

## Appendices

### Appendix 1 Variance analysis of the crop survey

Source	DF	SS	MS	F	P
Nhill/m <sup>2</sup>	22	495.913	22.5415	3.00	0.0008
Ntillers/m <sup>2</sup>	22	16624.7	755.667	1.67	0.0706
N panicles/m <sup>2</sup>	22	16095.5	731.615	1.66	0.0736
N grains/panicle	22	15671.0	712.318	1.21	0.2891
% filled grain	22	717.333	32.6061	1.04	0.4453
Grain yield (t/ha)	22	19.729	0.897	1.988	0.025
Straw weight (g/m <sup>2</sup> )	22	1549832	70446.9	2.53	0.004

### Appendix 2 Variance analysis of the upland field experiment

Source	DF	SS	MS	F	P
Grain yield (t/ha)	5	0.099	0.019	0.31	0.89
Straw weight (t/ha)	5	0.29	0.058	0.27	0.92
Leaf length (cm)	5	3166.13	633.226	13.32	0.00
Leaf width (cm)	5	2.495	0.499	10.55	0.00
Tillers/hill	5	30.370	6.074	4.13	0.00
Panicles/hill	5	14.783	2.956	1.85	0.10
Plant height (cm)	5	12812.0	2562.41	19.44	0.00

### Appendix 3 Variance analysis of the lowland field experiment

Source	DF	SS	MS	F	P
Grain yield (t/ha)	2	0.92	0.46	1.06	0.44
Straw weight (t/ha)	2	0.533	0.266	0.82	0.518
Leaf length (cm)	2	362.717	181.358	8.04	0.001
Leaf width (cm)	2	0.440	0.220	7.95	0.001
Tillers/hill	2	5.066	2.533	0.44	0.653
Panicles/hill	2	8.316	4.158	0.69	0.506
Plant height (cm)	2	2064.62	1032.31	18.18	0.000

Appendix 4 Yield components of the Kainoyleuang variety on farmers' fields

Field	Hills/m <sup>2</sup>		Tillers/m <sup>2</sup>		Panicles/m <sup>2</sup>		Grains/panicle		% filled grains	
	M	SD	M	SD	M	SD	M	SD	M	SD
1	23.00	2.64	152.33	23.45	149.66	19.55	172.33	19.65	90.33	1.15
2	24.33	3.31	134.00	19.92	130.66	20.50	180.33	14.46	91.00	3.00
3	28.00	4.58	158.33	5.05	152.66	4.16	161.00	23.57	91.66	1.52
4	18.33	1.53	170.66	5.13	162.33	5.51	184.33	21.55	91.33	4.04
5	23.33	3.21	163.33	15.50	157.66	15.62	180.66	16.86	90.33	2.31
6	20.00	2.00	170.00	7.00	164.33	10.69	189.33	14.29	82.33	5.68
7	21.00	3.46	158.33	21.50	150.00	22.91	191.33	17.00	90.00	7.21
8	21.00	2.00	144.33	18.23	138.00	18.33	174.66	38.78	85.33	7.02
9	27.00	1.41	168.33	8.85	162.00	8.72	170.66	3.05	87.33	1.53
10	23.00	2.24	170.33	8.38	166.00	7.38	203.00	18.08	86.00	2.00
11	27.66	2.08	171.66	15.30	166.33	18.58	160.33	16.26	84.33	9.33
12	21.00	1.00	136.00	46.77	130.66	45.71	173.66	22.36	92.66	3.21
13	22.00	1.00	154.33	14.46	146.66	17.56	159.33	12.58	91.33	0.57
14	25.00	4.58	152.00	25.63	145.66	25.03	136.66	23.11	84.66	8.08
15	22.33	3.21	169.66	23.50	165.66	21.03	183.00	17.52	82.00	6.08
16	25.33	1.53	131.33	19.85	124.66	18.61	186.33	10.78	89.00	3.67
17	21.33	1.52	144.00	14.11	138.66	11.85	159.66	45.23	87.66	5.02
18	23.33	2.08	150.00	11.27	144.00	11.94	153.00	27.71	88.33	1.52
19	20.00	2.00	137.66	2.52	136.33	1.53	165.66	46.05	88.66	3.05
20	20.33	4.16	164.66	45.96	161.33	47.26	177.66	24.13	82.33	15.94
21	20.66	1.15	169.33	34.53	165.00	33.00	146.33	29.28	92.00	1.73
22	27.00	3.60	128.00	13.89	126.33	14.15	173.33	17.03	86.33	9.35
23	20.33	3.05	188.66	12.85	183.66	12.89	165.33	28.04	89.00	2.64

Appendix 5 Measurements of the agro-morphological characters based on some the Standard Evaluation System for Rice.

<b>A. Agronomic traits</b>	<b>Growth stage</b>	<b>Scales</b>
1. Tillering ability The score must represent most plants within the plot Sample size=40 plants	Booting	1 Very high (more than 25 tillers/plant) 3 Good (20-25 tillers/plant) 5 Medium (10-19 tillers/plant) 7 Low (5-9 tillers/plant) 9 Very low (less than 5 tillers/plant)
2. Plant height Use actual measurement (cm) from soil surface to the tip of the tallest panicle (awns more excluded) Sample size=40 plants	Milk stage to mature grain	1 Semi-dwarf (lowland is less than 110 cm and upland is less than 90 cm) 5 Intermediate (lowland is less than 110–130cm and upland is less than 90–125 cm) 9 Tall (lowland more than 130 cm and Upland more 125 cm)
3. Spikelet fertility Identify the fertile spikelets by pressing the spikelets with the fingers and noting those that have no grains. Readings are obtained from counts of well-developed spikelets in proportion to total number of spikelets on 4 panicles.	Mature grain	1 Highly fertile >90% 3 Fertile 75-89% 5 Partly sterile (50-74%) 7 Highly sterile <50% to trace 9 Completely sterile 0%
4. Maturity Use the number of days from seeding to grain ripening (85% of grains on panicle are mature)	Mature grain	Actual number of days

<b>B. Morphological characters</b>	<b>Growth stage</b>	<b>Scales</b>
5. Leaf length Enter actual measurements, in centimeters of the leaf just below the flag leaf Sample size = 40	Heading	Centimeters
6. Leaf width Enter actual measurements, in centimeters of the widest portion of the leaf blade just below the flag leaf Sample size = 40	Heading	Centimeters

7. Leaf blade pubescence  
Aside from ocular inspection, rub figures from the tip down on the leaf surface. Presence of hairs on the blade surface are classified.
- |  |                    |                |
|--|--------------------|----------------|
|  | Booting to heading | 1 Glabrous     |
|  |                    | 2 Intermediate |
|  |                    | 3 Pubescence   |
8. Leaf blade color  
Ocular inspection of color  
Sample size=40
- |  |                            |   |
|--|----------------------------|---|
|  | Stem elongation to heading | 1 Light green                             |
|  |                            | 2 Green                                   |
|  |                            | 3 Dark green                              |
|  |                            | 4 Purple tips                             |
|  |                            | 5 Purple margins                          |
|  |                            | 6 Purple blotch (Purple mixed with green) |
|  |                            | 7 Purple                                  |
9. Ligule color  
Ocular inspection of color  
Sample size= 40
- |  |                            |                |
|--|----------------------------|----------------|
|  | Stem elongation to booting | 1 White        |
|  |                            | 2 Purple lines |
|  |                            | 3 Purple       |
10. Collar color  
Ocular inspection of color  
Sample size=40
- |  |                            |                |
|--|----------------------------|----------------|
|  | Stem elongation to booting | 1 White        |
|  |                            | 2 Purple lines |
|  |                            | 3 Purple       |
11. Auricle color  
Ocular inspection of color  
Sample size=40
- |  |                            |               |
|--|----------------------------|---------------|
|  | Stem elongation to booting | 1 Light green |
|  |                            | 2 Purple      |
12. Panicle length  
Enter actual measurements in centimeters from panicle base to tip.  
Sample size = 40
- |  |             |             |
|--|-------------|-------------|
|  | Dough stage | Centimeters |
|--|-------------|-------------|
13. Awning
- |  |              |                          |
|--|--------------|--------------------------|
|  | Mature grain | 0 Absent                 |
|  |              | 1 Short and partly awned |
|  |              | 5 Short and fully awned  |
|  |              | 7 Long and partly awned  |
|  |              | 9 Long and fully awned   |
14. Awn color
- |  |         |                 |
|--|---------|-----------------|
|  | Heading | 0 Awnless       |
|  |         | 1 Straw         |
|  |         | 2 Gold          |
|  |         | 3 Brown (tawny) |
|  |         | 4 Red           |

15. Apiculus color Ocular inspection of color Sample size= 50	Milk stage to mature grain	5 Purple 6 Black 1 White 2 Straw 3 Brown (tawny) 4 Red 5 Red apex 6 Purple 7 Purple apex
16. Lemma and palea color Ocular inspection of color Sample size= 50	Mature grain	0 Straw 1 Gold and gold furrows on straw background 2 Brown spots on straw 3 Brown furrows on straw 4 Tawny 5 Reddish to light purple 6 Purple spots on straw 7 Purple furrows on straw 8 Purple 9 Black 10 White
17 Sterile lemma color Readings are made when the spikelets are approaching maturity Sample size= 50	Mature grain	1 Straw (yellow) 2 Gold 3 Red 4 Purple
18 Seed coat color Readings are made on de-hulled rice Sample size= 50	Mature grain	1 White 2 Light brown 3 Speckled brown 4 Brown 5 Red 6 Variable purple 7 Purple
19 100-grain weight Enter measurements in grams of 100 well-developed whole grains, dried to 14% moisture content, weighed on a precision balance	Mature grain	Grams

20 Grain length                      Mature grain      Millimeters

Enter the mean length in millimeters as the distance from the base of the lowermost sterile lemma to the tip (apiculus) of the fertile lemma or pelea. In the case of awned varieties, the grain is measured to a point comparable to the tip of the apiculus

Sample size = 50

21 Grain width                      Mature grain      Millimeters

Enter the actual measurement of width in millimeters as the distance across the fertile lemma and the pelea at the widest point.

Sample size = 50

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Appendix 6 Experimental layout

Plot layout

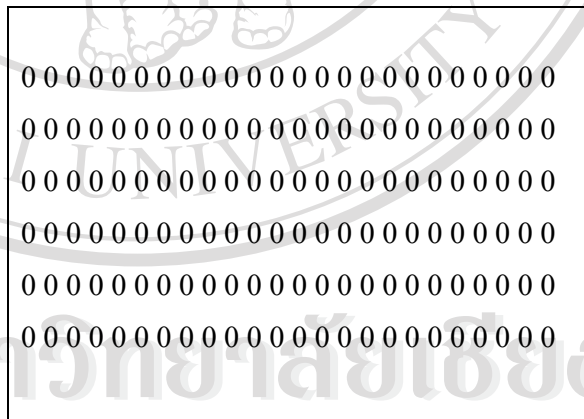
Number of Plots

1	2	3	4	5	6	7	8	9
KNN	KNL	KNL	KNH	KP	BHS	KCL	KCH	KCH

Plot layout

Spacing 25 x 25 cm  
Plot size= 18 m<sup>2</sup>

3.0 m



6.0 m

## Appendix 7 Climatic data in Samneua of Houaphanh province, Laos

## 7.A Temperature in Samneua district, 2001

Month	Average of temperature (°C)		
	Max.	Min.	Mean.
January	23.2	9.2	16.6
February	23.7	8.7	16.2
March	24.7	13.2	19.6
April	28.8	13.6	24.2
May	28.2	17.4	23.6
June	26.8	22.4	24.8
July	27.5	21.7	24.6
August	28.8	20.8	24.3
September	26.0	20.3	24.5
October	24.3	17.4	21.5
November	23.7	11.7	16.1
December	19.9	9.3	15.8

## 7. B Rain fall distribution in Samneua district, 2001

Month	Amount of rain fall (mm)	
	Max	Total
January	10.6	11.3
February	0.0	0.0
March	20.2	97.1
April	26.4	56.5
May	70.4	202.7
June	20.8	116.1
July	30.7	102.6
August	40.2	176.1
September	40.8	106.7
October	87	219.6
November	10	16.8
December	0.0	0.0
Total		1105.5



## 7. C Sunshine Duration (hours/day), 2001

Month	Sunshine duration (hours)	
	Max	Mean
January	10.1	4.9
February	8.1	4.0
March	8.3	3.0
April	10.5	6.2
May	10.0	1.9
June	10.5	3.4
July	9.4	3.5
August	8.4	2.4
September	9.7	3.4
October	7.0	2.3
November	8.1	4.7
December	8.7	2.8

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## Appendix 8 Farmers' interview form

Date.....

Interview number (vv/ss/hhh.).....

vv = assigned village no.

ss = sample no. in village

hhh = actual house no.

1. Name of farmer..... Age.....yr. family labor... .. persons, total rice area.....ha
2. Years of rice farming from 19.....
3. farmer status.....
- Wealthier than village average  Average for village
- Poorer than village
4. Year of education.....
5. Total rice variety..... varieties
- Name of most popular varieties: 1....., 2....., 3.....
6. Seed selection:
- From bulk when threshing  Panicle selection
- Separated plot
7. Seed storage
- Mixed in the same rice consumption storage  Across season
- No across season
- Separated from rice consumption storage  Panicle
- Threshed
8. Seed exchange
- Within village  Between districts
- Between villages  Between province
9. Reasons for growing many varieties
- Conservation
- Reduced insects outbreak
- Insufficient rice for consumption
- Cultural
- Other

## Appendix 9 Guide questions for semi-structured farmer interview (crop survey)

- Date....., No hh....., No field plot.....
- 1) Farmer name....., Age.....yrs, years of farming.....
  - 2) Year of Kainoyleuang transplanted....., Original source.....
  - 3) Water use
    - Irrigation
    - Rainfed
  - 4) Located zone
    - Low terrace
    - Moderate terrace
    - High terrace
  - 5) Crop management
    - A. Seed bed duration....., days
    - B Applied fertilizer:
      - Yes
      - No
  - 6) If yes, type of fertilizer....., amount.....Kg, time application....., times, Days after showing.....days
  - 7) Land preparation
    - Draft animals
    - Hand tractor
    - A. Tillage.....times
    - B. Harrow .....times
  - 8) Fertilization (after transplanting date)
    - A Applied fertilizer:
      - Yes
      - No
    - B. If yes, type of fertilizer....., amount.....Kg, time application.....times, After transplanting date..... Days
  - 9) Weed management
    - A. Weeding.....times, Days after transplanting.....days
    - B. Weed observation at harvesting time:
      - a. Much
      - b. Intermediate
      - c. Less
  - 10) Pest and disease management
    - A. Spraying.....times, Days after transplanting.....days, pesticide type....., dose.....
    - B. Major Pests and diseases:
      - a. Stem border

- b. Plant hopper
- c. Blast
- d. Other

## 11) Documentation on the seed management:

## A. Source of seeds:

- a. Own
- b. Bartering with
- c. Within community
- d. Bought
- e. Give away to
- f. Nearby community

## B. Seed selection

- a. Selected Panicle
- b. From bulk when threshing time
- c. Mark plot on field (separated plot)

## C. How often of Seed selection

- a. Every year
- b. Every two years
- c. Every three years
- d. Every five years
- e. Other

## D. Seed storage

- a. Sacking
- b. In side house
- c. Mixed within consumed grains

## 12) Yield and yield components

## A. Data collected in a sample

Sample	Hill/m <sup>2</sup>	Tiller/m <sup>2</sup>	Panicle/m <sup>2</sup>	Grain weight g/m <sup>2</sup>		Straw weight g/m <sup>2</sup>	
				Fresh	Dry	Fresh	Dry
1							
2							
3							

## B. Five panicles collected from around the plot

Sample	Grains/panicle	% filled grains	Height plant (cm)	100-grain weight g
1				
2				
3				

## 13) Diversity within the sample

Sample	Lemma and palea pubescence	Leaf blade pubescence	Panicles have awns
1			
2			
3			

Appendix 10 Form survey of village diversity of rice

1. Name of village.....

2. Number of rice cultivars existence at presents

No	Cultivars	Type		Maturity			Ecosystem	Special characters	Number households grown	Proportion of area
		N	G	E	M	L				
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

Appendix 11 Source of popular rice varieties collected from the study area.

No	ชื่อพันธุ์ Variety	ชื่อเกษตรกร Name of farmer	หมู่บ้าน Village
1	ข้าวไถ่น้อยเหลือง 1 Kainoyleuang 1	นายคำศรี Khamsee	อึ้ง Ban Ong
2	ข้าวไถ่น้อยเหลือง 2 Kainoyleuang 2	นายมัน Mun	ก้าน Ban Kan
3	ข้าวไถ่น้อยเหลือง 3 Kainoyleuang 3	นายทองมี Thongmee	ก้าน Ban Kan
4	ข้าวไถ่น้อยไร่ Kainoyhai	นายบุญพัน Bounphanh	หลักสี่บสอง Ban Lak Sipsong
5	ข้าวปู่ Kaopu	นายบัวแพง Bouapheng	ก้าน Ban Kan
6	ข้าวดอน Kaodon	นายสีทา Sitha	หลักสี่บสอง Ban Lak Sipsong
7	ข้าวลาย Kaolai	นายบุญพัน Bounphanh	หลักสี่บสอง Ban Lak Sipsong
8	ข้าวเจ้าหาง 1 Kaochaohang 1	นายสีพร Siphone	อึ้ง Ban Ong
9	ข้าวเจ้าหาง 2 Kaochaohang 2	นายบัวแพง Bouapheng	ก้าน Ban Kan

### Curriculum Vitae

**Name:** Mr. Khampheng Mounmeuangxam

**Date of birth:** 10 December 1971

**Educational background:**

1987-1990 Secondary School. Leuang Prabang High School Number One in Leuang Prabang province of the Lao PDR.

1991- 1993 Diploma Agriculture (Agronomy) Nabong Agricultural College, Vientiane, Lao PDR.

1994-1997 B.S. Agriculture (Agronomy)  
National University of Laos, Faculty of Agriculture and Forestry,  
Nabong campus, Vientiane, Lao PDR

**Scholarship:** Rockefeller Foundation

**Work experiences:**

1993-1994 Extension worker at Samneua Agriculture and Forestry Office, Samneua district, Houaphanh province, Lao PDR

1997-1998 Project manager assistance in training courses at Community Management Irrigation (CMI) Project in Houaphan province, Laos

1999- 2000 Field researcher on population dynamic and specimen taxonomy of rats in Houaphanh province of Laos network (Rodent Management Project in Southeast Asia funded by ACIAR)