1986 CROP YEAR BEAN PRODUCTION SURVEY TAMBON WAWI AND NAM LANG PROJECT AREAS

RESEARCH AND DEVELOPMENT CENTER

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RESEARCH AND DEVELOPMENT CENTER
PAYAP UNIVERSITY

RESEARCH REPORT 24

1986 CROP YEAR BEAN PRODUCTION SURVEY

During the period November 1986 through February 1987 a team from the Research and Development Center, Payap University, surveyed production of soybeans, red kidney beans, mungbeans and blackbeans in the Tambon Wawi and Nam Lang areas of the Thai-German Highland Development Programme. The survey was composed of direct measurement of yields supplemented by a questionnaire covering pertinent variables which may affect bean production. Virtually all farmers surveyed had received both training and inputs (including seed) from the TG-HDP. Details of survey methods are as follows.

Direct measurements of each of the bean fields of surveyed farmers were made by the team where possible. When a farmer was unable or unwilling to lead a survey team member to the field, the farmer was asked to estimate the size of the field(s) planted to the bean crop. Previous experience has indicated that farmers are able to reasonably accurately measure smaller fields (less than one rai). Their ability to measure multi-rai fields with reasonable accuracy has been found to be limited.

The entire bean production of each farmer was weighed. Where farmers were unable or unwilling to allow survey team members to measure the bean yields directly, farmer's estimates of bean yields were substituted. (One exception: yields of black beans, which were planted primarily as a cover crop and which were not harvested for sale/home consumption, were not

measured.)

Labor use was another major facet of the study. For each household surveyed interviewers obtained data on the types and quantities (person-days) of labor used in the various activities associated with production of a bean crop: soil preparation, planting, weeding and harvesting (including cutting, drying, transporting to the village and threshing).

In reviewing the labor data, several points should be borne in mind. First, for some farmers this was a new crop. As such, they may have tended to expend additional time with the crop just to gain experience with the new crop. If so, this would tend to bias labor data in an upward direction. Second, many of the fields were rather small - less than one rai. As labor data was measured in person-days rather than hours, it is possible that farmers who worked only a portion of a day in their small bean field would report it as a full day. This also would tend to bias upward total labor inputs. Third, labor data was gathered on all production activities after the harvest had been completed rather than on a daily basis or even at the end of each production activity cycle. This results in a potential reduction in data accuracy as the respondents cannot remember exactly how many days each person worked at which activity. This situation creates a potential bias of unknown dimensions and direction.

In addition to directly measuring yields, each surveyed farmer was asked a series of questions related to bean production in his fields, e.g., whether he used fertilizer, rizobium or pesticide, the number of years the field had been planted in succession, etc. Included in the survey questionnaire was a short attitude survey intended to measure villagers' feelings toward TG-HDP bean production promotion activities.

Several factors pertinent to the survey results must be reported. First, production of these bean crops was a new activity for the majority of farmers. Many were planting a bean crop for the first time, thus data on labor use, yields, etc., may not be representative of experienced highland bean farmers.

Second, it was found that in many instances inputs of bean seed from TG-HDP had arrived late. This resulted in beans being planted at other than the optimal time to maximize yields.

Third, some farmers who received training on production of kidney beans in fact received inputs of * beans, although exactly how much effect this had on production (labor input, yields, etc.) is not clear.

Results of the bean survey are presented in four parts, one for each type of bean.

PART I. SOYBEANS

1. Introduction.

The survey of soybean production was conducted after harvest of this crop had been completed. For this reason, all data on yields and planted area are based on responses of farmers to survey questionnaires. No direct observation of fields was possible.

Section 1. CHARACTERISTICS OF THE SURVEYED POPULATION

Tables 1 through 4 are frequency representations describing the surveyed population in terms of geographic location and ethnic composition. A total of 42 farmers who had received inputs and training were included in the survey. All were located in the Nam Lang project area. It is of interest that the average age of farmers planting soybeans was quite young, and the average education level was above average. This is an indication of which group of farmers should be targeted for promotion of this crop.

Table 1. VILLAGE

	Frequency	Percent
MAE MU	4	9.5
NONG TONG	4	9.5
LUK KHAOLAM	5	11.9
SOB PONG	4	9.5
NAM RIN	7	16.7
PHAMON	1	2.4
BAN RAI	6	14.3
UMONG	6	14.3
BO KHRAI	5	11.9
TOTAL	42	100.0

Table 2. AGE OF RESPONDENT

	Frequency	Percent
15 TO 30	32	76.2
31 TO 45	8	19.0
46 TO 60	2	4.8
TOTAL	42	100.0

Table 3. EDUCATION LEVEL OF RESPONDENT

	Frequency	Percent
NONE	21	50.0
UNDER 4 YEARS	4	9.5
4 YEARS	10	23.8
OVER 4 YEARS	6	14.3
TOTAL	42	100.0

Table 4. ETHNIC GROUP

	Frequency	Percent
LISU	15	35.7
MUSER	11	26.2
KAREN	7	16.7
THAI YAI	3	7.1
THAI	4	9.5
OTHER	2	4.8
TOTAL	42	100.0

Section 2. SOYBEAN PRODUCTION AND YIELD DATA

Most of the farmers were provided training on soybean production at a school or provincial agricultural office facility and the majority of the farmers could not recall when the training had been provided. (Tables 5 - 6)

Table 5. LOCATION OF TRAINING

	Frequency	Percent
NO TRAINING	1	2.4
PROV AG OFF	10	23.8
SCHOOL	20	47.6
TEMPLE	6	14.3
TG-HDP SITE OFFICE	2	4.8
NO ANSWER	3	7.1
TOTAL	42	100.0

Table 6. MONTH OF TRAINING

	Frequency	Percent
NO ANSWER/NO TRAINING	18	42.9
APRIL	4	9.5
MAY	3	7.1
JUNE	5	11.9
JULY	6	14.3
SEPTEMBER	5	11.9
OCTOBER	1	2.4
TOTAL	42	100.0

Most of the farmers received small quantities of seed. (Table 7) Only two farmers reported having received fertilizer and none received pesticide.

Table 7. LITERS OF SEED RECEIVED FROM TG-HDP

	Frequency	Percent
1 TO 10	34	81.0
11 TO 20	7	16.7
NONE	1	2.4
TOTAL	42	100.0

The previous use of the bean fields is described in Tables 8 through 15 below. One factor stands out clearly: many new fields were apparently opened specifically for soybean production. From Table 8, in almost 62% of the fields soybeans were the first, i.e., only, crop, and from Table 15, nearly 60% of the fields had been used for the first time in 1986. This could have serious implications for the ecology of the highlands: this new crop may not replacing old crops but rather resulting in opening of new areas. These findings are tentative and should be investigated further. For example, the total quantity of seed planted was small, and the crop is new to many farmers. However, it is strongly recommended that this situation be monitored closely.

Table 8. FIRST CROP 1986

	Frequency	Percent
RICE	6	14.3
CORN	2	4.8
BEANS	2	4.8
SOYBEANS	26	61.9
NONE	6	14.3
TOTAL	42	100.0

Table 9. FIRST CROP 1985

	Frequency	Percent
RICE	3	7.1
CORN	8	19.0
BEANS	1	2.4
SOYBEANS	2	4.8
NONE	28	66.7
TOTAL	42	100.0

Table 10. SECOND CROP 1985

	Frequency	Percent
RICE	3	7.1
CORN	3	7.1
BEANS	1	2.4
SOYBEANS	3	7.1
NONE	32	76.2
TOTAL	42	100.0

Table 11. FIRST CROP 1984

	Frequency	Percent
RICE	3	7.1
CORN	6	14.3
BEANS	1	2.4
NONE	32	76.2
TOTAL	42	100.0

Table 12. SECOND CROP 1984

	Frequency	Percent
RICE	1	2.4
CORN	3	7.1
SOYBEANS	2	4.8
KIDNEY BEANS	1	2.4
NONE	35	83.3
TOTAL	42	100.0

Table 13. FIRST CROP 1983

	Frequency	Percent
RICE	3	7.1
CORN	2	4.8
PEANUTS	1	2.4
NONE	36	85.7
TOTAL	42	100.0

Table 14. SECOND CROP 1983

	Frequency	Percent
CORN	1	2.4
BEANS	1	2.4
SOYBEANS	2	4.8
NONE	38	90.5
TOTAL	42	100.0

Table 15. FIRST YEAR FIELD PLANTED

	Frequency	Percent
2529	25	59.5
2528	5	11.8
2527	4	9.5
2526	4	9.5
BEFORE 2523	3	7.1
NO ANSWER	1	2.4
TOTAL	42	100.0

Most fields were within 15 minutes walking time from the village, much closer than most rice and corn fields. (Table 16)

Table 16. WALKING TIME TO FIELD

	Frequency	Percent
0 TO 15 MINUTES	27	64.3
16 TO 30 MINUTES	8	19.0
31 TO 60 MINUTES	2	4.8
61 TO 120 MINUTES	4	9.5
NO ANSWER	1	2.4
TOTAL	42	100.0

The majority of farmers reported using the TG-HDP recommended planting methods although most did not report using row planting. (Tables 17 - 18) In practice, the differences between traditional and recommended practices could not be readily observed in the fields: most soybeans appeared to be in fact planted in rows. Density of crops is shown in Table 19.

Table 17. PLANTING METHOD

	Frequency	Percent
TG-HDP METHOD	23	54.8
TRADITIONAL METHOD	17	40.5
NO ANSWER	2	4.8
TOTAL	42	100.0

Table 18. ROW PLANTING

	Frequency	Percent
NO	28	66.7
YES	8	19.0
NO ANSWER	6	14.3
TOTAL	42	100.0

Table 19. NUMBER OF PLANTS PER SQUARE METER

	Mean	Std Dev	Cases
For Entire Population	6.5610	3.5850	41

Weeding schedules and tools used in weeding are shown in Tables 20 - 26.

Table 20. NUMBER OF TIMES FIELD WEEDED

Value	Frequency	Percent
NOT WEEDED	2	4.8
1	20	47.6
2	16	38.1
3	3	7.1
NO ANSWER	1	2.4
TOTAL	42	100.0

Table 21. FIRST WEEDING: DAYS AFTER PLANTING

Value	Frequency	Percent
NOT WEEDED	3	7.1
10	4	9.5
15	8	19.0
16	1	2.4
20	9	21.4
25	4	9.5
30	13	31.0
TOTAL	42	100.0

Table 22. TOOLS USE FOR FIRST WEEDING

	Frequency	Percent
CURVED KNIFE	11	26.2
SMALL HOE	26	61.9
HAND	1	2.4
NO ANSWER/NOT WEEDED	4	9.5
TOTAL	42	100.0

Table 23. SECOND WEEDING: DAYS AFTER FIRST WEEDING

Value	Frequency	Percent
NOT WEEDED	23	54.8
20	12	28.6
25	1	2.4
30	3	7.1
35	2	4.8
40	1	2.4
TOTAL	42	100.0

Table 24. TOOLS USE FOR SECOND WEEDING

	Frequency	Percent
CURVED KNIFE	2	4.8
SMALL HOE	13	31.0
HAND	3	7.1
NO ANSWER/NOT WEEDED	24	57.1
TOTAL	42	100.0

Table 25. THIRD WEEDING: DAYS AFTER SECOND WEEDING

Value	Frequency	Percent
NOT WEEDED	40	95.2
10	1	2.4
20	1	2.4
TOTAL	42	100.0

Table 26. TOOLS USE FOR THIRD WEEDING

	Frequency	Percent
CURVED KNIFE	1	2.4
SMALL HOE	2	4.8
NO ANSWER/NOT WEEDED	39	92.9
TOTAL	42	100.0

Just over half the farmers reported using rizobium, while only two farmers had used fertilizer. (Tables 27 - 34) Only a few farmers indicated they would purchase fertilizer. (Table 29)

Table 27. USE OF RIZOBIUM

	Frequency	Percent
NOT USED	12	28.6
USED	22	52.4
NO ANSWER	8	19.0
TOTAL	42	100.0

Table 28. USE OF FERTILIZER

	Frequency	Percent
NOT USED	38	90.5
USED	2	4.8
NO ANSWER	2	4.8
TOTAL	42	100.0

Table 29. WILLING/ABLE TO PURCHASE FERTILIZER

	Frequency	Percent
NOT PURCHASE	35	83.3
PURCHASE	4	9.5
NO ANSWER	3	7.1
TOTAL	42	100.0

Most farmers had problems with crop pests, primarily birds and insects, but few farmers used pesticides. (Tables 28 - 30)

Table 30. PROBLEM WITH CROP PESTS

	Frequency	Percent
NO PESTS	9	21.4
HAVE PESTS	31	73.8
NO ANSWER	2	4.8
TOTAL	42	100.0

Table 31. NATURE OF CROP PESTS

	Frequency	Percent
UNKNOWN	9	21.4
BIRDS, INSECTS	13	31.0
LEAVE PROBLEMS	5	11.9
STEM ROT	4	9.5
NONE	11	26.2
TOTAL	42	100.0

Table 32. USE OF PESTICIDES

	Frequency	Percent
NOT USED	34	81.0
USED	3	7.1
NO ANSWER	5	11.9
TOTAL	42	100.0

Table 33. YIELD PER UNIT OF SEED PLANTED BY ETHNIC GROUP

	Mean	Std Dev	Cases
For Entire Population	167.0872	116.9796	5
LISU	80.0000	0.0	1
MUSER	360.0000	0.0	1
KAREN	121.2849	74.4275	2
THAI YAI	152.8662	0.0	1

Significance of F .3981

Table 34. YIELD PER UNIT OF SEED PLANTED BY VILLAGE

	Mean	Std Dev	Cases
For Entire Population	167.0872	116.9796	5
NONG TONG	80.0000	0.0	1
PHAMON	360.0000	0.0	1
BAN RAI	152.8662	0.0	1
UMONG	121.2849	74.4275	2

Significance of F .3981

Table 35. TOTAL PLANTED AREA (RAI) BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	.4755	.1947	5
TAMBON WAWI	.5783	.1764	3
NAMLANG	.3213	.1008	2

Significance of F .1675

Farmers were asked a general question about whether or not advice received was beneficial. The majority indicated it was in fact valuable. Only one individual indicated that the advice was not helpful due to language/communications problems. It is suggested that future studies investigate this area in more depth to confirm this lack of language problem.

Table 36. BENEFIT OF ADVICE RECEIVED

	Frequency	Percent
NO VALUE	3	7.1
VALUABLE	36	85.7
NO ANSWER	3	7.1
TOTAL	42	100.0

Section 3. LABOR USE DATA

Data on labor used in production of soybeans is presented broken down by category of labor: male, female and child household labor; male and female hired labor; and male and female exchange labor. Child labor (children under 15 years) is counted as 50% of adult labor, i.e., one day of child labor is equivalent to one half day of adult labor. All exchange and hired labor is adult labor.

As noted in the introduction to the bean report, there are two factors which tend to bias total reported labor inputs upward: the small size of bean fields and the fact that to some farmers this is a new crop. In addition, the fact that labor data was only surveyed after harvest was complete, respondents memories of the amounts of labor involved may be less than totally accurate.

Where the Significance of F is a value greater than .0500, this indicates that there is no statistically significant difference between the variables. For example, in Table 35 below, there is no statistically significant difference between days of male household labor per ton this indicates that there is no statistically significant difference between the variables.

Table 37. DAYS OF HOUSEHOLD LABOR PER TON OF YIELD BY PROJECT AREA

	Mean	Std Dev	Cases
MALE HOUSEHOLD LABOR	389.1958	750.8676	26
FEMALE HOUSEHOLD LABOR	450.1225	1294.2788	26
MALE EXCHANGE LABOR	49.4464	176.0248	26
FEMALE EXCHANGE LABOR	39.6154	131.9405	26
MALE HIRED LABOR	18.2543	51.7838	26
FEMALE HIRED LABOR	76.7094	342.5426	26
TOTAL LABOR	1023.3437	1885.8930	26

Table 38. DAYS OF TOTAL LABOR PER TON OF YIELD BY ETHNIC GROUP

	Mean	Std Dev	Cases
For Entire Population	1023.3437	1885.8930	26
LISU	1846.2338	2990.4836	7
MUSER	1616.0185	2758.5170	4
KAREN	511.3182	336.7129	7
THAI YAI	225.0000	82.4958	2
THAI	454.1667	381.5017	4
OTHER	686.6667	725.9630	2
Significance of F	.7353		

Table 39. DAYS OF LABOR PER TON OF YIELD BY ACTIVITY

	Mean	Std Dev	Cases
SOIL PREPARATION	352.8367	628.7473	26
PLANTING	148.8930	228.3290	26
WEEDING	311.5828	683.2323	26
HARVEST	210.0312	445.9282	26
TOTAL LABOR	1023.3437	1885.8930	26

Table 40. DAYS OF SOIL PREPARATION LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	21.1288	22.6755	5
TAMBON WAWI	13.5162	7.5772	3
NAMLANG	32.5478	38.8233	2

Table 41. DAYS OF SOIL PREPARATION LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Sum of Sq	Cases
TAMBON WAWI	13.5162	7.5772	114.8275	3
NAMLANG	32.5478	38.8233	1507.2498	2

Significance of F .4360

Table 42. DAYS OF PLANTING LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	10.8882	5.5140	5
TAMBON WAWI	11.1151	5.5578	3
NAMLANG	10.5478	7.7106	2

Significance of F .9283

Table 43. DAYS OF WEEDING LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	19.0635	11.7552	5
TAMBON WAWI	16.3755	9.0966	3
NAMLANG	23.0955	18.2497	2

Significance of F .6079

Table 44. DAYS OF HARVEST LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	9.5407	9.4538	5
TAMBON WAWI	10.2026	12.8526	3
NAMLANG	8.5478	4.8822	2

Significance of F .8781

Table 45. AVERAGE TOTAL MALE HOUSEHOLD LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	36.4483	28.0289	5
TAMBON WAWI	32.0167	20.3689	3
NAMLANG	43.0955	46.5339	2

Significance of F .7265

Table 46. AVERAGE TOTAL FEMALE HOUSEHOLD LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	22.1440	16.5772	5
TAMBON WAWI	15.8111	11.4748	3
NAMLANG	31.6433	23.1318	2

Significance of F .3657

Table 47. AVERAGE TOTAL MALE EXCHANGE LAB PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	.8696	1.9444	5
TAMBON WAWI	1.4493	2.5102	3
NAMLANG	0.0	0.0	2

Significance of F .4950

Table 48. AVERAGE TOTAL FEMALE EXCHANGE LAB PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	.5797	1.2963	5
TAMBON WAWI	.9662	1.6735	3
NAMLANG	0.0	0.0	2

Significance of F .4950

Table 49. AVERAGE TOTAL MALE HIRED LAB PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	.5797	1.2963	5
TAMBON WAWI	.9662	1.6735	3
NAMLANG	0.0	0.0	2

Significance of F .4950

Table 50. TOTAL LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	60.6212	41.4255	5
TAMBON WAWI	51.2095	25.9483	3
NAMLANG	74.7389	69.6658	2

Significance of F .6104

Table 51. TOTAL LABOR PER RAI BY ETHNIC GROUP

	Mean	Std Dev	Cases
For Entire Population	60.6212	41.4255	5
LISU	21.3333	0.0	1
MUSER	124.0000	0.0	1
KAREN	66.1475	2.7838	2
THAI YAI	25.4777	0.0	1

Significance of F .0428

PART II. RED KIDNEY BEANS

Section 1. CHARACTERISTICS OF THE SURVEYED POPULATION

Tables 1 through 5 describe the surveyed population in terms of geographic location and ethnic composition. A total of 70 farmers who had received inputs and training on bean production were included in the survey, in the Tambon Wawi and Nam Lang project areas. The average age of the persons surveyed was somewhat lower than the overall average for the areas, an indication that younger persons are more likely to be interested in producing this new crop.

Table 1. PROJECT AREA

	Frequency	Percent
TAMBON WAWI	30	42.9
NAMLANG	40	57.1
TOTAL	70	100.0

Table 2. VILLAGE

	Frequency	Percent
PHA DAENG MUSER	7	10.0
HUEY KHRAI	3	4.3
DOI CHANG	18	25.7
WANNA LUANG	3	4.3
MAE MU	2	2.9
NONG TONG	4	5.7
LUK KHAOLAM	4	5.7
SOB PONG	1	1.4
NONG PHA CHAM	5	7.1
MAI HUNG	1	1.4
MUANG PAM	4	5.7
THAM LOD	4	5.7
MAE LA NA	1	1.4
NAM RIN	7	10.0
DOI LAN	2	2.9
KHUN SUAI PANG NOK	4	5.7
TOTAL	70	100.0

Table 3. AGE OF RESPONDENT

	Frequency	Percent
15 TO 30	39	55.7
31 TO 45	22	31.4
46 TO 60	9	12.9
TOTAL	70	100.0

Table 4. EDUCATION LEVEL OF RESPONDENT

	Frequency	Percent
NONE	44	62.9
UNDER 4 YEARS	9	12.9
4 YEARS	13	18.6
OVER 4 YEARS	4	5.7
TOTAL	70	100.0

Table 5. ETHNIC GROUP

	Frequency	Percent
LISU	34	48.6
MUSER	11	15.7
AKHA	15	21.4
KAREN	4	5.7
THAI YAI	5	7.1
THAI	1	1.4
TOTAL	70	100.0

Section 2. RED KIDNEY BEAN PRODUCTION AND YIELD DATA

Most of the farmers were trained either at a village school or at the TG-HDP site office, although the majority could not recall what month they received the training. (Tables 6 and 7)

Table 6. LOCATION OF TRAINING

	Frequency	Percent
HILLTRIBE CENTER	12	17.1
PROV AG OFF	1	1.4
SCHOOL	15	21.4
TEMPLE	6	8.6
TG-HDP SITE OFFICE	15	21.4
NO ANSWER	21	30.0
TOTAL	70	100.0

Table 7. MONTH OF TRAINING

	Frequency	Percent
NO ANSWER	32	45.7
APRIL	1	1.4
MAY	1	1.4
JULY	3	4.3
AUGUST	7	10.0
SEPTEMBER	13	18.6
OCTOBER	9	12.9
NOVEMBER	3	4.3
DECEMBER	1	1.4
TOTAL	70	100.0

Many farmers received somewhat more seed inputs of kidney beans than did farmers receiving soybeans. However, a liter of kidney beans does contain fewer seeds than a liter of soybeans, so in terms of planted area seed distribution of the two types of beans was more or less equal. (Table 8)

Table 8. LITERS OF SEED RECEIVED FROM TG-HDP

	Frequency	Percent
1 TO 10	17	24.3
11 TO 20	15	21.4
21 TO 30	23	32.9
31 TO 40	6	8.6
41 TO 50	2	2.9
OVER 50	3	4.3
NO ANSWER	4	5.7
TOTAL	70	100.0

The cropping history of the surveyed fields is shown in Tables 9 - 16. The number of farmers who planted kidney beans as the first crop in their field was quite high, although the number of newly opened fields (Table 16) suggests a normal rotation of fields rather than farmers opening new fields specifically to produce kidney beans. This indicates that kidney bean production should not be a source of increased forest clearing.

Table 9. FIRST CROP 1986

	Frequency	Percent
CORN	7	10.0
BEANS	1	1.4
SOYBEANS	1	1.4
KIDNEY BEANS	50	71.4
NONE	11	15.7
TOTAL	70	100.0

Table 10. FIRST CROP 1985

	Frequency	Percent
RICE	12	17.1
CORN	12	17.1
BEANS	1	1.4
SOYBEANS	1	1.4
KIDNEY BEANS	3	4.3
TOMATO	2	2.8
OPIUM	1	1.4
LYCHEE	1	1.4
BANANA	1	1.4
CABBAGE	1	1.4
NONE	35	50.0
TOTAL	70	100.0

Table 11. SECOND CROP 1985

	Frequency	Percent
CORN	10	14.3
BEANS	3	4.3
SOYBEANS	1	1.4
KIDNEY BEANS	4	5.7
NONE	50	71.4
SESAME	1	1.4
COFFEE	1	1.4
TOTAL	70	100.0

Table 12. FIRST CROP 1984

	Frequency	Percent
RICE	10	14.3
CORN	11	15.7
SOYBEANS	1	1.4
KIDNEY BEANS	1	1.4
NONE	47	67.1
TOTAL	70	100.0

Table 13. SECOND CROP 1984

	Frequency	Percent
RICE	1	1.4
CORN	9	12.9
BEANS	1	1.4
SOYBEANS	2	2.9
KIDNEY BEANS	1	1.4
NONE	56	80.0
TOTAL	70	100.0

Table 14. FIRST CROP 1983

	Frequency	Percent
RICE	3	4.3
CORN	5	7.1
KIDNEY BEANS	1	1.4
NONE	59	84.3
OPIUM	2	2.9
TOTAL	70	100.0

Table 15. SECOND CROP 1983

	Frequency	Percent
RICE	1	1.4
CORN	4	5.7
SOYBEANS	1	1.4
KIDNEY BEANS	1	1.4
NONE	63	90.0
TOTAL	70	100.0

Table 18. FIRST YEAR FIELD PLANTED

	Frequency	Percent
2529	22	31.4
2528	17	24.3
2527	18	25.7
2526	4	5.7
2525	2	2.9
2524	2	2.9
2523	4	5.7
BEFORE 2523	1	1.4
TOTAL	70	100.0

As with soybeans, fields were generally rather close to the village. It is suggested that the reason for this proximity of bean fields to villages be investigated. (Table 17)

Table 17. WALKING TIME TO FIELD

	Frequency	Percent
0 TO 15 MINUTES	43	61.4
16 TO 30 MINUTES	12	17.1
31 TO 60 MINUTES	11	15.7
61 TO 120 MINUTES	3	4.3
NO ANSWER	1	1.4
TOTAL	70	100.0

Most farmers reported using the TG-HDP recommended method of planting, with approximately one third using traditional methods and not planting in rows. As kidney beans are planted in holes made in the ground rather than being broadcast, it is difficult not to plant in rows. In fact most farmers probably planted more or less in rows even if they did not do so specifically to follow TG-HDP recommendations. (Tables 18 - 19)

Table 18. PLANTING METHOD

	Frequency	Percent
TG-HDP METHOD	44	62.9
TRADITIONAL METHOD	25	35.7
NO ANSWER	1	1.4
TOTAL	70	100.0

Table 19. ROW PLANTING

	Frequency	Percent
NO	22	31.4
YES	45	64.3
NO ANSWER	3	4.3
TOTAL	70	100.0

The number of plants per square meter was slightly higher in Tambon Wawi than in Nam Lang. However, the very high standard deviation indicates a high variability in planting density. It is recommended that additional training be provided on proper spacing of kidney beans for maximum production. (Table 20)

Table 20. NUMBER OF PLANTS PER SQUARE METER BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	5.5314	3.1753	69
TAMBON WAWI	4.9655	3.0878	29
NAMLANG	5.9417	3.2131	40

Significance of F .2099

The average number of pods per plant and seeds per pod are shown in Tables 21 and 22. Although the average number of pods did not differ between the project areas, the number of seeds per pod was significantly lower in Nam Lang, indicating a lower total

yield per rai in that area. It is recommended that the reason for this difference in the number of seeds per pod be investigated.

Table 21. AVERAGE NUMBER OF PODS PER PLANT BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	4.4150	1.6248	40
TAMBON WAWI	4.4507	1.3499	25
NAMLANG	4.3556	2.0553	15

Significance of F .8605

Table 22. AVERAGE NUMBER OF SEEDS PER POD BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	3.0208	.6481	20
TAMBON WAWI	3.3367	.5984	10
NAMLANG	2.7050	.5540	10

Significance of F .0248

Weeding schedules and tools used in weeding are shown in Tables 23 - 27. Only six farmers weeded more than two times. A relatively high 18 farmers, one fourth of the surveyed population did not weed their kidney beans at all. In some cases this was due to a complete failure of the crop: the plants were eaten by animals or died before the first weeding. This situation should be investigated in greater depth, as no farmer who intends to

produce a satisfactory kidney bean crop would let his field go unweeded during the entire growing season.

Table 23. NUMBER OF TIMES FIELD WEEDED

Value	Frequency	Percent
0	18	25.7
1	30	42.9
2	15	21.4
3	6	8.6
NOT WEEDED	1	1.4
TOTAL	70	100.0

Table 24. FIRST WEEDING: DAYS AFTER PLANTING

Value	Frequency	Percent
NOT WEEDED/NO ANSWER	19	27.1
3	2	2.9
7	2	2.9
10	8	11.4
15	11	15.7
16	1	1.4
19	1	1.4
20	10	14.3
21	1	1.4
25	3	4.3
30	10	14.3
45	2	2.9
TOTAL	70	100.0

Table 25. TOOLS USE FOR FIRST WEEDING

	Frequency	Percent
CURVED KNIFE	12	17.1
SMALL HOE	28	40.0
HAND	7	10.0
NO ANSWER	23	32.9
TOTAL	70	100.0

26. SECOND WEEDING: DAYS AFTER FIRST WEEDING

Value	Frequency	Percent
NOT WEEDED	48	68.6
8	1	1.4
10	1	1.4
15	6	8.6
20	3	4.3
21	3	4.3
30	6	8.6
35	1	1.4
99	1	1.4
TOTAL	70	100.0

Table 27. TOOLS USE FOR SECOND WEEDING

	Frequency	Percent
CURVED KNIFE	3	4.3
SMALL HOE	12	17.1
HAND	3	4.3
NO ANSWER	52	74.3
TOTAL	70	100.0

Rizobium was used by 68% of farmers. (Table 28) This percentage could be higher considering that kidney beans are a new crop to many of the farmers in the project areas and many of the fields have yet to be inoculated with the bacteria. It is recommended that use of rizobium be stressed to farmers receiving kidney bean training/inputs.

Table 28. USE OF RIZOBIUM

	Frequency	Percent
NOT USED	15	21.4
USED	48	68.6
NO ANSWER	7	10.0
TOTAL	70	100.0

	Frequency	Percent
CURVED KNIFE	3	4.3
SMALL HOE	12	17.1
HAND	3	4.3
NO ANSWER	52	74.3
TOTAL	70	100.0

Rizobium was used by 68% of farmers. (Table 28) This percentage could be higher considering that kidney beans are a new crop to many of the farmers in the project areas and many of the fields have yet to be inoculated with the bacteria. It is recommended that use of rizobium be stressed to farmers receiving kidney bean training/inputs.

Table 28. USE OF RIZOBIUM

	Frequency	Percent
NOT USED	15	21.4
USED	48	68.6
NO ANSWER	7	10.0
TOTAL	70	100.0

Approximately half the farmers used fertilizer - about the same percentage as received fertilizer from TG-HDP. (Tables 29 - 30) When asked if they would be willing and able to purchase fertilizer, about half the respondents said yes. However, further questioning as to the reason they would buy fertilizer and the location where the fertilizer would be obtained, etc., seems to indicate that only about one fourth of farmers would indeed purchase fertilizer. (Tables 31 - 34) This issue of purchase of fertilizer should be monitored, as some fertilizer is necessary in most locations for optimal kidney bean yields. Data on methods of fertilizer use are shown in Tables 35 and 36.

Table 29. AMOUNT OF FERTILIZER RECEIVED FROM TG-HDP

Value	Frequency	Percent
0	38	54.3
10	4	5.7
25	5	7.1
50	20	28.6
100	3	4.3
TOTAL	70	100.0

Table 30. USE OF FERTILIZER

	Frequency	Percent
NOT USED	33	47.1
USED	37	52.9
TOTAL	70	100.0

Table 31. WILLING/ABLE TO PURCHASE FERTILIZER

	Frequency	Percent
NOT PURCHASE	47	67.1
PURCHASE	21	30.0
NO ANSWER	2	2.9
TOTAL	70	100.0

Table 32. REASON WILLING/ABLE TO BUY FERTILIZER

	Frequency	Percent
POOR YIELDS	10	14.3
IF NOT RECD. FREE	1	1.4
BETTER GROWTH	6	8.6
SOIL POOR	1	1.4
WILL NOT BUY	52	74.3
TOTAL	70	100.0

Table 33. REASON NOT WILLING/ABLE TO BUY FERTILIZER

	Frequency	Percent
NO FUNDS	30	42.9
SOIL GOOD	11	15.7
DO NOT KNOW WHERE TO	1	1.4
WILL BUY	28	40.0
TOTAL	70	100.0

Table 34. WHERE WILL BUY FERTILIZER

	Frequency	Percent
PROVINCE	13	18.6
KASET TAMBON	4	5.7
WILL NOT BUY/NO ANSWER	53	75.7
TOTAL	70	100.0

Table 35. FERTILIZING METHOD

	Frequency	Percent
BEFORE PLANTING	2	2.9
AT TIME OF PLANTING	3	4.3
RIGHT AFTER PLANTING	3	4.3
BROADCAST	2	2.9
SEVERAL DAYS AFTER PLANTING	17	24.3
NO ANSWER/NOT USED	43	61.4
TOTAL	70	100.0

Table 36. DAYS AFTER PLANTING FERTILIZER APPLIED

Value	Frequency	Percent
1	7	10.0
2	5	7.1
3	4	5.7
5	4	5.7
NOT USED/NO ANSWER	50	71.4
TOTAL	70	100.0

Approximately the same percentage of farmers had pest problems with their kidney beans as did soybean producers. (Table 37) The most prevalent pest was pests and insects followed by leaf problems and stem rot. (Table 38) It is recommended that the nature of these problems be investigated in detail to determine what corrective action would be appropriate. A surprisingly high 47% of farmers reported using pesticides of various types. However, this is mitigated by the fact that about one third of the farmers received pesticides from TG-HDP. (Tables 39 - 41) As use of these products is relatively new phenomenon for hilltribe farmers, it is highly recommended that the safety with which these chemicals are used be evaluated and action taken as appropriate to correct dangerous situations.

Table 37. PROBLEM WITH CROP PESTS

	Frequency	Percent
NO PESTS	18	25.7
HAVE PESTS	52	74.3
TOTAL	70	100.0

Table 38. NATURE OF CROP PESTS

	Frequency	Percent
UNKNOWN	4	5.7
BIRDS, INSECTS	22	31.4
LEAF PROBLEMS	14	20.0
STEM ROT	11	15.7
NONE	19	27.1
TOTAL	70	100.0

Table 39. RECEIPT OF PESTICIDE (QUANTITY IN MILLILITERS)

Value	Frequency	Percent
0	45	64.3
250	7	10.0
500	10	14.3
800	8	11.4
TOTAL	70	100.0

Table 40. USE OF PESTICIDES

	Frequency	Percent
NOT USED	38	54.3
USED	30	42.9
NO ANSWER	2	2.9
TOTAL	70	100.0

Table 41. TYPE OF PESTICIDE USED

	Frequency	Percent
CF2F	1	1.4
LANNATE	5	7.1
DIFLORITAN	1	1.4
VITAGRAN	1	1.4
SEVIN	3	4.3
SAIFOS	1	1.4
GRAMMOXONE	1	1.4
NOT USED	57	81.4
TOTAL	70	100.0

Farmers were asked a general question about whether or not they received advice from TG-HDP or other officials, how the assistance was received and the perceived value of the advice. (Tables 42). One item stands out from this: although kidney beans is a relatively new crop, only one third of farmers surveyed had received advice.

Table 42. RECEIPT OF ASSISTANCE FROM OFFICIALS

	Frequency	Percent
NOT RECEIVED	8	11.4
RECEIVED	24	34.3
NO ANSWER	38	54.3
TOTAL	70	100.0

Section 3. LABOR USE DATA

Overall, farmers in Tambon Wawi expended much less labor than farmers in Nam Lang per ton of yield. (Table 43) However, the average total labor per ton of yield (Table 44) is not statistically significantly different between the project areas. The total ramifications of this finding will require further study, but the initial indication is that production of kidney beans may impact less on the supply of family labor in Tambon Wawi than in Mae Hongson. There was no statistically significant difference on an inter-tribal basis. (Table 45)

Table 43. Crosstabulation: DAYS OF TOTAL LABOR PER TON OF YIELD BY PROJECT AREA

Count / Col Pct	TAMBON WAWI	NAMLANG	Row Total
0 TO 200	10 / 50.0	3 / 9.4	13 / 25.0
201 TO 400	4 / 20.0	8 / 25.0	12 / 23.1
401 TO 600	1 / 5.0	4 / 12.5	5 / 9.6
601 TO 800	3 / 15.0	6 / 18.8	9 / 17.3
801 TO 1000	1 / 5.0	6 / 18.8	7 / 13.5
OVER 1000	1 / 5.0	5 / 15.6	6 / 11.5
Column Total	20 / 38.5	32 / 61.5	52 / 100.0

Chi-Square Significance .0346

Table 44. DAYS OF TOTAL LABOR PER TON OF YIELD BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	692.2863	1097.4928	52
TAMBON WAWI	684.5566	1661.7167	20
NAMLANG	697.1173	537.6868	32

Significance of F .9684

Table 45. DAYS OF TOTAL LABOR PER TON OF YIELD BY ETHNIC GROUP

	Mean	Std Dev	Cases
For Entire Population	692.2863	1097.4928	52
LISU	819.3003	1471.4097	25
MUSER	579.4508	368.6307	8
AKHA	238.9794	155.4822	9
KAREN	783.7768	149.0321	4
THAI YAI	952.3030	1173.7410	5
THAI	833.3333	0.0	1

Significance of F .8250

Data on labor use broken down by category of labor and then by category of activity are presented in Tables 46 - 57. In none of the cases was there a statistically significant difference between the two project areas.

Table 46. DAYS OF MALE HOUSEHOLD LABOR PER TON OF YIELD BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	356.3684	539.7137	52
TAMBON WAWI	262.5319	576.1360	20
NAMLANG	415.0162	516.2815	32

Significance of F .3265

Table 47. DAYS OF FEMALE HOUSEHOLD LABOR PER TON OF YIELD BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	252.0088	463.3456	52
TAMBON WAWI	286.7466	730.9254	20
NAMLANG	230.2976	156.4878	32

Significance of F .6734

Table 48. DAYS OF CHILD HOUSEHOLD LABOR PER TON OF YIELD BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	.0986	.7112	52
TAMBON WAWI	.2564	1.1467	20
NAMLANG	0.0	0.0	32

Significance of F .2091

Table 49. DAYS OF MALE HIRED LABOR PER TON OF YIELD BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	23.8180	71.0427	52
TAMBON WAWI	39.6631	100.2334	20
NAMLANG	13.9164	43.3863	32

Significance of F .2067

Table 50. DAYS OF FEMALE HIRED LABOR PER TON OF YIELD
BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	13.2458	37.3706	52
TAMBON WAWI	7.5945	14.3426	20
NAMLANG	16.7779	46.2386	32

Table 51. DAYS OF FEMALE HIRED LABOR PER TON OF YIELD
BY PROJECT AREA

	Mean	Std Dev	Sum of Sq	Cases
TAMBON WAWI	7.5945	14.3426	3908.4790	20
NAMLANG	16.7779	46.2386	66278.3389	32

Significance of F .3939

Table 52. DAYS OF MALE HIRED LABOR PER TON OF YIELD
BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	45.8304	237.1113	52
TAMBON WAWI	85.3846	372.3079	20
NAMLANG	21.1091	76.7931	32

Significance of F .3265

Table 53. DAYS OF FEMALE HIRED LABOR PER TON OF YIELD
BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	.9645	6.0676	52
TAMBON WAWI	2.5077	9.7339	20
NAMLANG	0.0	0.0	32

Significance of F .1489

Table 54. DAYS OF SOIL PREPARATION LABOR PER TON OF YIELD BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	229.1375	571.8735	52
TAMBON WAWI	283.3268	882.5184	20
NAMLANG	195.2693	240.0023	32

Significance of F .5941

Table 55. DAYS OF PLANTING LABOR PER TON OF YIELD BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	113.4562	277.3461	52
TAMBON WAWI	133.4977	441.1641	20
NAMLANG	100.9303	82.7002	32

Significance of F .6846

Table 56. DAYS OF WEEDING LABOR PER TON OF YIELD BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	95.7627	124.0646	52
TAMBON WAWI	81.6218	91.6746	20
NAMLANG	104.6007	141.2861	32

Significance of F .5212

Table 57. DAYS OF HARVEST LABOR PER TON OF YIELD BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	253.9298	230.7415	52
TAMBON WAWI	186.1104	289.2171	20
NAMLANG	296.3170	177.4875	32

Significance of F .0941

Labor by unit of area (rai) is shown in Tables 58 - 71. Table 62 shows average total area planted to kidney beans in each of the areas. As many of the field measurements used in computing labor use per rai were based on survey responses rather than on actual observations, the accuracy of this data cannot be verified.

Table 58. DAYS OF SOIL PREPARATION LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Sum of Sq	Cases
TAMBON WAWI	29.8895	57.0243	71538.8347	23
NAMLANG	27.6605	48.4597	25831.8025	12

Significance of F .9090

Table 59. DAYS OF PLANTING LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	16.2075	38.4709	35
TAMBON WAWI	19.9563	46.0162	23
NAMLANG	9.0223	15.9341	12

Significance of F .4330

Table 60. DAYS OF WEEDING LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	15.9893	33.9307	35
TAMBON WAWI	19.9368	40.6401	23
NAMLANG	8.4232	12.6594	12

Significance of F .3482

Table 61. DAYS OF HARVEST LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	17.9059	21.7392	35
TAMBON WAWI	20.9039	25.3008	23
NAMLANG	12.1597	11.2103	12

Significance of F .2649

Table 62. TOTAL PLANTED AREA (RAI) BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	2.1339	4.1974	35
TAMBON WAWI	2.6404	5.0868	23
NAMLANG	1.1629	1.0686	12

Significance of F .3303

Table 63. AVERAGE TOTAL MALE HOUSEHOLD LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	32.4882	44.7616	35
TAMBON WAWI	36.3270	53.1428	23
NAMLANG	25.1304	21.3248	12

Significance of F .4906

Table 64. AVERAGE TOTAL FEMALE HOUSEHOLD LABOR PER BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	37.3972	74.0907	35
TAMBON WAWI	45.9395	88.5403	23
NAMLANG	21.0243	29.0443	12

Table 65. AVERAGE TOTAL CHILDREN HOUSEHOLD LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	.1554	.6572	35
TAMBON WAWI	.2365	.8046	23
NAMLANG	0.0	0.0	12

Significance of F .3194

Table 66. AVERAGE TOTAL MALE EXCHANGE LAB PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	.5039	1.7529	35
TAMBON WAWI	.7668	2.1302	23
NAMLANG	0.0	0.0	12

Significance of F .2245

Table 67. AVERAGE TOTAL FEMALE EXCHANGE LAB PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	.2235	.7515	35
TAMBON WAWI	.3402	.9117	23
NAMLANG	0.0	0.0	12

Significance of F .2083

Table 68. AVERAGE TOTAL MALE HIRED LAB PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	4.5593	13.0565	35
TAMBON WAWI	5.7786	15.1424	23
NAMLANG	2.2222	7.6980	12

Significance of F .5426

Table 69. AVERAGE TOTAL FEMALE HIRED LAB PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	3.9781	18.2150	35
TAMBON WAWI	1.4160	4.3210	23
NAMLANG	8.8889	30.7920	12

Significance of F .2552

Table 70. TOTAL LABOR PER RAI BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	79.3056	111.9392	35
TAMBON WAWI	90.8047	127.9477	23
NAMLANG	57.2658	71.9906	12

Significance of F .4082

Table 71. TOTAL LABOR PER RAI BY ETHNIC GROUP

	Mean	Std Dev	Cases
For Entire Population	79.3056	111.9392	35
LISU	143.0128	154.6162	13
MUSER	73.2434	98.3131	5
AKHA	34.2292	25.2294	13
KAREN	21.0000	0.0	1
THAI YAI	8.8333	2.5927	2
THAI	66.6667	0.0	1

Significance of F .1871

Table 72. YIELD PER UNIT OF SEED PLANTED BY PROJECT AREA

	Mean	Std Dev	Cases
For Entire Population	310.3190	668.6025	23
TAMBON WAWI	428.8533	839.3206	14
NAMLANG	125.9323	147.4722	9

Table 73. YIELD PER UNIT OF SEED PLANTED BY PROJECT AREA

	Mean	Std Dev	Cases
TAMBON WAWI	428.8533	839.3206	14
NAMLANG	125.9323	147.4722	9

Significance of F .2996

Table 74. YIELD PER UNIT OF SEED PLANTED BY ETHNIC GROUP

	Mean	Std Dev	Cases
For Entire Population	310.3190	668.6025	23
LISU	583.1974	1113.1091	8
MUSER	227.7785	239.4650	3
AKHA	199.0459	87.8707	8
KAREN	30.0000	0.0	1
THAI YAI	43.0278	55.8222	2
THAI	80.0000	0.0	1

Significance of F .8552

Table 75. YIELD PER UNIT OF SEED PLANTED BY VILLAGE

	Mean	Std Dev	Cases
For Entire Population	310.3190	668.6025	23
PHA DAENG MUSER	193.6643	100.6528	4
DOI CHANG	578.6617	1033.0939	8
MAE MU	128.0000	0.0	1
LUK KHAOLAM	202.3338	202.0364	4
MAI HUNG	80.0000	0.0	1
MUANG PAM	30.0000	0.0	1
THAM LOD	3.5556	0.0	1
MAE LA NA	82.5000	0.0	1
DOI LAN	21.3333	0.0	1

Significance of F .9785