

# COMBINING INDIGENOUS KNOWLEDGE AND AGRICULTURAL SCIENCE KNOWLEDGE: A CASE STUDY FROM KISAR ISLAND, INDONESIA

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## Abstract

This paper deals with the problematic issue of incorporating indigenous knowledge (IK) into agricultural research projects. We reflect on learning from the experience of a research project that aimed at the recognition of the cosmovision and indigenous knowledge of farmers in Kisar Island, Indonesia. We will show that there is an interface where IK and agricultural science can work together to achieve more sustainable rural development. The spirit of this interaction comes from learning to understand what farmers know and what they do not know. It requires a shift in perspective that challenges both the boundaries of scientific knowledge and of local knowledge. Through dialogical communication, the dominant scientific and outsider's view of the world is complemented with an indigenous and local worldview. Such dialogue needs to ensure the empowerment of the local participants, achieved in this situation by the use of a Participative Action Research (PAR) framework. This encouraged learning by both villagers, who were reliant on subsistence agriculture, and by the agricultural research team. The villagers learnt by reflecting on their indigenous ways of knowing, and by incorporating new ideas about the possible use of local resources as presented to them by the research team. Together the two groups were able to establish a more effective and creative interaction between the two knowledge systems, for the betterment of both groups.

## Introduction

The role of local knowledge, or farmer's knowledge, has been widely researched in rural development (e.g. Rhoades, 1984; Warren et al., 1989; Antweiler, 1993; Scoones and Thompson, 1994). The reason for this relates to the criticism of the *transfer of technology* (TOT) approach to rural development. This critique revealed that what was best for farmers depended to a large extent on how much power farmers had over their own decisions. Agricultural development based on control (through TOT) has not proved to be viable for resource-poor farmers, because they need and depend on inputs from outside. Hence, efforts to empower farmers need to consider existing resources available to such farmers, including their own indigenous knowledge (Christoplos and Nitsch, 1994). A participatory process of inquiry through the facilitation of experiential learning, is a practical way of bringing together people's knowledge systems (IK) with agricultural science knowledge.

## Study Site

Kisar is a small island located just above the tip of East Timor in Southwest Maluku province, in the eastern part of Indonesia. The research site was Pur-pura village on the island. Most of its inhabitants are resource-poor farmers, planting corn, vegetables and fruits, raising animals and tapping palm sugar *Borassus sundaicus*. Its inaccessibility and the fragility of the soils have resulted in the Kisesse being relatively marginalized by the Maluku government. A comment made to one of the researchers by a passenger on the ship taking them to Kisar

Island for fieldwork was: ‘*in a dry and rocky island like this, how do its inhabitants make a living?*’

### **Commencing the project**

A research team was formed that initially consisted of four people. The lead researcher (Jesajas) was born on Kisar, but had been away for some years. The three other core researchers were also originally from Kisar Island, they being a social-economic agriculturalist (Stev), an agronomist (Joshua) and an undergraduate student from the animal husbandry department (Demianus). All were from Pattimura University, Ambon, and had expressed interest in the project after being introduced to the concepts of action research and small group learning by the senior author. The undergraduate student concurrently worked with goat farmers on Kisar for his final year thesis. Joshua was the more fluent in the Kisaress language, since he had longer experience of working with Kisaress farmers, and he also understood the farmers’ situation better than the other team members. In the field, four local people joined the research team as co-researchers: Two were farmers, one a teacher, and one a government officer. The local co-researchers knew their community well, particularly regarding knowledge networks, and those persons who had the best knowledge about specific themes in the inquiry. The first field visit occurred in the month of February when the farmers were preparing their cornfields for planting. The first task of the research team was to build rapport and communication links with the local farmers, a crucial aspect for future cooperation.

### **Defining ‘Indigenous Knowledge’ in the research context**

A key issue for the research team was to question what was meant by the term ‘indigenous knowledge’ in researching farmer’s knowledge. The team realised that animals such as goats and pigs, as well plants such as maize, beans and sago, together with the knowledge about them, have been brought in from outside Kisar. For example, while interviewing Mr. Rex Amos about the historical aspect of sago *Metroxylon rumphii*, they were told:

*“In Kisar, sago palms are only available along the lake of Pur-pura village. The ancestors who brought sago (and goats) and the knowledge about it originally came from East Luang.... namely Heri Wewer and Hanu Woto with their four servants. They visited Wetar before they came to Kisar Island. At that time, they brought five shrubs of sago into Kisar Island. Three shrubs were then planted upstream of the lake “Oir Lapa” (“big water”) which belonged to Abrahamz/Mosesz family, and two shrubs were planted downstream of the lake “Oir Memere” (Reddish Water) on land belonging to Amos family and Tromday/Laitowono family. These five sago shrubs acted as the germplasm of today’s sago palms along the lake. If you want I can show you the place where the first sago shrubs were planted...”*

Literature findings also revealed that Europeans had introduced some plants to Kisar, including maize, beans, cassava and others, prior to the European settlement of Eastern Indonesia (Fox, 1991). If someone else had brought the knowledge of maize production, into the community, how could it be called “indigenous”?

It has been pointed out by Heim (1990) that making sense of concepts to be used by a research team was an important phase of a research project. Instead of being confused by the variety of definitions presented in the literatures, it was decided to accept a definition provided by Veldhuizen et al. (1997), who states that indigenous knowledge (IK) is: *the ideas, experiences, practices and information that either have been generated locally or are generated elsewhere, but have been transformed by local people and incorporated into their way of life.*

Thus what make such knowledge *indigenous* is the reality that it bounds local culture and emerges as people's perceptions and experiences in a local environment. Furthermore, in terms of knowledge acquisition, it results from a continuous process of observation and interpretation in relation to locally acknowledged, everyday rationalities and transcendental powers. In this sense, it is a fact that maize and other plants originate from elsewhere, but making the best use of it in the local environment has been a long-life learning process resulting from socially constructed knowledge, which is then transmitted from generation to generation within the Kisaresse community (Fussell, 1996). The successful accumulation of such knowledge is dependent upon exactly repeating the new knowledge, the new success, in the next generation, or upon experimenting with slight variations within the scope of this new knowledge (Watzlawick, 1984)

### **Working With Key Informants**

The snowball technique was used to find indigenous knowledge holders in the community. The following experience, drawn from field notes, acts as an example of data collected by the researchers:

One evening we met a woman who was "beating" sago trunk (*pukul sagu*) accompanied by a man, using a tool locally named "nani" (a tool like small hoe made of metal) to produce sago starch. After greeting them we started to have a casual conversation, which began with a question about what do people do with sago? The woman replied by saying: "*people used sago starch to make local foods such as papeda, sinoli. .... Sago is an important source of food for us. Its leaves are also useful for roofing ... my parents tell a story about their experiences of processing "ela sagu" (by product of sago), as food during a famine in the past. ....people who do not grown sago plants may ask to beat sago for someone who grows the plants, as a "share system or contract" made between the owner and the workers. .... I am beating sago belonging to Mr. Ary Mozes. After the work is finished we share - I have a half of the total sago starch produced to bring home or to sell it at the market .... the rest belongs to the owner. "* The conversation continued without any problem until we asked a question about how she had learned to beat the sago, and whether she knew how this plant came to the village. The woman responded: "*I learnt how to beat sago from my parents .... and so did my parents learn it from my grandparents .... but if you want to know about how the knowledge was taught (by someone) to Kisaresse in this village, you might be better ask someone from Amos family .... you had better ask Rev. Rex Amos. He is the only person who has the right to tell stories about this in the village"*

Kisaresse culture depends on storytelling and an oral tradition. With the assumption that indigenous knowledge is embedded in cultural practices, one may think that Kisaresse indigenous knowledge could be learnt through their cultural artefacts and behaviour (Spradley and McCurdy, 1972). Unfortunately, since most artefacts of Kisaresse culture have been destroyed during Christianisation (Engelehoven, 1998), the only thing that can be done is to learn from the behaviour and practices of the current generation. The only artefacts remaining are 'tempat sirih' and traditional 'ikat' weaving, however the research team found that it was difficult to have persons tell the stories behind this, due to the mystification of a name or event: In the community, someone who speaks a sacred name (such as ancestors) directly can be seen as practicing paganism ("*suanggi*" or witchcraft). This also explains why in the community certain persons or groups keep some knowledge, particularly historical knowledge about ancestors, secret. Moreover, as noted by Engelehoven (1998), the awareness of the importance of storytelling and the loss of narrative knowledge inevitably evoked feelings of great frustration among subsequent generations. Hence, the willingness of some farmers to tell stories about their indigenous knowledge was a difficulty in this inquiry. Experience has shown that with certain behaviours, practices and phenomena, information will only be

revealed after the building of confidence and winning the trust of key informants, through a deep immersion into local social life and by *putting oneself in the place of the other*. As van Eijk (1999) described, ‘the presence of the spirituality of indigenous knowledge will still be a vague concept so long as it is not internalised in the direct personal experience of the observer’. We cannot live other people’s lives but we can listen to what that say about their lives.

To commence the fieldwork, it was decided to first have a meeting with the village leader, to inform him about the research, and to consult with him about the possibility of holding a village meeting to introduce the research team and the research issue to the whole community. During this meeting, the village leader listened patiently while the research was introduced. However he felt it would be difficult to conduct a village meeting, instead offering an alternative tactic as follows:

*“It is nice that pa’a (Kisaresse word for a boy) has come back to visit the place where pa’a was born. I am glad that pa’a still remembers and cares for this community. But I feel sorry ... I think at the moment it is hard to invite the villagers into a meeting. I suggest it is better if pa’a could meet them personally at their home... or at church on this Sunday service ... yeah, I think it is better ...”.*

At that moment, the researcher team felt uncertain, and anxious about this challenge to their idea, but learning to deal with such feelings, and learning to be free from prejudice was a part of the necessary revision of attitudes required to improve communication with these farmers.

### **Working With Farmer Groups**

The existence of “roson”, a farmers group that labour-shared community activities, was an indication that the farmers were already used to forming groups. One farmer said:

*“roson group is useful for us. We need help from others to handle some works in our fields especially if the rain season will come. If we work individually, we do not have enough strength. Especially if we have more than one field to work with. It is better to work in ‘roson’. Our work will finish faster and we can learn from one another about agricultural techniques. Work in ‘roson’ means one help another...our ancestors have shown this example (work in roson) to us, so we do not see any other reasons for not to follow it ... however we have to carefully choose partners to work with, otherwise conflict will occur when we start... understand each other is important for this group to stay alive ...if one of our ‘roson’ member could not come on the day that we agreed to work in the field, it may be because he is sick or something else, another person in his family should come to take his position in the work, otherwise he should pay a fine. If he is absent more than once, other members will caution him, or may not be willing to work in his fields”*

The research team worked with these small farmer groups in order to avoid high expectations of the community to the research outcomes, to reduce conflicts of interest, and to make it easier for these groups to get fund from government or other aid agency. Through dialogue and discussion the best way to work with a particular *roson* was found, establishing when their time allowed them to meet, and appropriate ways to start an activity associated with this research. Such dialogue aimed for a free and creative exploration of complex and subtle issues, a deep listening to one another and the suspension of one’s own views (Senge, 1990).

### **Farmers expressing their views**

The farmers’ own expressions about their social life experiences (world view) were used as a starting point for this project, because it was believed that these contained the answers to many of questions raised by this project (Natpracha and Stephens, 1991). The concept of improvement was explored first by understanding the farmer’s situations, and how farmers perceived the meaning of improvement (Caceres and Woodhouse, 1995), and how such

improvement would take their social reality into account (Berger and Luckmann, 1976; Heller, 1984). During dialogue with the farmers, the *rosos* groups, were found to generally accept their current situation without question: Some of them even wanted to keep it silent. For example:

*“Our living in Kisar is like what you are seeing.... planting corn, raising animals, fishing and tapping ko’o (sugar palm juice).... What else we can do ? .... It is hard living. Our problems are rain and, sometimes, “ulat” (caterpillar) and mice (‘ornoho’). If rain comes we have to plant promptly otherwise corn will ‘damage’. Caterpillars and mice ate the corn in my fields last season ...hopefully it will not happen again this season. I do not know what I can do about caterpillars ...but at least it (caterpillar) left some for us to eat....”*

Feeling inferior about their own practices and insights in some circumstances may be a barrier for farmers when interacting with researchers. In some cases the research team found farmers who were undertaking certain local practices tried to hide them when they began to approach them. However, as these farmers observed the researchers’ attitudes they became more willing to show things to the researchers, gaining confidence that the researchers were really interested to learn about their practices. As an example, researchers accidentally met a woman who was preparing a ‘satay’ made of corn ears. She became nervous when asked about what she was doing. She said:

*“nothing, it is only a trick to cheat the mice in our cornfield to stop them eating our corn”*

However, after meeting her several times she was again asked if she was willing to tell her story about the practice, then she explained:

*“.... What we have done is only a trick to deal with mice attacks in our cornfield, there is no magic in that practice. If we do not do it properly, the mice will eat all the corn in the field and we have no security to face a severe dry season that might happen. Our parents taught us that a mouse would not eat a part of a corn that has been eaten before. Therefore, we put this behind and a half of a new ear in the front to make a corn ear ‘satay’, and hang it in the field ....”*

The researchers were told that in the cosmovision of Kisaresses farmers, the mouse (‘ornoho’) was viewed as the ‘landlord’.

*“One can do nothing to kill them in the field. The harder you act, the more their number will increase“.*

This view has become internalised into their folktales and spread widely through the community. Also some Kisaresses farmers believed that they could receive messages and guidance from their ancestors through dreams and visions. For instance, one farmer said:

*”The spirit of my dead mother gave us advice through a dream to solve the problem of which of our corn seed varieties were suitable to be planted in the backyard, and it worked. If other varieties of corn seed had been used, they would fail, and we have tested this.“*

For these farmers, nature was a living thing, leading them to assumptions about cause-effect relationships and chance (Haverkort and Millar, 1992; Millar, 1999). Thus for an old farmer, removing a caterpillar from a field was to be taken as a soul-exchange with these animals (Vitebsky, 1995), asking ‘softly’ for them to go out from his cornfield by saying

*“You have already eaten some of the corn, please leave the rest for us”.*

Then the farmer would put the caterpillar in a leaf and say

*“This is your food, the corn is our food”.*

Other farmers when dealing with mice and other pests such as snails would also use a similar practice

Under the influence of “modern” techniques and concepts, outsiders and the young people in the community often viewed such practices pejoratively, as being irrational, superstitious, or mystic. However, such “superstitious” thinking is not only dominant in traditional communities, also existing in “modern” communities in such rituals as *knocking on wood* for

luck in Western society. Most superstitious practitioners seem to be people who work or relate to dangerous, uncertain or insecure conditions. As Maple (1973) said, if superstition continues to be strongly entrenched in any particular occupation it is because of the existence of a deeply rooted sense of insecurity, whether real or imagined, creating a social climate in which omens and portents may be read into quite ordinary occurrences, and one in which, to a considerable extent, the past is allowed to dominate the present. Thus, superstitious thinking can be seen as a strategy people use to cope with uncertainty. In this sense, the uncertainty of knowledge is replaced by faith which creates confidence. This condition could be interpreted as the inability of farmers to move beyond what Freire (1972) calls “a limited situation” resulting in the acceptance of the situation as an inescapable condition.

The cosmivision of farmers needs to be understood within their cultural frame. For instance, there is no doubt that animism historically dominated Kisaressé farmers’ thinking, filling the gaps in the knowledge about the causes of natural phenomena. Even today in the community the research team found examples of the importance of sorcerers and healers, some considered good and some bad. People seek help from them to know who did good or bad to them and to seek healing from the bad that has been done to them. These sorcerers (*ri man hi’i u’ur leher*) are believed to be able to actually turn the bad that has been done to someone back onto the originating party. In this sense, disease or disaster may be perceived as an invasion of a bad spirit. In order to capture and understand this experience the research team took the opportunity to observe a priest during his practice as a healer and listen to what the patients and people surrounding the patients thought about the disease.

### **Farmers’ perspectives of causality**

As much as the researchers tried to understand the experiences of farmers, they could not ignore any theories that presented causal explanations about farmers’ actions. As Röling and Engel (1991) argued, farmers actively make sense out of their experience of the world, building theories that attribute *causes to effects*, and then applying these to control the socio-natural environment for their own purposes. The research team found that the question *but why?* Was a good tactic to use to explore farmers’ ability to explain the ‘rationality’ behind their actions. Our experience was that not all farmers shared the same responses that have been described above about pests and how to control them. Some young farmers even tried to respond ‘cleverly’:

*“We usually put our corn seeds in vinegar or in lemon juice for a night before planting. We do this to ensure that our corn seed will germinate healthy... without this ‘ulat’ (caterpillars) eat them”.*

But when asked why they use vinegar or lemon juice, they answered:

*“...We are not so sure ... perhaps vinegar or lemon juice are acid so ‘ulat’ could not ‘eat’ the seed but sometimes ‘ulat’ attack mature corns, then... we do not know how to combat them”.*

We also found an interesting story from a young farmer who planted lemon trees around his cornfield:

*“Lemon trees guard my corn from ‘ulat’ (caterpillars) attack, .... I believe the ‘ulat’ is afraid of ants from the lemon trees because I have seen ants kill the ‘ulat’*

Another good example of farmers’ reasoning we found was when we asked a group of women about the reasons behind the mixed farming of corn, beans, cassava and other tuber plants. They mentioned the following reasons: First to have a combination of foods,

*‘We cannot eat corn alone, it should be mixed with beans, cassava and kelor (an indigenous vegetable)’;*

Secondly, for food security:

*‘if corn fails we still have cassava to eat’.*

However, the farmers could not explain all their actions, some being practiced only for “pragmatic” purposes (Berger and Luckmann, 1976); for example one farmer said:

*‘It is always like as it happens, and we do not know why’*

### **Sharing beliefs and knowledge**

Participatory ‘discovery’ is a learning process that can be both painful and joyful - it is painful when struggling to gain insight, and joyful when the insight has emerged. The research team’s task in this sense was to minimise the painful and maximise the joyful experiences for both the researchers and the farmers, and to achieve mutual understanding about possible improvements. Here mutual understanding was interpreted as the matching of meaning through dialogue that allowed for either agreement or disagreement (Gudykunst, 1994). Insights were gained into the Kisaressé farming systems through the engagement with farmers’ knowledge about, for example, sugar palm juice utilization, and problems with pests in their cornfields. These insights led to ideas about how to investigate possible uses of sugar palm juice to help with the problem of corn pest management (Schiefelbein and Chiang, 1966; Carlson and Chiang, 1973; Fox, 1991). However, these ideas, together with other options, needed to be communicated to the farmers for debate. The research team needed to use concepts, beliefs and knowledge to denote ideas, insights, opinions and theories held by farmers and researchers about the situation: this itself was socially constructed (Berger and Luckmann, 1976) and thus itself needed to be shared, improved and tested in terms of (new) knowledge construction (Raedeke and Rikoon, 1997)

Researchers were working with farmers who were living in a resource-limited situation, and the research too had limited resources in term of financial support. However the farmers had ‘social capital’ which could be used to ‘empower’, beginning with their local knowledge of problems and solutions. This can be an important step in agricultural research, but the strengths of local farmers in observation needs to be combined with the experimental methods of researchers (DeWalt, 1994). As has already been described, Kisaressé farmers existing knowledge was not complete enough to address some problems, for example in term of pest management. New ideas about how local resources could be used needed to be brought to bear on the situation through dialogical interpersonal communication and it is this that was believed would “permit researchers to enter the farmers’ world of ideas and representation” (Salas, 1989). It does not mean that scientific ideas are better than local ideas, but that the former need to be put into a local context in order to increase understanding and to share (Millar and Curtis, 1998). Both indigenous knowledge systems and scientific knowledge systems must be seen as complementary sources of wisdom (DeWalt, 1994).

### **Consciousness Raising as empowerment**

Freire (1973) described the level of consciousness, such as that expressed by Kisaressé farmers above, as a *magical* level. Farmers with this level of consciousness are trapped by a myth of inferiority and tend to live in a culture of silence. In some circumstances magical thought may be their way of searching for explanations about their lives and actions. They accept existing problems in terms of physical survival. The research team’s task in working with such farmers would therefore be to first ‘enlighten’ farmers to become *critical* and to re-adjust their interpretation of their existing social reality. Put in a different way, the purpose was to ‘discover’ through mutual learning new insights that make meaning of their situation. Again, the research team brought these ideas forward through dialogue with the farmers. Resulting from this, a day excursion for a group of these farmers was arranged to look at the whole island and its natural environment. Farmers decided to go to the highest mountain in the island named “Tai Tulu” (means ‘buffalo droppings’, as it appeared). Farmers brought

food to be shared. The group walked through several villages and farms to get there. During the activity, farmers and researchers learnt together and shared their understandings, as they looked at the daily life and the environment of other farmers in the villages they passed through. Stimulating farmers' awareness of their reality, or conscientization through dialogue, was an important step needed to break the 'echo' of the dominant group and 'win the right to speak' (Freire, 1985). Here power was seen as being central to the helping process that enabled farmers to solve their own problems (Parsons, et al., 2001).

### **Challenging farmers understanding of pests**

As the research team acknowledged the social construction of knowledge they acted to challenge the farmers' (and their own) understanding of issues such as pest control, rather than just recommending the use of 'medicines' - as farmers refer to pesticides and insecticides - to solve pest infestation problems. To do this, the researchers worked with individual farmers who were experiencing pest attacks: As Millar and Curtis (1998) argue, working individually with farmers and catering for different learning needs is seen as a way of drawing out local knowledge and enhancing farmers' capacity to learn.

As an example, a meeting was held at which farmers were encouraged to bring artefacts associated with crop pests. Researchers collected these artefacts, including infected corn stalks, infected corn ears and caterpillars or other pests (if available) in order to explore causes of corn diseases. In dialogue with individual participants they were asked:

- To tell their story about the pest attack, so the farmer's perceptions about the pest could be grasped
- To describe the morphological appearances of the pest - colour, size, etc.
- To identify the pest through photographs presented to them

Farmers listed pests as *mai-mai* (refers to insects), *ulat* (refers to caterpillars), flour (refers to accumulated pests' eggs), snails and mice. However, the researchers found that farmers were confused when distinguishing between *mai-mai* and *ulat*. Sometimes the term *ulat* would also refer to *mai-mai*. For farmers, *ulat* was the most important pest. This may be because farmers' knowledge of pests was mostly based on the ease of observations and the importance of associated crop problems (Bentley, 1991). However, they were also aware of snail attacks on their beans. As they said

*"Snails are a very wicked pest. They cut our bean trees down.... we don't know where the snails come from. There used to be fewer snails in the village. Trucks pass by the village bringing the snails eggs.... Usually if we find snails in our field we destroy them manually.. but there were a huge number of snails last season and we feel frustrated trying to combat them..."*

Farmers were not sure about the causes of pests, but most of them thought that they came from the soil. As one farmer commented:

*"I don't know precisely what caused the disease (they were confused between 'pest' and 'disease')... but as I have observed, the disease first appeared when the corn began flowering.... If we don't take care, after two or three days we can find 'flour' on the leaf near the corn ear. They are disease eggs. When the wind blows, these eggs will enter the ears and will hatch and eat the ears..."*

The researchers then broke open the corn stalks and saw caterpillar tracks inside. They also found some caterpillars in the soil around the plant roots. However, the researchers did not explain about all the details of this "disease" to the farmers, because they felt that the farmers needed to take responsibility for their own learning and discovery; the aim was to stimulate thinking and to bring out the farmer's reflections of what they were learning. As a farmer said:

*"So, what we usually practice by leaving 'sick' stalks in our field is not quite right... it lets 'diseases' grow better and lets them eat our corn..."*



## Conclusion

This research has shown that farmers were eager to learn and understand some agricultural science principles and were willing to re-adjust their understanding of their social reality, as long as it was not beyond their capacity to learn through their collective consciousness. When beliefs and values fail to meet the challenge of experience a new theory emerged (Fussel, 1996). This research has also shown the importance of the researchers' learning about the indigenous knowledge of farmers, in order to participatively combine this with scientific knowledge to achieve a sustainable improvement in the farmers' situation.

## References

- ANTWEILER, C. (1993). Local Knowledge and Local Knowing. *Anthropos*. **93**, 469-494.
- BENTLEY, J.W. (1991). The epistemology of plant protection: Honduran campesinos knowledge of pest and natural enemies., In R.W. Gibson and A. Sweetwore (Eds). *Proceeding of a seminar on crop protection for resource poor farmers*. Isle of Thorns, West Sussex, UK, 4-8 November 1991.
- BERGER, P.L., AND TH.LUCKMANN, (1976). *The Social Construction of Reality*. Penguin Books Ltd. Harmondsworths.
- CACERES, D. AND P. WOODHOUSE, (1995). Not All Improvement Make Sense. *ILEIA Newsletter* **11**(4): 20-22.
- CARLSON, R.E. AND CHIANG, H.C., (1973). Reduction of an *Ostrinia nubilalis* population by predatory insects attracted by Sucrose Spray. *Entomophaga*. **18**:205-211.
- CHRISTOPLOS, I AND U. NITSCH, (1994). Extension and Learning. *Forest, Tree and People Newsletter*.**24** June.
- DE WALT, B.R., (1994). Using Indigenous Knowledge to Improve Agriculture and Natural Resource Management. *Human Organization*. **53**(2):123-131.
- ENGELEHOVEN, A. (1998). Epithets and Epitomes: Management and Loss of Narrative Knowledge in Southwest Maluku (East Indonesia). *Paideusis. Journal for Interdisciplinary and Cross Cultural Studies*. **1**: 30-40.
- FOX, J.J., (1991). The Heritage of Traditional Agriculture in Eastern Indonesia: Lexical Evidence and the Indications of Rituals from the Outer Arc of the Lesser Sundas. In P. Bellwood, (Ed.), *Indo-Pacific Prehistory Ass. Bulletin* **10**:248-262.
- FREIRE, P., (1972). *Pedagogy of the Oppressed*. Penguin Books. Harmondsworth, England.
- FREIRE, P., (1973). *Education for Critical Consciousness*. Seabury Press. New York.
- FREIRE, P., (1985). *The Politics of Education: Culture, Power and Liberation*. Bergin and Garvey Publishers. New York.
- FUSSELL, W. (1996). The Value of Local Knowledge and the Importance of Shifting Beliefs in the Process of Social Change. *Community Development Journal* **31**(1):44-53.
- GUDYKUNST, W.B., (1994). *Bridging Differences: Effective Inter-group Communication*. Sage Publications, New York.
- HAVERKORT, B AND D. MILLAR, (1992). Farmers' Experiment and Cosmovision. *ILEIA Newsletter* **8**(1): 26-27. March.
- HEIM, F.G., (1990). *How to work with Farmers. A Manual for Field Workers, Based on the Case of Thailand*. Verlag Josep Margraf, Germany.
- Heller, A., (1984). *Everyday Life*. Translated from the Hungarian by G.L. Campbell. Routledge and Kegal Paul Publication, London.
- MAPLE, E. (1973). *Superstitious:Are You Superstitious?* Wilshire Book Company. California.

- MILLAR, D., (1999). From T and V to Learning About Cosmvision in Northern Ghana. *Compas Newsletter*, February.
- MILLAR, J. AND A. CURTIS. (1998) Challenging the Boundaries of Local and Scientific Knowledge in Australia: Opportunities for Social Learning in Managing Temperate Upland Pastures. *Agriculture and Human Values* **16**:389-399.
- NATPRACHA, P. AND A. STEPHENS, (1991). *Taking Hold of Rural Life*. FAO, Regional Office for Asia and the Pacific (RAPA), Bangkok, Thailand.
- PARSONS, R.J., H. HERNANDEZ AND J.D. JORGENSEN, (2001). Integrated Practice : A Framework for Problem Solving. **In** J. Rothman, J.L. Erlich and J.E. Tropman (Eds). *Strategies of Community Intervention*. F.E. Peacock Publishing, Inc. Itasca, Illinois.
- RAEDEKE, A.H. AND J.S. RIKOON, (1997). Temporal and Spatial Dimensions of Knowledge: Implication for Sustainable Agriculture. *Agriculture and Human Values* **14**:145-158.
- RHOADES, R.E., (1984). *Breaking New Ground: Agricultural Anthropology*. International Potato Centre, Lima, Peru.
- RÖLING, N.G. AND ENGEL, P.G.H., (1991). Information Technology from a Knowledge Systems Perspective : Concepts and Issues. **In**: *Knowledge in Society: the International Journal of Knowledge Transfer*. Special Issue, February 1991, pp. 6-18
- SALAS, M.A.,(1989). *Extension and Indigenous Knowledge Systems in Conflict: Strengthening the Andean Knowledge System in Peru*. Institute for Sociology and Agricultural Extension, University of Hohenheim, Hohenheim, Germany.
- SCIEFELBEIN, J.W. AND CHIANG, H.C., (1966). Effects of Spray of Sucrose Solution in a Corn Field on the Population of Predatory Insects and Their Prey. *Entomophaga*, **11**:333-339.
- SCOONES, I. AND J. THOMPSON (EDS).(1994) *Beyond Farmer First : Rural People's Knowledge, Agricultural Research and Extension Practice*. Intermediate Technology Publication, London.
- SENGE,P.M., (1990). *The Fifth Discipline*. Random House Sydney Australia.
- SPRADLEY, J. P., AND D.W. MCCURDY, (1972). *The Cultural Experience: Ethnography in Complex Society*. Science Research Associates. Inc., Chicago.
- VAN EIJK, T., (1999). Science and Spirituality. *Compas Newsletter*. February.
- VAN VELDHUIZEN, L., A. WATERS-BAYER AND H. DE ZEEUW, (1997). *Developing Technology With Farmers : A Trainer's Guide for Participatory Learning*. Zed Books Ltd, London.
- VITEBSKY, P., (1995). From Cosmology to Environmentalism : Shamanism as Local Knowledge in Global Setting. **In** R. Fardon, (Ed)., *Counterworks : Managing the Diversity of Knowledge*. Routledge, New York.
- WARREN, D.M.L., L.J. SLIKKERVEER, AND S.O. TITIOLA (EDS). (1989). *Indigenous Knowledge Systems: Implications for Agriculture and International Development*. Studies in Technology and Social Changes Series. No. 11. Iowa State University Research Foundation. Iowa, USA.
- WATSLAWICK, P. (ED), (1984). *The Invented Reality: How do we know what we believe we know?* Contribution to Constructivism. WW.Norton and Company, New York.