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APPENDICES

Appendix 4.1 *The specific activity ratio (SAR) in the -S treatment, ryegrass after cropping, Uralla soil.*

	MCP	KCl-40	KCl-100	Bray
ICP-S	5.97 a	2.49 b	5.62 a	1.93 b
SO ₄ -S	12.95 a	2.73 c	6.89 b	1.87 c
S-org	1.23 b	2.20 b	3.76 a	2.15 b
Second MCP	25.92 a	47.47 a	92.43 a	15.22 a
HI-S remaining	20.54 a	22.26 a	27.46 a	23.46 a
Remainder	28.40 a	31.67 a	103.26 a	27.02 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.2 *The S concentration ($\mu\text{g S g}^{-1}$ soil) in the four test extractants in the +S treatment, ryegrass before planting, Uralla soil.*

	MCP	KCl-40	KCl-100	Bray
ICP-S	45.7 b	47.9 b	61.4 a	34.5 c
SO ₄ -S	42.8 b	43.9 b	50.5 a	30.9 c
S-org	2.9 c	4.0 b	10.9 a	3.6 b
Second MCP	4.8 b	5.9 b	2.6 c	26.6 a
HI-S remaining	50.5 b	47.1 b	40.2 c	56.9 a
Remainder	70.8 a	72.0 a	65.4 a	75.6 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.3 The percentage of ^{35}S in the four test extractants in the +S treatment, ryegrass before planting, Uralla soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	40.8 b	55.4 b	77.0 a	28.8 c
SO ₄ -S	37.8 b	52.3 b	75.2 a	26.5 c
S-org	3.0 a	3.1 a	1.8 b	2.3 ab
Second MCP	3.3 b	5.9 b	1.3 c	18.3 a
HI-S remaining	27.9 a	27.9 a	14.9 b	35.0 a
Remainder	4.7 a	16.7 b	8.1 b	36.1 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.4 The specific activity (SA) (KBq mg S⁻¹) in the four test extractants in the +S treatment, ryegrass before planting, Uralla soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	65.8 b	84.3 ab	91.9 a	62.1 b
SO ₄ -S	64.3 b	86.8 ab	109.2 a	64.0 b
S-org	87.3 a	55.8 ab	12.3 c	46.4 b
Second MCP	49.5 a	76.4 a	38.5 a	50.2 a
HI-S remaining	40.4 b	43.7 a	27.3 b	45.6 a
Remainder	32.5 b	16.9 c	9.0 c	47.0 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.5 The specific activity ratios (SAR) in the +S treatment, ryegrass before planting, Uralla soil.

	MCP	KCI-40	KCI-100	Bray
ICP-S	3.12 a	2.35 a	2.15 a	3.22 a
SO ₄ -S	3.22 a	2.29 ab	1.81 a	3.14 b
S-org	2.26 b	3.68 b	23.37 a	4.44 b
Second MCP	4.10 a	2.67 a	5.53 a	4.23 a
HI-S remaining	4.87 b	4.81 b	7.62 a	4.47 b
Remainder	6.08 b	22.45 a	24.90 a	4.40 b

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.6 The specific activity ratios (SAR) in the +S treatment, ryegrass after cropping, Uralla soil.

	MCP	KCI-40	KCI-100	Bray
ICP-S	1.11 a	0.94 b	1.17 a	0.82 b
SO ₄ -S	1.09 a	0.83 b	1.04 a	0.67 b
S-org	1.05 b	1.76 ab	2.93 a	1.69 ab
Second MCP	2.86 b	1.30 c	6.28 a	1.17 c
HI-S remaining	9.44 b	8.12 b	16.17 a	8.24 b
Remainder	4.78 ab	7.25 ab	16.86 a	4.07 b

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.7 The specific activity ratios (SAR) in the -S treatment, ryegrass after cropping, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	4.11 b	2.99 c	5.09 a	3.09 c
SO ₄ -S	5.22 a	2.10 b	4.31 a	2.43 b
S-org	2.35 b	4.71 ab	7.75 a	3.85 b
Second MCP	23.49 a	14.27 b	8.40 c	14.20 b
HI-S remaining	44.89 a	46.64 a	47.33 a	56.79 a
Remainder	49.35 a	45.63 a	56.47 a	34.53 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.8 The S concentration ($\mu\text{g S g}^{-1}$) in the four test extractants in the +S treatment, ryegrass before planting, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	52.4 b	37.5 c	75.6 a	37.5 c
SO ₄ -S	49.2 b	31.4 c	54.4 a	32.2 c
S-org	3.2 c	6.1 b	21.2 a	5.3 b
Second MCP	6.5 c	33.2 a	16.8 b	33.3 a
HI-S remaining	160.1 c	167.2 b	142.2 d	179.9 a
Remainder	128.8 b	136.6 a	123.5 b	123.8 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.9 The percentage of ^{35}S in the four test extractants in the +S treatment, ryegrass before planting, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	65.4 b	47.6 c	80.6 a	34.6 d
SO ₄ -S	60.2 b	42.4 c	76.3 a	32.5 d
S-org	5.2 a	5.2 a	4.3 ab	2.1 b
Second MCP	4.1 c	32.2 a	12.9 b	37.9 a
HI-S remaining	20.1 b	24.0 b	14.1 c	35.2 a
Remainder	14.5 b	28.4 a	5.2 c	30.2 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.10 The specific activity (SA) (KBq mg S⁻¹) in the four test extractants in the +S treatment, ryegrass before planting, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	82.9 a	84.5 a	70.9 b	61.4 c
SO ₄ -S	81.2 b	90.2 b	93.1 a	67.0 c
S-org	110.2 a	56.5 b	13.4 c	26.8 c
Second MCP	42.1 c	63.7 b	51.0 c	75.5 a
HI-S remaining	8.3 b	9.6 ab	6.6 b	12.9 a
Remainder	7.8 bc	14.0 a	2.6 c	11.2 ab

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.11 The specific activity ratios (SAR) in the +S treatment, ryegrass before planting, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	2.63 c	2.61 c	3.09 b	3.57 a
SO ₄ -S	2.69 b	2.46 bc	2.36 c	3.26 a
S-org	2.01 b	3.86 b	16.40 a	10.88 a
Second MCP	5.21 a	3.50 c	4.31 b	2.91 d
HI-S remaining	26.94 a	22.99 a	33.18 b	17.10 a
Remainder	31.29 b	16.43 b	67.12 a	20.36 b

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.12 The specific activity ratios (SAR) in the +S treatment, ryegrass after cropping, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	1.84 b	1.52 c	2.23 a	1.08 d
SO ₄ -S	1.88 a	1.26 b	1.91 a	1.10 b
S-org	1.60 b	3.17 b	9.31 a	1.06 b
Second MCP	3.40 a	2.83 ab	2.39 b	3.29 a
HI-S remaining	24.53 a	18.37 a	27.83 a	48.70 a
Remainder	124.50 a	62.07 a	288.41 a	25.06 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.13 The S concentration ($\mu\text{g S g}^{-1}$ soil) in the four test extractants in the -S treatment, ryegrass after cropping, Uralla soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	3.0 b	1.7 c	6.7 a	0.9 d
SO ₄ -S	2.6 b	1.1 c	4.9 a	0.5 d
S-org	0.4 b	0.6 b	1.8 a	0.4 b
Second MCP	0.7 b	1.3 a	0.6 b	0.9 ab
HI-S remaining	34.7 a	35.8 a	28.6 b	36.6 a
Remainder	33.1 a	33.3 a	35.5 a	33.3a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.14 The percentage of ³⁵S in the four test extractants in the -S treatment, ryegrass after cropping, Uralla soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	14.8 c	20.5 b	34.9 a	14.1 c
SO ₄ -S	6.0 c	11.3 b	20.7 a	7.2 c
S-org	8.8 b	9.2 b	14.2 a	6.9 b
Second MCP	0.9 ab	1.4 a	0.1 b	1.7 a
HI-S remaining	49.7 a	47.3 a	36.4 a	47.6 a
Remainder	35.5 a	32.2 a	28.7 a	38.3 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.15 The specific activity (SA) (KBq mg S^{-1}) in the four test extractants in the -S treatment, ryegrass after cropping, Uralla soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	103.3 b	254.9 a	110.2 b	322.8 a
SO ₄ -S	48.5 c	228.9 b	89.1 c	363.8 a
S-org	516.3 a	305.9 ab	175.1 b	307.3 ab
Second MCP	23.9 ab	24.2 ab	8.8 b	41.1 a
HI-S remaining	29.9 a	27.6 a	27.5 a	26.9 a
Remainder	23.0 a	20.8 a	15.9 a	24.3 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.16 The S concentration ($\mu\text{g S g}^{-1}$ soil) in the four test extractants in the +S treatment, ryegrass after cropping, Uralla soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	12.8 b	13.6 b	22.6 a	6.8 c
SO ₄ -S	10.9 b	10.7 b	17.9 a	4.7 c
S-org	1.9 c	2.9 b	4.7 a	2.1 c
Second MCP	1.1 c	2.4 b	0.9 c	4.8 a
HI-S remaining	39.1 b	37.3 c	31.2 d	44.9 a
Remainder	41.4 a	42.4 a	39.6 b	41.7 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.17 The percentage of ^{35}S in the four test extractants in the +S treatment, ryegrass after cropping, Uralla soil.

	MCP	KCI-40	KCI-100	Bray
ICP-S	46.0 c	56.6 b	74.9 a	31.9 d
SO ₄ -S	39.1 c	49.7 b	67.4 a	27.1 d
S-org	6.9 a	6.9 a	7.5 a	4.8 a
Second MCP	1.5 c	7.1 b	0.4 c	15.8 a
HI-S remaining	16.9 ab	17.7 ab	7.3 b	23.8 a
Remainder	37.0 a	25.8 b	17.8 b	44.2 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.18 The specific activity (SA) (KBq mg S⁻¹) in the four test extractants in the +S treatment, ryegrass after cropping, Uralla soil.

	MCP	KCI-40	KCI-100	Bray
ICP-S	181.4 c	211.9 b	168.9 c	240.1 a
SO ₄ -S	180.6 c	237.7 b	191.9 c	294.6 a
S-org	187.5 a	117.1 b	83.3 c	118.2 b
Second MCP	68.7 b	152.4 a	35.8 b	169.6 a
HI-S remaining	22.1 ab	24.3 ab	12.4 b	26.9 a
Remainder	63.2 ab	43.2 bc	32.9 c	73.8 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.19 The S concentration ($\mu\text{g S g}^{-1}$ soil) in the four test extractants in the -S treatment, ryegrass after cropping, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	5.8 b	3.0 c	9.2 a	3.0 c
SO ₄ -S	4.5 b	1.4 c	5.8 a	1.3 c
S-org	1.3 b	1.6 b	3.4 a	1.7 b
Second MCP	2.7 c	9.6 a	3.4 c	6.9 b
HI-S remaining	110.9 b	113.8 a	107.6 c	113.9 a
Remainder	113.4 a	113.2 a	113.3 a	113.2 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.20 The percentage of ³⁵S in the four test extractants in the -S treatment, ryegrass after cropping, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	22.7 b	16.0 c	29.1 a	15.4 c
SO ₄ -S	13.9 b	10.5 c	21.4 a	8.3 c
S-org	8.8 a	5.5 b	7.7 ab	7.1 ab
Second MCP	2.0 c	10.7 a	3.0 c	7.8 b
HI-S remaining	40.2 a	41.2 a	37.4 a	32.3 a
Remainder	37.1 ab	42.8 ab	33.4 b	52.3 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.21 The specific activity (SA) (KBq mg S⁻¹) in the four test extractants in the -S treatment, ryegrass after cropping, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	125.2 b	170.7 a	101.1 c	165.0 a
SO ₄ -S	99.3 b	243.9 a	118.7 b	208.8 a
S-org	225.8 a	110.3 b	71.6 b	133.6 b
Second MCP	23.9 c	35.8 b	61.0 a	36.1 b
HI-S remaining	11.5 a	11.7 a	11.2 a	9.0 a
Remainder	10.4 ab	12.3 ab	9.6 b	14.8 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.22 The S concentration (µg S g⁻¹ soil) in the four test extractants in the +S treatment, ryegrass after cropping, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	18.9 b	12.2 c	25.9 a	9.0 c
SO ₄ -S	16.6 b	8.7 c	20.8 a	6.6 c
S-org	2.3 b	3.5 b	5.1 a	2.4 b
Second MCP	4.0 c	10.6 a	5.5 bc	8.4 ab
HI-S remaining	119.1 b	125.1 a	111.9 c	128.7 a
Remainder	124.4 a	124.9 a	124.5 a	124.6 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.23 The percentage of ^{35}S in the four test extractants in the +S treatment, ryegrass after cropping, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	58.8 b	45.9 c	66.8 a	48.1 c
SO ₄ -S	50.6 b	39.4 c	62.7 a	34.7 c
S-org	8.2 b	6.5 b	4.1 b	13.4 a
Second MCP	6.8 c	21.6 a	7.2 c	14.8 b
HI-S remaining	30.7 ab	39.2 a	24.2 ab	20.7 b
Remainder	10.2 b	14.9 b	9.0 c	31.1 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 4.24 The specific activity (SA) (KBq mg S⁻¹) in the four test extractants in the +S treatment, ryegrass after cropping, Walcha soil.

	MCP	KCl-40	KCl-100	Bray
ICP-S	119.5 c	145.2 b	98.5 c	205.0 a
SO ₄ -S	116.6 b	174.3 a	116.4 b	200.0 a
S-org	140.2 ab	72.3 bc	30.6 c	217.6 a
Second MCP	64.8 b	79.3 b	91.7 a	66.8 b
HI-S remaining	9.6 a	11.9 a	8.5 a	6.3 a
Remainder	3.3 ab	4.7 ab	2.6 b	9.3 a

Numbers followed by the same letter within a same row are not significantly different according to DMRT.

Appendix 5.1 The total S and HI-reducible S fractions ($\mu\text{g S g}^{-1}$ soil) in the -S and +S treatments, radish, corn and ryegrass before planting and after cropping, in the Uralla and Walcha soils.

	Uralla				Walcha			
	Total S		HI-S		Total S		HI-S	
	-S	+S	-S	+S	-S	+S	-S	+S
<u>Before</u>								
Radish	89.9 b ^A	132.6 a	52.1 b	63.5 a	266.8 b	299.2 a	156.0 b	198.0 a
Corn	89.4 b	127.2 a	46.6 b	52.4 a	289.7 b	363.9 a	153.4 b	177.8 a
Ryegrass	91.4 b	167.0 a	46.6 b	53.0 a	271.1 b	341.2 a	152.7 b	168.7 a
<u>After</u>								
Radish	76.4 b	86.2 a	31.3 b	43.2 a	192.7 b	237.6 a	128.9 b	142.9 a
Corn	68.2 b	84.6 a	35.2 b	40.4 a	228.4 b	239.9 a	139.2 b	154.5 a
Ryegrass	70.8 b	93.4 a	34.9 b	41.0 a	230.1 b	262.4 a	121.4 b	140.7 a

^A Numbers followed by the same letter within a same soil fraction and crop are not significantly different according to DMRT at $P < 0.05$.