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PROJECT NOTE NO. 10

STUDY OF RICE YIELDS AND CULTURAL  
PRACTICES  
1982 WET SEASON

LAM NAM OON INTEGRATED RURAL DEVELOPMENT PROJECT

ISSUED BY

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LOUIS BERGER INTERNATIONAL, INC. U.S.A.  
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## FOREWORD

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Project Note No. 10, jointly developed by Khun Natavudh Bhasayavan of the Department of Agriculture, Ministry of Agriculture and Co-operatives, William C. Bell of the Louis Berger International, Inc. advisory team, and the Specific Assignment Team of the Lam Nam Oon Operations Center, is issued as a part of that service.

For those interested in Project Note No. 10 (Lam Nam Oon) additional copies may be obtained from the Center for Rural Development, c/o Louis Berger International, Inc. 100 Halsted St. East Orange, New Jersey 07019, U.S.A.

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AUTHORS

## I. IMPORTANT FINDINGS

1. In this 1982 Wet Season Rice Yield Study no significant statistical difference in yields were noted as between local varieties of rice grown in the Lam Nam Oon area and improved (Government) varieties of rice grown in that same area.
2. Also, there were no significant statistical differences in yields noted as between local varieties of rice and improved (Government) varieties grown on the three different soil series at Lam Nam Oon (Roi-et; Korat; Chiangmai/Pimai).
3. There are significant statistical differences between the yields of improved (Government) varieties of rice grown on saline-affected soils in the Lam Nam Oon area and local varieties of rice grown on those same soils. The improved (Government) varieties of rice have significantly lower yields on the saline-affected soils than do the local varieties of rice.
4. NO EFFECTIVE cultural practices are employed by a significant number of farmers in cultivating either improved (Government) varieties of rice or local varieties of rice in the Lam Nam Oon area.

This observation is supported by the evidence especially in relation to:

4.1 Purchase, storage, and cleaning of new, improved (Government) rice varieties seeds.

4.2 Application of fertiliser.

Fertiliser is applied mostly to seed plots only and in amounts which are so small as to be ineffective. Where fertiliser is applied in the rice paddies it is also in too small amounts relative to the replenishment needs of the soils.

4.3 Weed control is only by hand and the improved (Government) varieties of rice show a very high percentage of weed infestation with consequent lessened yields.

4.4 Plant diseases, insects, and pests cause the greatest number of problems for farmer's cultivating Wet Season rice in the Lam Nam Oon area; and they do very little to control either plant diseases, insects, or pests.

5. Reliable water supply for rice crops is cited by farmers as the second most serious problem affecting rice production in the Lam Nam Oon area. This problem is described by farmers as either caused by:

- 5.1 Lack of farm access to a water supply ditch; or
- 5.2 Lack of system management (either by RID or Water User Groups) to get the irrigation water in the right amounts to the correct locations when needed.
- 6. More than 60% of all rice farmers are selling some rice after a Wet Season. The total quantity sold by each is slightly more than 20% of their harvest.
- 7. The range of yields on rice production during the 1982 Wet Season was as follows:

	<u>Hybrid Varieties</u> <u>(Government)</u>	<u>Local Varieties</u>
Highest	566.3 Kilos/Rai	533.5 Kilos/Rai
Median <sup>N</sup>	305.8 Kilos/Rai	283.4 Kilos/Rai
Lowest	206.0 Kilos/Rai	166.7 Kilos/Rai

#### I. CONCLUSIONS AND RECOMMENDATIONS

The contents of this survey, and the results of the data-processing on the Apple III micro-computer at the Lam Nam Oon Operations Center raises some fundamental questions about:

- What indicators to use in measuring technological transfer and adoption of new technologies at Lam Nam Oon.
- What kinds of specialised training for farmers must be applied by the Department of Agriculture Extension and other participating agencies in the Lam Nam Oon irrigation project.

These fundamental questions, and recommendations of the authors, are presented below. It is their hope that Lam Nam Oon Team Leaders, the Lam Nam Oon Working Group, and Bangkok-based policy makers for Lam Nam Oon will examine the recommendations seriously - and take the appropriate policy/implementation actions.

The fundamental questions, and a recommendation for each follow:

1. Is it meaningful to regard increased planting of improved (Government) varieties of rice as a significant indicator of progress at Lam Nam Oon - in getting farmers to adopt new technologies or achieving higher production?

Evidence contained in this survey answers this question with a NO!

This is the answer because analysis shows that yields of the improved (Government) varieties planted in the Lam Nam Oon area are NOT significantly higher than yields obtained from local varieties.

The survey shows that the principle reason for this situation is lack of improvement in cultural practices and crop management by each farmer.

It is well known that the use of correct cultural practices and crop management by each farmer ( when using improved (Government) rice varieties ) is the ONLY way to achieve significant increases in rice production over local varieties.

Yet, the survey shows that:

- 1.1 There is no difference in cultural practices and crop management by farmers in the Lam Nam Oon irrigation project between what they do with local varieties of rice and improved (Government) varieties.

In both cases, they do virtually nothing of a special technical nature in relation to:

- 1.1.1 Purchase, care, and cleaning of seeds.
  - 1.1.2 Kinds and types of fertiliser applied which have significant impact upon production.
  - 1.1.3 Weeding of improved (Government) varieties.
  - 1.1.4 Insect/plant disease/and pest control of improved (Government) rice varieties.
- 1.2 Farmers planting local varieties of rice on saline soils at Lam Nam Oon are obtaining relatively higher production than those planting improved (Government) varieties on such soils.

Obviously, they are not being trained to adopt special crop management and cultural practices as well as special varieties for saline-prone soils.

#### RECOMMENDATION:

Future applied research, agricultural extension training of farmers', training of Lam Nam Oon technical staff, training by the Ban Fang Daeng Rural Development Training Center, and reporting about farmer acceptance of new technologies at the Lam Nam Oon irrigated project MUST emphasize improved cultural practices and crop management by each farmer.

2. What are the basic cultural practices and crop management techniques which should be emphasized to Lam Nam Oon irrigation project farmer's for their use when cultivating Wet Season rice?

2.1 Improved (Government) varieties of rice seed lose their vitality over a relatively short time.

Farmers need to be aware of this and replace seed. Also, the methods of distributing new rice seeds in the Lam Nam Oon area must be improved. This may include connecting improved (Government) rice variety seed sales/distribution to private sector market development for this crop.

Farmers must be instructed, repeatedly, that it is essential to adequately store and clean improved (Government) varieties of rice. They must not be mixed with other seed.

2.2 Farmers' use manure/compost spread out thinly over a large area of Lam Nam Oon soils. This has little or no effect upon productivity.

Farmers must be made aware of how and in what amounts to make effective use of manure/compost. Kaset Tambols should inspect each farm's soils and conditions and assist the farmer in judging where and in what amounts manure/compost should be used.

Compost use by the farmers appears almost non-existent on Lam Nam Oon rice fields or in seedling plots. This suggests that existing programs to emphasize the production and use of compost are not large enough in the area. Also, those programs probably need a higher degree of application farm-by-farm, with detailed training of farmers in each case.

Chemical fertilizers are used; but in small quantities with concentration on seedling plots.

Much more attention must be devoted at Lam Nam Oon to training farmers about what are adequate applications of chemical fertiliser, what kinds should be applied, where, and when.

2.3 Severe weed problems afflicted almost all farmers surveyed.

Many said that they do some weeding by hand. Yet, the most effective way to control weeds among improved (Government) varieties of rice is to transplant in rows such that a small and inexpensive hand roller can be pushed between the rows to destroy any weeds.

Another way to control weeds is to keep the seed clean before it is planted and not allow it to be contaminated by weed seeds.

The survey shows that NOWHERE in Lam Nam Oon are these two weed control practices being applied by farmers to improved (Government) rice varieties.

In this connection, it is of interest to note that in tests at the International Rice Institute (IRRI) it was found that one treatment for weeding in a rice field resulted in higher rice yields than growing azolla pinata in the same field and not applying weed control.

2.4 The largest and most widespread problem perceived by all farmers surveyed concerned:

- Plant diseases, insects, and pests.

Most farmer's said they knew nothing about how to recognize or control this problem.

This extremely bad situation suggests that the Department of Agriculture Extension and other agencies operating at Lam Nam Oon must place the highest priority on solving this problem through:

2.4.1 Training farmers

2.4.2 Set up systems to monitor, in each Chak, what is happening to the plant disease, insect, and pest situation.

2.4.3 Strengthening the government-operated and private sector systems which are supposed to diagnose plant disease, insect, and pest problems and quickly supply chemical or other means of treatment.

2.5 The second largest and most widespread problem perceived by all farmers surveyed concerned:

- Water supply and water delivery scheduling.

Farmers say they either cannot get access to adequate water supply ditches or water is not supplied at the right times in the right amounts.

This situation suggests that highest priority be attached by the Royal Irrigation Department to:

2.5.1 Further improving RID water management delivery operations.

2.5.2 Training RID Zonemen and Water User Groups in proper on-farm and in-farm water management practices.

RECOMMENDATION:

At the Lam Nam Oon irrigation project ALL applied research, support services, training programs, and management systems must be reexamined in order to:

- See that they are adequately concentrated upon improving farmer cultural practices and crop management.
  - Make certain that systems water management and on-farm and in-field water management is being done with the utmost efficiency by RID staff and that farmer's are being properly trained in these matters.
3. Are the economic as well as human consumption-needs incentives sufficient at the Lam Nam Oon irrigation project to cause the farmers to seek large-scale increases in rice production yield?

Evidence contained in this survey answers this question with a NO!

This is the answer because analysis shows that virtually all of the farmers at Lam Nam Oon produce enough rice ( using their existing low-technology methods) to meet their family consumption needs. Also, the analysis shows that the economic returns obtained from increased rice production in the area cannot justify the costs associated with additional inputs such as fertilisers, etc.

This situation suggests that the current strategy at the Lam Nam Oon irrigation project concerning Wet Season rice production must be modified.

Under that current strategy, the emphasis is upon trying to expand the use of improved (Government) rice varieties at Lam Nam Oon because these have a shorter growth/maturity cycle. It is hoped that the shorter production period will then allow farmers to begin Dry Season cultivation earlier in the Dry Season - thus better adjusting to the irrigation, rainfall and temperature cycles at Lam Nam Oon. Furthermore, early Dry Season production can enable them to obtain higher prices for their products.

It may, therefore, be necessary to modify the strategy at Lam Nam Oon so as to:

- 3.1 Place more emphasis upon developing and promoting the production of market-oriented, profitable, Dry Season crops and the accompanying necessary cultural practices, crop management, and water management.

If this is successful so that instead of the present 10% to 15% of area cultivated in the Dry Season is trippled to 30% or 45% then the farmers so benefitted may then

see the necessity of shifting towards the use of shorter season Wet Season improved (Government) rice varieties on an effective scale with proper cultural practices.

3.2 While continuing to emphasize introduction of new varieties of rice and other crops to Lam Nam Oon farmers - put much greater emphasis upon:

- Farmer adoption of better cultural practices.
- Improved farmer knowledge and use of fertilisers including manure, compost, and chemicals.
- Weed, insect, plant disease, and pest control training of farmers and development of improved systems for monitoring and controlling these matters.
- Improved farmer knowledge of on-farm, in-farm, and field water management and drainage practices.

RECOMMENDATION:

In future work at Lam Nam Oon, STOP assuming that farmers can be persuaded to increase their Wet Season rice production through the adoption of higher cost technologies and cultural practices.

Instead, ADOPT the assumption that farmers can be persuaded to cultivate market-oriented, high value, and steady-market industrial crops and vegetables during the DRY SEASONS under irrigated conditions, and with proper cultural practices. This kind of development will, in turn, cause profit-oriented farmers to start adopting cultural practices for short-season rice varieties in the Wet Seasons.

### III. DESCRIPTION OF STUDY

The results presented in this paper are based upon the contents of a rice yield survey performed at the Lam Nam Oon irrigation project during harvest of the 1982 Wet Season rice crop.

The Lam Nam Oon Integrated Rural Development project extends over three Amphoes (Phang Khon, Pannanikom, and Muang) and thirteen Tambols in changwat Sakon Nakhon. (1) Approximately 12,500 farmers are located in the 185,000 rai (31,000 hectare) area which comprises the irrigation project.

The Department of Agriculture, Ministry of Agriculture and Co-operatives, organised and financed the rice yield survey. The sampling system used, the questionnaire that was applied, and the statistical techniques employed were all developed and prescribed by the Department of Agriculture. A detailed explanation of the methodology used is presented in Project Note No. 6 "Study on Rice Yields - Wet Season - 1981" by Natavudh Bhasayavan of the Department of Agriculture.

Actual sampling in the field plus application of the questionnaire to all farmer's where yield tests took place was done by staff employed by the Lam Nam Oon Operations Center. These comprise members of the Specific Assignment Team (S.A.T.). They were trained and supervised by Department of Agriculture personnel. Khun Natavudh Bhasayavan of the Department of Agriculture coordinated this work.

The sample plots were randomly chosen throughout the project area; but special attempts were exerted to make sure that some balance existed in the samplings as between those areas of the project where land levelling has been done on scale (intensive areas) and those where ditch/dykes have been installed but no land levelling or rectangularisation of fields has been done. The number of yield samples were taken to reflect the size of plot. Sample areas were randomly chosen within plots and an area of 8 m<sup>2</sup> was cut and weighed. Moisture readings of each sample were taken and weights adjusted to the standard 14% moisture.

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(1) Amphoe refers to: District; Tambol to Sub-district; Changwat to province.

The questionnaires covered fourteen topics of interest. These questionnaires were filled out in discussions with each farmer during the time that the yield tests were taken.

A total of 48 yield tests and accompanying questionnaires were completed for improved (government) varieties of rice and 88 yield tests and accompanying questionnaires were completed for local varieties.

The data drawn from these samples was transferred to the Apple III micro-computer at the Lam Nam Oon Operations Center. This is operated by Mr. William Bell of the Louis Berger International, Inc. advisory team. Once the data was transferred to the micro-computer it became possible to analyze the data from many points of view. Many different combinations of factors could be compared in order to see whether they affected yields. The standard t-test for variance of independent samples was used to determine if there were significant differences.

The data is now permanently stored on Apple III micro-computer disks at Lam Nam Oon. This makes future use or comparison with other data very accessible and easy.

The contents of this survey shows a considerable improvement in quality of data as compared to previous efforts at Lam Nam Oon. However, there are still a number of improvements in supervision as well as specific content which can be emphasized in future surveys in order to increase the reliability and informative content of the data. Suggestions about these possible improvements are offered in the following pages.

#### IV. ANALYSIS OF THE QUESTIONNAIRE CONTENT

##### 1. Location:

Since the Lam Nam Oon area is still in various stages of irrigation development each farm sample was located accordingly.

Three different areas were targets of investigation:

- 1.1 Traditional Ditch/Dyke - these are areas where no planned/organised farm level system of irrigation/drainage is in place.
- 1.2 Ditch/Dyke - these are areas with farm level irrigation water delivery systems constructed, generally based on the 'Nong Wai modified Ditch/Dyke' model.
- 1.3 Intensive development - these are areas constructed with landleveling and plot realignment (generally called Land consolidation of the Chanasutr model)

Table 1.1 shows the percentage of samples taken from each of these areas.

TABLE 1.1

	<u>Traditional Ditch/Dyke</u>	<u>Ditch/Dyke</u>	<u>Intensive</u>
Improved varieties	27	29	44
Local varieties	73	25	2

These figures appear to indicate that there has been a farmer shift towards use of improved (Government) varieties in areas of intensive development. However, additional studies along with improvement in data-gathering about this matter are needed in order to show conclusively that such a trend exists.

##### 2. Varieties and Yields

It is evident in the survey that many farmers in all areas are planting more than one variety. Table 2.1 shows this.

TABLE 2.1

	<u>No./% Growing Local Varieties</u>		<u>No./% Growing Improved Varieties</u>	
Samples used for improved variety analysis	22	46%	-	
Samples used for local variety analysis	-		21	53%

Table 2.1 thus indicates that the farmers are planting about the same amount of local varieties as they are planting improved varieties. However, it must be noted that the questionnaires as organised only reported on numbers of farmers that planted local or improved varieties. The area planted to each was not reported. Subsequent surveys should remedy this deficiency in content.

Detailed analysis of yields of both local and improved varieties for one area compared to another did not show any significantly statistical differences in yield between any locations. The comparisons of yields as between local varieties and improved varieties are shown in I 7, "Range of Yields", Page 2.

### 3. Water Supply

Questions contained in the questionnaire were rather subjective because they reflect the farmers ideas on whether water supplies are adequate. Three categories were listed about the status of the water supply system:

- Not complete
- Fairly complete
- Complete

Table 3.1 shows the percent in each category:

TABLE 3.1

	<u>Not Complete</u>	<u>Fairly Complete</u>	<u>Complete</u>
Improved varieties	4	19	77
Local varieties	25	43	32

The contents of Table 3.1 seems to imply that more of the improved varieties were located where better water supply was available while the local varieties tended to be planted in fairly complete and not complete areas. However, owing to the subjective nature of the questions associated with this subject, no real conclusions can be drawn.

Analysis of the data accumulated with these questions showed all manner of combinations. Some traditional ditch/dyke areas had a complete water supply while some intensive areas reported that the supply was not complete. Analysis of yields for any of these categories showed no significant statistical differences.

In future surveys this subject will have to be addressed with questions based upon a more objective appraisal of the water supply situation in each area.

#### 4. Soils

Two questions related to soils:

##### 4.1 Soil types - the texture of soil: clay, sandy; loamy, etc.

Table 4.1 shows the percentage of each type.

	<u>Clay</u>	<u>Loam</u>	<u>Sandy</u>	<u>Sandy/Loam</u>
Improved varieties	8	0	27	65
Local varieties	5	7	13	75

Thus, most of the samples fell in sandy or sandy/loam types of soil. Considering the known characteristics of soils at Lam Nam Oon, this accurately reflects actual conditions.

Comparisons of yields among local and improved varieties grown on these soil types did not show any significant differences in yields.

##### 4.2 Soil Series - three major soil series are present at Lam Nam Oon: Roi-et, Korat, and Chiang Mai, Pimai. Table 4.2 shows the percentages of samples in each series.

TABLE 4.2

	<u>Roi-et</u>	<u>Korat</u>	<u>Chiang Mai/Pimai</u>
Improved varieties	48	42	10
Local varieties	58	34	8

Again, in regard to Soil Series, this accurately reflects actual conditions at Lam Nam Oon.

Comparisons of yields among local and improved varieties grown on these Soil Series did NOT SHOW any significant differences in yields. This finding is of interest because it has been assumed at Lam Nam Oon that yields will be significantly different among crops planted on different Soil Series. This survey does not show this to be true. At the same time, the survey shows that there are too many other variables (such as water supply and especially cultural practices) affecting yields such that to try to isolate one factor, like soil, is quite difficult.

#### 5. Salinity

The salinity question asked the farmers whether they had: no salinity problem, some problem, or lots of salinity problems. Table 5.1 summarizes the results in percent.

TABLE 5.1

	<u>No Salinity</u>	<u>Some Salinity</u>	<u>Lots-Salinity</u>
Improved varieties	44	44	12
Local varieties	44	53	3

It appears that for both improved varieties and local varieties more than half of all the samples (56%) reported at least some problems with salinity. For the local varieties there were no significant differences in yields for saline soils vis-a-vis non-saline soils. However, in the case of the improved varieties there was a significant statistical difference in yields between those grown on non-saline soils vis-a-vis those grown on saline soils.

This was the only significant difference shown on all comparisons concerning yields.

Table 5.2 shows the average yields:

TABLE 5.2

	<u>Non-saline</u>	<u>Saline</u>
Improved varieties	364.3 Kg./rai	298.9 Kg./rai

This yield difference is statistically significant at the 5% level.

## 6. Seed

The question asked, in this case, was how the farmer acquired seed. Three possible sources were cited: stored on the farm (carryover from the previous year), exchange with neighbors, or purchase commercially or through acquisition from the Department of Agriculture Extension or the Rice Experiment Station. Table 6.1 summarizes the results in percentages:

TABLE 6.1

	<u>Stored</u>	<u>Exchanged</u>	<u>Purchased</u>
Improved varieties	79 (1)	25	6
Local varieties	97	0	3

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 (1) More than 100% because some listed more than one source.

An analysis of these figures shows that most farmers are not acquiring new seed for planting each year. Those planting improved varieties seem to be acquiring them through exchanges with neighbors.

Future questionnaires should also be aimed at finding out how long the farmers continue to use the same seeds year-after-year; and how they store and clean the seeds each year.

## 7. Land Preparation

In all cases land preparation was by means of buffalo and plow. Farmers were asked if any mechanical means had been used; but not a single one replied in the affirmative. Table 7.1 shows percentage use of buffalo for land preparation whether by self or with hired labor.

TABLE 7.1

	<u>Self with buffalo</u>	<u>Hired Labor with buffalo</u>
Improved varieties	92	8
Local varieties	95	5

These figures reflect the generally known fact that very few tractors or mechanical hand-plows exist in the Lam Nam Oon area and almost no land preparation is done by any kind of mechanised equipment in preparation for Wet Season cultivation.

## 8. Seedling/Transplanting

The question about seedlings was: did the farmer do this work himself, exchange labor, or use hired labor. Table 8.1 shows the percentage results.

TABLE 8.1

	<u>Self</u>	<u>Exchange Labor</u>	<u>Hired Labor</u>
Improved varieties	94	0	6
Local varieties	30	0	20

Another question about transplanting dealt with the number of family labor, length of time for transplant and hired labor length of time and cost per day. Table 8.2 gives the averages (not in percentages) for each of these questions.

TABLE 8.2

	Amount family labor	Number of days	Number of Hired Labor	Number of days	Baht Paid per day
Improved varieties	3.7	28.3	4.9	9.7	26.8
Local varieties	4.0	22.9	4.5	8.3	23.6

Using these values and the average number of rai for each variety it is possible to calculate the labor requirement for transplanting and the cost for hired labor.

This is done below, using average values, in Table 8.3. CAUTION: the results presented in this Table are given as an example only. This is because the data relating to area of rai in the questionnaires was too ambiguous. In future surveys, this data about area should be strengthened through improved questions and more rigorous administration of the questions by the surveys and supervisors.

TABLE 8.3

	Rai	Family Man/Days	Hired Labor Man/Days	Total	Man Days/Rai	Baht total for Hand Labor
Improved varieties	11.4	104.7	47.5	152.2	13.4	260
Local varieties	5.1	91.6	37.4	129	25.3	196

The Table 8.3 figures (if valid) indicate that the man/days per rai expended are quite high - particularly with reference to local varieties. However, as noted above, this figure might be a distortion caused by inadequacies in the data on the number of rai planted as related to sample plots and transplanting to total farm area.

In both the cases of planting seedlings and transplanting no farmers reported using exchange labor.

## 9. Fertilizer

Three categories of questions related to use of fertilizers were asked of farmers.

9.1 Use of fertilizer. If used, what kind. Table 9.1 summarizes the answers in percentages.

TABLE 9.1

	<u>No Use</u>	<u>Manure</u>	<u>Compost</u>	<u>Chemical</u>
Improved varieties	35 (1)	44	2	44
Local varieties	35 (1)	50	3	25

-----  
 (1) Totals more than 100% because some used more than one kind.

9.2 To what and when fertilizer was applied and at what rate.

CAUTION: Much of the data concerning answers to this question was ambiguous and is not to be regarded as conclusive evidence. Thus, the next three Tables are presented as examples only - and should not be cited in studies or reports.

Table 9.2.1, in percentages, with fertilizer used on seed plots and fertilizer used on transplant plots.

TABLE 9.2.1

	<u>Fertiliser Used on Seed Plot</u>	<u>Fertiliser Used on Transplant Plot</u>
Improved varieties	46	31
Local varieties	50	15

Table 9.2.2 deals in averages with the times when fertiliser was used.

TABLE 9.2.2

	<u>Days Before Seedlings Planted</u>	<u>Days After Seedlings Planted</u>	<u>Days Before Transplant</u>	<u>Days After Transplant</u>
Improved varieties	?	?	8.3	18
Local varieties	?	?	30	14

-----  
(?) Questions not properly answered

Table 9.2.3 deals in rates of Kilograms/Rai that fertiliser was applied.

TABLE 9.2.3

	<u>Rate (kilogram/Rai) Manure</u>	<u>Rate (Kilogram/Rai) Chemicals</u>
Improved varieties	493	15
Local varieties	163	23

9.3 How was fertiliser applied? Answers indicated Chemical fertiliser was applied by broadcasting. For manure and compost most applications were by piling up, leveling out then plowing in.

A general conclusion that can be drawn from the answers to these categories of questions is that most fertilisers are applied to seed plots and in small amounts.

Most of the fertilisers used were manure or chemicals - with manure being the most used. Only two farmers reported use of compost.

## 10. Weeds

The questions asked the farmers on this subject concerned the extent to which they encountered weed problems and what did they do about them. Table 10.1 shows the percentage of farmers reporting no weeds, some weeds, and many weeds.

TABLE 10.1

	<u>No Weeds</u>	<u>Some Weeds</u>	<u>Many Weeds</u>
Improved varieties	2	79	19
Local varieties	3	85	12

Analysis of these figures shows that, in general, all farmers suffer from weed problems. Improved varieties show a higher percentage of many weeds.

Table 10.0 shows, in percentages, how farmers attempted to deal with their weed problems.

TABLE 10.2

	<u>No Control</u>	<u>Some Control</u>	<u>Lots of Control</u>	<u>By Hand</u>	<u>By Chemicals</u>
Improved varieties	29	62	9	100	0
Local varieties	18	80	2	100	0

Analysis of these figures show that farmers are making at least some attempt at controlling weeds through hand weeding. However, the questionnaire does not obtain information about whether the hand weeding is done in the seeding beds or in the fields or both. Furthermore, there is no data given about that the phrase 'some weeding' may actually mean. Does it mean a few weeds picked each day or several days in fields that can be easily entered? Does it mean several days of hand weeding field by field?

In future surveys questions should be developed and administered which elicit much more detailed data on this subject.

#### 11. Plant diseases/insects/pests

This question was designed in the same made as the one for weeds. Farmers were asked whether there was: no problem, some problems, or lots of problems. Table 11.1 shows the percentage of farmer responses on this subject:

TABLE 11.1

	<u>No_Problem</u>	<u>Some_Problems</u>	<u>Lots_of_Problems</u>
Improved varieties	17	63	20
Local varieties	14	80	6

Attempts at recognising and controlling plant disease, insect, and pest problems are reported in Table 11.2

TABLE 11.2

	<u>No_Control</u>	<u>Irregular_Control</u>	<u>Regular_Control</u>	<u>Chemicals_Control</u>
Improved varieties	86	5	2	7
Local varieties	84	13	0	3

Analysis of these Tables indicates that more than 80% of the farmer's have plant disease/insect/pest problems; but, they do very little to control such problems.

As will be shown in section 14 (below) the plant disease, insects, and pest problems were cited by all farmer's as their greatest group of problems in the production of rice. As will be also noted in that section, a very large number of farmer's confessed that they did not know what to do about such problems and they received little or no advice or help from government agencies in handling these problems.

## 12. Harvesting/Threshing

The question asked of farmer's concerning harvesting dealt with the amount of labor required from the family as well as hired labor in order to harvest the Wet Season rice crop. Table 12.1 gives the averages as reported:

TABLE 12.1

	<u>Numbers of Family Labor</u>	<u>Numbers of Hired Labor</u>	<u>Number of Days</u>	<u>Baht Per Day</u>
Improved varieties	3.6	5	5.6	27.9
Local varieties	4.4	4.7	11.3	25

Of the hired labor employed, about 70% came from the farmer's own village. Again, as in previously remarked instances, the questionnaire is lacking in data for the number of days family labor harvested. If this information could be obtained in future surveys, and with firmer data on the number of rai planted, it would be possible to construct a much more reliable estimate of labor requirements for harvesting.

All threshing was done by hand.

One question asked in regard to harvesting/threshing was: did the farmer feel his yield was adequate? Table 12.2 gives the results of the answer to this question in percentages:

TABLE 12.1

	<u>Adequate</u>	<u>Inadequate</u>
Improved varieties	93	7
Local varieties	100	0

This answer indicates that virtually all farmers thought their yields were adequate. The 7% cited as saying their yields were inadequate represents only 3 farmers. These replies raise serious questions as to whether farmers perceive any incentives that will cause them to substantially increase rice yields during the Wet Season. They appear to be satisfied with what they get now.

### 13. Disposition of Threshed Rice

The question, in this case, was aimed at trying to determine how much of the threshed rice the farmer kept for his own consumption or sold as well as where he sold it. Table 13.1

summarizes the disposition of GLUTINOUS rice. The values given are reaverages.

TABLE 13.1

	% of total selling rice	% used at home	% sold	Sold to/Baht/Kilo			
				Locally	Rice Mill	MOF	Other
Improved varieties	63	73.8	25.4	2.7	3.4	2.5	4.0
Local varieties	67	80.9	19.1	3.1	3.1	2.8	-

These figures, upon analysis, indicate a number of things. At least more than 60% of all farmers are selling some rice, with total quantity sold more than 20% of their harvest. The price differential between sales prices of improved varieties and local varieties are not very large with reference to improved varieties. This is probably another factor affecting farmer decisions not to devote much time and investment in cultural practices that will produce higher yields of improved varieties.

In any case, in future surveys, more complete data on area planted, family members employed, etc. could result in more conclusive evidence about per capita consumption, income from amounts sold, etc.

The NON-GLUTINOUS rice reported under the 'disposition of rice' question amounted to only 11 samples. Except for 1, all were sold at an average price of Baht 3.31/kilo.

#### 14. Farmer-perceived Problems

Farmers were asked what did they perceive as their biggest problems when cultivating rice in the Wet Season. Table 14.1 gives the percentages of answers as developed into categories identified by farmers:

TABLE 14.1

	<u>Diseases/ Pests</u>	<u>Water</u>	<u>Salinity</u>	<u>Weeds</u>	<u>Labor Shortage</u>
Improved varieties	72	30	5	7	2
Local varieties	64	57	0	4	0

As was shown in Tables 11.1 and 11.2 the biggest problem seems to be with plant diseases/insects/pests. In a number of cases the farmers commented that they did not understand anything about plant disease/pest control and/or about the chemicals needed to do this. Several remarked, also, that they never received any advice or assistance from government agencies about this subject.

The second largest problem identified by farmer's related to irrigation water supply. Farmer comments indicated these problems to be: lack of access to a supply ditch/dyke system and/or lack of management in getting the amounts of water needed when they are needed.

## AUTHOR

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Khun Natavudh Bhasayavan is a Master of Science (Agronomy) from the Indian Agricultural Research Institute, New Delhi, India.

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- Member of the Research Committee of the Farming Systems Research Institute.
- Site Coordinator at Lam Nam Oon Integrated Rural Development Project in matters concerning:
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Khun Natavudh joined the Lam Nam Oon project as the site coordinator for the Department of Agriculture in late 1980. Prior to that and since 1967 his experience had been with:

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- Rice-Yield Constraints Project of the International Rice Agro-Economic Network, in Central Thailand, in cooperation with the International Rice Research Institute in the Philippines.
- Cropping Systems Research project in cooperation with the Tropical Agricultural Research Centre (TARC), Government of Japan.

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Among other papers published by the author in the Thai and English languages the following are a representative list:

- Asian Farm Level Rice Yield Constraints, 1979.
- Study on 'Integrated Tri-Commodity Farming Systems: an Intensive Agricultural Development for Thai Small Farmers'. Paper presented at Crop/Livestock/Forestry Seminar, Chiang-mai, FAO/UNDP, 1980.

- Research papers for Department of Agriculture on Nam Oon Integrated Rural Development Project (Thai language) - 1981.
- Principles of Integrated Farming Systems (Thai language) 1982.
- Technology Constraints to Rice-based Cropping Systems in the Central Plain of Thailand, for Department of Agriculture and the Tropical Agricultural Research Centre (TARC), 1982.
- Cropping Systems Development in Lam Nam Oon Irrigation Project (Thai language). A paper presented at Udon Policy Conference, 1983.

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William C. Bell has been a member of the Louis Berger International, Inc. advisory team at the Lam Nam Oon Integrated Rural Development Project in Changwat Sakon Nakhon, Thailand since October, 1979.

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He has worked in the United States as a supervisory hydraulic engineer with the U.S. Bureau of Reclamation, and abroad in Brazil, Indonesia, and, currently Thailand.

Mr. Bell's other papers published at Lam Nam Oon to date (August, 1983) include:

- Hand Book, Channel Design, with Tables, for Varying Size Quaternary Canals Specific to Conditions at Lam Nam Oon.
- Project Note No. 2 Lam Nam Oon Preliminary Water Space and Integrated Rural Development Planning.
- Project Note No. 4 Dry Season Crop Production - 1981/82 - Lam Nam Oon.
- Project Note No. 5 Pilot Area 2 Operations Research Results - 1981/82 - Lam Nam Oon (in collaboration with Anthony Zola.

- Project Planning Note No. 7 Micro-computer based irrigation system management - Lam Nam Oon.
- Project Note No. 7 - The Broad-Crested Weir a simple-accurate flow measuring device for irrigation channels - Lam Nam Oon, March, 1983.
- Technical Note No. 8 - Potential Salinity Problems at Lam Nam Oon and Results of Initial Investigations, June 1983.
- Project Note No. 7 - Pilot Area 2, Main Canal, and Units 15-17 Operations Research Results, 1982/83 Dry Season Lam Nam Oon - Engineering, July 1983.
- Project Note No. 9 - Why is there Low Production during the Dry Seasons - at Lam Nam Oon? August 1983.

The Specific Assignment Team (S.A.T.) Lam Nam Oon

This is a group of 18 agricultural high school graduates directly employed by the Royal Irrigation Department at Lam Nam Oon as temporary employees. They report to the Project Field Director, Vichai Sruguanpaiboon and his Assistant Field Director, Saansonthi Boonyothayan.

This work force was first employed at Lam Nam Oon starting in September, 1981 with seven employees. Since that time it has been expanded with over 150 graduates applying each time that a position is open.

Members of the team are from the Lam Nam Oon area. They are used, as a group, in performing carefully supervised data-gathering and training tasks in the Lam Nam Oon irrigated area.

Various tasks are developed for the team. These are formulated by the Lam Nam Oon Working Group which is comprised of representatives from all participating agencies at Lam Nam Oon.