Let them eat grass: 
Experiences in using participatory approaches to 
develop forage technologies

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Abstract

Over the past 20 years there have been predictions of approaching severe shortages of feed for ruminant animals in Asia, especially in upland areas. These predictions are now coming true to the extent that livestock farmers across a large number of different upland farming systems are looking for managed alternatives to their declining traditional feed resources. Many forage technologies exist that have potential to improve livestock production in these farming systems. However, to date, few of these technologies have been adopted.

Recent trends in rural development methodologies highlight the potential of improving agricultural technology adaptation and adoption by developing the technologies in partnership with farmers. The approach described in this paper (Farmer Participatory Research; FPR) is currently being used for developing forage technologies in four countries of Southeast Asia (Laos, Vietnam, Philippines and Indonesia). The main advantage of FPR is substantially-increased potential for impact beyond target villages or districts. However, early experience has also shown that careful selection of the initial farmers is critical for subsequent successful adaptation and adoption of the technologies. Methods of village and farmer selection are discussed.
Introduction

Marie Antoinette, the wife of Louis XIV of France, when told that the peasants were starving, is said to have replied "Let them eat cake". By her reply she demonstrated how removed from the needs and realities of the people the French aristocracy had become...and for this they lost their heads in the revolution of 1789. Fortunately, for people interested in rural development, the consequences of ignoring the perceptions and needs of farmers are not as serious as they were for Marie Antoinette. However, if our goal is to improve livelihoods of resource-poor farmers, the message is the same: ignore farmers' needs and perceptions at your peril!

The focus of this paper is on how to better understand and incorporate farmers' needs into the process of developing forage technologies. Forage research and development in Asia has expanded considerably in the past two decades. In most countries, promising, adapted species have been identified from on-station and on-farm research. In some cases (notably Thailand and southern China), substantial quantities of seed are now being produced (Phaikaew et al, 1997). However, in general, adoption by farmers has been disappointing. This is despite the fact that in most countries of the region, there has been a recent explosion in demand from farmers for forages; not only to feed livestock but also to manage environmental problems (notably erosion, weeds and low soil fertility). The reasons for poor adoption have been partly (1) lack of planting material and (2) lack of expertise on forage management. However, even when these have been overcome, adoption has not improved.

The question that is now frequently being asked by researchers (and that is the central question addressed by this paper) is:

*Given that we have identified promising forage species from adaptation trials, how do we improve adoption by farmers?*
Forage technologies are more than just the species

A further reason for low adoption in the past is that forage technologies are more than just the species themselves. A forage technology is the combination of a forage species with how it can be grown within farming systems. Examples of successful forage technologies are:

- farmers in Bali using the tree legume, *Gliricidia sepium* in fence-lines to control animals and provide leaf for dry season feed supplementation
- farmers in Hainan using the legume *Stylosanthes guianensis* for leaf meal production for chickens and ground cover in fruit tree orchards
- farmers in Kalimantan using the legume *Centrosema pubescens* as a ground cover in maize crops, providing weed control, soil fertility improvement and animal feed.

It is the advantages and disadvantages of a forage technology as a whole that farmers will consider, not just the advantages and disadvantages of the species. It is not possible for researchers to predict beforehand which forage technologies farmers are likely to adopt without knowing their needs and criteria for judging these technologies.

This point was illustrated by Fujisaka (1993) and Fujisaka et al. (1994) for an upland mixed farming area of Mindanao in southern Philippines. Farmers identified gully, rill and sheet erosion as major risks to their crop yields and wanted to test ways of minimising these problems. In response, the researchers introduced the approach being used by farmers in other parts of the Philippines of planting *Gliricidia sepium* and *Pennisetum purpureum* in contour rows, harnessing erosion to form natural terraces and providing animal feed and green manure. Sixty farmers decided to try these technologies on their own fields. Over a period of eight years, more than 250 farmers adopted the contour hedgerow system (Fujisaka, pers. comm.) but many rejected the species and methods of establishing the hedgerows, mainly because they were too labour-intensive to establish and maintain. The farmers recognised that the contour rows were extremely successful in controlling their major problem, erosion (reducing losses from 200 to 20 t/ha/year), and so searched for better species (including other forage species, wild sunflower, fruit trees and coffee). In the end, they developed a system of low-maintenance, natural vegetative strips (containing weed species) in contours.

The example illustrates how researchers initially used criteria for choosing the technologies to offer farmers (yield, potential value as green manure) that were not compatible with the farmers criteria (labour requirement for establishment and maintenance, potential for competition with crops). The farmers innovated; adapting the contour system to their own needs and rejecting the species. Forage scientists might have been disappointed by the result but the outcome for the farmers was positive.

The example illustrates how involving farmers in the process of developing forage technologies encouraged innovation and incorporation of farmers knowledge into the technologies. In the process, the researchers learned that one of the main reasons the farmers liked the contours, apart from erosion control, was providing dry season feed (Fujisaka, 1993). Knowing the criteria the farmers used to reject the first group of forage species, researchers had the opportunity to identify other species that were less competitive with crops and less labour-intensive to establish, which the farmers could then test.
Using farmer participatory research (FPR) for forage technology development

The farmers and researchers in Mindanao were involved in a process known as Farmer Participatory Research (FPR). The farmers identified and prioritised problems in their agricultural systems that they wanted to resolve and, with the assistance of the researchers, chose, tested and evaluated technologies that had the potential to alleviate these problems.

FPR is gaining acceptance as a powerful approach to developing agricultural technologies (including forage technologies) with resource-poor farmers (Horne and Stür, 1997). The strength of FPR comes from:

- acknowledging that the criteria farmers use for judging the value of forage technologies are frequently different from those of researchers
- incorporating the knowledge of farmers for forage technology development
- acknowledging that farmers can solve their own problems. Often all they lack is access to new information and planting material
- encouraging farmers to experiment and innovate with potential new technologies
- improved chances of adoption of forage technologies, because farmers have been involved in developing and evaluating them from the beginning

The principles, methods and skills of FPR (and similar approaches generically known as participatory technology development; PTD) are described in detail by Okali et al. (1994) van Veldhuizen et al. (1997a, 1997b) and Horne et al, (1997). The main difference between FPR and previous approaches to forage technology development is that FPR is based on active, decision-making involvement of farmers in ALL stages of the technology development (Okali, et al., 1994; Figure 1).

The first step in FPR will often be Diagnosis (similar to Participatory Rural Appraisal) in which researchers work with a representative group of farmers to gain a greater understanding of their agricultural and livelihood systems and the farmers are encouraged to:

- identify the problems that are of most concern within their agricultural and livelihood systems,
- identify causal links between these problems
- describe what actions they have taken in the past to minimise each of the problems
- decide which of the problems are the highest priority for solution
- discuss what actions they would like to take to solve these problems in future
Figure 1. A model of Farmer participatory Research (FPR)
If researchers are interested in developing forage technologies, they should avoid narrowly focusing the Diagnosis on livestock feeding as there are important problems farmers experience, which forages can resolve, that are unrelated to livestock feeding. For example, in northern Laos, farmers practicing shifting cultivation on steep slopes have to spend up to 200 days/ha/year weeding (Horne, 1997). Some legumes have potential to be incorporated into the rice crops, reducing weeding time and erosion hazard.

If Diagnosis identifies problems that the farmers want to try to resolve AND there are technologies with the potential to resolve those problems, the researchers can offer options for the farmers to test (Planning; Figure 1). The farmers might, for example, have identified dry-season feed shortages as their main problem for which the researchers offered fencelines of tree legumes, intensively managed plots of grasses and legumes, hay-making and rice-straw treatment as alternative solutions. The first two of these may have been developed successfully by farmers in a different district, offering an opportunity for farmer-to-farmer visits to discuss the technologies. The role of the researcher in Planning is to introduce the farmers to as broad a range of suitable options as possible, not just a couple of preferred species. In south-central China, for example, forage researchers introduced a broad range of forages into adaptation trials. This included one species, *Chamaecrista rotundifolia*, which was well adapted but which the researchers did not prefer because of its low feeding value. In the end, however, it was this species that has shown most promise, not primarily for animal feed but as a ground cover in fruit tree orchards (Hacker et al., these proceedings).

During Planning, it is also the role of the researcher to provide enough neutral information about each option to allow the farmers to decide which ones they would like to test. What kinds of information are needed for farmers to decide on options to test? Farmers know how to grow crop plants well. What they may not know about forages is (1) where species can grow (eg. *Leucaena leucocephala* is not adapted to acid soils), (2) how they can be managed (eg. fencelines, cover-crops), (3) how they can be utilised (eg. *Gliricidia sepium* should not be cut lower than 50cm; animals can be easily trained to eat Gliricidia) and (4) how they can be propagated (eg. *Brachiaria decumbens* can be spread from rooted cuttings). There are also some common misconceptions about forages that should be dispelled, including:

- **There are no miracle species** that can produce high yields in adverse conditions. A common request is for grasses that produce yields during long dry seasons as high as during the wet season. Forages will usually not be the sole solution to problems of livestock feeding or natural resource management, but will supplement existing feed resources and management practices.

- **Many forage species are not broadly-adapted** (eg *Brachiaria ruziziensis* needs fertile, well watered soils to give high yields). Species need to be matched to the soils and climate of an area.

- **Forages need management.** The most common causes of failure of farmer trials with forages are:
  1. **Sowing seeds too deep.** Forage seeds are small. They should be sown no deeper than 1cm and preferably covered and compacted to improve soil seed contact and, hence, germination.
  2. **Too many weeds.** As their seeds are small, forages are slow to establish and can be defeated by a large number of rapidly-growing weeds. Even one round of early weeding will greatly enhance forage establishment.
  3. **Grazing of young seedlings.** Forage seedlings are susceptible to trampling and being eaten by livestock. Keep livestock away from newly establishing forage areas (<4 weeks old).
Continuous cutting of forages rapidly depletes soil nutrient reserves. Large quantities of nutrients, especially N, P and K, are removed from cut plots of forages. Nutrients need to be returned if yields are to be maintained.

Communal grazing land cannot easily be improved with forages unless free-grazing of livestock is controlled (either by fencing or prohibition).

In FPR, the stage of Experimentation (Figure 1) can take two forms. Many groups (eg. Ashby et al., 1989; Lightfoot et al., 1993 cited in Okali et al., 1994) favour developing farmers' research skills to the point where they can conduct formal and statistically valid experiments on their own fields. Two major problems with this approach, however, are that (1) on-farm trials are frequently plagued by high variability and (2) researchers will want to control these kinds of trials, being concerned more with statistical validity than encouraging farmer innovation. The approach being taken by the Forages for Smallholders Project is to allow farmers to test the options freely on their farms in whatever way they like, at the same time providing them with information about other farmers' and researchers' experiences with each option. When promising options are identified by the farmers or when they have developed their own forage technologies, more-controlled experiments can be conducted to validate and quantify the farmers' experiences.

An example of this process of innovation followed by controlled experimentation comes from Makroman village in East Kalimantan where thirty farmers were offered a small range of promising forage species for backyard forage production (Tuhulele, 1996). All species grew well in informal trials but the farmers rejected the technologies as they required too much labour for too little return. However, at the same time, two farmers complained of high labour requirements for weeding their maize. The development worker suggested trying two legumes (Stylosanthes guianensis and Centrosema pubescens) as cover crops. Over several years, these two farmers developed a system based on a permanent cover crop of Centrosema into which they sowed their maize. They claimed that the weeding requirements were lower, the yields higher and the soils were more fertile and did not require cultivation for the following crops. Other farmers in the village decided to take up the new technology. More-formal experiments are now being planned with several of the farmers to quantify the extent of the benefits of this farmer-generated technology.

Once farmers are testing technologies, there follows a period of Evaluation (Figure 1) in which farmers describe which of the technologies they like and why, which they do not like and why and what characteristics of the preferred technologies could be improved. Some of the many methods that exist for evaluating technologies with farmers have been described by Ashby (1990). Evaluation indicates not only which technologies are showing promise for expansion to other farmers, but also provides insights into farmers' criteria for judging forage technologies that can be used to guide on-station research.
What makes FPR different from previous approaches to forage technology development?

FPR is:

- based on active, decision-making involvement of farmers at ALL stages of technology development (diagnosis, planning, experimentation and evaluation) (Figure 2). In previous approaches to forage technology development, "finished" technologies were developed on research stations by researchers and given to extension workers to be delivered to farmers.

- generally more time consuming than previous approaches to technology development but more likely to produce technologies that match farmers' needs

FPR is NOT:

- a "production-line" process moving from a "beginning" to an "end". Technologies offered by researchers may be rejected by farmers (as in the Mindanao example cited earlier) but this gives feedback to researchers allowing them to provide better alternatives for farmers to test.

- a replacement for on-station research or for researcher-controlled on-farm trials. Researcher-controlled experiments are one source of potential technologies for farmers to test and are necessary to quantify of technologies developed by farmers. FPR can provide feedback on farmers' criteria for judging technologies to guide the on-station research (Figure 1).

- a replacement for extension. However, it enhances the chances of success of extension of technologies to farmers with similar problems and agricultural conditions, since the technologies were developed by farmers to conform to their needs.
What makes FPR different from previous approaches to forage technology development?

- necessarily capable of generating technologies with potential for wide adoption, although the underlying ideas may well find wider applicability (Fujisaka, 1993). For example, in one location in central Vietnam, farmers are very interested in backyard plots of Brachiaria spp. for supplementing their cattle at night but this technology is of little interest to other farmers in a nearby area who want forage species to feed fish and pigs.

Figure 2. Extent of farmer participation in different kinds of research

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How do we choose farmers for FPR?

Given that the success of FPR is dependent on active farmer participation and experimentation, the method of selecting farmers is a critical issue. In the past it has been common for researchers to work with model farmers who receive substantial support from researchers to demonstrate "successful" technologies. However, frequently model farmers are wealthier farmers situated close to roads or towns. They receive substantial extra inputs from the researchers and can afford to make technologies "appear" to work. For example, a model farmer may test forage technologies on the best crop land where all species will grow well and look impressive for visitors. However, this situation will not reflect the common problems and opportunities of most resource-poor farmers in the area.

Ideally we want to work with those farmers who are innovative, natural researchers and representative of a broader group of farmers with common problems that forages might be able to resolve. The often-asked question is "How do you identify such farmers?". The approach being used by the Forages for Smallholders Project is as follows:

1. Identify a village where the farmers appear to have a real need that can be addressed by forage technologies. This is achieved by using secondary information, consisting of both (1) data and (2) key information and observations. Examples of the kinds of secondary information that help identify places to start working are presented in Table 1. Ensure that there are enthusiastic development workers who will be able to conduct the work in that area.

2. Within each promising village confirm that the farmers are experiencing the problems identified from the secondary information by conducting a diagnosis with a representative group of farmers. What is meant by "representative"? For example, if you found from the secondary information that weeds in upland crops are a major problem and women are responsible for most of the weeding work, then it would be essential to include women in the diagnosis. If you found that livestock feeding problems in the dry season are severe and 90% of the animals are kept by the poorest farmers, make sure they are present at the diagnosis.

3. During the diagnosis, identify those farmers who have been actively trying to solve their problems in the past. For example, in one village in Xieng Khouang province of northern Laos, all the livestock keepers complained of dry-season feed shortages but four of them had actively sought solutions. They heard of a grass species that was growing well in another district so they travelled there, collected cuttings and spread them in their own village. These farmers had demonstrated their commitment to solving their own problems and willingness to innovate.

4. Visit the farms of these more-innovative farmers and assess their willingness to participate in FPR trials. Discuss their own particular set of problems and compare these with the problems identified by the diagnosis. Very often there will be a few innovative farmers who are willing to test a broad range of technologies and there will be other enthusiastic but less-innovative farmers who want to try one or two "best-bet" technologies.

5. Before starting FPR with these farmers, describe and quantify the problems they have which you are targeting with forage technologies. This information is used to quantify impact of the technologies at a later stage.
Table 1. Suggested secondary information required to select locations for commencing FPR on forage technologies

<table>
<thead>
<tr>
<th>Data</th>
<th>Key Information/Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>These are data and maps that are often available in district and provincial offices</td>
<td>These are results from personal observations and probing discussions with district officers, village heads and key farmers</td>
</tr>
</tbody>
</table>

1. **Climate:**
   - long-term data (at least 10 years) for: Monthly rainfall
     - Number of rain days/month
     - Monthly max and min temperatures
     - Extreme monthly temperatures
     - Incidence of catastrophes (such as typhoons and flooding)

2. **Altitude range**

3. **Soil**
   - pH
   - texture and drainage
   - broad fertility status
   - known fertility Deficiencies

4. **Livestock**
   - Type
   - Number

5. **Topography**

6. **Land use systems**

1. **Brief description of the area**
   - focusing on key issues affecting development

2. **Description of topography**

3. **Land use systems**
   - Relative land area for each use (%)
   - Topographic location of each land-use
   - What are the main land use systems and their benefits/constraints?
   - What inputs are used in agriculture?
   - How is non-cropped land used?
   - What is the land-ownership system?

4. **Livestock farming systems**
   - Why are livestock kept?
   - What proportion of farmers keep livestock?
   - Is shared ownership of livestock common?
   - Are inputs used in raising livestock (e.g. supplementary feeding, veterinary chemicals?)
   - How are livestock managed? (where do they graze throughout the year, are they fed cut feed, who is involved in livestock management)
   - How are livestock marketed?
   - What/When are the main constraints and opportunities?
   - How have farmers been dealing with these constraints until now?
   - How do they want to deal with them in future?

5. **Trends in the farming system**
   - What changes are happening within the farming system?
   - What changes are happening within the livestock raising system?

6. **What other rural development programs have been and are currently working in this area?**
Conclusions

Identifying adapted and promising forage species is only the first step towards developing forage technologies that help resolve farmers' problems. Farmer participatory research (FPR) provides a conceptual framework of methods, skills and principles that can help researchers work with farmers to develop forage technologies that will have a greater chance of wider adoption beyond target farmers or villagers.

The success of FPR for developing useful forage technologies will not depend on the quantity of seed distributed nor on the number of farmers initially involved. It will depend more on the careful selection of motivated and innovative farmers from the beginning. A handful of seed of a few forage species given to a small group of motivated farmers will be more successful than large quantities of seed given to many farmers who do not have a need for forages.

Although FPR requires a substantial commitment of time from researchers to work directly with farmers, it has the potential to produce forage technologies that have a greater chance of adoption than in the past.
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