

ELECTRONIC APPENDIX

This is the Electronic Appendix to the article

**Farm Scale Evaluations of spring-sown genetically modified
herbicide-tolerant crops: a statistical assessment**

by

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Electronic appendices are refereed with the text; however, no attempt is made to impose a uniform editorial style on the electronic appendices.

Table A1. Glossary of statistical terms, grouped according to type and approximately in the order they appear in the text.

term	definition
n_0	Originally planned sample size.
n	Realized sample size, i.e. number of replicate fields per treatment after exclusion of fields with any missing values or total counts of zero or one.
CV	Coefficient of variation, i.e. ratio of standard deviation to mean, expressed as a percentage.
M	Geometric mean of whole-field counts.
s	Standard deviation of half-field units, calculated as the square-root of the residual mean square from a randomized block ANOVA of the $2n$ half-field units transformed to natural logarithms.
V	Variance of a population of counts.
μ	Mean of a population of counts.
α	Parameter of Taylor's power law, $V = \alpha \mu^\beta$.
β	Exponent of Taylor's power law, $V = \alpha \mu^\beta$.
R	Multiplicative treatment difference.
d	Mean of the n differences between half-field counts for each treatment on the logarithmic scale. Test-statistic for H_0 and estimate of treatment effect on a logarithmic scale used for reporting results of FSE (corresponds to a variance-mean relationship with $\beta = 2$). R is estimated as 10^d .
r	Logarithm of the ratio of the arithmetic means for each treatment. Test-statistic for H_0 and estimate of treatment effect on a logarithmic scale (corresponds to a variance-mean relationship with $\beta = 1$).

d_w	Weighted version of d , with weights based on approximate variance of the difference in logarithmically-transformed counts. Test-statistic for H_0 (corresponds to a variance-mean relationship with $\beta = 1.5$).
$r_{1.5}$	Estimated treatment effect on a logarithmic scale based on a Generalized Linear Model with logarithmic link and variance function $V = \alpha \mu^{1.5}$ (corresponds to a variance-mean relationship with $\beta = 1.5$).
p	Observed probability level for the test of the null hypothesis based on a Monte Carlo paired randomization test, using the test-statistic d .
b	The regression coefficient obtained from a linear regression of logarithmically-transformed absolute standardized residuals on logarithmically-transformed fitted values, for any one of the three variance-mean models defined by $\beta = 1, 1.5$ or 2 .
β_{est}	Estimate of the true value of β , calculated as $\beta_{est} = 2b + \beta$, obtained for any one of the three variance-mean models defined by $\beta = 1, 1.5$ or 2 .
β_0	Combined estimate of the true value of β obtained from the three separate β_{est} values. Calculated as $-A/D$, where A and D are the intercept and regression coefficient, respectively, from a linear regression of the three values of $(\beta_{est} - \beta)/2$ on the three values of β .
θ	Estimate of non-centrality parameter, calculated as $\ln(R)/\sqrt{(2s^2/n)}$.
n_p	Projected sample sizes, in various multiples, k , of n , for which power of the d -statistic was estimated.
n_{80}	Sample size required for 80% power for any given value of R .
N	Total number of analyses of count indicators assessed.
$N_{1.5}$	Number of those N analyses with estimated $R > 1.5$ or estimated

$P_{1.5}$ $R < 0.67$.
Proportion of the $N_{1.5}$ analyses that achieved significance at the 5% level.

Table A2. Values of β_0 (estimate of the exponent in the power-law relationship between variance and mean abundance, $V = \alpha\mu^\beta$), n (number of fields), CV (coefficient of variation), s (natural logarithmic scale) and M (whole-field geometric mean) for analyses of count indicators grouped according to the primary FSE papers: aerial = Haughton *et al.* (2003), tables 2-7; boundary = Roy *et al.* (2003), tables 6-9; surface = Brooks *et al.* (2003), tables 1-4 & 6; trophic = Hawes *et al.* (2003), tables 4-7; vegetation = Heard *et al.* (2003), tables 2, 4 & 5 (year t only). Crops: b = beet; m = maize; s = spring oilseed rape. Pollinators = bees and butterflies.

group	table #	crop	taxa/group/occasion	period	β_0	n	CV%	s	M	
aerial	2	b	total bees	year	1.30	20	88.2	0.88	2.43	
			<i>Apis mellifera</i>	year	1.41	7	21.4	0.22	1.98	
			bumble bees	year	1.72	18	88.0	0.88	1.72	
			long-tongued bees	year	1.94	5	9.7	0.10	0.65	
		m	total bees	year	-1.40	15	115.7	1.15	1.57	
			<i>Apis mellifera</i>	year	4.47	3	168.4	1.68	1.99	
			bumble bees	year	-3.64	14	105.3	1.05	1.51	
			total bees	year	1.52	62	64.9	0.65	40.21	
	3	b	s	<i>Apis mellifera</i>	year	1.62	51	103.0	1.03	10.02
				bumble bees	year	1.41	62	64.5	0.64	24.31
				long-tongued bees	year	1.14	38	63.3	0.63	2.33
				total butterflies	year	1.16	58	57.3	0.57	4.70
			m	total butterflies	May	3.38	5	80.4	0.80	1.07
				total butterflies	June	1.96	11	64.5	0.64	1.80
				total butterflies	July	1.16	32	66.9	0.67	2.34
				total butterflies	Aug	1.53	51	64.4	0.64	3.05
m	b	s	total butterflies	year	1.65	35	64.3	0.65	3.51	
			total butterflies	June	1.48	6	54.5	0.55	1.14	
			total butterflies	July	0.84	15	30.0	0.30	2.48	
			total butterflies	Aug	1.88	28	76.8	0.77	2.55	

	s	total butterflies	year	1.44	65	42.4	0.42	14.17
			June	1.36	34	63.2	0.64	3.72
			July	0.89	49	70.6	0.71	4.03
			Aug	1.42	54	54.6	0.55	9.00
		<i>Pieris</i>	year	1.44	65	47.2	0.47	12.42
			June	0.95	34	68.1	0.68	3.47
			July	1.28	44	73.3	0.73	3.52
			Aug	1.68	52	55.4	0.55	8.98
		non- <i>Pieris</i>	year	1.19	42	68.8	0.69	1.84
			June	0.96	3	60.6	0.61	1.66
			July	1.03	25	61.9	0.62	1.75
			Aug	1.85	15	85.1	0.85	1.73
4	b	total Araneae	year	0.90	64	53.6	0.53	8.71
		Linyphiidae	year	1.29	59	53.2	0.53	3.90
			June	0.99	23	76.8	0.77	1.90
			Aug	1.04	57	50.3	0.50	3.20
		<i>L. tenuis</i>	year	1.66	26	60.6	0.61	1.61
	m	total Araneae	year	2.07	55	61.0	0.60	6.30
		Linyphiidae	year	2.41	41	75.1	0.75	3.05
		<i>L. tenuis</i>	year	16.54	10	94.1	0.94	1.80
	s	total Araneae	year	2.09	64	52.6	0.52	7.68
			June	2.25	44	63.9	0.64	2.38
			Aug	1.92	59	59.2	0.59	6.27
		Linyphiidae	year	1.32	62	65.9	0.65	3.82
			June	1.33	30	69.8	0.70	2.09
			Aug	1.71	56	66.5	0.67	3.15
		<i>L. tenuis</i>	year	1.65	32	60.3	0.60	1.64
5	b	total Collembola	year	2.45	64	61.6	0.61	62.76
			June	1.82	54	80.7	0.80	17.76
			Aug	2.23	62	67.6	0.68	42.67

		Entomobryidae	year	1.96	64	78.9	0.79	20.13
			June	1.89	47	88.0	0.88	4.95
			Aug	1.92	61	83.3	0.84	16.20
		Isotomidae	year	2.02	58	77.8	0.78	12.25
		Sminthuridae	year	1.72	55	72.5	0.72	14.72
			June	1.72	45	96.6	0.96	8.06
			Aug	1.78	48	68.7	0.69	6.87
m		total Collembola	year	1.64	57	76.9	0.77	95.01
			June	2.07	52	89.9	0.90	33.17
			Aug	1.38	53	90.5	0.90	50.88
		Entomobryidae	year	1.96	55	76.9	0.77	28.31
			June	2.31	49	92.3	0.92	7.33
			Aug	1.52	51	96.1	0.97	19.09
		Isotomidae	year	1.83	54	99.9	1.01	25.08
			June	2.25	43	106.5	1.07	9.30
			Aug	1.68	49	110.5	1.11	15.65
		Sminthuridae	year	1.65	53	99.6	1.00	15.47
			June	1.96	47	99.7	0.99	11.57
			Aug	1.59	41	91.0	0.91	6.43
s		total Collembola	year	2.08	64	65.8	0.66	121.78
			June	2.58	55	90.3	0.91	31.90
			Aug	2.10	60	53.6	0.54	87.07
		Entomobryidae	year	1.73	61	62.3	0.62	36.86
			June	2.06	44	83.3	0.83	6.68
			Aug	1.95	56	64.4	0.65	37.44
		Isotomidae	year	1.73	60	78.5	0.78	37.13
			June	2.01	45	90.2	0.91	15.24
			Aug	1.81	55	81.3	0.81	25.85
		Sminthuridae	year	2.01	57	101.6	1.02	17.52
			June	2.06	48	111.6	1.12	13.00

			Aug	2.40	46	96.3	0.96	6.69	
6	b	total Heteroptera	year	1.32	48	84.6	0.85	3.84	
		herbivores	year	2.40	11	68.7	0.69	1.58	
		predators	year	1.74	26	79.3	0.80	1.89	
	m	total Heteroptera	year	2.22	42	92.7	0.93	3.33	
		herbivores	year	0.76	7	62.0	0.62	1.16	
		predators	year	-0.62	35	77.3	0.77	1.96	
	s	total Heteroptera	year	1.36	41	69.8	0.70	4.40	
		herbivores	year	0.68	9	67.0	0.67	1.25	
		predators	year	1.26	31	72.6	0.73	2.81	
7	b	total Carabidae	year	1.72	57	61.3	0.61	4.04	
			June	0.96	25	68.6	0.68	2.05	
			Aug	1.14	52	61.0	0.61	3.39	
		<i>B. lampros</i>	year	6.05	34	69.9	0.70	1.53	
		<i>B. obtusum</i>	year	1.48	20	64.7	0.65	1.92	
		<i>T. quadristriatus</i>	year	1.17	22	69.0	0.69	1.53	
	m	total Carabidae	year	1.61	43	54.0	0.54	3.69	
			June	1.32	19	74.4	0.75	1.52	
			Aug	1.46	38	58.6	0.58	3.21	
		<i>B. lampros</i>	year	1.40	21	77.0	0.77	1.59	
		<i>B. obtusum</i>	year	1.50	11	69.0	0.69	2.35	
		<i>T. quadristriatus</i>	year	2.70	11	74.9	0.75	1.28	
	s	total Carabidae	year	2.57	54	57.2	0.57	3.52	
		<i>B. lampros</i>	year	0.49	23	59.5	0.59	2.00	
		<i>B. obtusum</i>	year	1.98	17	83.5	0.83	1.46	
		<i>T. quadristriatus</i>	year	1.40	21	73.3	0.73	1.32	
boundary	6	b	total butterflies	year	1.45	66	62.1	0.62	10.17
			May	0.75	25	67.9	0.68	2.00	
			June	1.16	22	69.2	0.69	1.48	
			July	1.50	54	79.8	0.80	4.28	

		Aug	1.57	58	68.4	0.68	4.71
	<i>Pieris brassicae</i>	year	1.18	37	78.6	0.78	2.20
	<i>Pieris rapae</i>	year	1.69	51	65.8	0.66	3.67
	<i>Pieris napi</i>	year	2.01	24	66.9	0.67	1.77
	<i>Aglais urticae</i>	year	1.13	31	91.3	0.92	2.24
	<i>Inachis io</i>	year	1.30	16	83.2	0.83	1.70
	<i>Maniola jurtina</i>	year	1.80	34	57.9	0.58	2.32
m	total butterflies	year	1.56	56	57.5	0.57	11.44
	<i>Pieris brassicae</i>	year	1.15	32	65.7	0.65	2.31
	<i>Pieris rapae</i>	year	1.54	44	53.5	0.54	3.45
	<i>Pieris napi</i>	year	1.27	14	61.3	0.62	2.36
	<i>Aglais urticae</i>	year	1.51	27	82.9	0.83	2.20
	<i>Inachis io</i>	year	1.92	18	72.9	0.73	1.37
	<i>Pyronia tithonus</i>	year	0.97	23	93.2	0.93	1.97
	<i>Maniola jurtina</i>	year	2.40	36	72.1	0.72	2.46
	<i>Aphantopus</i>	year					
	<i>hyperantus</i>		1.10	16	79.6	0.79	1.83
s	total butterflies	year	1.15	67	49.2	0.49	21.20
		June	1.29	42	74.3	0.74	2.44
		July	1.37	57	64.1	0.64	7.11
		Aug	1.69	64	51.5	0.52	11.98
	<i>Pieris</i> species	year	1.06	67	51.8	0.52	14.83
		June	1.02	37	81.2	0.81	2.36
		July	0.73	51	59.7	0.59	4.04
		Aug	1.80	61	59.7	0.60	10.07
	non- <i>Pieris</i> species	year	1.65	61	63.3	0.64	5.48
		June	0.70	7	72.2	0.72	1.03
		July	1.46	48	77.5	0.78	3.83
		Aug	1.59	47	57.7	0.58	2.54
	<i>Pieris brassicae</i>	year	1.55	52	80.5	0.81	3.81

		<i>Pieris rapae</i>	year	1.61	65	50.7	0.51	9.88
		<i>Pieris napi</i>	year	1.41	31	78.3	0.78	1.79
		<i>Inachis io</i>	year	2.02	16	69.9	0.70	1.53
		<i>Aglais urticae</i>	year	3.39	29	87.4	0.88	1.97
		<i>Pyronia tithonus</i>	year	0.08	13	72.6	0.73	2.23
		<i>Maniola jurtina</i>	year	1.14	31	79.9	0.80	2.20
		<i>Aphantopus</i>	year					
		<i>hyperantus</i>		-0.55	23	80.8	0.80	2.76
7	b	total bees	year	1.51	63	87.6	0.88	8.61
			May	0.81	19	87.6	0.87	1.29
			June	1.08	35	88.4	0.89	2.66
			July	1.47	47	88.3	0.88	4.02
			Aug	2.12	44	106.2	1.06	2.86
		<i>Apis mellifera</i>	year	1.64	26	101.4	1.01	2.50
			June	0.37	13	75.6	0.76	1.48
			July	1.32	13	100.4	1.00	2.00
		bumble bees	year	1.21	63	86.4	0.87	6.91
			May	0.78	15	90.7	0.91	1.26
			June	1.06	30	75.6	0.76	2.28
			July	1.29	46	89.6	0.89	3.46
			Aug	2.06	41	106.6	1.06	2.71
		long-tongued bees	year	1.53	45	93.3	0.93	2.88
			June	1.41	18	64.8	0.65	1.40
			July	1.88	19	90.1	0.90	1.86
			Aug	1.88	27	102.7	1.02	1.56
	m	total bees	year	1.87	54	77.5	0.78	7.54
		<i>Apis mellifera</i>	year	1.85	27	85.8	0.85	2.70
			June	1.16	11	76.8	0.77	1.76
			July	1.51	10	108.7	1.09	2.96
			Aug	1.11	15	70.4	0.71	1.59

		bumble bees	year	1.52	53	77.2	0.77	5.77
		long-tongued bees	year	1.34	35	76.8	0.77	2.00
	s	total bees	year	1.84	67	69.3	0.69	13.74
		<i>Apis mellifera</i>	year	1.21	50	88.4	0.89	3.45
		bumble bees	year	1.43	67	70.4	0.71	9.57
		long-tongued bees	year	2.16	50	71.0	0.71	2.36
8	b	total Gastropods	year	1.22	64	66.7	0.66	55.68
		slugs	year	1.42	61	65.3	0.65	8.93
		snails	year	1.36	61	77.4	0.78	36.53
	m	total Gastropods	year	1.51	58	47.0	0.47	84.39
		slugs	year	1.34	54	58.7	0.59	9.78
		snails	year	1.32	58	67.3	0.67	51.10
	s	total Gastropods	year	1.45	66	64.5	0.65	81.11
		slugs	year	1.79	58	76.5	0.77	11.99
		snails	year	1.61	60	73.1	0.73	57.62
9(a)	b	total Carabidae	year	1.36	60	58.1	0.58	3.93
		total Araneae	year	1.54	64	58.0	0.57	16.83
		total Heteroptera	year	2.21	58	78.8	0.79	9.59
		herbivorous species	year	1.74	40	89.0	0.89	1.67
			June	1.15	12	72.2	0.72	1.27
			Aug	2.37	34	88.9	0.89	1.44
		total Collembola	year	1.90	64	86.5	0.86	119.04
	m	total Carabidae	year	2.25	51	58.2	0.58	3.56
		<i>B. lampros</i>	year	1.45	22	64.3	0.64	1.36
		<i>D. atricapillus</i>	year	0.55	9	36.1	0.36	1.70
		total Araneae	year	1.56	57	46.6	0.47	22.29
		Linyphiidae	year	1.59	55	55.1	0.56	6.86
		total Heteroptera	year	2.06	54	58.9	0.59	12.39
		total Collembola	year	1.72	57	65.8	0.65	160.95
			June	1.66	52	76.1	0.76	69.57

			Aug	1.54	53	75.8	0.76	86.50	
	s	total Carabidae	year	1.24	58	61.4	0.61	2.99	
		total Araneae	year	1.53	65	64.6	0.64	13.74	
		Linyphiidae	year	1.44	60	58.2	0.58	5.80	
			June	1.18	41	69.8	0.70	2.44	
			Aug	2.81	53	66.1	0.66	4.26	
		total Heteroptera	year	1.06	47	56.4	0.57	7.10	
		total Collembola	year	1.79	65	69.6	0.70	109.21	
		Sminthuridae	year	2.24	54	127.4	1.27	10.34	
			June	2.18	45	150.1	1.50	10.11	
			Aug	1.57	36	92.7	0.93	3.20	
9(b)	b	herbivores	year	1.59	64	70.2	0.70	46.35	
			June	1.67	56	80.8	0.80	18.07	
			Aug	1.23	62	78.9	0.79	25.71	
		predators	year	1.50	64	47.0	0.47	26.34	
		parasitoids	year	1.27	64	65.9	0.66	34.09	
			June	1.31	56	69.4	0.69	10.52	
			Aug	1.19	62	73.9	0.74	22.71	
	m	bird food	year	1.96	64	60.1	0.60	54.67	
		herbivores	year	2.37	57	55.7	0.55	65.66	
		predators	year	1.37	57	39.3	0.39	32.85	
		parasitoids	year	1.75	57	47.3	0.47	41.45	
		bird food	year	2.76	57	47.2	0.47	79.75	
	s	herbivores	year	1.61	65	53.2	0.54	39.42	
		predators	year	1.52	65	52.2	0.53	20.13	
		parasitoids	year	2.34	65	43.3	0.43	41.47	
		bird food	year	1.52	65	40.6	0.41	48.95	
surface	1	b	total Carabidae	year	1.13	66	24.5	0.25	1640.78
			<i>Pterostichus</i> spp.	year	1.39	66	26.9	0.26	1217.39
			<i>Bembidion</i> spp.	year	1.59	61	61.9	0.62	35.67

		May	1.43	51	64.8	0.65	34.06
		July	1.84	43	76.0	0.76	8.88
		Aug	1.74	40	82.7	0.82	4.41
	<i>B. tetracolum</i>	year	1.59	41	80.8	0.80	12.97
		May	1.65	31	78.5	0.79	13.61
		July	1.86	25	85.2	0.85	6.42
		Aug	2.07	13	47.7	0.48	3.83
	<i>N. brevicollis</i>	year	1.74	45	58.0	0.58	19.27
	<i>H. rufipes</i>	year	1.51	64	62.7	0.63	37.86
		May	1.78	30	60.4	0.61	4.00
		July	1.62	53	66.2	0.66	12.99
		Aug	1.48	58	74.2	0.74	33.20
	<i>Amara</i> spp.	year	1.30	43	69.0	0.69	2.89
		May	1.52	25	74.3	0.74	2.07
		July	1.19	16	59.3	0.59	2.04
		Aug	1.80	24	64.5	0.65	1.60
	<i>L. pilicornis</i>	year	1.97	38	61.6	0.61	2.96
	<i>T. quadristriatus</i>	year	1.75	65	66.2	0.66	11.52
		May	3.29	32	71.1	0.71	3.41
		July	1.93	30	69.6	0.70	3.75
		Aug	1.88	58	73.4	0.73	9.10
m	total Carabidae	year	2.20	58	28.3	0.29	805.61
	<i>Pterostichus</i> spp.	year	1.97	58	30.9	0.31	477.68
		May	1.75	54	48.2	0.48	49.13
		July	1.82	49	41.4	0.41	251.05
		Aug	2.35	45	31.1	0.31	367.13
	<i>P. niger</i>	year	2.45	38	68.8	0.69	14.03
	<i>Bembidion</i> spp.	year	1.70	58	54.5	0.55	45.68
	<i>N. brevicollis</i>	year	1.92	43	70.4	0.70	9.47
	<i>H. rufipes</i>	year	1.58	53	81.2	0.82	18.11

			May	1.48	34	52.9	0.53	4.11
			July	1.61	40	78.1	0.78	8.92
			Aug	1.66	41	92.1	0.92	14.77
		<i>Amara</i> spp.	year	2.01	42	64.5	0.64	2.63
			May	0.68	25	53.3	0.53	2.41
			July	1.37	16	74.5	0.74	1.30
			Aug	0.88	20	75.5	0.76	1.29
		<i>A. dorsale</i>	year	1.19	45	80.1	0.80	7.16
			May	1.27	34	79.4	0.80	3.77
			July	1.96	34	98.9	0.99	4.27
			Aug	1.63	17	67.0	0.67	3.22
		<i>L. pilicornis</i>	year	1.27	43	61.5	0.62	4.23
		<i>T. quadristriatus</i>	year	1.48	48	66.2	0.67	8.41
s		total Carabidae	year	1.57	67	23.9	0.24	1036.28
		<i>Pterostichus</i> spp.	year	1.33	67	33.6	0.33	677.95
		<i>P. niger</i>	year	1.49	60	48.8	0.49	55.95
		<i>Bembidion</i> spp.	year	1.27	64	57.7	0.57	19.57
		<i>N. brevicollis</i>	year	1.72	58	70.0	0.69	25.62
		<i>H. rufipes</i>	year	1.84	53	83.6	0.84	22.27
			May	1.24	24	72.2	0.73	2.76
			July	1.82	42	78.6	0.78	7.06
			Aug	1.91	49	89.1	0.89	18.24
		<i>Amara</i> spp.	year	1.53	49	63.8	0.64	5.16
		<i>L. pilicornis</i>	year	1.21	58	60.1	0.60	4.03
		<i>T. quadristriatus</i>	year	1.54	56	62.8	0.63	7.78
		<i>N. biguttatus</i>	year	1.25	53	62.2	0.62	7.86
2	b	Staphylinidae	year	1.35	66	37.0	0.37	134.52
	m	Staphylinidae	year	1.26	58	39.8	0.40	128.76
	s	Staphylinidae	year	1.03	67	32.1	0.32	214.84
3	b	total spiders	year	1.76	66	30.3	0.30	284.01

		Linyphiidae	year	1.80	66	33.7	0.33	139.88
			year					
		<i>L. tenuis</i>		1.07	63	48.7	0.49	14.35
		<i>Erigone</i> agg.	year	1.58	62	65.2	0.65	39.18
		<i>Oedothorax</i> spp.	year	1.43	42	46.4	0.46	64.03
		Lycosidae	year	1.57	63	41.6	0.41	26.84
		<i>Pardosa</i> spp.	year	1.48	61	62.4	0.62	8.85
	m	total spiders	year	1.55	58	30.5	0.31	251.66
		Linyphiidae	year	2.29	58	38.7	0.38	128.39
			year					
		<i>L. tenuis</i>		0.93	56	45.3	0.45	15.69
		<i>Erigone</i> agg.	year	1.75	57	66.5	0.66	41.98
		<i>Oedothorax</i> spp.	year	1.41	46	70.6	0.71	50.70
		Lycosidae	year	1.53	58	35.6	0.36	27.60
		<i>Pardosa</i> spp.	year	1.77	55	56.2	0.57	9.84
	s	total spiders	year	1.86	67	29.5	0.29	213.18
		Linyphiidae	year	1.50	67	28.7	0.29	125.24
			year					
		<i>L. tenuis</i>		0.99	66	39.8	0.40	22.12
		<i>Erigone</i> agg.	year	1.64	67	57.7	0.57	30.31
		<i>Oedothorax</i> spp.	year	1.70	54	58.3	0.59	26.37
		Lycosidae	year	1.48	67	35.8	0.36	34.30
		<i>Pardosa</i> spp.	year	1.80	59	58.1	0.58	10.17
4	b	total Collembola	year	2.06	66	49.3	0.49	377.77
			May	1.71	53	56.1	0.56	195.38
			July	1.89	60	88.7	0.88	79.26
			Aug	1.57	62	75.8	0.76	69.27
		Entomobryidae	year	1.37	66	72.5	0.73	96.14
			May	1.72	52	78.8	0.79	53.09

		July	1.68	53	96.7	0.97	25.01
		Aug	1.50	59	79.3	0.79	35.53
	Isotomidae	year	2.23	65	67.1	0.67	86.26
		May	1.73	53	74.9	0.75	52.33
		July	2.22	56	92.7	0.93	16.57
		Aug	2.03	48	92.8	0.92	15.38
	Sminthuridae	year	2.00	58	78.4	0.78	43.95
		May	2.09	40	87.8	0.88	23.43
		July	1.99	53	103.1	1.03	14.19
		Aug	2.01	40	98.9	0.99	10.18
	Poduridae	year	1.68	29	86.4	0.87	18.28
		May	1.64	22	82.6	0.82	15.88
		July	66.42	17	120.0	1.20	4.86
		Aug	2.12	17	133.5	1.34	6.10
m	total Collembola	year	1.86	58	54.0	0.55	666.54
		May	1.58	54	66.6	0.67	317.21
		July	1.88	49	71.0	0.71	194.99
		Aug	2.20	45	85.8	0.86	109.09
	Entomobryidae	year	1.68	58	58.5	0.58	177.93
		May	1.60	52	82.8	0.83	74.36
		July	1.73	45	69.0	0.69	55.02
		Aug	1.77	44	82.6	0.82	45.73
	Isotomidae	year	1.96	58	62.9	0.63	166.67
		May	1.68	53	72.2	0.72	109.59
		July	1.88	47	81.2	0.81	38.95
		Aug	1.87	43	98.7	0.98	15.75
	Sminthuridae	year	1.96	58	84.6	0.84	68.10
		May	2.10	52	90.5	0.90	39.27
		July	1.81	45	111.1	1.11	27.40
		Aug	1.92	39	117.1	1.17	9.04

		Poduridae	year	1.87	42	138.5	1.38	11.50
			May	2.15	31	117.6	1.18	4.90
			July	2.05	25	193.7	1.94	7.95
			Aug	2.87	16	156.6	1.56	13.78
	s	total Collembola	year	1.38	67	43.8	0.44	554.67
			May	1.87	57	51.5	0.52	179.93
			July	1.60	57	70.3	0.70	116.47
			Aug	1.46	60	51.9	0.52	186.37
		Entomobryidae	year	1.50	67	72.8	0.73	105.82
			May	1.74	53	79.6	0.79	40.53
			July	1.50	53	104.1	1.04	27.99
			Aug	1.56	55	79.4	0.80	52.83
		Isotomidae	year	1.50	67	46.0	0.47	213.10
			May	1.83	57	60.0	0.60	81.23
			July	1.75	53	79.3	0.79	35.74
			Aug	1.64	57	67.2	0.68	69.93
		Sminthuridae	year	1.33	66	99.0	0.99	70.52
			May	1.38	49	90.7	0.91	31.09
			July	1.66	54	124.6	1.24	25.12
			Aug	1.54	49	76.7	0.76	18.06
		Poduridae	year	1.65	46	110.9	1.10	6.73
			May	1.90	27	106.3	1.07	4.15
			July	2.65	23	113.7	1.14	3.20
			Aug	1.91	27	98.3	0.98	4.56
6	b	total gastropods	year	2.56	40	70.4	0.70	4.96
		<i>D. reticulatum</i>	year	1.43	34	79.5	0.80	3.85
	m	total gastropods	year	1.46	42	71.0	0.71	8.35
		<i>D. reticulatum</i>	year	1.85	36	71.8	0.72	5.80
	s	total gastropods	year	1.56	59	67.5	0.68	11.27

trophic	4	b	<i>D. reticulatum</i>	year	1.56	47	83.1	0.83	8.51	
				May	1.50	33	94.2	0.94	2.92	
				Aug	1.61	36	93.7	0.94	7.02	
			herbivores	year	2.05	52	64.9	0.65	132.47	
			aphids		1.71	50	86.7	0.86	112.81	
			flea beetles		2.21	40	84.6	0.84	2.95	
			leaf miners		2.34	10	68.5	0.68	3.85	
			predators		1.69	52	54.1	0.54	22.80	
			parasitoids		1.59	44	89.7	0.90	6.38	
			herbivores	June	2.28	40	72.3	0.72	15.09	
				July	1.80	52	76.2	0.76	107.70	
			predators	June	1.78	33	53.4	0.53	7.69	
				July	2.23	50	64.6	0.64	16.92	
			parasitoids	June	1.22	22	56.1	0.56	3.15	
				July	1.93	41	100.9	1.01	4.99	
		m	herbivores	year	1.48	54	43.5	0.43	325.31	
			aphids		1.52	54	83.7	0.84	62.75	
			thrips		1.29	54	47.4	0.48	163.81	
			predators		2.05	54	59.1	0.59	29.85	
			parasitoids		1.74	49	85.2	0.85	12.87	
			herbivores	July	1.16	47	50.6	0.50	176.95	
				Aug	1.70	52	90.7	0.90	103.94	
			predators	July	1.88	45	68.7	0.69	8.09	
				Aug	1.78	52	63.0	0.63	19.86	
			parasitoids	July	1.67	37	88.9	0.89	4.95	
				Aug	1.76	44	84.7	0.84	8.86	
			s	herbivores	year	1.81	64	54.6	0.55	211.69
				aphids		1.84	49	101.9	1.01	25.38
				pollen beetles		1.66	62	61.0	0.62	127.39
				predators		1.37	55	79.8	0.80	6.05

		parasitoids		1.24	40	97.1	0.97	4.17
		herbivores	June	1.58	52	70.3	0.70	33.32
			July	1.81	63	66.2	0.66	166.48
		predators	June	2.06	27	78.6	0.79	4.14
			July	2.04	47	78.5	0.78	5.00
		parasitoids	June	1.67	20	94.6	0.95	2.97
			July	1.43	31	88.3	0.88	3.91
5	b	herbivores	year	1.64	64	66.0	0.66	14.52
		predators	year	1.26	64	45.1	0.46	15.32
		parasitoids	year	1.81	64	54.2	0.55	21.76
		detritivores	year	2.45	64	61.6	0.61	62.76
		herbivores	June	1.61	57	80.4	0.80	24.51
			Aug	1.96	61	54.8	0.55	39.21
		predators	June	1.30	56	51.8	0.51	12.23
			Aug	2.21	61	42.1	0.42	32.45
		parasitoids	June	1.37	56	63.0	0.63	14.00
			Aug	1.65	61	48.5	0.48	46.10
		detritivores	June	1.59	57	84.9	0.85	60.61
			Aug	2.09	61	75.8	0.76	123.68
	m	herbivores	year	1.82	56	77.8	0.78	13.26
		predators	year	2.67	56	53.7	0.54	11.21
		parasitoids	year	1.82	57	63.3	0.64	15.13
		detritivores	year	1.64	57	76.9	0.77	95.00
		herbivores	June	1.71	44	87.8	0.87	6.19
			Aug	3.03	52	80.5	0.81	7.38
		predators	June	1.32	41	57.6	0.57	2.74
			Aug	1.84	52	62.3	0.62	9.72
		parasitoids	June	1.88	42	64.7	0.64	2.72
			Aug	1.76	53	70.9	0.71	14.13
		detritivores	June	2.07	52	89.9	0.90	33.17

			Aug	1.38	53	90.5	0.90	50.87
	s	herbivores	year	2.07	65	64.2	0.64	18.60
		predators	year	2.08	65	44.4	0.45	12.97
		parasitoids	year	1.02	64	45.4	0.46	49.31
		detritivores	year	2.09	64	65.8	0.66	121.52
		herbivores	June	1.77	53	76.9	0.77	9.35
			Aug	2.38	62	63.1	0.63	9.08
		predators	June	1.89	53	59.8	0.59	3.11
			Aug	1.66	62	55.3	0.55	10.28
		parasitoids	June	1.81	48	65.7	0.65	8.89
			Aug	1.32	61	48.1	0.48	42.15
		detritivores	June	2.00	54	88.4	0.89	32.89
			Aug	2.12	60	53.6	0.53	86.93
6	b	detritivores	year	2.06	66	49.3	0.49	377.77
		predators		1.03	66	20.7	0.21	2252.63
		detritivores	May	1.71	53	56.1	0.56	195.38
			June	1.89	60	88.7	0.88	79.26
			Aug	1.57	62	75.8	0.76	69.27
		predators	May	1.21	53	28.2	0.28	317.06
			June	1.34	61	26.1	0.27	1019.15
			Aug	1.82	62	29.1	0.29	940.13
	m	detritivores	year	1.86	58	54.0	0.55	666.54
		predators		2.05	58	22.0	0.22	1355.17
		detritivores	May	1.58	54	66.6	0.67	317.21
			June	1.88	49	71.0	0.71	194.99
			Aug	2.20	45	85.8	0.86	109.09
		predators	May	1.35	54	26.4	0.26	357.86
			June	2.38	49	27.9	0.27	684.49
			Aug	1.88	45	26.9	0.27	679.30
	s	detritivores	year	1.38	67	43.8	0.44	554.67

			predators		1.75	67	16.4	0.16	1641.28
			detritivores	May	1.87	57	51.5	0.52	179.93
				June	1.60	57	70.3	0.70	116.47
				Aug	1.46	60	51.9	0.52	186.37
			predators	May	1.64	57	35.6	0.36	295.08
				June	1.94	63	25.2	0.25	504.57
				Aug	2.18	60	24.6	0.25	914.69
	7	b	pollinators	year	1.30	60	60.6	0.61	5.43
				May	0.61	7	58.6	0.59	1.32
				June	2.62	13	66.4	0.66	1.97
				July	0.68	36	59.7	0.60	2.40
				Aug	1.47	51	70.0	0.70	3.49
		m	pollinators	year	2.23	42	75.8	0.76	3.55
				June	1.38	6	58.9	0.59	1.18
				July	1.32	20	81.5	0.82	2.50
				Aug	1.61	31	74.0	0.74	2.78
		s	pollinators	year	1.49	66	44.2	0.44	58.99
				June	1.50	41	80.0	0.80	6.76
				July	1.46	61	74.6	0.75	27.11
				Aug	1.01	55	56.6	0.57	13.78
vegetation	2	b	seedbank	-	1.92	64	44.8	0.44	100.51
			seedling	-	2.08	64	62.4	0.63	370.29
			pre-GM herbicide	-	1.69	54	94.7	0.95	411.95
			post-herbicide	-	1.46	62	67.8	0.68	250.26
			final	-	1.92	63	60.7	0.61	86.68
			seed rain	-	1.95	65	144.5	1.44	85.93
		m	seedbank	-	1.65	57	36.7	0.37	127.42
			seedling	-	1.61	58	103.2	1.03	440.27
			post-herbicide	-	1.61	52	115.8	1.16	185.64
			final	-	1.75	45	78.3	0.79	83.15

4	s	seed rain	-	2.40	54	180.2	1.81	139.12
		seedbank	-	1.73	65	71.4	0.71	109.74
		seedling	-	1.56	66	94.9	0.95	287.70
		post-herbicide	-	1.75	62	74.5	0.74	293.01
		final	-	1.64	63	64.2	0.65	203.28
	b	seed rain	-	2.16	65	132.5	1.33	346.01
		seedbank	-	2.11	64	47.7	0.48	48.70
		seedling	-	2.02	64	64.6	0.65	261.52
		pre-GM herbicide	-	1.69	54	83.4	0.84	254.95
		post-herbicide	-	1.43	62	65.1	0.65	165.25
	m	final	-	1.81	63	57.7	0.58	53.13
		seed rain	-	1.95	65	149.1	1.50	71.32
		seedbank	-	1.74	57	46.6	0.47	67.88
		seedling	-	1.64	58	126.5	1.26	302.10
		post-herbicide	-	1.62	52	128.6	1.28	101.43
s	final	-	1.72	45	89.8	0.90	43.61	
	seed rain	-	2.27	54	191.8	1.91	98.46	
	seedbank	-	1.62	65	64.7	0.64	58.16	
	seedling	-	1.69	65	95.2	0.96	199.57	
	post-herbicide	-	1.97	62	80.6	0.81	194.03	
5	b	final	-	1.95	63	71.2	0.71	115.84
		seed rain	-	2.31	65	142.9	1.43	255.24
		seedbank	-	1.81	63	62.1	0.62	32.90
		seedling	-	2.15	64	95.4	0.95	45.65
		pre-GM herbicide	-	1.87	54	142.6	1.42	62.18
	m	post-herbicide	-	2.01	62	121.9	1.22	36.88
		final	-	1.53	62	92.3	0.92	18.72
		seed rain	-	1.96	53	135.9	1.36	9.04
		seedbank	-	1.46	57	64.1	0.64	43.19
		seedling	-	1.95	58	95.1	0.95	65.82

	post-herbicide	-	1.93	51	123.6	1.23	50.62
	final	-	1.72	45	89.2	0.90	25.37
	seed rain	-	2.08	42	160.5	1.60	17.83
s	seedbank	-	1.93	64	90.3	0.90	35.08
	seedling	-	1.79	66	101.0	1.01	49.27
	post-herbicide	-	2.26	62	102.9	1.03	52.69
	final	-	1.62	63	89.0	0.89	48.20
	seed rain	-	1.85	60	137.1	1.37	29.76

Table A3. Number of analyses, out of N , with $\geq 90\%$ power for various multiples, k , of n (number of fields, see table A2), and three values of the multiplicative treatment effect, R , for groups of indicators corresponding to the primary FSE papers (see table 1) and all 531 indicators combined.

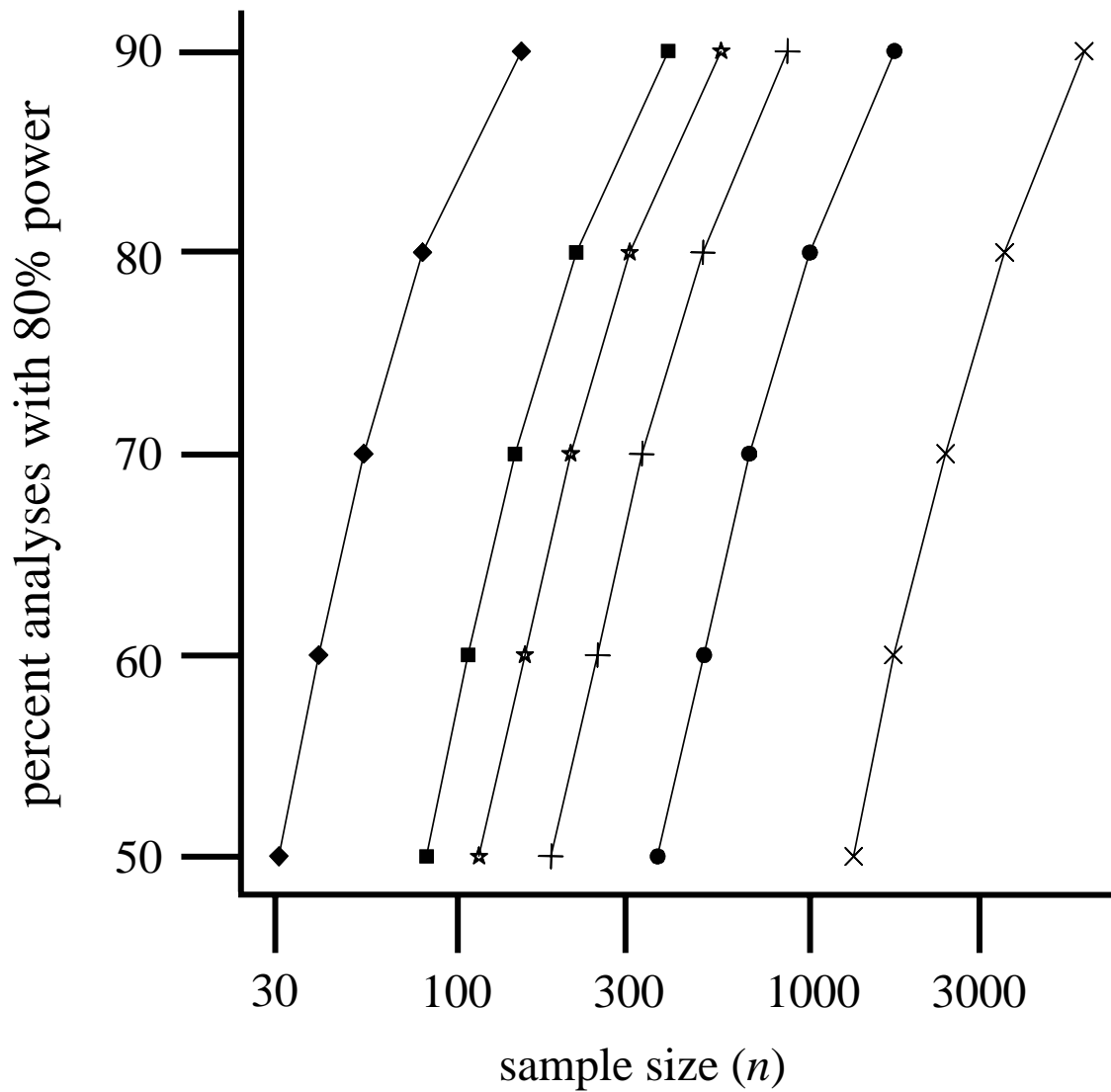
k	R	group					
		aerial ($N=106$)	boundary ($N=119$)	surface ($N=151$)	trophic ($N=107$)	vegetation ($N=48$)	all indicators ($N=531$)
0.08	1.3	4	0	1	0	0	5
0.17		2	0	1	1	0	4
0.33		2	0	4	4	0	10
0.5		2	0	9	10	0	21
0.67		0	0	14	12	0	26
1		1	2	22	16	2	43
1.5		4	11	31	27	4	77
2		8	20	40	37	11	116
3		22	47	66	57	17	209
6		53	67	106	86	32	344
12		80	86	132	100	44	442
0.08		1.5	4	0	1	1	0
0.17	2		0	4	5	0	11
0.33	2		0	16	12	0	30
0.5	3		3	24	19	2	51
0.67	2		12	31	29	4	78
1	13		28	48	43	15	147
1.5	26		49	72	62	18	227
2	42		59	89	78	26	294

3		59	70	113	89	34	365
6		84	87	138	101	44	454
12		94	109	145	105	48	501
0.08	2	4	0	7	8	0	19
0.17		3	4	24	16	2	49
0.33		9	18	42	39	12	120
0.5		23	43	66	60	18	210
0.67		36	55	85	71	24	271
1		51	67	111	89	33	351
1.5		72	74	129	95	40	410
2		83	85	133	101	44	446
3		87	97	142	102	45	473
6		98	114	147	105	48	512
12		102	118	150	107	48	525

Legend to Figure A1

Figure A1. Proportion of analyses with 80% power given estimated initial sample sizes (n , number of fields), for six values of the multiplicative treatment effect, $R = 1.1$ (x), 1.2 (●), 1.3 (+), 1.4 (*), 1.5 (■) and 2 (◆), based on analyses of 531 FSE count indicators (see table A2).

Figure A1



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