**Report on Travel to Thailand and Laos**
**March 18 - 28, 2000**
USAID Grant No. LAG-G-))-97-00002-00
SM-CRSP Project *Decision Aids for Integrated Nutrient Management*

**Traveler:** Russell Yost - University of Hawaii
**Objectives:**
1. Visit IBSRAM and explore collaborative possibilities with their soil management networks, including the Acid Soils Network, the Pacific Islands Network, and the Africa land network.
2. Visit Kasetsart University and present an invited seminar on NuMaSS and PDSS2. Discuss student program on rock phosphate usage.
3. Develop collaborative studies for the 2000 crop year with the testing of P requirements as estimated using the PDSS2 and Bray 2 P. NuMaSS does not contain the Bray P2 methodology.
4. Discuss possible activities in the next rainy season in Laos in collaboration with B. Linquist (Lao-IRRI program) and R. LeFroy (IBSRAM).

**Purpose:**
The proposed travel follows up on collaborative opportunities for testing and evaluating NuMaSS software. These opportunities result from both contacts developed during the project's workshop in the Philippines in 1999 and a visit to Hawaii by investigators from Kasetsart University, Thailand.
Specific travel objectives are to further explore and, if feasible, develop collaboration with:
1. The IBSRAM, Acid Soils Network (Dr. Rod LeFroy),
2. The Kasetsart University nutrient testing program conducted throughout Thailand (Dr. Tasnee Attanandana), and
3. Laos-IRRI nutrient management efforts, via a meeting with Dr. Bruce Linquist in Thailand.

**Itinerary:**

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| March 18 | Departure from Honolulu |
| March 19 | Arrival in Bangkok |
| March 20-24 | In Bangkok |
| March 24-26 | In Chiang Mai |
| March 26 | Return to Bangkok |
| March 27 | Visit project sites, discuss project responsibilities |
| March 28 | Departure from Thailand |

**Report:**
Laos-IRRI Uplands Program
Met with Bruce Linquist, Lao-IRRI Uplands Program, previously with the lowlands program of the Lao-IRRI project, concerning the soon to be developed survey of productivity potential and

production limitations in the uplands of northern Laos. Activities are likely to include selecting of some 40 to 80 samples from which approximately 10 will be further selected for field estimates of yield potential measurement and possibly some treatment application. The expectations are that a large number of samples will indicate that P is deficient. In the lowlands, for example, roughly 70% of survey soil samples are deficient in soil P. In some cases yields without P are as low as 500 kg $ha^{-1}$. Also included in the survey will be a range of the following factors: 1) Fallows, 2) Slopes, 3) Catena-geomorphic position, 4) Geology?

One possibility is to use the NuMaSS diagnostic frameworks for N, acidity, and P and test the predictions at the survey sites and especially at the 10 or so sites where there will be some estimate of yield potential (all nutrients will be supplied if possible). The Diagnostic framework is a logical starting point for determining the extent and severity of nutrient limitations in the Northern Lao uplands. This may be an opportunity to field-test some of the diagnostic criteria that have been developed for NuMaSS. The PDSS2 module with the Bray 2 algorithms will be needed as this is the primary P method for the moment.

While the samples will likely be analyzed in Laos, there might be an opportunity for collaboration with the IBSRAM/ACIAR laboratory project of R. LeFroy. It is not clear just what and how this will be tested but that is to be developed during Rod LeFroy's May visit to Laos. Bruce Linquist will provide further details on the sample survey design.

IBSRAM Visit

Discussed the decision-aids project, workshop, and project activities with IBSRAM Director General Eric Craswell, who is also on the Decision-aids external evaluation panel, and later with Fritz Penning-DeVries, Research Director. Seems that they are developing the following projects:

Soils compendium

Land Management software

This is a compilation of software that is available worldwide for assisting in land management – somewhat similar to the recent CAMASE effort undertaken by the Agric. Univ. of Wageningen. The scope of software is quite broad including decision-aids, simulation models, and databases. Likely the database will be implemented for both desktop and online access. They will be having a meeting in October 1, 2000 for a selected group of evaluators. He would like to have someone from the Soil Management CRSP to attend and contribute regarding soil modeling efforts and soil models that can be generalized and adapted for wider possible use. Seems that there needs to be an interdisciplinary group to evaluate the software and to suggest the extent of generalization possible and to identify limitations and possible difficulties in the wider application.

Discussions at IBSRAM Rod LeFroy

Dr. LeFroy has organized a "Sealnet" fertilizer workshop for September 11-16, 2000, in Jakarta, Indonesia, sponsored in part by IMPHOS, and local fertilizer and government organizations. It will include sessions on fertilizer quality, fertilizer legislation, as well as technical issues relating to laboratory analysis and quality. This will be a unique meeting of a wide range of research, commercial producers, and government institution representatives all associated with the production, distribution, and regulation of fertilizers and fertilizer quality, and laboratory quality. Supported by ACIAR and IMPHOS and others.

Some discussion focused on plant indicators that are sometime used to indicate nutrient status. Examples in Burma include *Richardsonia brasiliensis* and *Oxalis latifolia.* The first, known locally as "Shan pyay" or "Shan run", is, as the name suggests, a rather aggressive weed in medium to low fertility soils, but the interesting thing is the replacement by the second, pink shamrock (or "Hmo chin" in Shan), when soils are more acid. There was a great example of an area of poor acid soil covered with the oxalis, except where a small amount of lime had been accidently dumped and then spread, where the Shan run took over (notes from Rod LeFroy). Rod loaned a summary document prepared by Sawaeng Ruaysoongnern, Khon Kaen University summarizing phosphorus studies in Thailand in preparation for the Thai-Lao Phosphorus Consortium December 1997.

Kasetsart University collaboration

Discussed a student thesis project that relates to the use of rock phosphate on acid soils of Thailand. The student will work with PDSS2 and the rock phosphate module that is in development for PDSS2 and later NuMaSS. The student will be preparing a test of a simple dynamic model based on preliminary work of Wang (1997). Extensive testing of fertilizer recommendations both based on PDSS2 and using a local soil testing kit were designed for the 2000 production year. On-farm experiments will be conducted by the extension service on 10 important soil series involving approximately 180 farmers.

The PDSS2 critical level database was updated to use locally determined critical levels. The diagnostics module will be run for PDSS2 on the soils data provided by the Department of Land Development. A simple form was suggested to record and track the diagnostic results of the pre-plant assessment / visit to each site. Approximately 10 locations were to have confirmatory field applications according to the decision aid predictions. CERES-Maize was to be used again this year for the estimates of N requirements as in the previous year (Attanandana et al., 1999a). The series will be identified in the field. An ingenious photograph-based decision-aid was developed to assist in the identification of the soil series. The tool is based on matching photographs with the clearly distinguishing features of the soil series (based on field experience identifying them). The result is a book with some 25 to 30 photos leading to a final page with the soil name and final photo. This was developed by the Department of Land Development under the guidance of Taweesak Vearasilp.

Key soil series will be both analyzed by the central laboratory at Kasetsart University and on site by a test kit developed by Dr. T. Attanandana for comparison and field tests of predictions (Attanandana et al., 1999b). The test kit uses Mehlich 1 as the extractant for nitrate and ammonium, phosphorus, and potassium. Relationships between the soil test kit and the standard laboratory methods were quite close for N and K and look promising for P

Table 1. Comparison of PDSS2 predictions based on laboratory and based on soil test kit (Mehlich 1).

| Soil | | | pH | Bray-2 P | | Mehlich 1 P |
|---|---|---|---|---|---|---|
| Series | Texture | Clay | ($H_2O$) | Measured | Target | Target |
| | | % | | (depth in cm) | | (Kasetsart Test Kit) |
| Takhli | clay loam | 22 | 6.9 | 1 | 12 | 6 |
| Lop Buri | clay | 39 | 7.1 | 69 | 12 | 6 |
| Pak Chong | clay loam | 38 | 4.6 | 2 | 15 | 6 |
| Warin | sandy loam | 8 | 6.7 | 6 | 12 | 6 |
| Satuk | sandy loam | 16 | 4.0 | 4 | 12 | 6 |
| Chai Badan | clay | 53 | 7.0 | 22 (0-15)<br>8 (15-33) | 12 | 6 |
| Chaturat | silty clay | 26 | 6.8 | 8 | 12 | 6 |
| Lam Narai | clay | 58 | 7.0 | 33 | 12 | 6 |
| Tap Kwang | clay | 82 | 6.9 | 4 | 12 | 6 |
| Choke Chai | clay loam | 29 | 5.2 | 7 | 12 | 6 |

The Kasetsart soil test kit presently is designed to give ranges of Low, Medium, and High. These will be estimated as equivalent to 1.5, 4.5, and 6 for the purposes of use in the PDSS2 decision-aid.

**Literature:**

Attanandana, T., C. Suwannarat, T. Vearasilp, S. Kongton, R. Meesawat, P. Boonampol, K. Soitong and A. Charoensaksiri. 1999a. Nitrogen fertilizer recommendation for grain yield of corn using a modeling approach. Thai J. Agric. Sci. 32(1):73-83.(in English).

Attanandana, T., C. Suwannarat, B. Tiewnukoontham, and S. Kritapirom. 1999b. Simple soil test for NPK. Thai Journal of Soils and Fertilizer 21 : 46-51 (in Thai).

Ruaysoongnern, S. 1998. A review on phosphorus studies in Thailand. Presented at the Thail-Lao Phosphorus Consortium (TLPC) planning workshop, Dec. 1997. Department of Soil Science, Khon Kaen University.

**List of Contacts:**

In Thailand

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Laos-IRRI - Bruce Linquist (in Thailand)

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