



APPENDICES

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

Copyright© by Chiang Mai University

All rights reserved

Appendix 1 Analysis of variance of inorganic- N(kg/rai) mineralization from vegetable soybean residue incorporated into the soil from 1-6 weeks

Appendix 1.1 Analysis of variance of inorganic- N(kg/rai) mineralization from vegetable soybean residue within the 1st week

Source	DF	SS	MS	F	P
Block	2	0.6918	0.34591		
Treat	2	5.1225	2.56124	1.05	0.4306 (ns)
Error	4	9.7767	2.44418		
Total	8	15.5910			
Grand Mean	2.5256	CV 61.90	LSD _{0.05} 3.54		

Appendix 1.2 Analysis of variance of inorganic- N(kg/rai) mineralization from vegetable soybean residue within the 2nd week

Source	DF	SS	MS	F	P
Block	2	39.672	19.8362		
Treat	2	50.981	25.4905	1.16	0.4007 (ns)
Error	4	87.944	21.9859		
Total	8	178.597			
Grand Mean	14.111	CV 33.23	LSD _{0.05} 10.63		

Appendix 1.3 Analysis of variance of inorganic-N (kg/rai) mineralization

from vegetable soybean residue within the 3rd week

Source	DF	SS	MS	F	P
Block	2	42.630	21.3152		
Treat	2	65.604	32.8022	1.07	0.4233 (ns)
Error	4	122.161	30.5404		
Total	8	230.396			
Grand Mean	6.3167	CV 87.49	LSD _{0.05}	12.53	

Appendix 1.4 Analysis of variance of inorganic-N (kg/rai) mineralization

from vegetable soybean residue within the 4th week

Source	DF	SS	MS	F	P
Block	2	14.5574	7.27871		
Treat	2	8.6918	4.34591	0.76	0.5245 (ns)
Error	4	22.8234	5.70584		
Total	8	46.0726			
Grand Mean	3.6156	CV 66.07	LSD _{0.05}	5.42	

Appendix 1.5 Analysis of variance of inorganic-N (kg/rai) mineralization

from vegetable soybean residue within the 5th week

Source	DF	SS	MS	F	P
Block	2	1.71042	0.85521		
Treat	2	0.72116	0.36058	3.56	0.1293 (ns)
Error	4	0.40498	0.10124		
Total	8	2.83656			
Grand Mean	2.7478	CV 11.58	LSD _{0.05}	0.72	

Appendix 1.6 Analysis of variance of inorganic-N(kg/rai) mineralization from

vegetable soybean residue within the 6th week

Source	DF	SS	MS	F	P
Block	2	0.06549	0.03274		
Treat	2	0.01556	0.00778	0.20	0.8243 (ns)
Error	4	0.15338	0.03834		
Total	8	0.23442			
Grand Mean	0.1844	CV 106.17	LSD _{0.05}	0.44	

Appendix 2 Analysis of variance of NH_4^+ -N mineralization from vegetable soybean residue incorporated into the soil from 1-6 weeks

Appendix 2.1 Analysis of variance of NH_4^+ -N (kg/rai) mineralization from vegetable soybean residue within the 1st week

Source	DF	SS	MS	F	P
Block	2	0.6642	0.33208		
Treat	2	5.0767	2.53834	1.03	0.4351 (ns)
Error	4	9.8396	2.45989		
Total	8	15.5804			
Grand Mean	2.5144	CV 62.38	LSD = 3.56		

Appendix 2.2 Analysis of variance of NH_4^+ -N (kg/rai) mineralization from vegetable soybean residue within the 2nd week

Source	DF	SS	MS	F	P
Block	2	12.7125	6.35623		
Treat	2	2.0382	1.01910	0.44	0.6741(ns)
Error	4	9.3501	2.33753		
Total	8	24.1008			
Grand Mean	2.6567	CV 57.55	LSD _{0.05} = 3.47		

Appendix 2.3 Analysis of variance of $\text{NH}_4^+\text{-N}$ (kg/rai) mineralization fromvegetable soybean residue within the 3rd week

Source	DF	SS	MS	F	P
Block	2	0.33136	0.16568		
Treat	2	1.07549	0.53774	0.55	0.6146(ns)
Error	4	3.90278	0.97569		
Total	8	5.30962			
Grand Mean	1.3844	CV 71.35	LSD _{0.05} = 2.24		

Appendix 2.4 Analysis of variance of $\text{NH}_4^+\text{-N}$ (kg/rai) mineralization fromvegetable soybean residue within the 4th week

Source	DF	SS	MS	F	P
Block	2	0.08296	0.04148		
Treat	2	0.86816	0.43408	10.49	0.0256
Error	4	0.16551	0.04138		
Total	8	1.11662			
Grand Mean	0.5844	CV 34.80	LSD _{0.05} = 0.46		

Treat Mean Homogeneous Groups

4 1.0233 A

2 0.3800 B

3 0.3500 B

Alpha 0.05 Standard Error for Comparison 0.1661 Critical T Value 2.776 critical

Value for Comparison 0.4611 Error term used: Block*Treat, 4 DF There are 2

groups (A and B) in which the means are not significantly different from one another.

Appendix 2.5 Analysis of variance of NH_4^+ -N (kg/rai) mineralization from

vegetable soybean residue within the 5th week

Source	DF	SS	MS	F	P
Block	2	0.08002	0.04001		
Treat	2	0.13896	0.06948	1.63	0.3029 (ns)
Error	4	0.17011	0.04253		
Total	8	0.38909			
Grand Mean	0.2089	CV 98.72	LSD _{0.05} = 0.47		

Appendix 2.6 Analysis of variance of NH_4^+ -N (kg/rai) mineralization from

vegetable soybean residue within the 6th week

Source	DF	SS	MS	F	P
Block	2	0.00402	0.00201		
Treat	2	0.02536	0.01268	5.73	0.0669 (ns)
Error	4	0.00884	0.00221		
Total	8	0.03822			
Grand Mean	0.0944	CV 49.79	LSD _{0.05} = 0.11		

Appendix 3 Analysis of variance of NO_3^- -N (kg/rai) mineralization from vegetable soybean residue incorporated into the soil from 1-6 weeks

Appendix 3.1 Analysis of variance of NO_3^- -N (kg/rai) mineralization from vegetable soybean residue within the 1st week

Source	DF	SS	MS	F	P
Block	2	2.889E-04	1.444E-04		
Treat	2	1.556E-04	7.778E-05	1.27	0.3735 (ns)
Error	4	2.444E-04	6.111E-05		
Total	8	6.889E-04			
Grand Mean	0.0111	CV 70.36	LSD _{0.05} = 0.02		

Appendix 3.2 Analysis of variance of NO_3^- -N (kg/rai) mineralization from vegetable soybean residue within the 2nd week

Source	DF	SS	MS	F	P
Block	2	18.694	9.3472		
Treat	2	32.854	16.4270	1.32	0.3639 (ns)
Error	4	49.950	12.4875		
Total	8	101.499			
Grand Mean	11.454	CV 30.85	LSD _{0.05} = 8.01		

Appendix 3.3 Analysis of variance of NO_3^- -N (kg/rai) mineralization fromvegetable soybean residue within the 3rd week

Source	DF	SS	MS	F	P
Block	2	38.527	19.2635		
Treat	2	52.032	26.0159	1.18	0.3954 (ns)
Error	4	88.157	22.0393		
Total	8	178.716			
Grand Mean	4.9322	CV 95.18	LSD _{0.05} = 10.64		

Appendix 3.4 Analysis of variance of NO_3^- -N (kg/rai) mineralization fromvegetable soybean residue within the 4th week

Source	DF	SS	MS	F	P
Block	2	12.4695	6.23474		
Treat	2	14.3683	7.18414	1.46	0.3340 (ns)
Error	4	19.6743	4.91858		
Total	8	46.5121			

Grand Mean 3.0311 CV 73.17 LSD_{0.05} = 5.03

Appendix 3.5 Analysis of variance of NO_3^- -N (kg/rai) mineralization fromvegetable soybean residue within the 5th week

Source	DF	SS	MS	F	P
Block	2	1.05762	0.52881		
Treat	2	0.22802	0.11401	1.24	0.3811 (ns)
Error	4	0.36784	0.09196		
Total	8	1.65349			
Grand Mean	2.5389	CV 11.94	LSD _{0.05} = 0.69		

Appendix 3.6 Analysis of variance of NO_3^- -N (kg/rai) mineralization fromvegetable soybean residue within the 6th week

Source	DF	SS	MS	F	P
Block	2	0.08487	0.04243		
Treat	2	0.06647	0.03323	1.17	0.3971 (ns)
Error	4	0.11327	0.02832		
Total	8	0.26460			
Grand Mean	0.0900	CV 186.97	LSD _{0.05} = 0.38		

Appendix 4 Analysis of variance of accumulation of fresh weight (kg/rai) of kale from 14 days to 48 days after planting

Appendix 4.1 Analysis of variance of kale fresh weight (kg/rai) after planting 14 days (1st week)

Source	DF	SS	MS	F	P
Blocks	2	10.644	5.3222		
Treats	3	272.161	90.7205	3.55	0.0873*
Error	6	153.244	25.5407		
Total	11	436.050			
Grand Mean	34.467	CV 14.66	LSD _{0.05} 10.10		

LSD All-Pairwise Comparisons Test for Treatment Mean Homogeneous Groups

4 41.920 A

3 34.017 AB

2 33.250 AB

1 28.680 B

Alpha 0.05 Standard Error for Comparison 4.1264 Critical T Value 2.447 Critical

Value for Comparison 10.097 Error term used: Blocks*Treatment, 6 DF There are 2 groups (A and B) in which the means are not significantly different from one another.

Appendix 4.2 Analysis of variance of kale fresh weight (kg/rai) after planting

21 days(2ndweek)

Source	DF	SS	MS	F	P
Blocks	2	947.83	473.91		
Treats	3	4480.18	1493.39	5.14	0.0427*
Error	6	1742.59	290.43		
Total	11	7170.59			
Grand Mean	114.71	CV 14.86			

\Treats Mean Homogeneous Groups

4 139.04 A

2 127.71 AB

3 100.20 BC

1 91.87 C

Alpha 0.05 Standard Error for Comparison 13.915

Critical T Value 2.447 Critical Value for Comparison 34.048

Error term used: Blocks*Treats, 6 DF There are 3 groups (A, B, etc.) in which the means are not significantly different from one another.

Appendix 4.3 Analysis of variance of kale fresh weight (kg/rai) after planting28 days (3rd week)

Source	DF	SS	MS	F	P
Blocks	2	10277.3	5138.65		
Treats	3	11505.8	3835.26	2.27	0.1801*
Error	6	10116.6	1686.10		
Total	11	31899.7			
Grand Mean	291.40	CV 14.09	LSD _{0.05} 82.04		

LSD All-Pairwise Comparisons Test for Treatment Mean Homogeneous Groups

2 327.21 A

3 304.66 AB

4 296.74 AB

1 242.64 B

Alpha 0.05 Standard Error for Comparison 33.527 Critical T Value 2.447 Critical

Value for Comparison 82.038 Error term used: Blocks*Treatment, 6 DF There are 2

groups (A and B) in which the means are not significantly different from one another.

Appendix 4.4 Analysis of variance of kale fresh weight (kg/rai) after planting 35days(4thweek)

Source	DF	SS	MS	F	P
Blocks	2	247650	123825		
Treats	3	44421	14807	0.83	0.5248(ns)
Error	6	107261	17877		
Total	11	399331			
Grand Mean 821.26 CV 16.28 LSD _{0.05} 267.13					

Appendix 4.5 Analysis of variance of kale fresh weight (kg/rai) after planting 42days(5thweek)

Source	DF	SS	MS	F	P
Blocks	2	32242.5	16121.2		
Treatment	3	34100.6	11366.9	3.19	0.1054
Error	6	21377.1	3562.9		
Total	11	87720.1			
Grand Mean 1032.3 CV 5.78 LSD _{0.05} 2.447					

LSD All-Pairwise Comparisons Test for Treatment Mean Homogeneous Groups

2 1079.3 A

4 1073.9 A

3 1029.7 AB

1 946.2 B

Alpha 0.05 Standard Error for Comparison 48.736 Critical T Value 2.447 Critical Value for Comparison 119.25 Error term used: Blocks*Treatment, 6 DF There are 2 groups (A and B) in which the means are not significantly different from one another.

Appendix 4.6 Analysis of variance of kale fresh weight (kg/rai) afterplanting 48 days(6thweek)

Source	DF	SS	MS	F	P
Blocks	2	34509	17254.6		
Treatment	3	201362	67120.6	2.93	0.1218
Error	6	137569	22928.2		
Total	11	373440			
Grand Mean	1199.5	CV 12.62	LSD _{0.05} 302.52		
LSD All-Pairwise Comparisons Test for Treatment Mean Homogeneous Groups					
4	1345.8	A			
3	1262.1	AB			
2	1194.9	AB			
1	995.1	B			

Alpha 0.05 Standard Error for Comparison 123.63 Critical T Value 2.447 Critical Value for Comparison 302.52 Error term used: Blocks*Treatment, 6 DF There are 2 groups (A and B) in which the means are not significantly different from one another.

Appendix 5 Analysis of variance of Accumulation fresh weight (kg/rai) of kale from 14 days to 48 days after planting

Appendix 5.1 Analysis of variance of kale fresh weight (kg/rai) after planting

48 days(1st Treatment)

Source	DF	SS	MS	F	P
Blocks	2	50133	25066		
Weeks	5	2870886	574177	30.41	0.0000
Error	10	188781	18878		
Total	17	3109800			
Grand Mean	507.61	CV 27.07	LSD _{0.05} 249.96		

LSD All-Pairwise Comparisons Test for Weeks Mean Homogeneous Groups

6 995.10 A

5 946.17 AB

4 741.18 B

3 242.64 C

2 91.87 C

1 28.68 C

Alpha 0.05 Standard Error for Comparison 112.18 Critical T Value 2.228 Critical

Value for Comparison 249.96 Error term used: Blocks*Weeks, 10 DF There are 3

groups (A, B, etc.) in which the means are not significantly different from one another.

Appendix 5.2 Analysis of variance of kale fresh weight (kg/rai) after planting

48 days(2nd Treatment)

Source	DF	SS	MS	F	P
Blocks	2	35570	17785		
Weeks	5	3706665	741333	75.13	0.0000
Error	10	98677	9868		
Total	17	3840912			

Grand Mean 591.00 CV 16.81 LSD_{0.05} 180.72

LSD All-Pairwise Comparisons Test for Weeks Mean Homogeneous Groups

6 1194.9 A

5 1079.3 A

4 783.7 B

3 327.2 C

2 127.7 D

1 33.2 D

Alpha 0.05 Standard Error for Comparison 81.108 Critical T Value 2.228 Critical

Value for Comparison 180.72 Error term used: Blocks*Weeks, 10 DF There are 4 groups (A, B, etc.) in which the means are not significantly different from one

another.

Appendix 5.3 Analysis of variance of kale fresh weight (kg/rai) after planting48 days(3rd Treatment)

Source	DF	SS	MS	F	P
Blocks	2	8658	4329		
Weeks	5	4085493	817099	62.99	0.0000
Error	10	129709	12971		
Total	17	4223859			
Grand Mean 602.70 CV 18.90					

LSD All-Pairwise Comparisons Test for Weeks Mean Homogeneous Groups

6 1262.1 A

5 1029.7 B

4 885.5 B

3 304.7 C

2 100.2 CD

1 34.0 D

Alpha 0.05 Standard Error for Comparison 92.991 Critical T Value 2.228 Critical

Value for Comparison 207.20 Error term used: Blocks*Weeks, 10 DF There are 4 groups (A, B, etc.) in which the means are not significantly different from one

another.

Appendix 5.4 Analysis of variance of kale fresh weight (kg/rai) after planting

48 days(4th Treatment)

Source	DF	SS	MS	F	P
Blocks	2	6747	3374		
Weeks	5	4403539	880708	83.62	0.0000
Error	10	105320	10532		
Total	17	4515606			

Grand Mean 628.91 CV 16.32

LSD All-Pairwise Comparisons Test for Weeks Mean Homogeneous Groups

6 1345.8 A

5 1073.9 B

4 876.0 C

3 296.7 D

2 139.1 DE

1 41.9 E

Alpha 0.05 Standard Error for Comparison 83.793 Critical T Value 2.228 Critical

Value for Comparison 186.70 Error term used: Blocks*Weeks, 10 DF There are 5 groups (A, B, etc.) in which the means are not significantly different from one

another.

Appendix 6 Analysis of variance of Nitrogen content in terms of %N, %N abundance and %N atom excess in kale plant grown on soil incorporated with different nitrogen fertilized soybean manures

Appendix 6.1 Analysis of variance of %total nitrogen in kale

Source	DF	SS	MS	F	P
Block	2	0.08322	0.04161		
Treatment	3	0.59229	0.19743	4.63	0.0528
Error	6	0.25598	0.04266		
Total	11	0.93149			
Grand Mean	2.1792	CV 9.48			

LSD All-Pairwise Comparisons Test of TotalN for Treatment

Treatment Mean Homogeneous Groups

3 2.3867 A

4 2.2933 A

2 2.2300 A

1 1.8067 B

Alpha 0.05 Standard Error for Comparison 0.1686 Critical T Value 2.447 Critical

Value for Comparison 0.4127 Error term used: Block*Treatment, 6 DF There are 2

groups (A and B) in which the means are not significantly different from one another.

Appendix 6.2 Analysis of variance of % ^{15}N abundance in kale

Source	DF	SS	MS	F	P
Blocks	2	0.00301	0.00151		
Treatment	3	0.30293	0.10098	11.83	0.0063*
Error	6	0.05123	0.00854		
Total	11	0.35717			

Grand Mean 0.6329 CV 14.60

LSD All-Pairwise Comparisons Test

Treatment Mean Homogeneous Groups

3 0.7993 A

4 0.6933 A

2 0.6677 A

1 0.3713 B

Alpha 0.05 Standard Error for Comparison 0.0754 Critical T Value 2.447 Critical

Value for Comparison 0.1846 Error term used: Blocks*Treatment, 6 DF There are 2

groups (A and B) in which the means are not significantly different from one another.

Appendix 6.3 Analysis of variance of % ¹⁵N atom excess in kale

Source	DF	SS	MS	F	P
Blocks	2	0.00861	0.00430		
Treatment	3	0.29848	0.09949	16.87	0.0025*
Error	6	0.03538	0.00590		
Total	11	0.34247			
Grand Mean	0.2583	CV 29.74			

LSD All-Pairwise Comparisons Test

Treatment Mean Homogeneous Groups

3 0.4330 A

4 0.3270 AB

2 0.2680 B

1 0.0050 C

Alpha 0.05 Standard Error for Comparison 0.0627 Critical T Value 2.447 Critical

Value for Comparison 0.1534 Error term used: Blocks*Treatment, 6 DF There are 3 groups (A, B, etc.) in which the means are not significantly different from one

another.

Appendix 7 Analysis of variance of calculated percentage and quantity of N-uptake in kale as affected by Vegetable soybean decomposition

Appendix 7.1 Analysis of variance of % N uptake by kale

Source	DF	SS	MS	F	P
Blocks	2	50.8092	25.4046		
Treat	2	3.0935	1.5468	0.14	0.8730 (ns)
Error	4	44.0171	11.0043		
Total	8	97.9199			
Grand Mean	30.364	CV 10.93	LSD _{0.05} 7.52		

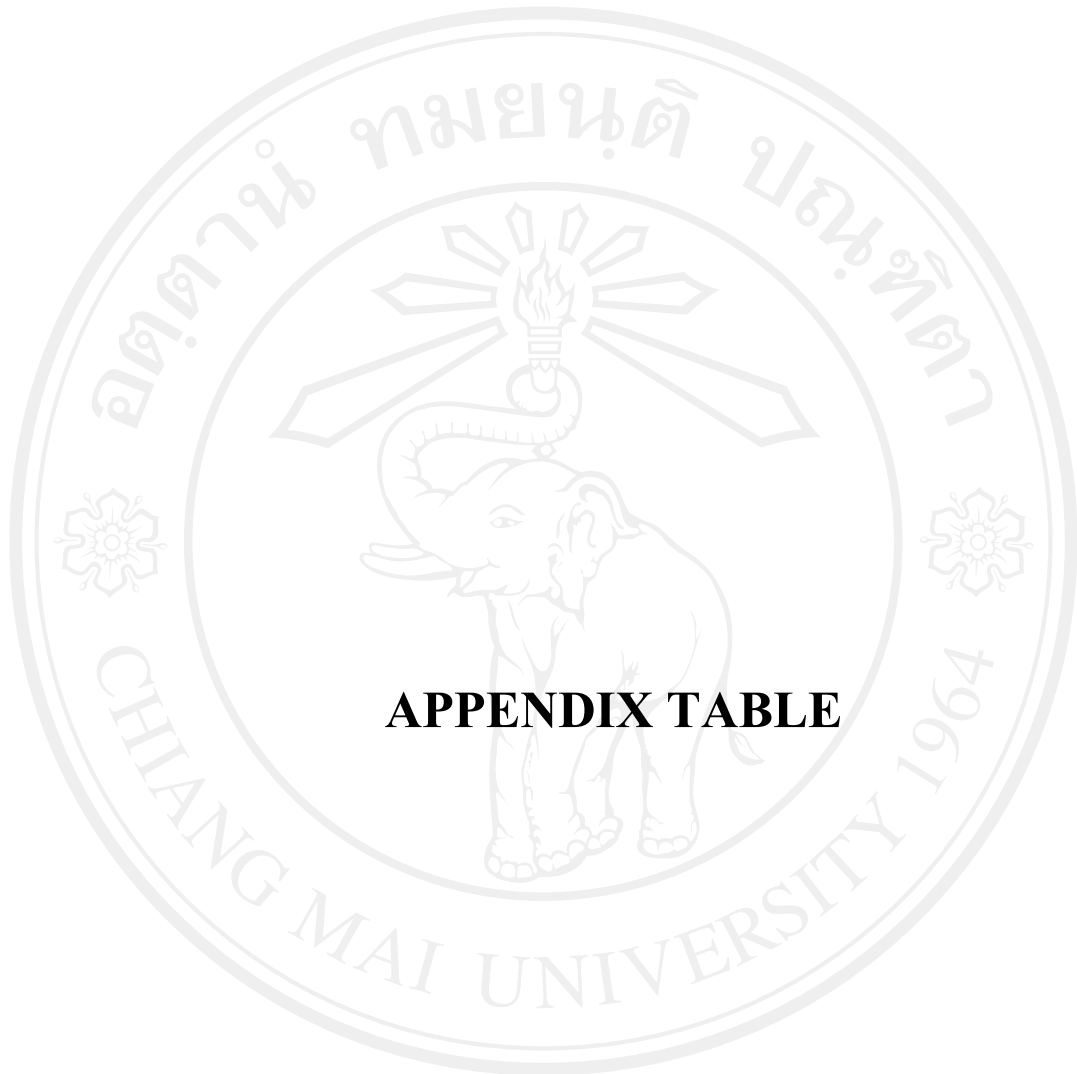
Appendix 7.2 Analysis of variance of quantity of N-uptake in kale as affected by Vegetable soybean decomposition

Source	DF	SS	MS	F	P
Blocks	2	40.1580	20.0790		
Treat	2	6.2454	3.1227	0.54	0.6224 (ns)
Error	4	23.3392	5.8348		
Total	8	69.7426			
Grand Mean	11.872	CV 20.35	LSD _{0.05} 5.48		

Appendix 7.3 Analysis of variance of % fertilizer use efficiency in kale from vegetable soybean residue decomposition

Source	DF	SS	MS	F	P
Blocks	2	143.30	71.651		
Treat	2	572.81	286.405	4.02	0.1104 (ns)
Error	4	285.10	71.275		
Total	8	1001.21			
Grand Mean	58.054	CV 14.54	LSD _{0.05} = 19.14		

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
 Copyright© by Chiang Mai University
 All rights reserved



APPENDIX TABLE

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

Copyright© by Chiang Mai University

All rights reserved

Appendix Table1. The quantity of inorganic-N mineralization during 1-6 weeks after amendment of vegetable soybean residues

Treatment \ Week	Week					
	1	2	3	4	5	6
Fer.16 kgN/rai	1.46	10.75	6.11	3.59	2.80	0.14
Fer. 32 kgN/rai	2.97	15.95	9.72	4.83	3.06	0.24
Fer. 48 kgN/rai	3.14	15.64	3.12	2.43	2.38	0.17
Average	2.52	14.11	6.32	3.62	2.75	0.18
LSD _{0.05}	ns	ns	ns	ns	ns	ns
CV(%)	61.90	33.23	87.49	66.07	11.58	106.17

Means with the same letter are not significantly different at alpha level =0.05

Appendix Table 2. Mineralization quantity of NH₄⁺-N during 1-6 weeks after amendment of vegetable soybean residues

Treatment \ Week	Week					
	1	2	3	4	5	6
Biomass 16 kgN/rai	1.46	1.99	1.6	0.38 b	0.22	0.09
Biomass 32 kgN/rai	2.96	2.94	1.66	0.35 b	0.35	0.11
Biomass 48 kgN/rai	3.13	3.05	0.9	1.02 a	0.05	0.16
Average	2.52	2.66	1.39	0.58	0.21	0.12
LSD _{0.05}	ns	ns	ns	0.46	ns	ns
CV(%)	62.38	57.55	71.35	34.80	98.72	49.79

Means with the same letter are not significantly different at alpha level =0.05

Appendix Table 3. Mineralization quantity of NO_3^+ -N during 1-6 weeks after amendment of vegetable soybean residues

Treatment	Week					
	1	2	3	4	5	6
Biomass 16 kgN/rai	0	8.76	4.51	3.21	2.58	0.13
Biomass 32 kgN/rai	0	13	8.07	4.48	2.71	0.21
Biomass 48 kgN/rai	0	12.6	2.22	1.4	2.33	0.17
Average	0	11.45	4.93	3.03	2.54	0.17
LSD _{0.05}	ns	ns	ns	ns	ns	ns
CV(%)	70.36	30.85	95.18	73.17	11.94	186.97

Means with the same letter are not significantly different at alpha level =0.05

Appendix Table 4. Quantity of inorganic-N mineralized in root residue soil incorporated with vegetable soybean plant biomass at different rates during 1-6 weeks

Treatment	Week					
	1	2	3	4	5	6
Biomass 3.64 t/rai	16.41	10.69 b	20.78	14.03	4.27	10.80
Biomass 4.86 t/rai	29.90	29.05 ab	34.48	10.87	10.51	15.15
Biomass 6.47 t/rai	28.50	43.30 ab	43.55	8.73	12.98	18.54
Fer.21.2 KgN/rai	26.00	52.54 a	40.70	12.31	16.74	19.47
LSD _{0.05}	ns	34.07	ns	ns	ns	ns
CV(%)	38.76	50.31	56.90	62.67	79.36	49.07

Means with the same letter are not significantly different at alpha level =0.05

Appendix Table 5. Quantity of inorganic-N mineralized in non-root residue soil incorporated with vegetable soybean plant biomass at different rates during 1-6 weeks

Treatment \ Week	Week					
	1	2	3	4	5	6
Biomass 3.64 t/rai	5.44	8.27 b	4.44	0.22 b	0.85 b	0.48
Biomass 4.86 t/rai	11.74	24.79 ab	10.36	15.02 a	12.95 ab	8.91
Biomass 6.47 t/rai	18.24	23.45 ab	20.25	20.17 a	15.88 a	13.66
Fer.21.2 KgN/rai	11.88	35.82 a	17.03	18.86 a	11.78 ab	10.09
LSD _{0.05}	ns	26.36	ns	11.78	14.98	ns
CV(%)	67.82	57.16	81.23	43.44	72.35	89.25

Means with the same letter are not significantly different at alpha level =0.05

Appendix Table 6. Quantity of NH₄⁺-N mineralized in root residue soil incorporated with vegetable soybean plant biomass at different rates during 1-6 weeks

Treatment \ Week	Week					
	1	2	3	4	5	6
Biomass 3.64 t/rai	14.71	8.82 b	13.17	6.35	3.79	2.19 b
Biomass 4.86 t/rai	22.70	23.58 ab	19.16	3.61	1.52	9.39 a
Biomass 6.47 t/rai	23.87	40.47 a	27.92	6.46	3.79	2.37 b
Fer.21.2 KgN/rai	26.47	41.99 a	25.38	2.69	5.90	7.47 a
LSD _{0.05}	ns	30.15	ns	ns	ns	4.83
CV(%)	40.79	52.56	51.39	99.47	98.14	45.19

Means with the same letter are not significantly different at alpha level =0.05

Appendix Table 7. Quantity of NH_4^+ -N mineralized in non-root residue soil

incorporated with vegetable soybean plant biomass at different rates during 1-6 weeks

Treatment	Week					
	1	2	3	4	5	6
Biomass 3.64 t/rai	5.07	6.14 b	0.52 b	0.68	1.21	2.13
Biomass 4.86 t/rai	11.56	12.38 ab	0.72 b	0.81	4.89	4.72
Biomass 6.47 t/rai	17.93	15.07 ab	1.62 b	5.12	2.87	6.95
Fer.21.2 KgN/rai	12.48	24.40 a	5.11 a	5.06	2.43	4.49
LSD _{0.05}	ns	17.07	2.97	ns	ns	ns
CV(%)	70.33	58.93	74.54	95.95	130.26	71.19

Means with the same letter are not significantly different at alpha level =0.05

Appendix Table 8. Quantity of NO_3^+ -N mineralized in root residue soil

incorporated with vegetable soybean plant biomass at different rates during 1-6 weeks

Treatment	Week					
	1	2	3	4	5	6
Biomass 3.64 t/rai	0.47 b	1.87	7.61	6.01 b	3.47	4.45
Biomass 4.86 t/rai	2.17 ab	5.48	15.32	10.26 ab	3.66	3.79
Biomass 6.47 t/rai	5.10 ab	2.83	15.63	11.27 a	8.85	8.70
Fer.21.2 KgN/rai	7.67 a	10.55	15.32	9.29 ab	10.51	10.19
LSD _{0.05}	5.73	ns	ns	4.38	ns	ns
CV(%)	74.42	24.10	33.71	23.80	84.15	48.90

Means with the same letter are not significantly different at alpha level =0.05

Appendix Table 9. Quantity of NO_3^- -N mineralized in non root residue soil incorporated with vegetable soybean plant biomass at different rates during 1-6 weeks

Treatment \ Week	Week					
	1	2	3	4	5	6
Biomass 3.64 t/rai	0.37	2.13	2.70	1.04 b	2.30	0.41
Biomass 4.86 t/rai	0.19	12.41	11.42	12.55 ab	5.40	4.11
Biomass 6.47 t/rai	0.30	8.38	19.69	15.05 a	13.00	6.64
Fer.21.2 KgN/rai	0.40	11.43	12.98	13.79 a	9.36	5.53
LSD _{0.05}	ns	ns	ns	12.75	ns	ns
CV(%)	81.79	68.84	84.61	60.15	75.95	84.13

Means with the same letter are not significantly different at alpha level =0.05

Appendix Table 10. Relative growth rate of kale dry weight as affected by different levels of rate of soybean biomass with root and urea fertilizer

Treatment \ Week	Week			
	3	4	5	6
control	0.80 a	0.98 b	1.22 ab	1.26
Biomass3.64 t/rai	0.54 ab	0.85 b	1.69 a	1.45
Biomass4.86 t/rai	0.70 ab	1.18 b	1.61 a	1.36
Biomass6.47 t/rai	0.51 ab	1.13 b	1.68 a	1.49
Fer.21.2 kgN/rai	0.46 b	2.45 a	0.96 b	1.39
LSD _{0.05}	0.33	0.48	0.50	ns
CV(%)	29.55	19.43	18.57	24.71

Means with the same letter are not significantly different at alpha level =0.05

Appendix Table 11. Relative growth rate of kale dry weight as affected by different levels of rate of soybean biomass without root and urea fertilizer

Treatment	Week			
	3	4	5	6
control	0.27 b	0.99	1.53	0.72
Biomass3.64 t/rai	0.36 ab	0.96	1.55	1.19
Biomass4.86 t/rai	0.84 a	0.95	1.62	0.90
Biomass6.47 t/rai	0.85 a	1.12	1.56	0.92
Fer.21.2 kgN/rai	0.34 ab	1.34	1.53	0.97
LSD _{0.05}	0.53	ns	ns	ns
CV(%)	53.09	28.18	14.82	29.69

Means with the same letter are not significantly different at alpha level =0.05

CURRICULUM VITAE

The author was born on April 15, 1953, in Phichit Province, Thailand. He is the third of the four children . He received his secondary education from Santirajbumrourng School, Bangkok, in 1974. He graduated with the degree of Bachelor of Science in Agriculture with a major in plant science from Khon Kaen University, Khon Kaen, Thailand, in 1977.

From December 1979 to June 1989, he worked as a seed technologist, Rice Division, Department of Agriculture, Ministry of Agriculture and Co-operative, Thailand.

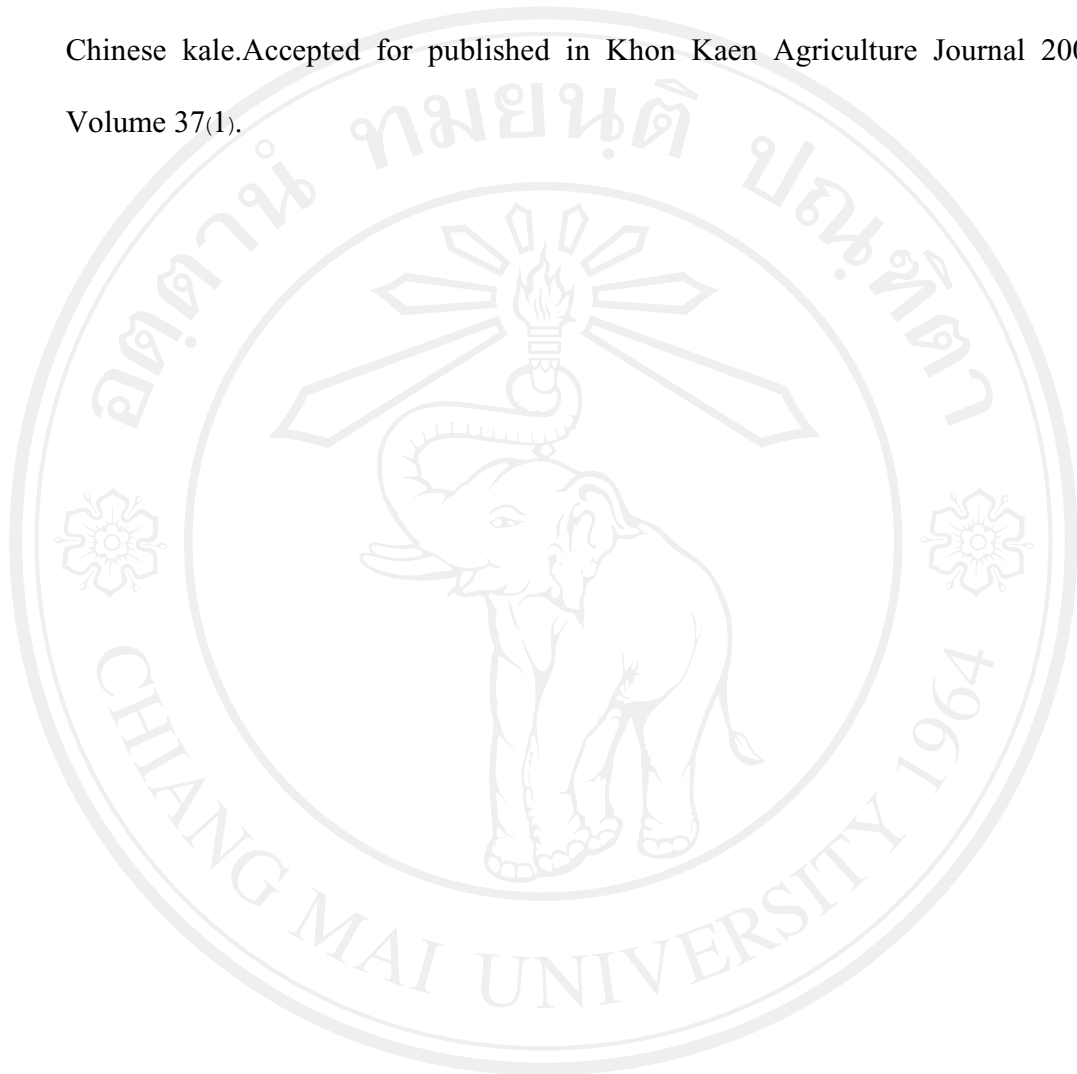
In 1985, he entered Chiang Mai University to pursue his Master of Science degree in agronomy, majoring in Seed Technology and graduated in 1987. From 1989 to 2003, he worked as an Agricultural Scientist, Department of Agricultural Extension, Ministry of Agriculture and Co-operative, Thailand.

In November, 2004, he entered Chiang Mai University to pursue the Doctor of Philosophy degree with a major in agronomy. He worked as an Agricultural Economic Scientist, Office of Agricultural Economics, Ministry of Agriculture and Co-operative, Thailand.

Publication

1. Wiwat Mathayakul, Sodchol Wonprasaid, Somporn Choonluchanon, and Chuckree Senthong. 2008. Uptake Efficiency of N Mineralized from vegetable Soybean Residues of Chinese kale by Using Isotope Technique. Thai Agricultural Research Journal 26(2):164-175.

2. Wiwat mathayakul, Chuckree Senthong, Dumnern Karladee and Suthat Julsrigival.
Effect of Vegetable Soybean Decomposition on Quantity of N-uptake and Yield of
Chinese kale. Accepted for published in Khon Kaen Agriculture Journal 2009;
Volume 37(1).



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved