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Bridging the Gap Between Farmers and Researchers: The Lao Pilot Extension Project Experience

J.G. Connell[1] and K. Soysithatthha[1]

Abstract

The Pilot Extension Project (PEP) has used an off-the-shelf 'technology package' for rice production with great effect, raising yields by approximately 1 t/ha in 3 years, over 20% of the paddy area in pilot villages. While this generally applicable technology package has been an effective vehicle to train staff and mobilise extension, there is in fact no real 'bridge' between the emerging research and extension institutions, let alone farmers, in Laos. Any such bridge should provide for a flow of information in two directions: research providing research results for extension to use with farmers, and extension feeding back information to direct research. However, there are a number of factors which make this seemingly straightforward information flow a complex task. Firstly, extension needs to develop farmers' capabilities, not simply deliver 'technology packages'. Secondly, the diversity of the production environment raises questions as to the role of site specific research, and, how extension can best use the precise and careful results of research when faced with the reality of farmers' conditions. Despite this complexity, PEP believes there are a number of robust mechanisms which could be used to ensure both that research findings are used more effectively, and that farmers' issues are indeed able to contribute to the direction of research.

THE OBJECTIVE of the Pilot Extension Project is to establish a model for development of a national extension system, based on the existing Provincial and District Agriculture and Forestry Offices (PAFO and DAFO). In the past, their work has been mainly administrative, or mobilising villagers for activities such as constructing irrigation weirs and digging canals. The instances of using improved technologies to gain increases in productivity are rare. As a result, staff at both levels have few of the basic technical or communication skills for extension, or in most cases, even a concept of what is involved in extension work.

The key to the development of an extension system is capacity-building of the staff. At the same time, PEP has tried to focus not just on training of the DAFO technical staff, but on up-grading the DAFO as a unit. Eventually, this will involve changes to its structure and administrative procedures to give the necessary priority to extension work.

PEP has developed:

(a) **Working Models** for implementing extension:
- extension methodology;
- DAFO organisational structure adjusted for extension;
- extension management system.

(b) **Programs** to develop staff capacity, to work according to the models:
- for capacity-building of the DAFO and its staff;
- developing leadership for the senior DAFO staff.

These could be applied to PAFO and DAFO throughout the country to gradually establish the basis for an extension system. Over the past 3 years, PEP has implemented these models and programs in two DAFO in each of two Southern Provinces,

[1]Pilot Extension Project and Agriculture Extension Project, Agriculture Extension Agency, Ministry of Agriculture and Extension, Vientiane Lao PDR. jconnell@mail.laonet.net

Saravan and Champassak (i.e. a total of four DAFO) and is currently in a process of presenting these models and programs and their impact to MAF for assessment.

Using a Technology Package

Given the general lack of understanding of the processes of extension by PAFO and DAFO staff, in order to carry out the Capacity-Building Program, PEP needed to find technical interventions which would (a) have a visible impact on production, and (b) would be rapidly adopted by farmers. While under no delusions that such a technology would provide long term solutions to farmers' problems, this 'quick-fix' was needed as a training mechanism, to ensure DAFO staff would see they had gained results with farmers, and could see the process of adoption begin to spread from farmer to farmer, within 1 or 2 seasons.

With rice the predominant production activity in the pilot areas, PEP used a basic 'technology package' as the main technical intervention to introduce to farmers. This consisted of the components shown in Table 1.

This technology package was the result of research conducted by the Lao National Rice Research Program, having been tested in on-farm trials in numerous locations by the Rice Research Network. It was regarded as a 'confirmed' technology, and indeed was the single main technical intervention to be promoted to farmers. Thus in 1996 when field work began in the pilot areas, PEP simply accepted this technology package for DAFO staff to use in the pilot areas.

Table 1. 'Technology Package' for improved rice production.

New materials	Improved practices
Improved rice varieties: TDK 1 PN 1 RD 10	Close spacing (20 × 20 cm)
Chemical fertiliser	Rates and timing of fertiliser application: Basal 16–20–00 × 150 kg Top dress 1# 46–00–00 × 50 kg Top dress 2# 46–00–00 × 50 kg
	Smaller seed-beds with drainage channels.

One of the characteristics of a 'technology package' is that the components interact to support each other to achieve the full potential yield. While this is true, it is also characteristic that farmers 'disassemble' technology packages! Extensionists see this as part of the adoption process.

The effects of this on this 'technology package' have been (Sipaphone et al. 1998) illustrated by a socio-economic study by Lao IRRI in Ban Oupalath, Phone Tong District Champassak.

From 1995–97, the Lao IRRI project conducted a study to assess the impact of its 'technology package' on rice yields and farmers' income. They provided seven 'collaborating farmers' with all the material inputs to apply the full technology package over 1 ha of paddy under supervision. In the two following seasons (1996 and 1997), the project surveyed the yield and practices of 66 farmers in the

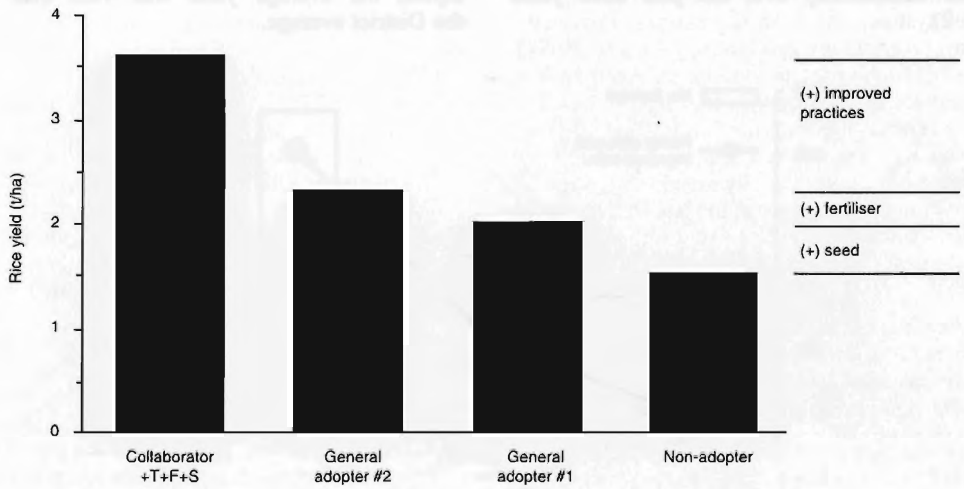


Figure 1. Yield Increases due to components of technology package.

village (56% of all farmers in the village) to assess the general adoption of the technology in village.

The results (Figure 1) showed that farmers had indeed dis-assembled the 'package' and used the components separately, or in combination.

Even with the package dis-assembled, there were significant increases in yield above the yield for traditional practices (1.5 t/ha) for each of the components of the technology package used. These were:

Improved seed (– fertiliser; – imp. practices)	+ 0.5 t/ha.
Fertiliser (– imp. practices)	+ 0.3 t/ha.
Improved practices	+ 1.3 t/ha.

From the point of view of the technology package, the survey showed clearly that farmers would gain a far greater benefit from using the full technology package over adopting only components.

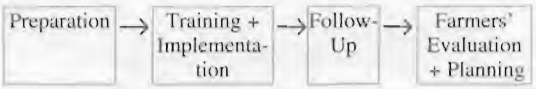
However, looking at this from an extension point of view, the data also separate the benefits of:

- the new material inputs; from
- the improved practices (i.e. 'how to use the new material inputs').

This is important as often farmers adopt the new material inputs, but not the improved practices. The new material inputs are visible and concrete. They can be quickly transferred via seed exchange; via merchants etc. The knowledge of how to use the material inputs does **not** automatically travel with them. Far more conscientious effort is needed to assist farmers to gain the improved practices.

The case of Ban Oupalath was a special one where the collaborating farmers were contracted to use the technology package and supervised by research staff. In one of the pilot DAFO, PEP working with the DAFO staff on an extensive level in 12 pilot villages has seen the use of improved seed rise dramatically over the past three years (Figure. 2).

The DAFO staff followed the 'extension methodology' introduced by PEP, which employs 4 steps for each cycle of extension:



This includes trips to farmers' fields, Farmers' Exchange Meetings and Village Evaluation Meetings, to stimulate farmers to observe and analyse their results, and to spread the results and knowledge among other farmers. Farmers' Exchange Meetings are held for representatives from villages in a 'cluster' to exchange experiences; to learn; and to stimulate each other. Village Evaluation Meetings are held within a village at the end of a season for the selected farmers to report back to the village on the new technologies they used on a trial basis. The effect of these extension activities in assisting farmers to know how to use the material inputs is clearly demonstrated (Figure 3).

In the years 1996 and 1997, the use of new material inputs throughout the District was minimal. This changed rapidly in 1998 due to greater availability of the inputs, and spill-over from PEP villages. As a result, the average rice yield for the District showed a significant rise to **2.5 t/ha**. This use of inputs, however, was without extension support, and so the increase in yield was limited, **0.7 t/ha**, very similar to the general adoption in Ban Oupalath.

However, in the 12 PEP villages which had received extension for 2–3 years, the average yield was **3.8 t/ha**. Thus here in this extension case, where extension had assisted farmers in how to use the inputs, the average yield was **+1.3 t/ha** above the District average.

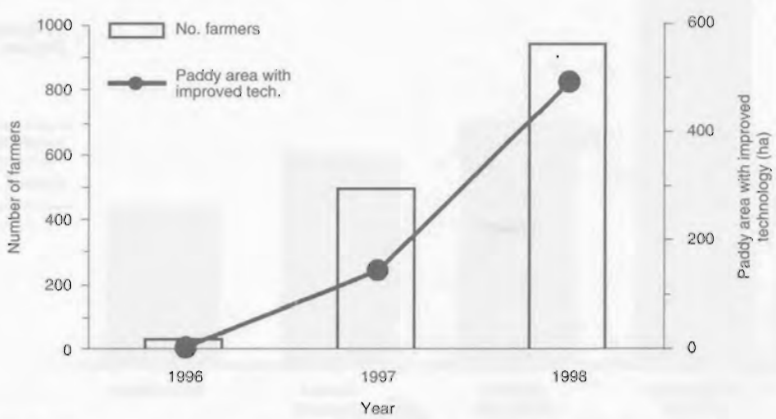


Figure 2. Increase in use of improved rice seed (12 pilot villages, Soukhouma District, Champassak)

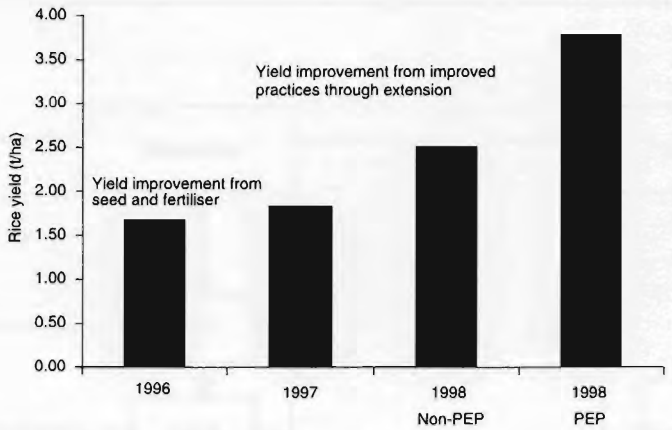


Figure 3. Effect of extension over general use of material inputs.

The DAFO staff in Soukhouma estimated that with the experience they now had, that they could achieve similar results over 50% of the paddy area of the District (i.e. 5300 ha) within 5 years. This would result in production of additional rice each year of 8957 tonnes, worth approximately 5373 million Kip (≈AUD$1.2 million). Extension would then be having a macro-economic effort on the economy of the District.

This has been a short story and one with a happy ending. The availability of a technology package which was generally applicable provided an example for PEP to train DAFO staff and demonstrate the dynamics of adoption over just a few seasons. As it was, no 'bridge' or linkage between research and extension was needed, as the technology package was well known.

The success of the 'off-the-shelf' technology package was possible as farmers' present production practices are at such a low level of intensification, so that any general technology package with improved varieties and fertiliser would provide an increase in yields. Once this general technology package or something similar has been adopted, gaining the next level of improvement in production will be far more difficult; research will need to work harder to get smaller increases, and any new technologies will have to be tailored for specific production domains. In this situation, functional linkages between research and extension will need to develop quickly.

There are two information loops for linking research and extension, (Figure 4):

1. Research needs to convey its results to extension for use with farmers;
2. Extension needs to provide information to research on problems areas which need research efforts.

Given that both research and extension are still emerging in Laos, this makes the institutional structures for this unclear. PEP as a pilot project has worked in a very limited area and has not the direct experience on the ground to have been confronted with a wide range of issues. However, there are a number of robust mechanisms which PEP does see could be put into place fairly quickly and serve to stimulate the development of a research/extension linkage.

Before we look at this it is necessary to appreciate the more complex issues that research and extension face.

Complex Issues for Extension

Extension and transfer of technology

As Lao farmers begin to move from traditional agricultural practices to more developed agriculture, they are faced with a whole range of decisions which they need to make, sometime each season. These include what crop to grow in the dry-season under their new pump irrigation scheme, how much fertiliser to purchase for the main rice crop, whether to buy from the local merchant or trust to the Agriculture Promotion Bank to deliver its subsidised fertiliser on time, and so on. Their sources of information may come from a variety of sources, including neighbours, radio, merchants and finally the DAFO staff.

These decisions are common place, yet demanding. Farmers need the ability to analyse their constraints and opportunities. Thus the broad objective of extension for farmers to be able to deal with the complex issues they deal with on a day-to-day basis, is to:

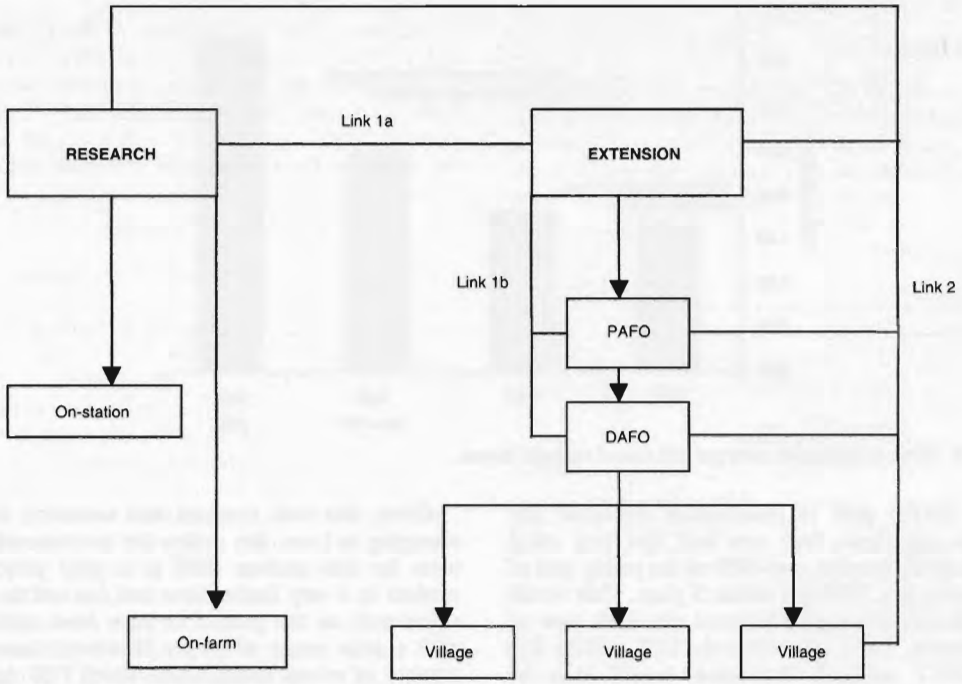


Figure 4. Typical information linkages between research, extension and farmers.

Assist farmers to have the ability to assess their problems; to learn and try new technologies; to evaluate these, and to make decisions.

Simply delivering the latest 'technology package' to farmers will not achieve this. At the same time, a common task of DAFO staff will be introducing improved technologies to farmers. More often than not, this will not be as a 'package' as part of a campaign, but in the context of assisting farmers to solve various production problems as they arise. Thus DAFO staff will need a range of technical knowledge they can call on for problem-solving, rather than simply to instruct farmers in a technical package.

Diverse production environments

Rainfed paddy is a highly diverse environment. Within a single village, there may be 2–4 different soil types which need not only different nutrient applications, but even require farmers to adjust the ways they manage the soil tillage, transplant seedling, and other operations. The rain-fed environment means that recommendations with precise times for split fertiliser application often cannot be followed if no rain falls at the time. Even worse, the threat of flood and drought can make the application of expensive inputs a risky venture.

This sort of diversity means researchers need to think clearly about what is the real meaning of any on-farm trial. An on-farm plot located 500 m away could easily have given a quite different result. When a technology package is released, it is presented as a precise set of procedures. These recommendations are not then precise, but in fact an 'average' of many different results from a number of on-farm sites. If this is the case, should farmers, faced with the particular conditions of their fields, be expected to follow this 'average' technology package precisely?

Instead of researchers trying to home in on the 'best' technology, what is needed is a range of technologies as options. Extension can then provide these to farmers as 'starting points' for farmers to try and expect them to adapt these to their particular conditions.

'Mechanisms' for Linkage Between Research/Extension/Farmers

The sort of mechanisms for linkage between research and extension and farmers can now be discussed with the two areas of complex issues in mind.

Research results → Farmers

Loop 1a: Research → Extension

This first part of the information loop, transferring research results to extension, is perhaps the expected or the most 'traditional' part of the loop. At present, the mechanisms for this are not yet clear in Laos. Given the 'complex issues' described above, the mechanisms for this need to be considered carefully and not assumed.

(i) Formal release of research results

Once research has a mature technology ready for application, this should be notified to extension. The process for ratifying and releasing new technologies is not yet clear in Laos.

Once results of research have been ratified for general release, they need to go through a further process to put them into a form where they can be used by extension. There needs to be discussion between research and extension about (a) the way results could be used and then (b) how they should be presented.

There has been one attempt at this during the past year, when staff from PEP and Lao IRRI jointly produced a pamphlet on the general technology package for rice production. Extension was able to raise difficulties farmers might face. They would have to follow certain procedures recommended, and researchers were able to advise when certain common farmer practices were just not functional. The resulting pamphlet focused on how to use the recommendations, rather than a description of the recommendations, and was in terms more readily accessible to farmers.

Proposed linkage mechanism:

Form a joint committee from research and extension to ratify confirmed research results for release;

Form teams as required to prepare results of research in an accessible form for extension.

(ii) Informal release of research results

There is a great deal of research results which do not lend themselves to an extension campaign, to be spread throughout the country. Examples of such results are: NPK omission trials, or the responsiveness of released varieties to N, etc.

These results provide extremely useful background information, which extension staff could use to explain observations in the field, or to gain incremental improvements in production in a particular environment. Yet, at present, these sort of results do not reach extension at all, except perhaps as technical papers, in English.

Proposed linkage mechanism:

Establish a newsletter aimed at the DAFO staff and Village Extension Workers (VEW). This would be published by extension, but with access to researchers, and would include news of current research; experiences for the field etc. Such a mechanism would be dynamic and stimulate thinking at all levels.

Loop 1b: Extension → Farmers

Given the two complex issues for extension, extension cannot simply be the delivery of technology packages. The diversity of the production environment precludes this (except with a few generally applicable technologies), and the need to enable farmers to be able to analyse their own situation and make decisions, demands something more dynamic.

The model for 'extension methodology' introduced by PEP firstly allows extension to respond to farmers' identification of their particular problems. Secondly, any new technology is introduced for trial by farmers, rather than being promoted.

In a very practical way, this allows farmers to select the best option for their own conditions. After 'selected farmers' in the villages in Soukhouma used two different rice varieties on a trial basis, other farmers selected the variety they thought would suite their own conditions. In some villages, TDK 1 was preferred over PN 1, and visa versa, but in each village both varieties gained acceptance by at least some farmers (Table 2).

Table 2. Farmers' selection of rice variety according to site conditions (Soukhouma, March 1997).

Village	Adoption of improved technologies		Seed requirements (kg)		
	No. farmers	Area (ha)	TDK1	PN1	total
None Yang	36	12.0	54	658	712
Done Kong	35	18.5	697	417	1114
That	96	30.0	863	885	1748
Samkha	62	33.5	1033	967	2000
Don Wy	66	18.5	69	1039	1108
None Phachao	70	32.0	145	1732	1877
Total	365	144.5	2861	5698	8559
Total as % of village	43%	24%			

These four steps follow a natural process of working and are not 'contrived' to try to be 'participatory'. Yet, at the same time, farmers are involved in decision-making at each step, which engages them in the process of looking for solutions to their own field, rather than just following instructions. In the

long term, this will work toward developing farmers' capacity for, and encourage the habit of, problem identification and experimentation.

Extension Feed-back→ Research

(i) Confirmation trials

Extension staff should be able to conduct confirmation trials of research results under farmers' conditions to determine any limits to their applicability. Such trials would prevent release of technologies which break down under certain conditions. These trials would not be replicated or require data collection, but only require observation and comment by DAFO staff with checks by researchers.

Proposed linkage mechanism:

Establish procedures for confirmation trials.

(ii) Normal feed-back

General reports do presently move back from the DAFO to PAFO and then to the Ministry of Agriculture and Forestry (MAF). There is no specific process for this and no sense of purpose that such general impressions should affect research direction at present.

Reports should be requested to include: performance of introduced rice variety under various conditions of drought etc.; their unacceptability to local millers etc. The development of this change in attitude and procedures will be a slow process until extension becomes more general, and local staff begin to gain a sense that results from research can be applied in their work.

Proposed linkage mechanism:

Establish a policy that DAFO and PAFO should comment on performance of introduced technologies and identify areas problem areas where research could assist.

(iii) Farmer exchange meetings

As part of PEP's extension methodology, farmer representatives from villages within a cluster meet to exchange results and experiences on production of the season. These meetings provide research staff with an opportunity to directly hear feed-back of farmers use of introduced technologies, and to collect issues which they could direct research for in the future.

Within the PEP pilot areas, staff of Phone Ngam station have attended farmer exchange meetings over the past 2 years, as observers, but not yet with the intention to use this as a feed-back opportunity for research.

Proposed linkage mechanism:

Assign research staff to attend farmer exchange meetings and to report on key issues raised to Nation Agriculture and Forestry Institute (NAFRI).

(iv) Emergency feed-back

There will be occasions when serious problems occur which need immediate attention from research. Examples of this will be with disease or pest outbreaks. Research staff should visit problem areas to determine the conditions which have led to the outbreak. Understanding of these conditions can then be used within a research program.

Proposed linkage mechanism:

Initiate a form for reporting outbreaks of pest and disease or other problems.

Joint and Shared Activities

On-farm trials

DAFO staff have become involved in the research network to conduct on-farm trials. These staff have greatly benefited from the training and the experience. However, this occurred during a period when there was still little regular extension work being done by DAFO staff. It is clear from work in the PEP pilot Districts, that if the DAFO is to provide extension to all villages of a District, the technical staff will not have the time for the detailed work of on-farm trials.

However, on-farm trials will still require a co-operative effort between researchers and DAFO staff. The interaction required should begin with researchers discussing the purpose of any trial with DAFO staff. The DAFO staff with their detailed knowledge of the area should then assist to identify an appropriate site for the trial and introduce the researcher to prospective farmer co-operators. Following this, the researcher is responsible for conducting and monitoring the trial and any data collection.

Proposed linkage mechanism:

Establish a new protocol of responsibilities for co-operation between researchers and DAFO staff for on-farm trials.

Planning Research

Research activities must be directed to the needs of farmers. Thus, as well as providing feed-back information, extension should be directly involved in setting the priorities for research.

Over the past year, PEP has been invited as representatives for extension, to attend planning meetings

with research staff. In addition, PEP has had some input to the direction of research through the various other interactions between PEP and research staff already stated. This interaction and purpose could be formalised.

Proposed linkage mechanism:

Establish a joint research/extension committee to advise on priorities for research. This committee could share the work of the committee proposed above for ratification of research results for release to extension.

Final Conclusions

The diverse production environment for the rainfed paddy areas of Laos means that research results will need to be reported either as being site specific, or as general recommendations which should be adapted by farmers to suite their own specific conditions.

The extension methodology introduced by PEP actively engages farmers in making decisions, and so should simulate the sort of local adaptation of introduced technology needed in diverse production environments.

In time, this dynamic extension approach could affect research strategies, as it would relieve researchers of the need to conduct repetitive trials, such as fertiliser trials, which farmers will always need to adapt and which can now be achieved through engaging farmers in problem solving during extension.

To ensure good linkage between research and extension, three formal mechanisms are proposed:

1. Establish a joint research/extension committee with functions of:
   - establishing priorities for research;
   - ratifying results of research for general release;
   - assignment of research/extension teams to prepare such results in forms which are readily useable by extension.
2. Establish procedures for 'confirmation trials' to be conducted by:
   - extension to validate research results over wide areas, in preparation
   - for ratification and release.
3. Institute a report bulletin which allows DAFO and PAFO personnel to:
   - quickly communicate events which need researchers to observe; and
   - assess as background information to identifying issues for research.

In addition to these formal mechanisms, two informal and dynamic mechanisms should also be established:

1. Institution of a newsletter to disseminate results of research which are currently lost to extension, and to provide a forum for discussion between researchers and extension workers and village extension workers.
2. Institute researchers' attendance at farmers exchange meetings (where these are held) to gain direct feed-back from farmers on introduced technologies and to identify issues for future research.

All of the above, except perhaps for the joint research/extension committee, could be established quickly and would ensure more effective and dynamic linkage between research and extension.

Acknowledgments

The authors wish to acknowledge that the production results and the proposals presented here are the cumulative results of work in the field and discussion between PEP team members, co-operating PAFO and DAFO staffs and the project technical advisors, over many months.

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