.056	
	till_level	**5.964**	**0.015**	*
	OM_level	1.415	0.493	
QE = 4401.21, P < 0.05, df = 1103	**N_reduce : N_reference**	**274.058**	**<0.001**	*
QM =13868.90, P < 0.05, df = 49	**N_reduce : div_level**	**13.237**	**0.010**	*
	N_reference : div_level	**51.264**	**<0.001**	*
LTEs included = 14	N_reduce : till_level	1.066	0.302	
	N_reference : till_level	**8.021**	**0.018**	*
	div_level : till_level	**6.159**	**0.013**	*
	N_reduce : OM_level	1.208	0.751	
	N_reference : OM_level	6.377	0.095	
	div_level : OM_level	**10.924**	**0.012**	*
	till_level : OM_level	**50.358**	**<0.001**	*
	N_reduce : N_reference : div_level	**243.076**	**<0.001**	*
	N_reduce : N_reference : OM_level	**12.435**	**0.002**	*
	N_reduce : div_level : OM_level	**13.970**	**<0.001**	*
	N_reference : div_level : OM_level	**10.848**	**0.013**	*

Note: Focal variable names are as follows: for CD, 'simpsons' = Simpson's index of crop diversity, 'legumes' = whether or not the diversification involves legumes, 'system' = whether the diversification was a rotation or intercrop; for FC, 'FC_reference' = whether the initial treatment was a system with or without legumes, 'FC_comparison' = the type of fertility crop in the FC treatment, 'grazing' = whether or not the fertility crop was grazed; for OM, 'OM_reference' = whether the initial treatment received any OM, 'OM_comparison' = the type of OM addition in the OM treatment, 'res_mgm' = whether crop residues were kept, removed, or added in the OM treatment; for TI, 'till_reference' = the initial more intensive tillage treatment, 'till_reduce' = the reduced tillage treatment; for NF, 'N_reference' = the amount of N kg ha^{-1} applied to the initial treatment, and 'N_reduce' = the difference between the initial and reduced N treatment, expressed as a proportion of N in the initial treatment. All context variables (ending in _level) are described in the rightmost column of Table 1 in the main text.

Table S3.4: LTEs supporting each categorical model term in the final model for crop diversity (CD). Model terms match those listed in Table S3.3, and LTE codes match those in Table S1.1. The continuous variable Simpson's index is not shown in this table, as all LTEs tested that variable (but see Table S3.5 for the ranges of Simpson's index within each LTE).

Model term	Level	LTEs
legumes	[without legumes]	DOM, MON, SUS, LCR, SCE, BRB
	[with legumes]	CHI, DOM, HEN, MON, MSE, SUS, LCR, SQL, SQT, LTF, BRB
system	[rotation]	CHI, DOM, HEN, MON, MSE, SUS, LCR, SQL, SQT, LTF, SCE, BRB
	[intercrop]	CHI, DOM, HEN, MSE, SUS
N_level	[<100kg N ha]	CHI, DOM, HEN, LCR, SQL, SQT, LTF, SCE, BRB
	[>100kg N ha]	MON, MSE, SUS, SCE, BRB
till_level	[deep inversion]	HEN, MON, SQL, SQT, LTF, SCE, BRB
	[reduced]	HEN, SQL, SQT, LTF
	[no-till]	CHI, DOM, HEN, MON, MSE, SUS, LCR, SQL, SQT, LTF
OM_level	[no OM added]	CHI, HEN, MON, MSE, SUS, LCR, SQL, SQT, LTF, SCE, BRB
	[manure]	DOM, BRB
legumes : system	[without legumes] + [rotation]	DOM, MON, SUS, LCR, SCE, BRB
	[with legumes] + [rotation]	CHI, DOM, HEN, MON, MSE, SUS, LCR, SQL, SQT, LTF, BRB
	[without legumes] + [intercrop]	SUS
	[with legumes] + [intercrop]	CHI, DOM, HEN, MSE, SUS
legumes : N_level	[without legumes] + [<100kg N ha]	DOM, LCR, SCE, BRB
	[with legumes] + [<100kg N ha]	CHI, DOM, HEN, LCR, SQL, SQT, LTF, BRB
	[without legumes] + [>100kg N ha]	MON, SUS, SCE, BRB
	[with legumes] + [>100kg N ha]	MON, MSE, SUS, BRB
system : N_level	[rotation] + [<100kg N ha]	CHI, DOM, HEN, LCR, SQL, SQT, LTF, SCE, BRB
	[intercrop] + [<100kg N ha]	CHI, DOM, HEN
	[rotation] + [>100kg N ha]	MON, MSE, SUS, SCE, BRB
	[intercrop] + [>100kg N ha]	MSE, SUS
legumes : till_level	[without legumes] + [deep inversion]	MON, SCE, BRB
	[with legumes] + [deep inversion]	HEN, SQL, SQT, LTF, BRB
	[with legumes] + [reduced]	HEN, SQL, SQT, LTF
	[without legumes] + [no-till]	DOM, MON, SUS, LCR
	[with legumes] + [no-till]	CHI, DOM, HEN, MON, MSE, SUS, LCR, SQL, SQT, LTF
legumes : OM_level	[without legumes] + [no OM added]	MON, SUS, LCR, SCE, BRB
	[with legumes] + [no OM added]	CHI, HEN, MON, MSE, SUS, LCR, SQL, SQT, LTF, BRB
	[without legumes] + [manure]	DOM, BRB
	[with legumes] + [manure]	DOM, BRB

Table S3.5: The minimum and maximum Simpson's index of crop diversity of the comparison treatments in each LTE in the CD meta-analysis model.

LTE	Minimum Simpson's index	Maximum Simpson's index
BRB	1.6	3
CHI	2	2
DOM	2	2
HEN	2	2.67
LCR	1.6	2.67
LTF	2.67	2.67
MON	2	3
MSE	2	2
SCE	5	5
SQL	2	2.67
SQT	2	2.67
SUS	2	3

Table S3.6: LTEs supporting each model term in the final model for fertility crops (FC). Model terms match those listed in Table S3.3, and LTE codes match those in Table S1.1.

Model term	Level	LTEs
FC_reference	[arable without legumes]	MON, SUS, LCR, PSP, RLT, RLS, RLL, TIR, BRB
	[arable with legumes]	LCR, TCR, SQL, SQT, TUL, WOB
FC_comparison	[grain legume]	MON, SUS, LCR, TIR, BRB
	[ley with legumes]	TCR, PSP, RLT, RLS, RLL, TUL, WOB
	[annual service legumes]	LCR, TCR, SQL, SQT, PSP
	[ley grass only]	RLT, RLS, RLL, WOB
[FC grazed]	[no grazing]	MON, SUS, LCR, SQL, SQT, PSP, RLT, RLS, RLL, TIR, BRB, WOB
	[FC grazed]	LCR, TCR, TUL
N_level	[0kg N ha]	RLT, RLS, RLL, TUL, BRB, WOB
	[<100kg N ha]	LCR, TCR, SQL, SQT, RLT, RLS, RLL, BRB, WOB
	[>100kg N ha]	MON, SUS, PSP, RLT, RLS, RLL, TIR, BRB, WOB
till_level	[deep inversion]	SQL, SQT, PSP, RLT, RLS, RLL, TIR, TUL, BRB, WOB
	[reduced]	SQL, SQT, TIR
	[no-till]	MON, SUS, LCR, TCR, SQL, SQT, TIR
FC_reference : FC_comparison	[arable without legumes] + [grain legume]	MON, SUS, LCR, TIR, BRB
	[arable without legumes] + [ley with legumes]	PSP, RLT, RLS, RLL
	[arable with legumes] + [ley with legumes]	TCR, TUL, WOB
	[arable without legumes] + [annual service legumes]	LCR, PSP
	[arable with legumes] + [annual service legumes]	LCR, TCR, SQL, SQT
	[arable without legumes] + [ley grass only]	RLT, RLS, RLL
	[arable with legumes] + [ley grass only]	WOB
FC_reference : grazing	[arable without legumes] + [no grazing]	MON, SUS, LCR, PSP, RLT, RLS, RLL, TIR, BRB
	[arable with legumes] + [no grazing]	SQL, SQT, WOB
	[arable without legumes] + [FC grazed]	LCR
	[arable with legumes] + [FC grazed]	LCR, TCR, TUL
FC_comparison : grazing	[grain legume] + [no grazing]	MON, SUS, LCR, TIR, BRB
	[ley with legumes] + [no grazing]	PSP, RLT, RLS, RLL, WOB
	[annual service legumes] + [no grazing]	SQL, SQT, PSP
	[ley grass only] + [no grazing]	RLT, RLS, RLL, WOB
	[ley with legumes] + [FC grazed]	TCR, TUL
	[annual service legumes] + [FC grazed]	LCR, TCR
FC_reference : N_level	[arable without legumes] + [0kg N ha]	RLT, RLS, RLL, BRB
	[arable with legumes] + [0kg N ha]	TUL, WOB
	[arable without legumes] + [<100kg N ha]	LCR, RLT, RLS, RLL, BRB
	[arable with legumes] + [<100kg N ha]	LCR, TCR, SQL, SQT, WOB
	[arable without legumes] + [>100kg N ha]	MON, SUS, PSP, RLT, RLS, RLL, TIR, BRB
	[arable with legumes] + [>100kg N ha]	WOB
FC_comparison : N_level	[grain legume] + [0kg N ha]	BRB
	[ley with legumes] + [0kg N ha]	RLT, RLS, RLL, TUL, WOB
	[ley grass only] + [0kg N ha]	RLT, RLS, RLL, WOB
	[arable with legumes] + [<100kg N ha]	LCR, BRB

	[ley with legumes] + [<100kg N ha]	TCR, RLT, RLS, RLL, WOB
	[annual service legumes] + [<100kg N ha]	LCR, TCR, SQL, SQT
	[ley grass only] + [<100kg N ha]	RLT, RLS, RLL, WOB
	[arable with legumes] + [>100kg N ha]	MON, SUS, TIR, BRB
	[ley with legumes] + [>100kg N ha]	PSP, RLT, RLS, RLL, WOB
	[annual service legumes] + [>100kg N ha]	PSP
	[ley grass only] + [>100kg N ha]	RLT, RLS, RLL, WOB
grazing : N_level	[no grazing] + [0kg N ha]	RLT, RLS, RLL, BRB, WOB
	[FC grazed] + [0kg N ha]	TUL
	[no grazing] + [<100kg N ha]	LCR, SQL, SQT, RLT, RLS, RLL, BRB, WOB
	[FC grazed] + [<100kg N ha]	LCR, TCR
	[no grazing] + [>100kg N ha]	MON, SUS, PSP, RLT, RLS, RLL, TIR, BRB, WOB
FC_reference : till_level	[arable without legumes] + [deep inversion]	PSP, RLT, RLS, RLL, TIR, BRB
	[arable with legumes] + [deep inversion]	SQL, SQT, TUL, WOB
	[arable without legumes] + [reduced]	TIR
	[arable with legumes] + [reduced]	SQL, SQT
	[arable without legumes] + [no-till]	MON, SUS, LCR, TIR
	[arable with legumes] + [no-till]	LCR, TCR, SQL, SQT
N_level : till_level	[0kg N ha] + [deep inversion]	RLT, RLS, RLL, TUL, BRB, WOB
	[<100kg N ha] + [deep inversion]	SQL, SQT, RLT, RLS, RLL, BRB, WOB
	[>100kg N ha] + [deep inversion]	PSP, RLT, RLS, RLL, TIR, BRB, WOB
	[<100kg N ha] + [reduced]	SQL, SQT
	[>100kg N ha] + [reduced]	TIR
	[<100kg N ha] + [no-till]	LCR, TCR, SQL, SQT
	[>100kg N ha] + [no-till]	MON, SUS, TIR
FC_reference : FC_comparison : N_level	[arable without legumes] + [grain legume]+ [0kg N ha]	BRB
	[arable without legumes] + [ley with legumes] + [0kg N ha]	RLT, RLS, RLL
	[arable with legumes] + [ley with legumes] + [0kg N ha]	TUL, WOB
	[arable without legumes] + [ley grass only] + [0kg N ha]	RLT, RLS, RLL
	[arable with legumes] + [ley grass only] + [0kg N ha]	WOB
	[arable without legumes] + [grain legume] + [<100kg N ha]	LCR, BRB
	[arable without legumes] + [ley with legumes] + [<100kg N ha]	RLT, RLS, RLL
	[arable with legumes] + [ley with legumes] + [<100kg N ha]	TCR, WOB
	[arable without legumes] + [annual service legumes] + [<100kg N ha]	LCR
	[arable with legumes] + [annual service legumes] + [<100kg N ha]	LCR, TCR, SQL, SQT
	[arable without legumes] + [ley grass only] + [<100kg N ha]	RLT, RLS, RLL
	[arable with legumes] + [ley grass only] + [<100kg N ha]	WOB
	[arable without legumes] + [grain legume] + [>100kg N ha]	MON, SUS, TIR, BRB
	[arable without legumes] + [ley with legumes] + [>100kg N ha]	PSP, RLT, RLS, RLL
	[arable with legumes] + [ley with legumes] + [>100kg N ha]	WOB
	[arable without legumes] + [annual service legumes] + [>100kg N ha]	PSP
	[arable without legumes] + [ley grass only] + [>100kg N ha]	RLT, RLS, RLL
	[arable with legumes] + [ley grass only] + [>100kg N ha]	WOB

Table S3.7: LTEs supporting each model term in the final model for organic matter management (OM). Model terms match those listed in Table S3.3, and LTE codes match those in Table S1.1.

Model term	Level	LTEs
OM_reference	[no OM added]	KSA, KSS, KSM, KSE, D2, SCE, NTR, BKZ, BRB, HOO
	[manure]	DOM, BKZ, BRB
OM_comparison	[no OM added]	SCE, NTR, BRB
	[plant-based]	KSA, KSS, KSM, KSE, D2, BKZ
	[manure]	KSA, KSS, KSM, KSE, BRB, HOO
	[plant+manure]	DOM, BKZ
residues	[residues removed]	KSA, KSS, KSM, KSE, BRB
	[residues_in_comparison]	SCE, NTR, BRB, HOO
	[residues_retained]	DOM, D2, BKZ, BRB
N_level	[0kg N ha]	KSA, KSS, KSM, KSE, D2, BKZ, BRB, HOO
	[<100kg N ha]	DOM, D2, SCE, BKZ, BRB, HOO
	[>100kg N ha]	KSA, KSS, KSM, KSE, D2, SCE, NTR, BKZ, BRB, HOO
till_level	[deep inversion]	SCE, NTR, BKZ, BRB, HOO
	[reduced]	KSA, KSS, KSM, KSE, D2, NTR, BKZ
	[no-till]	DOM, NTR
diversity_level	[monoculture]	DOM, KSA, KSS, KSM, KSE, SCE, BRB, HOO
	[diverse without legumes]	NTR, BRB
	[diverse with legumes]	D2, BKZ, BRB
OM_comparison : residues	[plant-based] + [residues removed]	KSA, KSS, KSM, KSE
	[manure] + [residues removed]	KSA, KSS, KSM, KSE, BRB, HOO
	[no OM added] + [residues_in_comparison]	SCE, NTR, BRB
	[manure] + [residues_in_comparison]	BRB
	[plant-based] + [residues_retained]	D2, BKZ
	[manure] + [residues_retained]	BRB
	[plant+manure] + [residues_retained]	DOM, BKZ
OM_reference : N_level	[no OM added] + [0kg N ha]	KSA, KSS, KSM, KSE, D2, BRB, HOO
	[manure] + [0kg N ha]	BKZ, BRB
	[no OM added] + [<100kg N ha]	D2, SCE, BRB, HOO
	[manure] + [<100kg N ha]	DOM, BKZ, BRB
	[no OM added] + [>100kg N ha]	KSA, KSS, KSM, KSE, D2, SCE, NTR, BKZ, BRB, HOO
	[manure] + [>100kg N ha]	BRB
OM_comparison : N_level	[no OM added] + [0kg N ha]	BRB
	[plant-based] + [0kg N ha]	KSA, KSS, KSM, KSE, D2
	[manure] + [0kg N ha]	KSA, KSS, KSM, KSE, BRB, HOO
	[plant+manure] + [0kg N ha]	BKZ
	[no OM added] + [<100kg N ha]	SCE, BRB
	[plant-based] + [<100kg N ha]	D2
	[manure] + [<100kg N ha]	BRB, HOO
	[plant+manure] + [<100kg N ha]	DOM, BKZ
	[no OM added] + [>100kg N ha]	SCE, NTR, BRB
	[plant-based] + [>100kg N ha]	KSA, KSS, KSM, KSE, D2, BKZ
	[manure] + [>100kg N ha]	KSA, KSS, KSM, KSE, BRB, HOO
residues : N_level	[residues removed] + [0kg N ha]	KSA, KSS, KSM, KSE, BRB

	[residues_in_comparison] + [0kg N ha]	BRB, HOO
	[residues_retained] + [0kg N ha]	D2, BKZ, BRB
	[residues removed] + [<100kg N ha]	BRB
	[residues_in_comparison] + [<100kg N ha]	SCE, BRB, HOO
	[residues_retained] + [<100kg N ha]	DOM, D2, BKZ, BRB
	[residues removed] + [>100kg N ha]	KSA, KSS, KSM, KSE, BRB
	[residues_in_comparison] + [>100kg N ha]	SCE, NTR, BRB, HOO
	[residues_retained] + [>100kg N ha]	D2, BKZ, BRB
OM_reference : till_level	[no OM added] + [deep inversion]	SCE, NTR, BKZ, BRB, HOO
	[manure] + [deep inversion]	BKZ, BRB
	[no OM added] + [reduced]	KSA, KSS, KSM, KSE, D2, NTR, BKZ
	[manure] + [reduced]	BKZ
	[no OM added] + [no-till]	NTR
	[manure] + [no-till]	DOM
OM_comparison : till_level	[no OM added] + [deep inversion]	SCE, NTR, BRB
	[plant-based] + [deep inversion]	BKZ
	[manure] + [deep inversion]	BRB, HOO
	[plant+manure] + [deep inversion]	BKZ
	[no OM added] + [reduced]	NTR
	[plant-based] + [reduced]	KSA, KSS, KSM, KSE, D2, BKZ
	[manure] + [reduced]	KSA, KSS, KSM, KSE
	[plant+manure] + [reduced]	BKZ
	[no OM added] + [no-till]	NTR
	[plant+manure] + [no-till]	DOM
N_level : till_level	[0kg N ha] + [deep inversion]	BKZ, BRB, HOO
	[<100kg N ha] + [deep inversion]	SCE, BKZ, BRB, HOO
	[>100kg N ha] + [deep inversion]	SCE, NTR, BKZ, BRB, HOO
	[0kg N ha] + [reduced]	KSA, KSS, KSM, KSE, D2, BKZ
	[<100kg N ha] + [reduced]	D2, BKZ
	[>100kg N ha] + [reduced]	KSA, KSS, KSM, KSE, D2, NTR, BKZ
	[<100kg N ha] + [no-till]	DOM
	[>100kg N ha] + [no-till]	NTR
N_level : diversity_level	[0kg N ha] + [monoculture]	KSA, KSS, KSM, KSE, BRB, HOO
	[<100kg N ha] + [monoculture]	DOM, SCE, BRB, HOO
	[>100kg N ha] + [monoculture]	KSA, KSS, KSM, KSE, SCE, BRB, HOO
	[0kg N ha] + [diverse without legumes]	BRB
	[<100kg N ha] + [diverse without legumes]	BRB
	[>100kg N ha] + [diverse without legumes]	NTR, BRB
	[0kg N ha] + [diverse with legumes]	D2, BKZ, BRB
	[<100kg N ha] + [diverse with legumes]	D2, BKZ, BRB
	[>100kg N ha] + [diverse with legumes]	D2, BKZ

Table S3.8: LTEs supporting each model term in the final model for tillage intensity (TI). Model terms match those listed in Table S3.3, and LTE codes match those in Table S1.1.

Model term	Level	LTEs
till_reference	[deep inversion]	DOM, HEN, MON, MSE, SUS, SQL, SQT, LTF, TIR, NTR, BAS, BKZ
	[deep non-inversion]	LTF, TIR, BAS
	[ridge-furrow]	CHI, MSE
	[shallow non-inversion]	SQL, SQT, LTF, TIR, NTR
	[basins]	CHI, DOM, HEN, MON, MSE, SUS
	[no-till]	DOM, HEN, MSE, SUS, SQL, SQT
till_comparison	[deep non-inversion]	LTF, TIR, BAS, BKZ
	[ridge-furrow]	MSE
	[shallow non-inversion]	SQL, SQT, LTF, TIR, NTR, BAS
	infreq.till	LTF, NTR
	[basins]	CHI, DOM, HEN, MON, MSE, SUS
	[no-till]	DOM, HEN, MON, MSE, SUS, SQL, SQT, LTF, TIR, NTR
	[zero-till]	CHI, DOM, HEN, MSE, SUS, SQL, SQT
till_reference : till_comparison	[deep inversion] + [deep non-inversion]	LTF, TIR, BAS, BKZ
	[deep inversion] + [ridge-furrow]	MSE
	[deep inversion] + [shallow non-inversion]	SQL, SQT, LTF, TIR, NTR, BAS
	[deep non-inversion] + [shallow non-inversion]	LTF, TIR, BAS
	[deep inversion]_infreq.till	LTF, NTR
	[deep non-inversion]_infreq.till	LTF
	[shallow non-inversion]_infreq.till	LTF, NTR
	[deep inversion] + [basins]	DOM, HEN, MON, MSE, SUS
	[ridge-furrow] + [basins]	CHI, MSE
	[deep inversion] + [no-till]	DOM, HEN, MON, MSE, SUS, SQL, SQT, LTF, TIR, NTR
	[deep non-inversion] + [no-till]	LTF, TIR
	[ridge-furrow] + [no-till]	MSE
	[shallow non-inversion] + [no-till]	SQL, SQT, LTF, TIR, NTR
	[basins] + [no-till]	DOM, HEN, MON, MSE, SUS
	[deep inversion] + [zero-till]	DOM, HEN, MSE, SUS, SQL, SQT
	[ridge-furrow] + [zero-till]	CHI, MSE
	[shallow non-inversion] + [zero-till]	SQL, SQT
	[basins] + [zero-till]	CHI, DOM, HEN, MSE, SUS
	[no-till] + [zero-till]	DOM, HEN, MSE, SUS, SQL, SQT

Table S3.9: LTEs supporting each categorical model term in the final model for nitrogen fertiliser (NF). Model terms match those listed in Table S3.3, and LTE codes match those in Table S1.1. The continuous variables describing the reference N level and the proportion by which N is reduced are not shown in this table, as all LTEs tested those variable (but see Table S3.9 for the range of NF found within each LTE).

Model term	Level	LTEs
diversity_level	[monoculture]	KSA, KSS, KSM, KSE, SCE, BRB, HOO
	[diverse without legumes]	SCE, RLT, RLS, RLL, BRB, WOB
	[diverse with legumes]	D2, RLT, RLS, RLL, OLD, BKZ, BRB, WOB
till_level	[deep inversion]	SCE, RLT, RLS, RLL, OLD, BKZ, BRB, HOO, WOB
	[reduced]	KSA, KSS, KSM, KSE, D2, BKZ
OM_level	[no OM added]	KSA, KSS, KSM, KSE, D2, SCE, RLT, RLS, RLL, BRB, HOO, WOB
	[plant-based]	KSA, KSS, KSM, KSE, D2
	[manure]	KSA, KSS, KSM, KSE, OLD, BKZ, BRB, HOO
diversity_level : OM_level	[monoculture] +[no OM added]	KSA, KSS, KSM, KSE, SCE, BRB, HOO
	[diverse without legumes] + [no OM added]	SCE, RLT, RLS, RLL, BRB, WOB
	[diverse with legumes] + [no OM added]	D2, RLT, RLS, RLL, BRB, WOB
	[monoculture] + [plant-based]	KSA, KSS, KSM, KSE
	[diverse with legumes] + [plant-based]	D2
	[monoculture] + [manure]	KSA, KSS, KSM, KSE, BRB, HOO
	[diverse without legumes] + [manure]	BRB
	[diverse with legumes] + [manure]	OLD, BKZ, BRB
till_level : OM_level	[deep inversion] + [no OM added]	SCE, RLT, RLS, RLL, BRB, HOO, WOB
	[reduced] + [no OM added]	KSA, KSS, KSM, KSE, D2
	[reduced] + [plant-based]	KSA, KSS, KSM, KSE, D2
	[deep inversion] + [manure]	OLD, BKZ, BRB, HOO
	[reduced] + [manure]	KSA, KSS, KSM, KSE, BKZ

Table S3.10: The minimum and maximum amount of kg ha N applied as fertiliser by each LTE in the NF meta-analysis model.

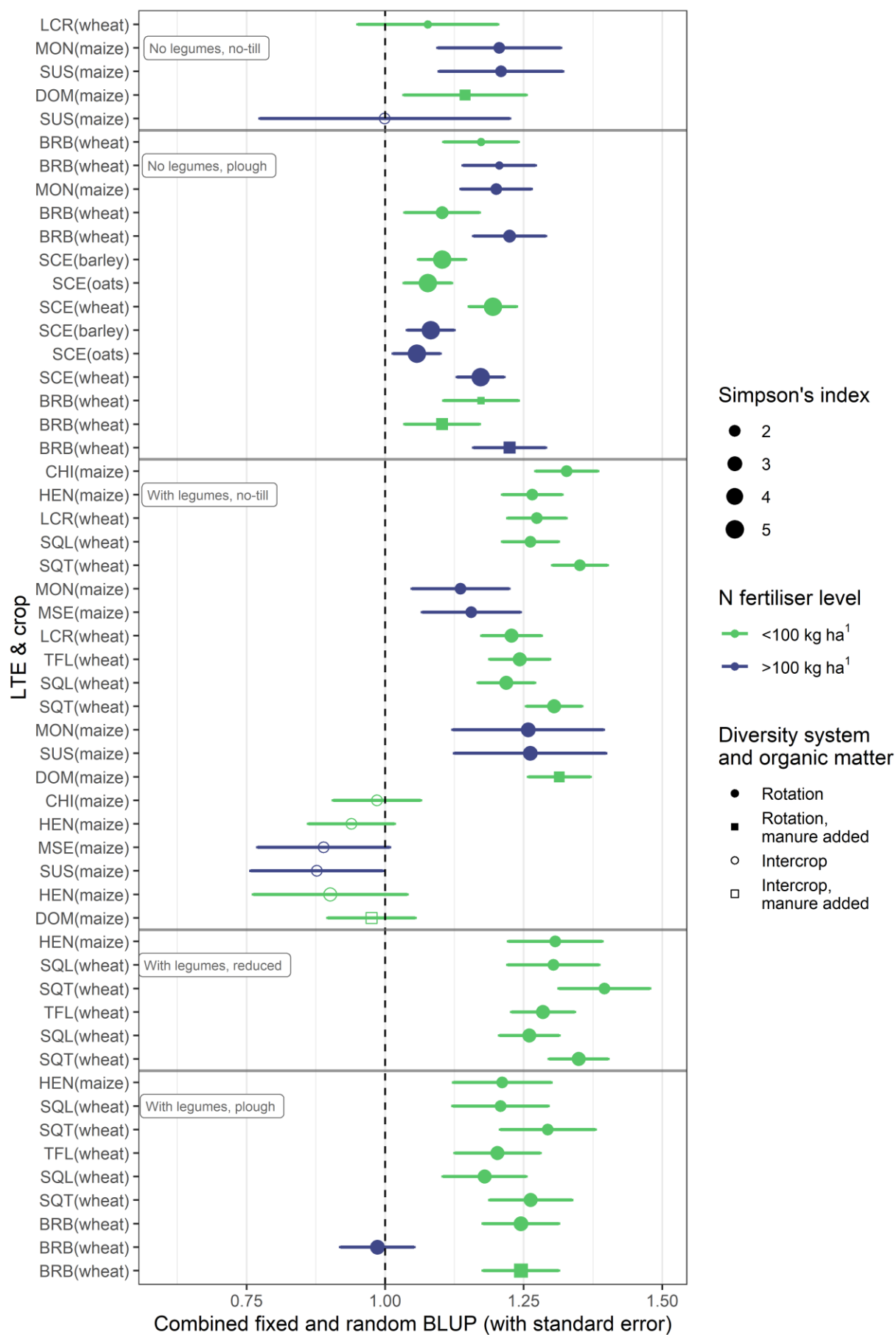| LTE	Minimum N kg ha	Maximum N kg ha
BKZ	100	100
BRB	48	288
SCE	70	140
D2	60	120
HOO	48	144
KSA	120	120
KSE	120	120
KSM	120	120
KSS	120	120
OLD	26	80
RLL	40	135
RLS	40	135
RLT	40	135
WOB	72.8	218.4

Figure S3.1: Forest plot showing combined fixed and random effect BLUPs (points) and their standard errors (error bars) for yield ratios between monoculture treatments and more diverse treatments.
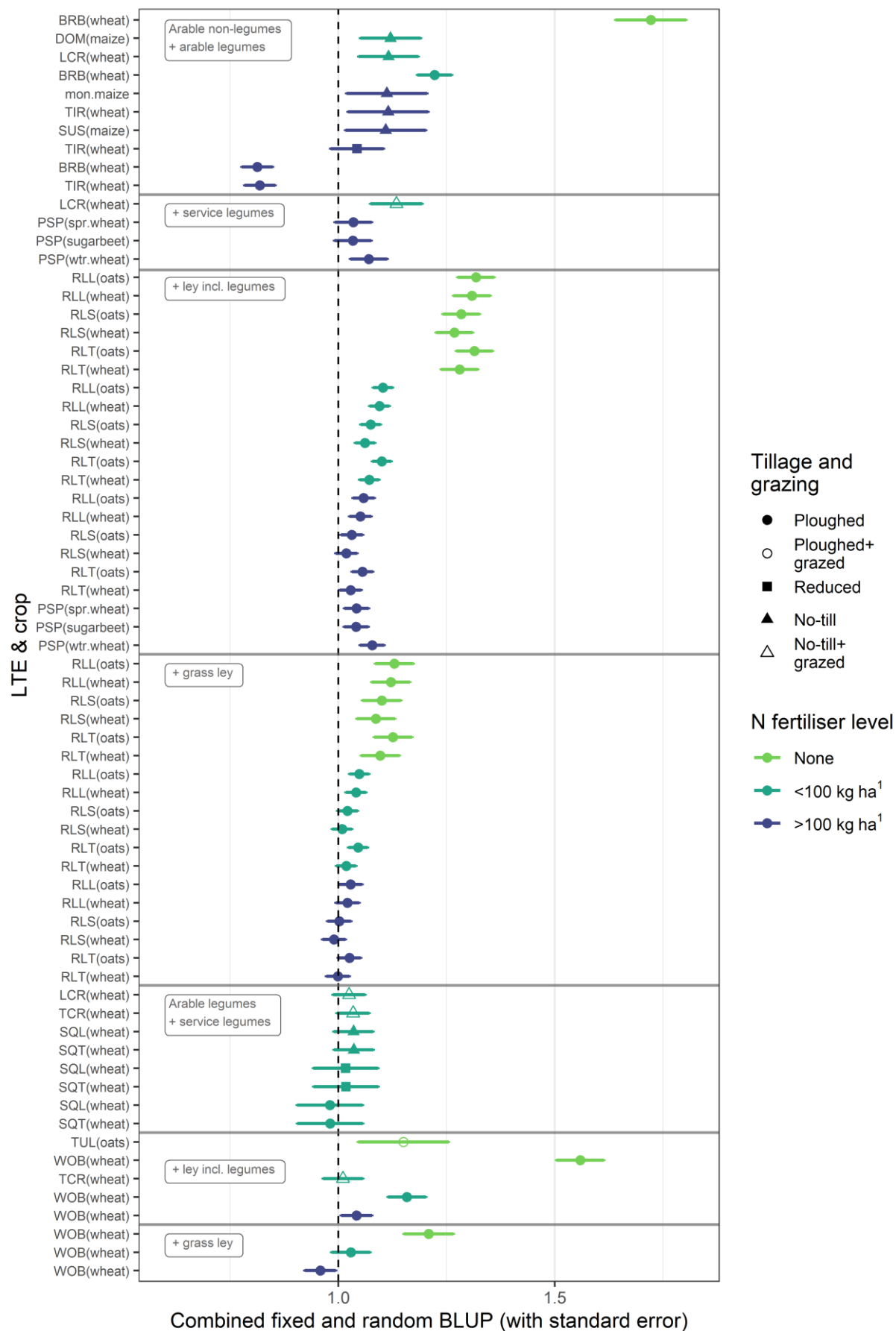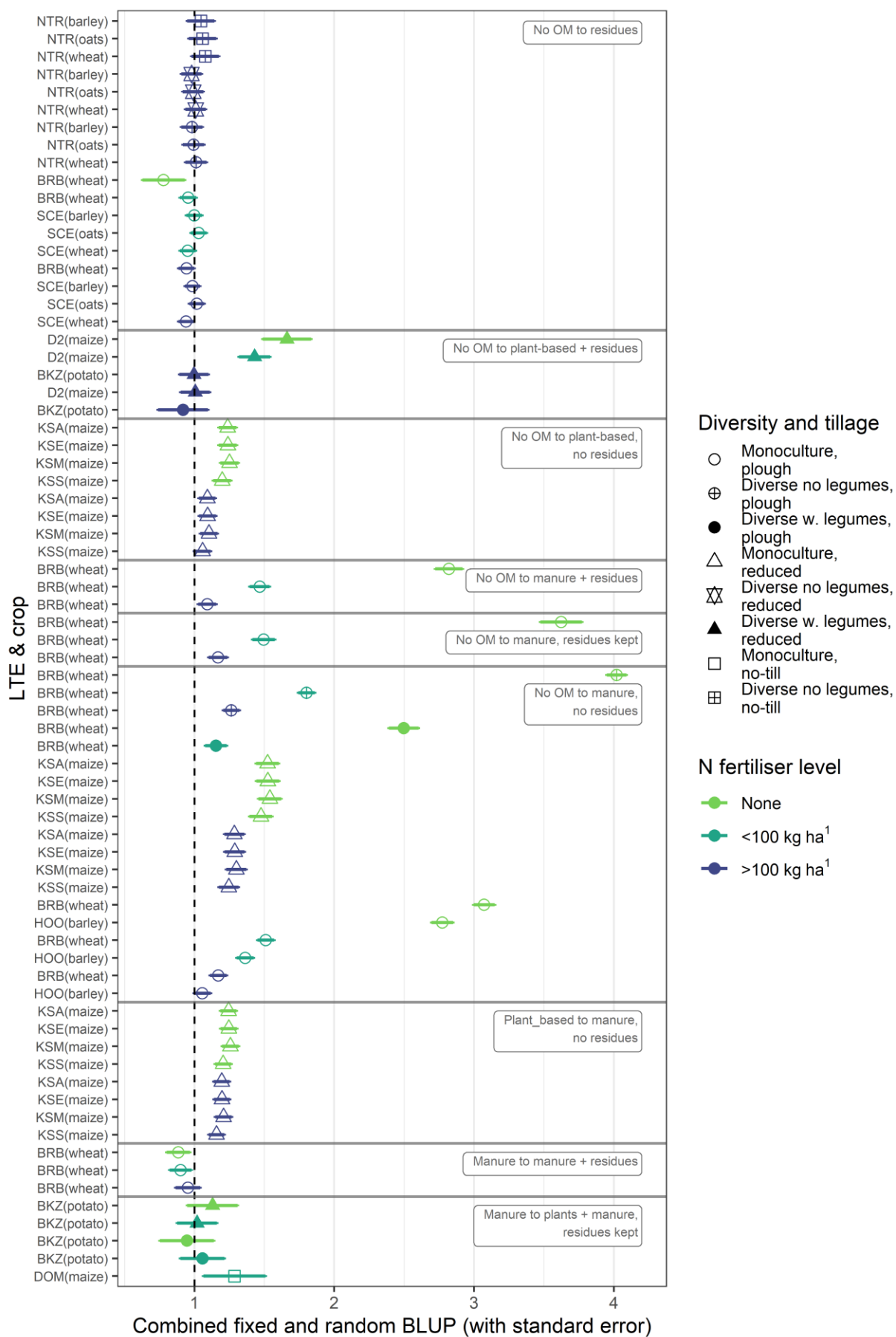
Figure S3.2: Forest plot showing combined fixed and random effect BLUPs (points) and their standard errors (error bars) for yield ratios resulting from adding fertility crops to either arable rotations without legumes (top four panels) or to arable rotations with legumes (bottom three panels).

Figure S3.3: Forest plot showing combined fixed and random effect BLUPs (points) and their standard errors (error bars) for yield ratios between treatments without OM additions or residue retention, and treatments with OM additions and/or residue retention (panels).
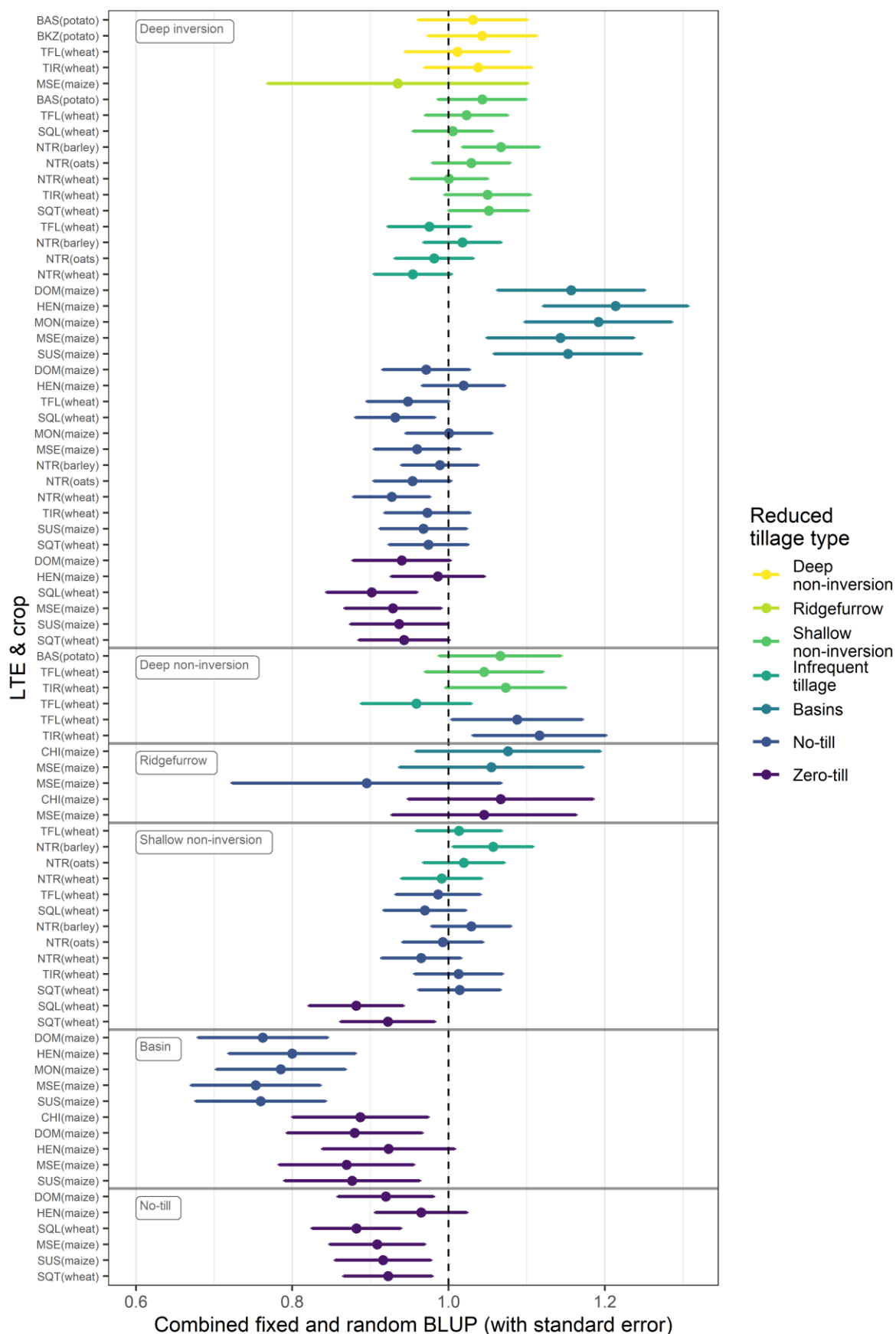
Figure S3.4: Forest plot showing combined fixed and random effect BLUPs (points) and their standard errors (error bars) for yield ratios between treatments with a higher intensity of tillage (panels) and those with a lower intensity of tillage (legends).
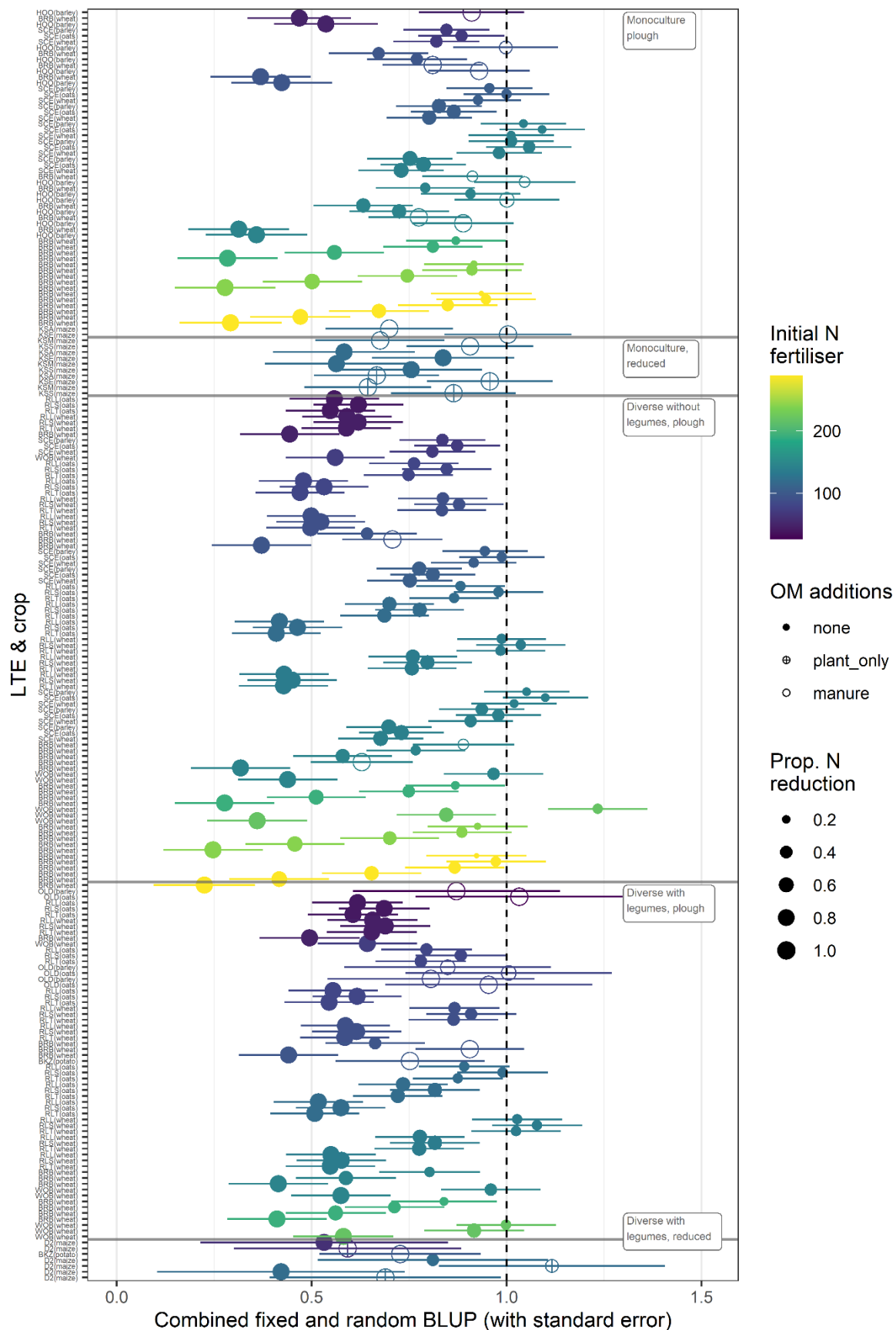
Figure S3.5: Forest plot showing combined fixed and random effect BLUPs (points) and their standard errors (error bars) for yield ratios between treatments with a higher application of synthetic nitrogen fertiliser (colour) and with a lower application of fertiliser. The difference in fertiliser rates is expressed as a proportion along the x axis. Panels indicate the diversity context of the comparison and point shading indicates the OM context.