

APPENDIX

Appendix A

Appendix: A1 Percent moisture content of rice sample at harvesting of field experiment

Varieties	Frequency of KI	Moisture content (%)		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	20.1	20.7	21.3
	once a week*	19.5	20.2	21.5
	twice a week**	19.0	18.4	20.7
KDS	one time at PI	25.5	25.0	23.3
	once a week*	25.7	26.1	26.6
	twice a week**	26.3	24.5	25.1
CNT-1	one time at PI	15.7	15.2	14.1
	once a week*	17.3	16.2	15
	twice a week**	18.1	16.3	16.7

Appendix: A2 Percent moisture content of rice sample at milling.**On farm trial**

Selected farmer	KI	Non-KI
San KampheangA	12.5	14.0
San KampheangB	14.4	14.2
San KampheangC	14.1	14.3
San KampheangD	15.2	15.4
San KampheangE	12.5	12.6
San KampheangF	16.0	15.3
San Pa Tong A	15.0	12.7
San Pa Tong B	18.4	17.8
San Pa Tong C	16.2	14.7
San Pa Tong D	11.4	12.1
San Pa Tong E	11.4	12.2
San Sai A	16.2	12.2
San Sai B	14.8	12.0
San Sai C	15.2	14.9
San Sai D	11.9	11.4
Ban Thi A	13.2	13.1
Ban Thi B	16.0	18.0
Ban Thi C	18.0	15.9
Ban Thi D	18.1	17.7
Ban Thi E	12.2	13.3

Field Experiment

Varieties	Frequency of KI	Moisture content (%)		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	11.3	11.3	11.4
	once a week*	11.4	11.4	11.8
	twice a week**	10.6	11.9	11.2
KDS	one time at PI	11.5	10.5	10.8
	once a week*	11.2	10.7	1.3
	twice a week**	11.5	12.0	11.6
CNT-1	one time at PI	11.8	12.3	12.4
	once a week*	12.3	12.1	12.4
	twice a week**	12.3	12.2	12.6

Appendix A3 Milling quality of field experiment**Percentage of head rice**

Varieties	Frequency of KI	Percentage of head rice		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	44.45	49.26	51.98
	once a week*	45.43	50.77	55.16
	twice a week**	43.09	55.16	51.89
KDS	one time at PI	18.26	19.38	16.48
	once a week*	15.58	21.48	20.84
	twice a week**	16.91	26.43	20.02
CNT-1	one time at PI	29.63	41.17	40.37
	once a week*	27.33	36.65	44.20
	twice a week**	26.13	39.34	40.93

Percentage of broken rice

Varieties	Frequency of KI	Percentage of broken rice		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	25.82	20.51	18.46
	once a week*	25.26	20.50	16.17
	twice a week**	27.44	15.51	19.22
KDS	one time at PI	48.15	42.74	43.25
	once a week*	51.07	42.98	43.22
	twice a week**	47.45	37.45	46.94
CNT-1	one time at PI	41.84	29.91	31.58
	once a week*	44.01	34.76	27.19
	twice a week**	46.31	31.55	31.35

Percentage of brown rice

Varieties	Frequency of KI	Percentage of brown rice		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	76.40	76.59	75.88
	once a week*	76.75	77.57	77.42
	twice a week**	76.67	76.75	76.98
KDS	one time at PI	76.43	75.72	76.35
	once a week*	76.46	77.13	76.49
	twice a week**	75.96	74.99	75.92
CNT-1	one time at PI	78.20	78.27	79.02
	once a week*	78.73	78.54	78.79
	twice a week**	79.25	78.22	78.64

Percentage of milled rice

Varieties	Frequency of KI	Percentage of milled rice		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	70.26	69.78	70.43
	once a week*	70.69	71.27	71.33
	twice a week**	70.53	70.67	71.12
KDS	one time at PI	66.40	62.12	63.28
	once a week*	66.64	64.46	64.06
	twice a week**	64.36	63.88	63.42
CNT-1	one time at PI	71.46	71.08	71.95
	once a week*	71.34	71.42	71.39
	twice a week**	72.44	70.90	72.28

Percentage of husk

Varieties	Frequency of KI	Percentage of husk		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	23.60	23.41	24.12
	once a week*	23.25	22.43	22.58
	twice a week**	23.34	23.42	23.03
KDS	one time at PI	23.58	24.28	23.65
	once a week*	23.54	22.87	23.51
	twice a week**	24.04	25.01	24.08
CNT-1	one time at PI	21.80	21.74	20.98
	once a week*	21.27	21.46	21.21
	twice a week**	20.75	21.78	21.36

Percentage of bran

Varieties	Frequency of KI	Percentage of bran		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	6.14	6.81	5.45
	once a week*	6.06	6.29	6.09
	twice a week**	6.13	6.08	6.09
KDS	one time at PI	10.02	13.60	13.07
	once a week*	9.82	12.67	12.43
	twice a week**	11.60	11.11	12.49
CNT-1	one time at PI	6.74	7.19	7.07
	once a week*	7.39	7.13	7.39
	twice a week**	6.80	7.32	6.37

Grain hardness

Varieties	Frequency of KI	Grain hardness(N/cm ²)		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	80.37	80.46	81.27
	once a week*	80.90	82.30	81.70
	twice a week**	79.72	82.09	79.29
KDS	one time at PI	68.19	69.03	69.23
	once a week*	59.96	61.25	69.05
	twice a week**	56.72	67.08	70.99
CNT-1	one time at PI	70.62	78.99	82.13
	once a week*	76.92	80.70	81.23
	twice a week**	78.22	80.10	78.66

Appendix A4 Nutritive values of field experiment**Iodine content in brown rice**

Varieties	Frequency of KI	Iodine content in brown rice ($\mu\text{g}/100\text{g}$)		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	4.69	5.31	4.96
	once a week*	4.61	5.10	5.59
	twice a week**	4.90	5.44	5.52
KDS	one time at PI	5.52	7.06	5.75
	once a week*	6.50	5.43	5.71
	twice a week**	5.70	6.12	6.88
CNT-1	one time at PI	6.72	5.53	5.67
	once a week*	5.03	5.22	5.79
	twice a week**	5.23	5.90	5.60

Potassium content in brown rice (mg/100g)

Varieties	Frequency of KI	Potassium content in brown rice(mg/100g)		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	160.67	165.81	166.76
	once a week*	164.89	163.21	174.13
	twice a week**	169.26	170.26	150.05
KDS	one time at PI	237.64	257.02	238.64
	once a week*	228.91	255.96	216.76
	twice a week**	241.96	246.34	241.07
CNT-1	one time at PI	212.52	203.80	197.14
	once a week*	199.28	213.91	207.42
	twice a week**	201.65	197.69	198.84

Protein content in brown rice (mg/100g)

Varieties	Frequency of KI	Protein content in brown rice(mg/100g)		
		0.0g%KI	0.1g%KI	0.2g%KI
KDML105	one time at PI	9.81	10.35	10.17
	once a week*	10.23	10.56	10.44
	twice a week**	9.96	10.11	10.39
KDS	one time at PI	12.23	14.15	14.02
	once a week*	12.52	13.34	12.96
	twice a week**	12.37	14.48	13.71
CNT-1	one time at PI	10.87	12.15	11.77
	once a week*	11.36	11.88	11.94
	twice a week**	10.90	11.31	11.96

Appendix A5 Milling quality of on farm trial

selected size	%head rice		%broken rice		%brown rice		%milled rice		%husk rice		%bran rice		grain hardness	
	KI	Non-KI	KI	Non-KI	KI	Non-KI	KI	Non-KI	KI	Non-KI	KI	Non-KI	KI	Non-KI
sankamphang A	58.64	59.75	9.30	8.29	73.60	73.60	67.94	68.04	26.40	26.40	5.66	5.56	60.84	57.06
sankamphang B	47.67	44.67	20.53	23.52	74.66	74.79	68.20	68.19	25.34	25.21	6.46	6.60	67.27	63.16
sankamphang C	47.47	44.67	21.97	24.95	75.23	75.40	69.44	69.62	24.77	24.60	5.80	5.78	69.88	67.18
sankamphang D	47.47	45.17	21.55	21.68	74.03	75.07	69.02	66.85	25.97	24.93	5.01	8.22	63.50	66.32
sankamphang E	53.23	50.09	16.02	19.88	75.47	75.65	69.25	69.97	24.53	24.35	6.22	5.68	65.68	65.98
sankamphang F	57.03	54.36	10.49	13.83	75.39	74.43	67.52	68.19	24.61	25.57	7.87	6.24	64.47	51.93
SanpatongA	48.45	47.56	20.17	18.77	74.20	72.81	68.62	66.33	25.80	27.19	5.57	6.48	67.13	60.50
SanpatongB	48.87	47.27	12.75	13.33	68.22	67.49	61.62	60.60	31.78	32.51	6.60	6.89	52.43	50.82
SanpatongC	50.18	51.79	19.28	14.72	74.87	75.38	69.46	66.51	25.13	24.62	5.41	8.87	56.76	56.41
SanpatongD	54.60	53.73	15.23	16.13	75.66	75.69	69.83	69.86	24.34	24.31	5.83	5.83	67.40	68.22
SanpatongE	51.82	47.26	16.28	19.53	74.38	74.15	68.10	66.79	25.62	25.85	6.28	7.36	66.56	61.94
SanseiA	59.62	49.05	6.39	18.80	73.87	74.08	66.01	67.85	26.13	25.92	7.86	6.23	59.30	51.78
SanseiB	57.30	44.98	10.04	22.99	73.28	74.15	67.34	67.97	26.72	25.85	5.94	6.18	66.80	63.42
SanseiC	45.05	46.38	19.17	22.99	71.67	74.87	64.22	69.37	28.33	25.13	7.45	5.50	61.38	54.09
SanseiE	46.28	45.26	23.41	24.80	75.68	74.60	69.69	70.06	24.32	25.40	5.98	4.54	64.75	67.18
BanathiA	53.98	51.71	12.24	15.81	73.39	73.66	66.22	67.52	26.61	26.34	7.18	6.15	64.92	58.48
BanathiB	56.81	56.46	9.71	7.14	72.87	69.73	66.52	63.60	27.13	30.27	6.35	6.13	60.92	60.74
BanathiC	58.83	57.27	8.91	10.98	73.67	74.30	67.74	68.25	26.33	25.70	5.93	6.05	60.70	65.70
BanathiD	58.45	54.04	7.76	13.86	72.04	74.05	66.21	67.90	27.96	25.95	5.84	6.16	59.89	59.18
BanathiE	52.89	52.28	15.29	15.24	74.22	74.37	68.18	67.52	25.78	25.63	6.04	6.84	71.70	72.04

Appendix A6 Nutritive values of brown rice of on farm trial

selected size	%potassium		%iodine	
	KI	non_KI	KI	non_KI
BanathiA	235.70	212.29	3.37	2.95
BanathiB	235.50	220.74	3.61	3.01
BanathiC	230.83	245.23	4.33	4.44
BanathiD	234.33	222.53	4.22	3.55
BanathiE	223.05	219.32	4.07	4.11
sankampheang A	203.39	205.13	3.95	3.99
Sankampheang B	204.49	228.2	4.05	3.99
sankampheang C	193.87	243.68	3.88	3.99
sankampheang D	193.83	236.18	3.61	3.7
sankampheang E	212.22	206.66	3.46	3.4
sankampheang F	186.66	196.79	3.58	3.6
SanpatongA	213.25	209.87	3.03	3.7
SanpatongB	250.7	253.3	4.69	3.72
SanpatongC	185.13	215.41	4.11	3.73
SanpatongD	199.8	200.77	4.5	3.91
SanpatongE	224.16	225.84	3.41	4.5
SansaiA	203.39	205.13	3.5	2.75
SansaiB	234.91	226.731	4.18	3.95
SansaiC	241.09	245.788	3.71	5.14
SansaiE	238.09	-	3.98	4.19

Appendix B: Analysis of Variance (ANOVA) of the Field Experiment

Appendix B1 ANOVA for Number of days to maximum culm dry weight from transplanting

SOURCE	DF	SS	MS	F	P
REP (A)	2	9.40741	4.70370	0.13	0.8835
VAR (B)	2	80.2222	40.1111	1.09	0.4191
A*B	4	147.259	36.8148		
RATE (C)	2	123.630	61.8148	8.24	0.0056
B*C	4	20.1481	5.03704	0.67	0.6242
A*B*C	12	90.0000	7.50000		
FREQUENCY (D)	2	43.6296	21.8148	1.68	0.1975
B*D	4	102.815	25.7037	1.98	0.1136
C*D	4	28.7407	7.18519	0.55	0.6968
A*B*C*D	44	570.148	12.9579		
TOTAL	80	1216.00			

Appendix B2: ANOVA for Number of days to maximum leave dry weight from transplanting

SOURCE	DF	SS	MS	F	P
REP (A)	2	55.8765	27.9383	0.22	0.8136
VAR (B)	2	16624.9	8312.46	64.64	0.0009
A*B	4	514.420	128.605		
RATE (C)	2	107.580	53.7901	0.55	0.5929
B*C	4	502.716	125.679	1.28	0.3327
A*B*C	12	1181.70	98.4753		
FREQUENCY (D)	2	76.0247	38.0123	0.58	0.5624
B*D	4	423.160	105.790	1.62	0.1854
C*D	4	311.605	77.9012	1.20	0.3263
A*B*C*D	44	2867.88	65.1790		
TOTAL	80	22665.9			

Appendix B3: ANOVA for Number of days to maximum panicle dry weight from transplanting

SOURCE	DF	SS	MS	F	P
REP (A)	2	441.284	220.642	1.23	0.3825
VAR (B)	2	7593.06	3796.53	21.23	0.0074
A*B	4	715.309	178.827		
RATE (C)	2	310.395	155.198	1.76	0.2130
B*C	4	32.1975	8.04938	0.09	0.9833
A*B*C	12	1055.63	87.9691		
FREQUENCY (D)	2	303.877	151.938	2.14	0.1297
B*D	4	820.494	205.123	2.89	0.0330
C*D	4	505.605	126.401	1.78	0.1499
A*B*C*D	44	3124.02	71.0006		
TOTAL	80	14901.9			

Appendix B4: ANOVA for the maximum culm dry weight

SOURCE	DF	SS	MS	F	P
REP (A)	2	161987	80993.5	1.43	0.3405
VAR (B)	2	1660043	830021	14.63	0.0145
A*B	4	226985	56746.2		
RATE (C)	2	28647.0	14323.5	0.42	0.6660
B*C	4	128390	32097.6	0.94	0.4725
A*B*C	12	408631	34052.6		
FREQUENCY (D)	2	100809	50404.5	2.49	0.0945
B*D	4	89261.5	22315.4	1.10	0.3673
C*D	4	73068.4	18267.1	0.90	0.4707
A*B*C*D	44	890483	20238.3		
TOTAL	80	3768305			

Appendix B5: ANOVA for the maximum leave dry weight

SOURCE	DF	SS	MS	F	P
REP (A)	2	62843.0	31421.5	3.09	0.1542
VAR (B)	2	32701.8	16350.9	1.61	0.3069
A*B	4	40622.7	10155.7		
RATE (C)	2	14537.6	7268.78	1.73	0.2185
B*C	4	34049.7	8512.43	2.03	0.1544
A*B*C	12	50383.3	4198.61		
FREQUENCY (D)	2	17645.0	8822.48	2.01	0.1465
B*D	4	70577.3	17644.3	4.01	0.0073
C*D	4	14482.1	3620.51	0.82	0.5172
A*B*C*D	44	193427	4396.07		
TOTAL	80	531269			

Appendix B6: ANOVA for the maximum panicle dry weight

SOURCE	DF	SS	MS	F	P
REP (A)	2	232615	116307	2.91	0.1662
VAR (B)	2	1621541	810771	20.26	0.0081
A*B	4	160081	40020.3		
RATE (C)	2	25453.7	12726.8	3.70	0.0561
B*C	4	27190.2	6797.55	1.97	0.1628
A*B*C	12	41320.7	3443.39		
FREQUENCY (D)	2	113378	56689.2	2.99	0.0605
B*D	4	46320.1	11580.0	0.61	0.6568
C*D	4	166789	41697.3	2.20	0.0845
A*B*C*D	44	833726	18948.3		
TOTAL	80	3268416			

Appendix B7: ANOVA for Average rate of dry weight accumulation of culm (g/day)
from transplanting

SOURCE	DF	SS	MS	F	P
REP (A)	2	0.02193	0.01096	5.73	0.0669
VAR (B)	2	0.02578	0.01289	6.74	0.0523
A*B	4	0.00765	0.00191		
RATE (C)	2	0.00429	0.00215	1.24	0.3235
B*C	4	0.00757	0.00189	1.09	0.4030
A*B*C	12	0.02074	0.00173		
FREQUENCY (D)	2	0.00696	0.00348	1.63	0.2081
B*D	4	0.01824	0.00456	2.13	0.0926
C*D	4	0.00205	5.130E-04	0.24	0.9142
A*B*C*D	44	0.09409	0.00214		
TOTAL	80	0.20930			

Appendix B8: ANOVA for Average rate of dry weight accumulation of leave (g/day)
from transplanting

SOURCE	DF	SS	MS	F	P
REP (A)	2	0.01370	0.00685	8.18	0.0386
VAR (B)	2	0.00573	0.00286	3.42	0.1361
A*B	4	0.00335	8.370E-04		
RATE (C)	2	4.956E-04	2.478E-04	0.68	0.5244
B*C	4	0.00372	9.294E-04	2.56	0.0932
A*B*C	12	0.00436	3.636E-04		
FREQUENCY (D)	2	5.014E-04	2.507E-04	0.52	0.5964
B*D	4	0.00289	7.227E-04	1.51	0.2165
C*D	4	8.156E-04	2.039E-04	0.43	0.7895
A*B*C*D	44	0.02110	4.795E-04		
TOTAL	80	0.05666			

Appendix B9: ANOVA for Average rate of dry weight accumulation of panicle
(g/day) from transplanting

SOURCE	DF	SS	MS	F	P
REP (A)	2	0.11176	0.05588	1.24	0.3806
VAR (B)	2	0.66952	0.33476	7.44	0.0449
A*B	4	0.18001	0.04500		
RATE (C)	2	0.03467	0.01734	1.27	0.3172
B*C	4	0.01026	0.00256	0.19	0.9406
A*B*C	12	0.16438	0.01370		
FREQUENCY (D)	2	0.10106	0.05053	3.59	0.0361
B*D	4	0.03404	0.00851	0.60	0.6618
C*D	4	0.09264	0.02316	1.64	0.1804
A*B*C*D	44	0.62002	0.01409		
TOTAL	80	2.01836			

Appendix B10: ANOVA for Grain Yield

SOURCE	DF	SS	MS	F	P
REP (A)	2	93365.5	46682.8	1.00	0.4442
VAR (B)	2	687145	343573	7.37	0.0456
A*B	4	186595	46648.8		
RATE (C)	2	2119.86	1059.93	0.05	0.9524
B*C	4	155010	38752.5	1.79	0.1956
A*B*C	12	259716	21643.0		
FREQUENCY (D)	2	33220.1	16610.0	1.69	0.1971
B*D	4	90299.6	22574.9	2.29	0.0746
C*D	4	64647.1	16161.8	1.64	0.1812
A*B*C*D	44	433594	9854.41		
TOTAL	80	2005712			

Appendix B11: ANOVA for Number of tillers per hill of three varieties;KDML 105,
KDS and CNT-1

SOURCE	DF	SS	MS	F	P
REP (A)	2	93365.5	46682.8	1.00	0.4442
VAR (B)	2	687145	343573	7.37	0.0456
A*B	4	186595	46648.8		
RATE (C)	2	2119.86	1059.93	0.05	0.9524
B*C	4	155010	38752.5	1.79	0.1956
A*B*C	12	259716	21643.0		
FREQUENCY (D)	2	33220.1	16610.0	1.69	0.1971
B*D	4	90299.6	22574.9	2.29	0.0746
C*D	4	64647.1	16161.8	1.64	0.1812
A*B*C*D	44	433594	9854.41		
TOTAL	80	2005712			

Appendix B12: Number panicles per hill of KDML 105, KDS and CNT-1 at 0.0, 0.1
and 0.2 g%KI concentration

SOURCE	DF	SS	MS	F	P
REP (A)	2	0.01852	0.00926	0.02	0.9848
VAR (B)	2	874.019	437.009	726.11	0.0000
A*B	4	2.40741	0.60185		
RATE (C)	2	23.4630	11.7315	4.64	0.0322
B*C	4	10.7963	2.69907	1.07	0.4146
A*B*C	12	30.3519	2.52932		
FREQUENCY (D)	2	7.46296	3.73148	1.71	0.1923
B*D	4	10.4630	2.61574	1.20	0.3242
C*D	4	26.8519	6.71296	3.08	0.0254
A*B*C*D	44	95.8889	2.17929		
TOTAL	80	1081.72			

Appendix B13: ANOVA for Number of filled grains per panicle of KDML 105, KDS and CNT-1

SOURCE	DF	SS	MS	F	P
REP (A)	2	2599.43	1299.72	1.25	0.3791
VAR (B)	2	21232.9	10616.5	10.19	0.0269
A*B	4	4165.52	1041.38		
RATE (C)	2	83.5705	41.7852	0.07	0.9359
B*C	4	1065.77	266.443	0.42	0.7881
A*B*C	12	7530.66	627.555		
FREQUENCY (D)	2	659.986	329.993	0.73	0.4863
B*D	4	1035.98	258.995	0.58	0.6821
C*D	4	6191.27	1547.82	3.44	0.0157
A*B*C*D	44	19814.1	450.320		
TOTAL	80	64379.2			

Appendix B14: ANOVA for Percent unfilled grain of three varieties; KDML 105, KDS and CNT-1

SOURCE	DF	SS	MS	F	P
REP (A)	2	112.587	56.2937	0.86	0.4887
VAR (B)	2	4028.51	2014.26	30.81	0.0037
A*B	4	261.502	65.3755		
RATE (C)	2	42.9519	21.4759	0.28	0.7583
B*C	4	316.943	79.2356	1.04	0.4246
A*B*C	12	910.364	75.8637		
FREQUENCY (D)	2	19.2395	9.61973	0.10	0.9062
B*D	4	864.082	216.021	2.22	0.0826
C*D	4	405.174	101.294	1.04	0.3978
A*B*C*D	44	4287.84	97.4508		
TOTAL	80	11249.2			

Appendix B15: ANOVA for 1000-grain weight

SOURCE	DF	SS	MS	F	P
REP (A)	2	24.0019	12.0009	2.08	0.2400
VAR (B)	2	277.303	138.652	24.06	0.0059
A*B	4	23.0477	5.76192		
RATE (C)	2	13.2078	6.60389	2.62	0.1139
B*C	4	17.7782	4.44454	1.76	0.2013
A*B*C	12	30.2667	2.52222		
FREQUENCY (D)	2	11.8171	5.90853	1.72	0.1904
B*D	4	9.24131	2.31033	0.67	0.6139
C*D	4	4.22169	1.05542	0.31	0.8713
A*B*C*D	44	150.926	3.43013		
TOTAL	80	561.811			

Appendix B16: ANOVA for Harvest Index

SOURCE	DF	SS	MS	F	P
REP (A)	2	0.07417	0.03708	2.28	0.2179
VAR (B)	2	3.58145	1.79073	110.32	0.0003
A*B	4	0.06493	0.01623		
RATE (C)	2	0.00194	9.679E-04	0.19	0.8255
B*C	4	0.06049	0.01512	3.04	0.0601
A*B*C	12	0.05961	0.00497		
FREQUENCY (D)	2	0.00211	0.00105	0.13	0.8819
B*D	4	0.05639	0.01410	1.69	0.1700
C*D	4	0.07122	0.01780	2.13	0.0929
A*B*C*D	44	0.36762	0.00835		
TOTAL	80	4.33993			

Appendix B17: ANOVA for Percentage of head rice

SOURCE	DF	SS	MS	F	P
REP (A)	2	180.368	90.1838	2.23	0.2234
VAR (B)	2	12361.2	6180.59	152.93	0.0002
A*B	4	161.657	40.4143		
RATE (C)	2	1216.49	608.247	15.59	0.0005
B*C	4	328.062	82.0154	2.10	0.1434
A*B*C	12	468.124	39.0103		
FREQUENCY (D)	2	1.46643	0.73322	0.04	0.9582
B*D	4	30.8306	7.70764	0.45	0.7722
C*D	4	171.301	42.8254	2.50	0.0562
A*B*C*D	44	754.448	17.1465		
TOTAL	80	15673.9			

Appendix B18: ANOVA for Percentage of broken rice

SOURCE	DF	SS	MS	F	P
REP (A)	2	148.626	74.3132	2.12	0.2351
VAR (B)	2	7771.56	3885.78	111.09	0.0003
A*B	4	139.918	34.9796		
RATE (C)	2	1446.95	723.476	16.55	0.0004
B*C	4	228.606	57.1516	1.31	0.3220
A*B*C	12	524.508	43.7090		
FREQUENCY (D)	2	1.47429	0.73714	0.04	0.9630
B*D	4	35.8485	8.96212	0.46	0.7659
C*D	4	172.703	43.1757	2.21	0.0836
A*B*C*D	44	860.479	19.5563		
TOTAL	80	11330.7			

Appendix B19: ANOVA for Percentage of milled rice

SOURCE	DF	SS	MS	F	P
REP (A)	2	1.64146	0.82073	0.28	0.7681
VAR (B)	2	852.629	426.315	146.49	0.0002
A*B	4	11.6406	2.91016		
RATE (C)	2	12.3200	6.15999	1.54	0.2542
B*C	4	22.5409	5.63524	1.41	0.2900
A*B*C	12	48.0523	4.00436		
FREQUENCY (D)	2	5.71552	2.85776	0.86	0.4306
B*D	4	7.46604	1.86651	0.56	0.6921
C*D	4	4.87942	1.21986	0.37	0.8311
A*B*C*D	44	146.392	3.32710		
TOTAL	80	1113.28			

Appendix B20: ANOVA for Percentage of brown rice

SOURCE	DF	SS	MS	F	P
REP (A)	2	1.04074	0.52037	0.23	0.8056
VAR (B)	2	89.0599	44.5299	19.54	0.0086
A*B	4	9.11735	2.27934		
RATE (C)	2	0.50188	0.25094	0.24	0.7875
B*C	4	1.87908	0.46977	0.46	0.7664
A*B*C	12	12.3548	1.02957		
FREQUENCY (D)	2	5.12932	2.56466	5.91	0.0053
B*D	4	4.42306	1.10577	2.55	0.0526
C*D	4	2.68023	0.67006	1.54	0.2064
A*B*C*D	44	19.1084	0.43428		
TOTAL	80	145.295			

Appendix B21: ANOVA for Percentage of husk

SOURCE	DF	SS	MS	F	P
REP (A)	2	1.04074	0.52037	0.23	0.8056
VAR (B)	2	89.0599	44.5299	19.54	0.0086
A*B	4	9.11735	2.27934		
RATE (C)	2	0.50188	0.25094	0.24	0.7875
B*C	4	1.87908	0.46977	0.46	0.7664
A*B*C	12	12.3548	1.02957		
FREQUENCY (D)	2	5.12932	2.56466	5.91	0.0053
B*D	4	4.42306	1.10577	2.55	0.0526
C*D	4	2.68023	0.67006	1.54	0.2064
A*B*C*D	44	19.1084	0.43428		
TOTAL	80	145.295			

Appendix B22: ANOVA for Percentage of bran

SOURCE	DF	SS	MS	F	P
REP (A)	2	0.66753	0.33376	3.23	0.1464
VAR (B)	2	516.488	258.244	2497.08	0.0000
A*B	4	0.41367	0.10342		
RATE (C)	2	10.0689	5.03447	3.79	0.0530
B*C	4	18.1267	4.53166	3.41	0.0440
A*B*C	12	15.9433	1.32861		
FREQUENCY (D)	2	0.92666	0.46333	0.17	0.8455
B*D	4	2.03123	0.50781	0.18	0.9452
C*D	4	6.09286	1.52322	0.55	0.6974
A*B*C*D	44	121.049	2.75111		
TOTAL	80	691.808			

Appendix B23: ANOVA for Grain hardness

SOURCE	DF	SS	MS	F	P
REP (A)	2	82.6424	41.3212	1.61	0.3071
VAR (B)	2	3618.20	1809.10	70.44	0.0008
A*B	4	102.729	25.6822		
RATE (C)	2	23.5223	11.7611	0.70	0.5153
B*C	4	388.892	97.2229	5.80	0.0078
A*B*C	12	201.304	16.7753		
TIME (D)	2	10.6248	5.31241	0.13	0.8741
B*D	4	163.556	40.8889	1.04	0.3981
C*D	4	218.519	54.6297	1.39	0.2538
A*B*C*D	44	1732.10	39.3660		
TOTAL	80	6542.09			

Appendix B24: ANOVA for Potassium Content in rice grain

SOURCE	DF	SS	MS	F	P
REP (A)	2	2098.59	1049.29	4.76	0.0874
VAR (B)	2	86545.2	43272.6	196.46	0.0001
A*B	4	881.060	220.265		
RATE (C)	2	2567.39	1283.69	2.10	0.1653
B*C	4	1223.57	305.892	0.50	0.7363
A*B*C	12	7337.96	611.496		
TIME (D)	2	739.455	369.728	0.60	0.5550
B*D	4	1755.40	438.850	0.71	0.5905
C*D	4	1438.00	359.500	0.58	0.6785
A*B*C*D	44	27258.1	619.501		
TOTAL	80	131845			

Appendix B25: ANOVA for Fe content in rice grain

SOURCE	DF	SS	MS	F	P
REP (A)	2	0.09231	0.04616	0.46	0.6584
VAR (B)	2	1.07343	0.53672	5.40	0.0730
A*B	4	0.39724	0.09931		
RATE (C)	2	0.00335	0.00167	0.03	0.9712
B*C	4	0.27728	0.06932	1.21	0.3557
A*B*C	12	0.68595	0.05716		
TIME (D)	2	0.03642	0.01821	0.49	0.6180
B*D	4	0.18948	0.04737	1.27	0.2979
C*D	4	0.40606	0.10152	2.71	0.0420
A*B*C*D	44	1.64691	0.03743		
TOTAL	80	4.80844			

Appendix B24: ANOVA for Zn content in rice grain

SOURCE	DF	SS	MS	F	P
REP (A)	2	0.87465	0.43732	0.80	0.5084
VAR (B)	2	0.61413	0.30706	0.57	0.6079
A*B	4	2.17344	0.54336		
RATE (C)	2	0.14218	0.07109	1.32	0.3045
B*C	4	0.17613	0.04403	0.81	0.5398
A*B*C	12	0.64862	0.05405		
TIME (D)	2	0.22857	0.11429	0.98	0.3833
B*D	4	0.67577	0.16894	1.45	0.2341
C*D	4	0.61474	0.15368	1.32	0.2782
A*B*C*D	44	5.13093	0.11661		
TOTAL	80	11.2791			

Appendix B25: ANOVA for Percentage of nitrogen (N) content

SOURCE	DF	SS	MS	F	P
REP (A)	2	0.05353	0.02676	0.57	0.6068
VAR (B)	2	3.30344	1.65172	35.02	0.0029
A*B	4	0.18864	0.04716		
RATE (C)	2	0.33107	0.16553	21.93	0.0001
B*C	4	0.10548	0.02637	3.49	0.0411
A*B*C	12	0.09059	0.00755		
TIME (D)	2	5.951E-04	2.975E-04	0.03	0.9731
C*D	4	0.03823	0.00956	0.88	0.4883
B*D	4	0.07229	0.01807	1.65	0.1819
B*C*D	8	0.05017	0.00627	0.57	0.7919
A*B*C*D	36	0.39311	0.01092		
TOTAL	80	4.62714			

Appendix B26: ANOVA for Percentage of protein content

SOURCE	DF	SS	MS	F	P
REP (A)	2	2.08959	1.04479	0.57	0.6070
VAR (B)	2	129.135	64.5675	35.04	0.0029
A*B	4	7.37115	1.84279		
RATE (C)	2	12.9351	6.46753	21.93	0.0001
B*C	4	4.11920	1.02980	3.49	0.0412
A*B*C	12	3.53900	0.29492		
TIME (D)	2	0.02240	0.01120	0.03	0.9741
C*D	4	1.49778	0.37445	0.88	0.4869
B*D	4	2.82078	0.70519	1.65	0.1824
B*C*D	8	1.96591	0.24574	0.58	0.7906
A*B*C*D	36	15.3594	0.42665		
TOTAL	80	180.855			

Appendix C: Rice Standard

The definitions

The meaning of the terminology in this Rice Standard is as follows:

1. Rice Standards means the minimum specifications for rice of each type and grade for domestic trade and international trade.
2. Rice means non-glutinous and glutinous rice (*Oriza sativa* L.) in whatever form.
3. Paddy means rice that is not yet dehusked.
4. Cargo rice (Loonzain rice, Brown rice, Husked rice) mean rice that is dehusk only.
5. White rice means rice that is obtained by removing bran from Cargo non-glutinous rice.
6. White glutinous rice means rice that obtained by removing bran from Cargo glutinous rice.
7. Parboiled rice means non-glutinous rice that has passed through the parboiling process and has its bran removed.
8. Rice classification means rice kernels of various lengths as specified which are the mixtures of rice kernels of each class in accordance with the specified proportion.
9. Classes of rice kernels mean classes of rice kernels which are classified in accordance with the length of the whole kernels.
10. Parts of rice kernel mean each part of the whole kernels that is divided lengthwise into 10 equal parts.
11. Whole kernels mean rice kernels that are in whole condition without any broken part, including the kernels that have the length as form 9 parts onward.
12. Head rice means broken kernels whose lengths are more than those of Brokens but have not reached the length of whole kernels. This includes split kernels that retain the area as from 80% of the whole kernel.
13. Brokens mean broken kernels that have the length as from 2.5 parts but have not reached the length of Head rice. This includes split kernels that retain the area less than 80% of the whole kernel.
14. Small brokens C1 mean small broken kernels that pass through round hole metal sieve No.7

15. Undermilled kernels mean milled rice kernels that have the milling degree below that specified for each grade of rice.
16. Milling degree means the degree to which the rice is milled
17. Sieve means round hole metal sieve No.7, that is 0.79 mm. (0.031 inch) thick and with hole diameter of 1.75 mm. (0.069 inch)

Classes of rice kernels and Milling degree

1. Classes of rice kernels are divided into 4 classes as follows:
 - 1.1 Long grain Class 1 is whole kernel having the length exceeding 7.0 mm.
 - 1.2 Long grain Class 2 is whole kernel having the length exceeding 6.6 mm. upto 7.0mm.
 - 1.3 Long grain Class 3 is whole kernel having the length exceeding 6.2 mm. upto 6.6mm.
 - 1.4 Long grain Class 4 is whole kernel having the length not exceeding 6.2 mm.
2. Milling degree is divided into 4 degrees as follows:
 - 2.1 Extra well milled is the removal of bran entirely to the extent that the rice kernel has a especially beautiful appearance.
 - 2.2 Well milled is the removal of bran entirely to the extent that the rice kernel has a beautiful appearance.
 - 2.3 Reasonably well milled is the removal of the large amount of bran to the extent that the rice kernel has a reasonably beautiful appearance.
 - 2.4 Ordinarily milled is the removal of some portions of bran only.

Type and grades of rice

1. Type of rice are divided into 4 types as follows:
 - 1.1 White rice
 - 1.2 Cargo rice (*Loonzain rice, Brown rice, Husked rice*)
 - 1.3 White glutinous rice
 - 1.4 Parboiled rice

2. Grade of white rice are divided into 13 grades as follows:
 - 2.1 White rice 100 % Grade A
 - 2.2 White rice 100 % Grade B
 - 2.3 White rice 100 % Grade C
 - 2.4 White rice 5 %
 - 2.5 White rice 10 %
 - 2.6 White rice 15 %
 - 2.7 White rice 25 % Super
 - 2.8 White rice 25 %
 - 2.9 White rice 35 %
 - 2.10 White rice 45 %
 - 2.11 White broken rice A1 Extra Super
 - 2.12 White broken rice A1 Super
 - 2.13 White broken rice A1 special

3. Grades of Cargo rice are divided into 6 grades as follows:
 - 3.1 Cargo rice 100% Grade A
 - 3.2 Cargo rice 100% Grade B
 - 3.3 Cargo rice 100% Grade C
 - 3.4 Cargo rice 5%
 - 3.5 Cargo rice 10%
 - 3.6 Cargo rice 15%

4. Grades of White glutinous rice are divided into 3 grades as follows:
 - 4.1 White glutinous rice 10%
 - 4.2 White glutinous rice 25%
 - 4.3 White glutinous broken rice A 1

5. Grades of Parboiled glutinous rice are divided into 9 grades as follows:
 - 5.1 Parboiled rice 100% Sorted
 - 5.2 Parboiled rice 100%
 - 5.3 Parboiled rice 5% Sorted
 - 5.4 Parboiled rice 5%

5.5 Parboiled rice 10% Sorted

5.6 Parboiled rice 10%

5.7 Parboiled rice 15%

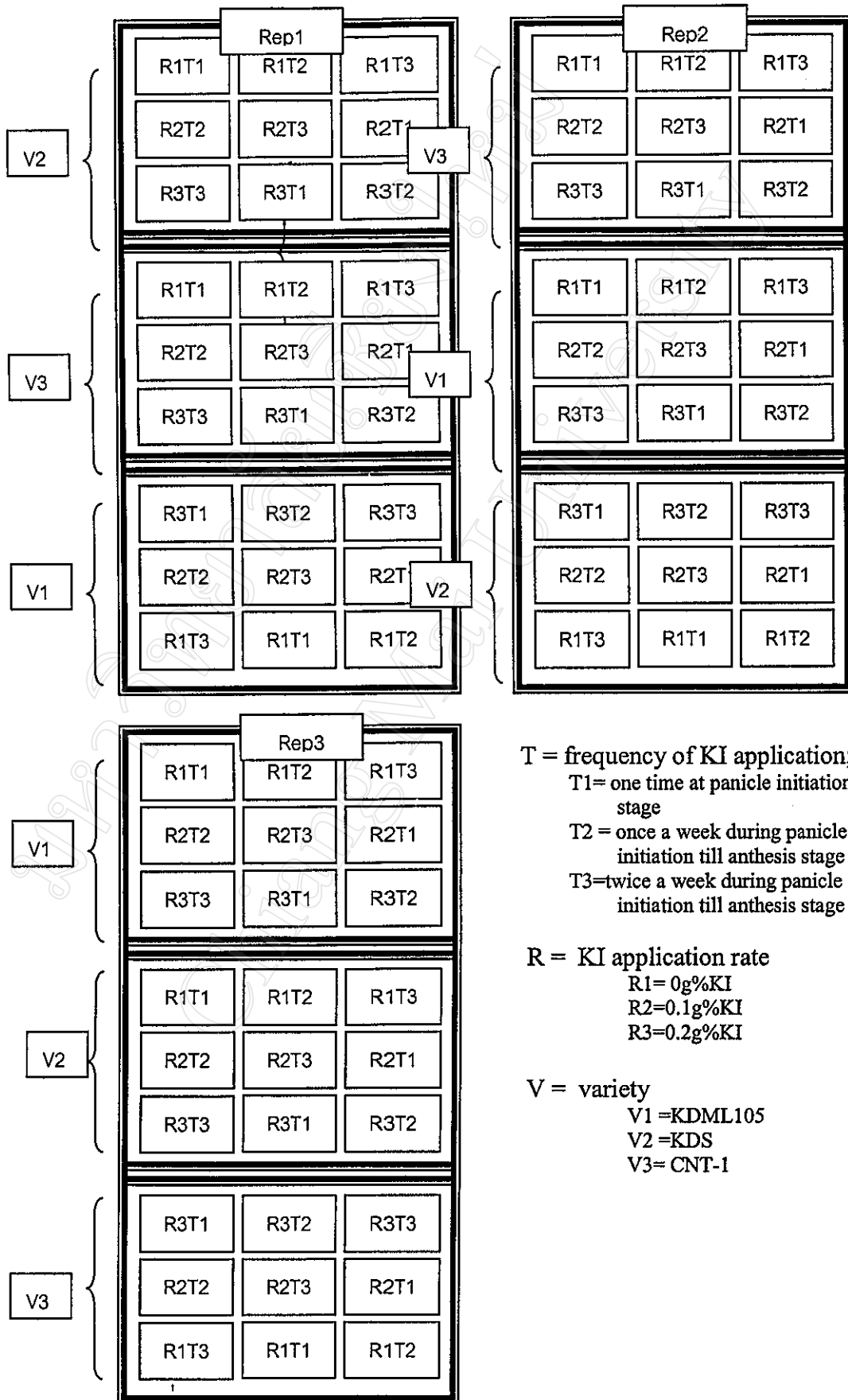
5.8 Parboiled rice 25%

5.9 Parboiled broken rice A 1

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Appendix D

Layout and diagram of field experiment



T = frequency of KI application;
 T1= one time at panicle initiation stage
 T2 = once a week during panicle initiation till anthesis stage
 T3=twice a week during panicle initiation till anthesis stage

R = KI application rate
 R1= 0g%KI
 R2=0.1g%KI
 R3=0.2g%KI

V = variety
 V1 =KDML105
 V2 =KDS
 V3= CNT-1

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