Women's Wisdom

Documentation of Women's Knowledge on Ecological Agriculture in the Philippines, Indonesia and Pakistan

Pesticide Action Network Asia and the Pacific
(PAN AP)

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Comments and inquiries may be forwarded to:

Pesticide Action Network Asia and the Pacific (PAN AP)
P.O. Box 1170, 10850
Penang, Malaysia
Tel: (604) 6560381
Fax: (604) 6583960
Email: panap@panap.net
Website: www.panap.net

This book features articles and studies by various writers that have been credited within.

Editor in Chief: Sarojeni V. Rengam
Editors: Jennifer Mourin and Prabakhar Nair
Additional Editorial Input and Production Supervision: Ma. Johanna Busto Quinto
Copy Editor: Rudhrapathy Vijayavale

Cover and Inside Artwork: Rowena Bayon
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Foreword

I grew up in an extended family with my grandmother and great grandmothers and we were fed not only with stories of pursuits of gods and goddesses, heroes and heroines but also of families' experiences and life. Living with cousins, we as children were always into some mischief or other and inadvertently we would fall and cut ourselves or have a fish bone lodged in our throat or catch cold and cough. My great grandmother would clean the wound and quickly apply turmeric. I remember the number of times I had to swallow blobs of rice to dislodge the fish bone in my throat. A vile, horrible tasting concoction of two plants – the *tulasi* (basil) leaves and *kaparavalli* leaves - pounded and the juice extracted to treat my cough and cold. I shudder to remember the taste of this concoction. And most of the time we would also be dosed with tons of tender loving care of mothers, grandmothers, and the great grandmother. These home remedies were effective and did not cost anything. After some crying, often because the cure was even more horrible than the hurt, we would be running around happily and again get into some other mischief. I have good memories about my grandmother and great grandmother and home truths that I learned from them and live by. I have tremendous respect and awe about the life and hardship they faced as migrant women in another country not of their own. I have always wanted to document not only their life's experiences but the experience of women and their knowledge that has been handed over through the generations.

The struggle of women, their experiences and knowledge has often been left secluded and excluded by history, their voices silenced because these have not been documented, except maybe in the oral cultural traditions. Stories, life experiences, and local knowledge shared from daughter to daughter and so on. These should not be left forgotten.

Therefore, we take this opportunity to help keep alive women's knowledge in agriculture, as a tiny step to document and make available the rich, cultural, complex, holistic knowledge of women in agriculture. The idea for this came from a brainstorming session on women and pesticide issues way back

in 1994 and it developed into this effort to begin the documentation. Without Nasira Habib and Sudha Murali this idea would not have taken root and later we were joined by Vijayalakshmi. I hope that this is a start and that the vibrancy and depth of women's knowledge in agriculture could be further documented and made widely available not only in books but also in other visual media. Not only as knowledge for archives but as a living and utilised knowledge and that it would be an empowering tool for peasant and indigenous women and for all of us as women. That is a hope for the future!

Sarojeni V. Rengam
Executive Director
PAN AP

INTRODUCTION

Women's Wisdom: Documentation of Women's Knowledge on Ecological Agriculture

By Sarojeni V. Rengam

Through the ages, women have played a crucial role in agriculture and its development. They were involved in all aspects of agriculture – sowing, nurturing and protecting crops from pests, harvesting, selecting and preserving seeds for the next crop, soil enrichment and so on. They used local ecological resources in a balanced way and then regenerated these resources. Learning by experience, and experimenting and innovating when faced with problems, they developed a vast amount of knowledge and skills in agriculture over generations, and provided food security to millions of families.

In fact, their knowledge went far beyond farming, into the inter-related areas of food, clothing, medicine and health care. They developed techniques of storing, processing and preserving food; worked out varied recipes to suit the climate, seasons and health conditions; developed local medicines and methods for curing common ailments in the household and the livestock; and also methods of making clothing, again, according to seasons and the climate. Thus, they created a rich and holistic culture itself, which blended well with the local ecology.

This publication brings together the results of a participatory pilot study of women's knowledge in sustainable agriculture in collaboration with PAN AP'S network partners in Indonesia, Philippines and Pakistan. These three pilot studies are presented here to begin this essential and crucial documentation; to ensure that women's knowledge and skills in agriculture are made visible.

WOMEN AS CUSTODIANS OF SEEDS

The conservation of biodiversity and plant genetic resources is now widely recognised as crucial to food security. Women have a greater responsibility to feed and nurture their families and so have developed a special knowledge on the value and diverse use of plants for nutrition, health and income. In India, the Centre for Indigenous Knowledge Systems noted that in a study of two villages in Tamilnadu, women have intimate knowledge and understanding of the traditional rice varieties and their preparation, as well as in vegetable seeds (Vijayalakshmi, 1998). Another example comes from Rwanda where women produce more than 600 varieties of beans (Howard, 2003).

In Bangladesh, Farida Akhter has noted that, women always preserve and conserve seeds. In rural households, the general practice of sharing seeds among sisters, neighbours and relatives is already helping to enhance biodiversity and genetic resources, and therefore families have wide variety of foods which are entirely outside the market (Akhter, 2001).

Vandana Shiva asserts that women's knowledge in agriculture includes seed preparation which requires visual discrimination, fine motor coordination, sensitivity to humidity levels and weather conditions (Shiva, 1991). For example, sowing and selecting seeds call for knowledge about seasons, climate, plant requirements, weather conditions, micro-climatic factors, soil enrichment; sowing seeds require physical dexterity and strength (Shiva, 1991).

In addition to working in the fields, women have to not only ensure fuel, fodder, water, and food, but to also look after the emotional needs of their families - children, elders, and husbands. The nurturing; and caring; and reproductive responsibilities are a dimension that have never been computed economically, but are an essential and significant proportion of women's workload. Women's role as food producers is related also to their role as mothers, nurturers and care-givers in sustaining their families and communities. Their work is integral to the quality of life of people.

WOMEN CONSERVERS OF BIODIVERSITY

In Pakistan, KHOJ Research and Publication Centre documented the traditional agricultural practices in two villages, and reports that women see weeds not as a pest problem but as a source of food for humans and animals. Greens like 'Baathu' in the field of wheat were plucked and cooked in a 'greens' preparation that is considered a delicacy. The same plant is used in Yunaani[1] and Ayurvedic[2] systems of treatment for curing illnesses, especially stomach ailments. 'Saavari', 'Patraala' and 'Vissa' were the weeds that were offered to the animals.

Many rural women manage home gardens that contain high levels of diversity, which are models of sustainable land use (Huvio, 1999). A study in Nigeria found that women who cultivate intensive home gardens may grow 18 to 57 plant species, including tubers, legumes, grains and fruit-trees, in addition to raising dwarf goats and poultry (Huvio, 1999). Women may also make extensive use of wild patches and marginal areas of community lands where they collect wild plants for food, medicine, and seed generation (Huvio, 1999). According to Patricia Howard, experts analysing 135 different societies with various subsistence bases (including agriculture, animal husbandry, etc) demonstrated that women provide 79 per cent of total vegetal food collected (Howard, 2003).

The domestic sphere is the responsibility of women and women undertake tasks such as livestock keeping, poultry rearing, gardening, storage, processing of food, and post harvesting preservation. In fact, Howard states, "the kitchen and pantry are quite possibly the most undervalued sites of plant biodiversity conservation" (Howard, 2003).

Howard attests that women's local knowledge is complex, holistic, highly technical, innovative and responds to external and internal change. She portrayed women's multifaceted role as wild plant gatherers, home gardeners, plant domesticators, herbalists and seed custodians. (Howard, 2003)

[1]Yunaani healing can be traced all the way back to Claudius Galenos, 2th century AC, the basic knowledge of Yunani medicine as a healing system was collected by Hakim Ibn Sina (known as Avicenna). It is practiced in Asia especially India. In India, Yunani practitioners can practice as qualified doctors. Yunani medicine is similar to Ayurveda.

[2]Ayurveda or ayurvedic medicine is a comprehensive system of medicine from India, first described by Charaka around the beginning of the Common Era, and based on a holistic approach rooted in earlier Vedic culture. Ayurvedic healing includes herbs, nutrition, panchakarma cleansing, acupressure massage, Yoga, Sanskrit, and Jyotish (Vedic astrology).

Tunisian Women Innovate in Dryland Farming

Livelihood systems in central and southern Tunisia have changed radically in recent years. New production systems have replaced the traditional pastoralism and links between the countryside and urban markets are much closer. Rural women need more cash to satisfy new needs. Women innovate both to increase their income and to reduce their workload.

The Indigenous Soil and Water Conservation (ISWC) team at the Arid Zones Institute facilitated the identification of men and women innovators as a step to help improve and expand rural innovation in Tunisia and beyond.

Spheres of women's innovation

The women involved in the project were seen to be innovating in activities that concern them directly. The main economic activity of the 31 women innovators identified was farming, livestock keeping, and handicrafts making. Areas that the women innovated in were in animal husbandry; cropping; handicrafts; use of medicinal plants; efficient use of energy for charcoal making and improved stoves; and processing sheep and goat milk.

Handicrafts include making carpets and other products out of wool, weaving mats and other household items from alfa grass. Natural dyes are extracted from leaves, roots and bark. The oldest innovations – in handicrafts and medicines – are rooted in local knowledge but adapted (in design, materials, and use) to the new socio-economic context.

The crop-related innovations include fig-pollination techniques and using plastic bottles for irrigation. Mrs

Rgaya Zammouri of Médenine region, over 70 years old, uses 1.5 litre bottles to irrigate watermelons and melons. She buries each bottle upside-down in the soil. The cork has tiny holes in it made with a needle and the water infiltrates slowly near the roots of the plant. She fills the bottles from a cistern fed by run-off rainwater.

Hatching eggs without a chicken

Eleven women (35%) innovated in livestock keeping, specifically with sheep and goat feeding, as well as poultry, rabbit and bee keeping. For example, Mrs Mbirika Chokri, a 70-year-old farmer in Gafsa region, specialises in poultry and incubates chicken eggs in dry cattle dung. She puts the eggs with some straw in plastic bags to preserve humidity. Each bag has 16-20 eggs. She puts the bags in small holes dug in the manure and covers them with cardboard and a thin layer of manure. Each day she opens the bags to check the temperature of the eggs and to turn and aerate them. From day 20, the eggs start to hatch. She puts the chicks into a box to protect them from the cold and feeds them couscous, vegetables and bread. The idea came 5 years ago when one of her chickens, with eggs about to hatch, suddenly died. She put the eggs into a dung pile and they hatched after a few days. She decided to repeat this technique till she mastered it. She did not share her idea with neighbours, but accepted the ISWC team's request to present it in the "Agriculture and Innovation" programme on Gafsa regional radio and later on television. It aroused widespread interest among other farmers.

Extracted from the article, Innovation by Tunisian Women in Dryland Farming by Noureddine Nasr, Bellachheb Chahbai and Ali Ben Ayedpublished in ILEIA Newsletter, July 2000.

WOMEN AS TRADITIONAL VETERINARIANS

Women are the authority on the interface of livestock keeping with farming in South Asia. In Pakistan, as highlighted by the research of Nasira Habib of KHOJ in Chapter 1, eighty per cent of the livestock management is borne on the shoulders of women. They display a sophisticated knowledge of animal diseases and how to cure them. They can instantly volunteer information of countless recipes on how to prepare medicines for prevention and cure. While being active in these spheres, they do not suffer from the specialist syndrome. On the contrary they have integrated different aspects of agriculture, culture and religion in a creative manner - in a way that makes agriculture a way of life that has accommodated diverse aspects of human life in a creative unity.

WOMEN'S WORK IS MULTIFACETED

In Southeast Asia, women's work is also multifaceted and diverse. Women provide up to 90 per cent of labour for rice cultivation. In Thailand (Department of Agriculture Extension, 1987), women do extensive work in agriculture; about 50 per cent of the work involves plant protection, harvesting, field crop cultivation, horticulture and almost 80 per cent in soil improvement. Almost 90 per cent of the work in inland fishing and almost all the work in vegetable and home gardening; in food preservation and food production, as well as in mulberry tree growing and silkworm raising; are carried out by women.

LOCAL KNOWLEDGE: HOLISTIC AND SUSTAINABLE

Rituals and symbolic practices are important elements in local knowledge and rural women, men and indigenous communities have kept these practices alive even now. It is not surprising that traditional farming communities had a deeper understanding of nature, as well as the relationship of humans and nature, since agriculture has been practiced for 10,000 years. This relationship of the oneness of creation is a deep-seated belief of many rural and indigenous communities. Rituals and

symbolisms were therefore an important part of this relationship. Many of these rituals are now understood to be functional. For example, in India a ceremonial germination test or 'Negilu Pooje' was conducted before sowing the seeds. Before seeds are stored, women evoke the forces essential for a good crop and this ritual is an important part of seed preservation (Ramprasad, 1999). In Chapter 2, SIBAT (Wellspring of Science and Technology) documents the ceremonies of indigenous communities in the Philippines at every stage of planting of rice and other crops.

This holistic concept that encompasses the spiritual, human and natural world continues to be of major importance for farmers and rural and urban people (Haverkort and Hiemstra, 1999). This concept has been defined as cosmovision by COMPASS, a network of partners in ten countries in Asia, Africa, Latin America and Europe. Cosmovision is described by COMPASS partners as the relationship between the spiritual world, the natural world and the social world (Haverkort and Hiemstra, 1999). This worldview was often an integral part of rural communities' local knowledge and practices.

Overall, much of the traditional rural life and agricultural production was self reliant and rich in spiritual practices, and worked harmoniously with nature, ensuring sustainability of land, water and inputs. The systems practiced took a view of minimum interference by keeping the systems complex and inputs used were renewable and sparingly applied (Pereira, 1993). These local practices were complex; the crops were free of pests and free from diseases. Soil fertility was a major focus and diverse soil management practices were developed to suit the environment as well as maximising local renewable resources including compost and manure. Farmers were constantly innovating to suit the local changes. It was noted that Indian farmers could continue farming for more than 2000 years without a drop in yields (Pereira, 1993).

However, traditional rural life was also not completely harmonious. Class, caste and gender conflicts and discrimination were embedded in rural traditional life, and much of this continues both in urban and rural environments without change.

GENDER DISCRIMINATION

Peasant and indigenous women contribute tremendously in food and agricultural production through their toil, knowledge, and their nurturing capacities. Even so, women are discriminated and their contribution remains unacknowledged and they continue to play secondary roles in the social, cultural and spiritual life of the community. As can be seen in the three case studies in this book, women's contribution and knowledge remain invisible and their leadership within the community is almost non-existent although they are beginning to organise themselves.

Women are of course not a homogenous group and generalising women's discrimination may be limiting. Because women come from all walks of life, they are "attached" to certain men due to their economic or social situation. So if they belong to a dominant or ruling class they feel solidarity with the men (fathers, brothers and husbands) of that class rather than to poor women or to Dalit women. If they are from a certain race, they are going to be attached to the men of that race.

Gender discrimination therefore has to be understood within this context of women's further oppression and exploitation due to their class, race, caste and ethnicity. Assessing the situation in the Philippines, the book, "Resisting Poisons, Reclaiming Lives! Impact of Pesticides on Women's Health", notes that "22 families control 65 per cent of the nation's wealth and 90 per cent of peasants who work the land own only 10 per cent of all titled lands. In such an unjust system peasant women are oppressed not only because they are women but also because of the oppression of landlords who influence and work with the political and the economic systems." (Rengam and Bhar, 2006). In addition it also notes that, "Dalit women in South Asia are oppressed because of their caste. Around 160 million Dalits are considered "untouchables" in a system that they are borne into; and are thought of as "unpure"; and are treated as less than human. Dalits are given the lowest, menial jobs; are humiliated; beaten and raped by so called upper caste people. They make

up the majority of the poor and illiterate in India. Constantly living in fear for their lives, livelihood, well-being and personal security, Dalit women continue to eke a living, feed their families, and provide a roof over their heads". (Rengam and Bhar, 2006).

However, the trends of gender-specific discrimination, disparity and the unequitable distribution of resources to women continue to exist, given the reality of the tremendous diversity of women's experience and situation. "Even today", writes Simone de Beauvoir, "the woman is heavily handicapped though her situation is changing" (De Beauvoir, 1997). Legally, women are discriminated and often disadvantaged. De Beauvoir continues, "Even when her rights are legally recognised, the social and cultural norms prevent their full expression in the mores." Rural women rarely own property or own land, and have very little access to productive resources. Even when her right to own property is recognised by law, culturally and socially her right is not guaranteed.

Women are paid less for the same job that men do. Their upward mobility is more restricted and opportunities to advance are also limited. In all spheres of life from politics to business to farming, men monopolise positions of power.

Women in agriculture often do the most repetitious, back-breaking, menial, hazardous work, in addition to working longer and harder. Weeding, planting, and sorting in the fields as well as the kitchen garden are often their responsibility. In the case of rice planting, they work for hours standing and squatting in water. In addition to this, they are also often involved in activities such as land clearing, ploughing, harvesting, threshing, and using implements that require huge expenditures of human energy. Girl children start working in the fields at a very young age often in hazardous situations. For example, about 250,000 girl children between the ages of 10-14 are employed in the cotton seed industry in Andhra Pradesh, India. Favoured for their nimble fingers and docile nature, these girl children are exposed to large amounts of pesticides and suffer many ailments that could be related to their exposure to pesticides. They also work long hours and are paid very, very low wages.

While women's labour, knowledge and hard work feed her family and community, the discrimination she faces ensures that she is the last and least to eat (Rengam and Bhar, 2006). These gender biases make women in the rural sector undernourished. Worldwide, there are 450 million women who are undernourished compared to 400 million men. In addition, women with anaemia (iron deficiency) total 458 million compared with 238 million men (Valls-Llobet, et al, 1999).

Frequent childbearing exacerbates women's health problems in many countries. Most women work until late into their pregnancies but are not given any special care, neither do they receive extra food or rest (Kane, 1999). Due to traditional roles, pregnant farm workers in China continue to work in the fields despite their medical condition or stage of their pregnancy, making their situation all the more risky. Women in rural Pakistan, for instance, frequently carry water over long distances and over difficult terrain, these being linked with increased rates of miscarriages (Kane, 1999).

With this backdrop of gender discrimination, the richness of women's local knowledge and livelihoods are not recognised by their own communities and families, let alone by conventional agricultural scientists and development experts who fail to see the connection of women's knowledge, work and skills with ensuring community food security and the creation of wealth.

DOMINANT VALUES AND KNOWLEDGE

The onslaught of the externally imposed "modern" agriculture has destroyed the richness of Asian agriculture, and eroded the knowledge base and skills accumulated from experience and experimentation over centuries. The invisibility of women's knowledge in ecological agriculture and its erosion and disappearance was further aggravated by this onslaught.
Historically, European contact with Asian local communities, particularly colonisation, was self serving, violent and involved the transformation of agricultural productive systems to satisfy the needs of the colonisers to exploit natural resources and for international commerce. Both of which were basically for profits.

During the middle ages in Europe, independent women who were healers and herbalists, who worked with the natural environment and gathered medicinal plants, were accused of being witches. Ceremonies and rituals that were part of the rural landscape were also branded as witchcraft. The women involved in these activities became the focus of intense persecution. Women were burned and killed, believed to be as witches by the Spanish Inquisitors or persecutors.

The post-inquisition Spanish and Portuguese explorers then took the fervour for "God, Gold and Glory" as the basis of European plunder of Asia, Latin America and Africa. Many of the colonisers forcefully converted local communities into Christianity. And "often altered the symbolic and ritual bases of agriculture in non-western societies" (Hecht, 1995). According to Hecht, "These modifications transformed and often interfered with the generational and lateral transfer of local agronomic knowledge. This process along with slaving, diseases and the frequent restructuring of the agricultural base of rural communities for colonial and market purposes, often continued to the destruction or abandonment of the hard technologies such as irrigation systems and soft technologies (cultivar types, cropping mixes, techniques of biological control and soil management) of local agricultures, which were far more dependent on cultural forms of transmission" (Hecht, 1995).

In addition, the loss of local knowledge was further aggravated through a process of ridiculing local knowledge as superstition, since it was rich with symbolic practices and rituals. Local knowledge was rarely studied or understood by western scientists. It was seen as non-scientific, hence without any rational basis and was not systematic. Hecht elucidates clearly, "this position of (equating this knowledge as superstition) coupled with an often derogatory view of the abilities of rural people generally and colonized population in particular further obscured the richness of many rural knowledge systems whose content was expressed in discursive and symbolic form." (Hecht, 1995)

Local knowledge had been systematically undermined by colonial history and the advent of the industrial age in Europe hastened this process of erosion of knowledge. It was at this time in the seventeenth century that the western concept of science came to be widely accepted and the dominant knowledge system. The western concept of science held the view that the world functioned as a machine. Although western scientific concepts have changed with new understanding of human and nature, the mechanistic world-view has had a tremendous dominating impact on the world in terms of development and thrust of technology. On the other hand, perceptibly 'contradicting' local knowledge systems have stressed the oneness of all life in the planet and the world as a living, organic entity.

The impact of this systematic undermining of local and indigenous people's knowledge has not only been the slow destruction of their culture and way of life, but has also contributed to their low self esteem, the alienation of the youth and for many, a loss of pride in their rich cultural heritage.

Corruption of Science

Western science, to differentiate it from local knowledge (since local knowledge is also science), was promoted as being rational, systematic, objective and non-political. It has developed technology that makes life easier for us. It is seen to be above society and it is seen to be always true.

Lewontin repudiated this belief or "ideology" and explains that, "science, like the Church before it, is a supremely social institution, reflecting and reinforcing the dominant values and views of society at each historical epoch" (Lewontin, 1991). He goes on to explain that it is sometimes the social experiences that influence the development of scientific theory; and that scientific theory is a direct translation of social experiences. He cites as an example, that Darwin's theory of evolution was influenced heavily by Thomas Malthus in Essays on Population. "The essay was an argument against the English Poor Law, which Malthus thought was too liberal, and in favour of a much stricter control

of the poor so they would not breed and create social unrest", explains Lewontin. "Darwin", according to Lewontin, "took the early-nineteenth-century political economy and expanded it to include all of natural economy..... In fact, Darwin's whole theory of evolution by natural selection bears an uncanny resemblance to the political economic theory of early capitalism."

Another example put forward by Lewontin is on hybrid corn (Lewontin, 1991). Hybrid corn is produced when two true-breeding inbred varieties are crossed and the seed from these are planted. Obtaining the inbred varieties requires a long process of self pollination until a genetically uniform variety is produced. The hybrid corn produces high yields as compared to the open pollinated varieties. However, if the seeds from the harvest of the hybrid corn is kept and planted out, the yields will drop dramatically. And this is what the corporations want. Farmers are thus forced to buy the hybrid corn seed from the said corporation. But this begs the question of whether hybridisation is the superior method for agricultural production. There are of course alternative methods of production, as Lewontin puts it, by selecting high yielding plants from each generation and propagating these. However, no corporation will be interested in undertaking such research or development because there are no profits in this endeavour. Interestingly, one of the biggest seed corporations, Pioneer hybrid seed company, was founded by Henry Wallace to promote and market hybrids when he saw the huge profits that could be earned. When he became the Secretary of Agriculture of the US, hybrids became widely introduced and used in the US and Canada. These are now being advanced as the most scientific methods to increase productivity and feed the hungry all over the globe. But behind this "pure science", it disguises the narrow, vested interest for profits.

It is quite clear that the claims of science being objective and non-political are really a myth. Science is a tool that is used by those in power to direct its course in terms of research and technology for economic gains.

Egilman and Bohme argue that "to that extent that science is carried out by and for corporations, it becomes subject of the corporate logic of profit maximization." (Egilman and Bohme, 2005). In the issue of the International Journal of Occupational Environmental Health entitled, Corporate Corruption of Science, they and other writers cite numerous cases of how science in the hands of corporations, is used to manipulate data and analysis, hide evidence, and influence public opinion in order to maximise profits. They show the failure of science and governments to protect human health and environment, and instead these have become a tool for promoting industry's pursuit for wealth and profits.

A more recent "scientific" advancement, i.e. genetic engineering in food and agriculture, is touted repeatedly by corporations such as Syngenta and Monsanto that it would "Feed the World". However, genetic engineering (to differentiate it from other biologically-based technology) has not gone through the required health and safety tests, and poses the threat of large-scale environmental contamination. Meantime, critics of the technology, as well as scientists who highlight or publish studies that this technology is dangerous and environmentally unsound, are systematically discredited, harassed or silenced. Another concern is the push for the commercialisation of another genetically engineered technology, dubbed as "terminator technology", due to the fact that it is being created to induce sterility in the offspring of the 'mother' seed, thus terminating any possibility of a second generation of crops. US seed company Delta & Pine Land and United States Department of Agriculture developed the technology to make the act of seed saving redundant. This has the potential of adversely impacting more than 1.4 billion farmers who depend on self saved seeds. Terminator technology is also called Genetic Use Restriction Technology or GURTS. Terminator has not yet been commercialised or field-tested but tests are currently being conducted in greenhouses in the United States.

A few transnational corporations hold patents on Terminator Technology including Syngenta, Monsanto, Delta and Pine Land, Dupont and BASF. Many of these corporations also control the pesticide and seeds markets. According to the new ETC (Action Group for Erosion, Technology and Concentration) report, Oligopoly, Inc. 2005, global agrochemical sales (herbicides, fungicides and insecticides) reached US$35,400 million in 2004. The top 10 companies accounted for 84% (US$29,566 million) of the total market. The top six companies control 71% of the pesticide market; the top 2 control over one-third (ETC Group, 2005).

Table 1. Top 10 Pesticide Firms*

COMPANY	AGROCHEMICAL SALES 2004 (US$MILLIONS)	%PESTICIDE MARKET SHARE
1. Bayer (Germany)	6,120	17%
2. Syngenta (Switzerland)	6,030	17%
3. BASF(Germany)	4,141	12%
4. DOW (USA)	3,368	10%
5. Monsanto (USA)	3,180	9%
6. Dupont (USA)	2,211	6%
7. Koor (Israel)	1,358	4%
8. Sumitomo (Japan)	1,308	4%
9. Nufarm (Australia)	1,060	3%
10. Arysta (Japan)	790	2%

**Extracted from ETC Group 'Communiqué, Global Seed Industry Concentration – 2005, September/October 2005*

Another ETC report (ETC Group, 2005) notes that the top 10 companies control half of the world's commercial seed sales with a total worldwide market of approximately US$21,000 million [$21 billion] per annum. The corporate concentration and control of the seed particularly genetically engineered seeds in the hands a few transnational corporations, has tremendous implications to the global food security.

This clearly indicates the subversion of science as a tool for corporate greed and not to "Feed the World". There are more than 840 million people who suffer hunger and malnutrition most of whom are in Asia but technological solutions such as genetic engineering cannot solve these problems. It is only by redistributing wealth, ensuring fair wages, genuine agrarian reform, and overall political and social transformation that the world's hungry will be fed.

Patel, et al, describe how Monsanto, an agrochemical and seed corporation, has used various strategies to claim that their products are safe even though concerns over the health and environmental impacts of genetic engineering still remain (Patel, 2005). Scientists whose studies highlight problems with the technology have been systematically discredited.

The promotion of such technology will destroy biodiversity. Shiva (Shiva, 1998) points out that genetically engineered Round-Up-Ready Crops of Monsanto (crops that are resistant to Round Up, a herbicide) will not only destroy the diversity of crops but also promote the increasing use of pesticides. Pesticides poison human health and the environment and every year an estimated 25 million agricultural workers are being poisoned and many others suffer a litany of chronic diseases.

Given this reality of domination of science by corporations, it is not surprising that not only local knowledge but also women's knowledge in agriculture have become systematically marginalised thus, eroding the base of whatever little power rural people and particularly women have had traditionally.

GLOBALISATION AND THE PATENTING OF LIFE

The recent developments of globalisation have major adverse impact on women's knowledge in ecological agriculture. Globalisation in agriculture has intensified the development of the cash crop economy that perpetuates monocultures and high input agriculture. It has also intensified the control of agriculture production and distribution, and inputs into the hands of a few Transnational Corporations (TNCs). Introducing monocrop agriculture has wiped out the wide varieties of plants and crops the farmers had nurtured. The imposition of this development by governments and rulers were for various reasons.

In Indonesia, as documented in the case study by Hesti Wijaya, small farmers were forced to plant high yielding rice varieties for fear that they would be accused of being communists and punished for it. This "modern" agriculture has destroyed the natural resources on which traditional farming depended on, and brought in external commercial resources such as chemical fertilisers (in place of natural manure and good soil management), chemical pesticides (in place of ecological pest control based on farmers' sound knowledge of the local ecology and the ecological processes) and commercially grown seeds (in place of indigenous seeds selected and prepared by women). The new agriculture imposed ready external solutions for all farming problems such as soil fertility and crop protection, which eventually aggravated problems instead of solving them. And finally, by taking away the autonomy of the traditional farmers, it created total dependency on the market for agricultural inputs, which eventually turned into a crisis when the market failed to provide these inputs or pushed them beyond the farmers' economic reach. Women's role in agriculture was marginalised in this new high external-input, market-oriented system.

Further marginalising peasant women and men are the intellectual property rights regimes that are being advanced by multilateral (such as the WTO) and bilateral trade and investments agreements. Databases of genetic information are now proprietary rights of individuals and corporations through patenting. Patents on human, animal and plant genetic

material number in the millions. Local knowledge is now up for grabs by biotechnology corporations. For example, the neem tree's anti-bacterial and insecticide properties are now patented by various US and Japanese corporations (Godrej, 2002). There is the Trade-related IPR (TRIPs) under the WTO agreements but there are also TRIPS-plus included in bilateral agreements. "TRIPS-plus" refers to any requirement to provide stronger intellectual property protection than required by the World Trade Organisation's TRIPS Agreement (GRAIN, 2003). WTO TRIPS is considered the international minimum standard.

Patents are basically all about profits. Godrej hits the nail on the head when he succinctly summarises, "serving Western multinationals under a cloud of development rhetoric, TRIPs has done little for useful technology transfer, but much in terms of criminalising people using their communal knowledge and legalising corporate theft" (Godrej, 2002).

The proponents of IPR systems claim that this will ensure long-term increase of knowledge in the public domain based on the assumption that private domain will ensure individual ownership and that economic incentives will encourage individuals to innovate. However, these assumptions are false in the context of the realities of local and indigenous communities. In fact, local communities have for thousands of years developed knowledge systems about their environment. This collective knowledge is public knowledge and therefore is vulnerable, as it can be privatised or owned by an individual. As such, collective knowledge is seen as a "free-for-all" and the IPR regimes are now increasing the pressure to allow outsiders to document, commercialise, and utilise the biodiversity and knowledge held by local and indigenous communities. In addition, communities have been innovating for centuries without compensation or monetary rewards.

"The IPR system is really very different from those of most indigenous peoples' concepts of knowledge 'ownership'." stressed Marcus Colchester of the Forest People's Programme. He stressed that, "Indigenous people and women are asserting their right over their traditional knowledge and biotechnologies

and this assertion is part and parcel of indigenous demands for the right to self-determination" (Colchester, 1994).

RECLAIMING WOMEN'S KNOWLEDGE

While there are concerns over the IPR regimes and the objective of commodification of local and indigenous communities' knowledge, it is nonetheless important that documentation of women's knowledge is undertaken so that it is not lost or that it does not disappear. It is important that the significance and vitality of women's knowledge of agricultural systems should be recognised, but it is equally important to document and bring on record that knowledge so that it can be used as a tool for women's liberation. Documentation of women's knowledge alone is not enough and may be perceived as an extractive process. Documentation has to go hand in hand with discussions and consultations with women and with the communities on the integration of this knowledge within local farming systems. Being able to conserve, innovate and utilise this knowledge within the existing system is the ultimate, in terms of the sustainability of women's knowledge, and will be a test of its appropriateness and relevance. Another aspect of documentation is the documentation of women's struggles and responses to life's problems. The process of such documentation itself could be part of the process of empowering women. Finally, it is crucial that this knowledge is protected. Peasant and indigenous women and men should be guaranteed their rights for food sovereignty including rights over their biological and natural resources and traditional knowledge.

Documentation is required so that:

- The knowledge of centuries is not washed away and forgotten
- The contribution of women is systematically recognised and publicised
- Women's history, their past struggles, sufferings are captured and this would lead to collective women's consciousness that would provide firmer basis for struggles of women's emancipation

- Women's knowledge can provide a basis and theoretical framework for a pro-human agriculture

It is with these factors in mind that PAN AP has initiated, in collaboration with network partners from India—Centre for Indian Knowledge Systems (CIKS); Pakistan—KHOJ Research and Education; and Indonesia, a participatory action research pilot study project on women's knowledge on sustainable agriculture. A year later, SIBAT from the Philippines joined in the collaboration. CIKS research and documentation has been published separately as booklets, posters, postcards and even video documentation in order to ensure quick and immediate distribution and wide utilisation.

A series of workshops were organised by PAN AP in Penang between 1998-2000 to discuss the concept and framework for the pilot study, and the methodology for data collection and compilation, and utilisation of the data in the reports.

These initiatives would help rural women to develop viable and sustainable agricultural systems that could support even future generations. Going beyond that, such documentation will help trace the history of women's involvement in agriculture and record their struggles and achievements, contributing to women's collective consciousness and strengthening today's struggle for women's empowerment.

Food security and sovereignty must begin with women farmers and be built on their knowledge and experience. Formal scientific systems have to nurture and work with farmers in complementary, equitable and non-exploitative collaboration to take up the challenge of achieving global food security and sovereignty. Women farmers, with their knowledge systems and innovation, have much to contribute here. And these pilot studies will hopefully be the beginning of a more in-depth learning collaboration with women farmers in sustaining and building on their experience, knowledge and innovating capabilities which are vital to the future of our foods, our health and our planet.

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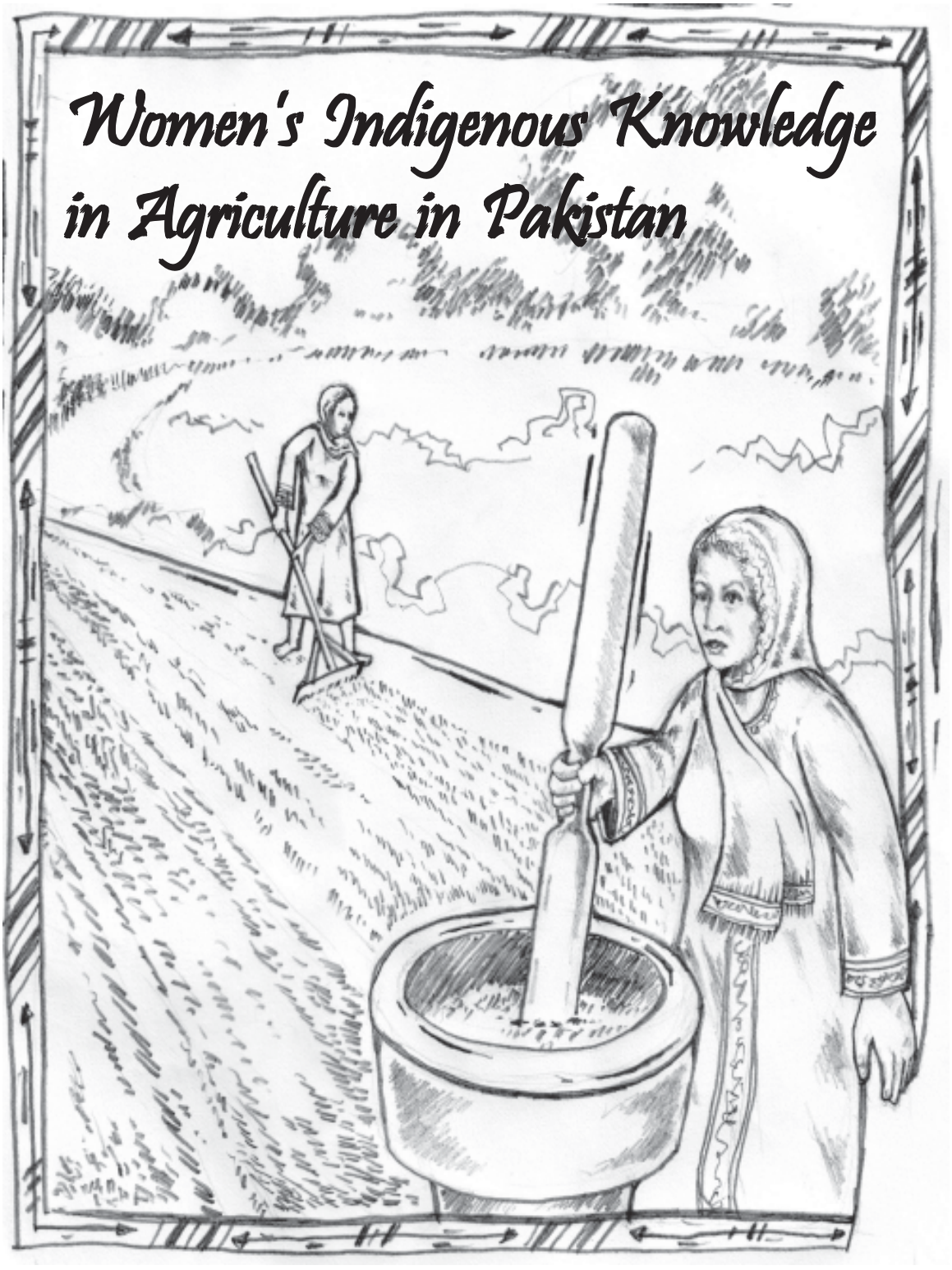
Women's Indigenous Knowledge in Agriculture in Pakistan



Women's Indigenous Knowledge in Agriculture in Pakistan

By Nasira Habib

"Pulses, chillies, vegetables, millets, wheat, everything was home-grown. Now what do we have? Wheat that is full of poison! "
Faiz Bibi,a farmer from Sojhla Taanvri Village

"Today's food is food of hunger."
Anwar from Sojhla Taanvri Village

The Green Revolution was introduced in Pakistan in the 1960s. In 1992-1993, a cross-country study was done by KHOJ, a non-governmental organisation, on behalf of Pesticide Action Network — Asia and the Pacific (PAN AP) on the concrete role of women in agriculture and to assess the impact of chemical pesticides on farming communities, especially on women. The FAO Code of Conduct on the Distribution and Use of Pesticides was used as a yardstick to monitor the ground reality.

During the course of the study, the following issues were raised most frequently and forcefully by both men and women farmers:

- Problems of plant protection, soil degradation, environment and human health were never so acute and so widespread before the advent of chemical pesticides, chemical fertilisers and other technologies of the Green Revolution.
- The indiscriminate and aggressive use of chemical inputs was responsible not only for soil degradation, immunity in pests, and more frequent and larger-scale pest attacks but a gradual decrease in production as well.
- There is an urgent need for alternatives to the Green Revolution inputs and technologies.
- Household food security and the health and well-being of the family have become a much graver concern among women.
- In their conversations, the farmers always made a comparison between agriculture now and in the earlier days and concluded that they had to face fewer problems in the pre-Green Revolution era.

These findings provided a strong reason to document the experience and knowledge of farmers, especially women farmers, and also look at how they have been managing the needs of food and clothing in the post-Green Revolution period.

THE METHODOLOGY

- A total of 30 women and men (15 each) respondents from two villages of South Punjab — Chak 118-6R in Haroonabad and Sojhla Taanvri in Ahmad Pur Sharqia[1] — were interviewed in depth.
- Farmers around 60 years of age were selected so that indigenous knowledge that had roots in their experience could be assessed.
- A questionnaire was designed to serve as guidelines for the interviews.
- After in-depth individual interviews, group discussions were held with women and men farmers. Field observations were also noted.
- Farmers owning less than 12 acres of land and landless practising agriculture (tenant-farmers) formed the sample groups for the study.

The following is the classification according to the 1990 Census of Agriculture[2]:

Small Landholder	5 to 12.5 acres
Medium Landholder	12.5 to 50 acres
Large Landholder	50 acre and above

AREA PROFILE

Sojhla Taanvri village (10 km off the main road), is 20 km from the nearest town Ahmad Pur Sharqia and 70 km from the district headquarter of Bahawalpur. Bahawalpur is the district of Sojhla Taanvari. This village is in Ahmad Pur Sharqia tehsil. The Taanvri tribe had established this village. Coming most probably from

[1] Haroonabad is one of the tehsils or sub-divisions of Bahawal Nagar district and Ahmad Pur Sharqia is one of the tehsils or sub-divisions of Bahawalpur district.

[2] Five acre is the minimum recognized economic landholding. A farm less than 5 acres in size is not considered economically viable.

Sindh province; they had settled here because of the rivulets of Satluj River. In 1926, headworks were constructed under the Satluj Valley Project, and the area around Ahmad Pur Sharqia fell at the tail of the canal. The village has an estimated population of around 2,000; the average household size is 6.5. According to the 1981 census, the women-to-men ratio was 569 to 632. Among the women, not one has attained the educational level of Grade 10. The overall population's rate of literacy is 6.3 per cent.

The village Chak 118-6R is 23 km away from the nearest town Haroonabad. The village was established under the 1919 Settlement Scheme. The population consists of Punjabis who had been practicing farmers. These farmers migrated from different parts of Punjab in search of better fortunes. At present, the village is facing the problem of severe water logging, among other problems.

The total area of the village is 2,050 acres (the cultivated area being 1,381 acres) and the population is estimated to be around 2,500 people. According to the 1981 population census, the women to men population ratio is 763 women to 812 men. There are six women in the village who come under the category of grade 10 and above in education. The overall rate of literacy is 25.2 per cent. The average household size is 6.8.

The Significance of Women's Knowledge

Current theories of knowledge, work and development have marginalised women's contribution to the development of knowledge. We need to redefine and re-interpret these theories so that women's contribution to this sphere could be brought into the mainstream and into development planning. For this, a pre-requisite is to give up the elitist abstract thinking, narrow-mindedness and the arrogance of the academicians and theoreticians. Knowledge is not the privilege of professional thinkers and scientists but has its roots in the living social, cultural, political and economic processes. We need to learn from life itself with its emotional and spiritual dimensions. If we take these

factors into consideration, women's vast knowledge and experience and their contribution to the development of knowledge itself will become more visible.

Coming to the sphere of agriculture, such a definition of knowledge would put women at the forefront of the crucial function of sustenance of life. Women perform the whole range of work in agriculture — farming, livestock-keeping and post-harvest work, including storage, processing and preparation of food. According to a recent survey conducted in a cotton-growing area in Pakistan, women are involved in more than 60 major on- and off-farm activities, not mentioning the countless related chores.

> *"In all work, women always work side by side with us", says Ghulam Hussain, a farmer and a respondent in this study. "When we ploughed the field, they collected grass and weeds. When we tended the animals, they worked on the spinning wheel. They ginned the cotton and spun the thread. And they hand-stitched the clothes for the whole family."*
>
> *"Men and women together harvested the millets. Women separated the pods. The pods were threshed using bullocks, and then the women separated the grains and the husk using a winnow. Wheat was also harvested similarly. There were no threshers those days. Also, all sick animals were treated at home and women generally prepared the medicines".*
>
> *When asked why he had three wives, Ghulam Hussain was candid. "Wives earn for themselves. That's why the more wives a man has; the better it is for the family. I work and they work. That is how we earn bread for our children."*

Obviously, one needs to have the skills and the knowledge to carry out all these farm-related and household activities. Through these activities, women have developed sophisticated knowledge about seed preparation, germination requirements, soil structure and soil conditions, soil maintenance, weather conditions and seasons, the time for harvesting, grading of the

produce, and preservation and storage of the produce. They are also an authority on the interface of farming with livestock-keeping; eighty per cent of the livestock management is handled by women. They have sophisticated knowledge of animal diseases and how to cure them. They can instantly volunteer information on countless recipes for medicines for both the prevention and cure of these diseases.

Yet, though active and knowledgeable in all these areas, they do not suffer from the specialist syndrome. On the contrary, they have easily integrated the various aspects of agriculture, culture and religion in a creative manner — in a way that makes agriculture a way of life which has accommodated diverse aspects of life in creative unity. Their work is thus integral to their lifestyle.

Modern agriculture not only ignored this tremendous contribution of women but tried to systematically marginalise it with the introduction of new philosophies and technologies, eroding the base of whatever little power women had traditionally. They are now seen as raw hands in handling these new technologies.

Green Revolution technologies have been globally criticised for their negative effects on productivity, soil structure, toxicity, cost-effectiveness, etc. The following passage from Maria Mies (a researcher and writer from Germany) about what a woman in Germany told her, paints a comprehensive picture of the disasters of Green Revolution technologies. "In Germany, it was no longer safe to breastfeed a baby for longer than three months as mothers' milk was poisoned", the woman told Maria Mies. "As a solution, she suggested starting a project in South India for the production of safe and wholesome baby food. There, on the dry arid Deccan plateau, grows a special millet called *ragi*. It needs little water and no fertiliser and it is poor people's cheap subsistence food. This millet contains all the nutrients an infant needs. This woman suggested that *ragi* should be processed and canned as baby food and exported to Germany. This, she said, should solve the problem of desperate mothers whose breast milk is poisoned."

This shows the poverty of modern agriculture. In fact, **what else can be expected from a system that has become a systemic threat to human life?**

It is therefore important that the significance and vitality of women's knowledge of agricultural systems be recognised and it is equally important that this knowledge be documented and brought on record so that it can be used as a tool for women's liberation. Documentation of women's knowledge can become a documentation of their struggles and responses to life's problems. Documentation is required so that —

(i) The knowledge developed over centuries is not washed away and forgotten

(ii) The contribution of women is recognised and brought to the light of day

(iii) The documentation and dissemination of information on their history and their struggles and sufferings leads to the building up of women's collective consciousness which will in turn provide a firmer basis for future struggles for women's emancipation

(iv) The knowledge provides a basis and theoretical framework for a pro-human agriculture.

Women's Perception of Old and New Agriculture

According to the respondents, *old agriculture was inexpensive and helpful in many ways,* whereas today everything is based on money and the market. One needs money for everything – for farming as well as to provide for other family needs. Earlier, farming was not dependent on money. "It took birth from us, from our bodies."

Today's agriculture also *promoted materialism and alienation* through the aggressive marketing of the Green Revolution practices. Overemphasis on marketability is one of the most pronounced outcomes of the new system. Though eradication

of poverty and hunger was the claimed objective of the new agriculture, greed actually replaced the older values and everything was weighed in terms of its monetary worth. Now, the landless women complained, landholders do not even allow them to collect weeds from their fields, and weeds were a vital source of food for their animals. So now it is difficult for them to keep livestock because "animals now eat money" which is not easy to provide, said one woman.

In the olden days, food was abundant and nutritious and people were healthy, according to the respondents. But now things have changed. There is "no energy and substance" in the food. As a result, people are suffering from poor health. "In the past, eating just greens with *roti* (unleavened bread), we were healthy. Now, even after having milk and butter our health is poor." There is no starchy element in the new wheat. The bread becomes hard in no time and there is no taste in it, and it does not look as good as it used to. Bread from the older varieties of wheat was softer, tastier and could be eaten even after two days, and was "full of energy". Women especially expressed grave concern about the low quality of food and its proneness to cause diseases. One woman from Chak 118-6R said: "On one acre of potato crop, ten bags of chemical fertilisers were used. Obviously, those chemicals were in the vegetables. We cooked these potatoes and ate them. Next morning, every one in the family complained about some ill-tasting watery stuff in the mouth. These are poisons which are destroying our health."

Earlier, they grew a range of crops and consequently had variety and diversity in food. In addition to wheat, *bajri* (a millet) and pulses, they had three very different varieties of *jawar,* also a variety of millet, i.e., Naangri, Chena and Saanvak. The processing, preparation, recipes for cooking and the taste of these three varieties were very different. The recipes showed a profound knowledge of the grains, their nutritional values, the kind of processing required, the appropriate time for cooking, etc.

THE FOLK WISDOM

Because of the onslaught of the dominant powers, the indigenous knowledge systems were marginalised. Yet, despite the apparent acceptance of the dominant technologies, beliefs and values, there is a parallel stream of indigenous thinking and a wealth of indigenous knowledge that still influences decision-making among rural communities. For instance, they do not see any value in growing hybrid varieties of cotton except their marketability. As a result, they grow indigenous cotton for domestic use and hybrid varieties for the market. Similarly, for domestic consumption, they grow vegetables without using chemicals and for the market they grow different varieties, using chemicals in the vegetables, keeping in view the demands of the market.

Women's knowledge can especially be used as a foundation for further research. Health of human beings, animals and plants all of which have roots in agriculture are the crucial areas of women's knowledge.

With responsibility for the well-being of the family, women also knew which foods were best for the health of the family and which foods appropriate for the sick. Not only food but preparing cloth and clothes were also seen as women's job. Thus they acquired very sophisticated knowledge of the properties of different kinds of foods and healthy and unhealthy combinations of foods. The use of appropriate ingredients and combinations in cooking demanded a profound and "scientific" knowledge of the plants in terms of what stage a particular plant is ready for a particular preparation, and how to retain the nutritional values while cooking. Their knowledge of the properties of different kinds of foods — grains, vegetables, fruits, spices, herbs, animal products, etc — led them to develop countless and varied cooking recipes. Combined with other factors, it also led to the development of expertise in the maintenance of human health. And this vast body of undeniably useful health-related knowledge and folk recipes are still being transferred from one generation of women to another.

WOMEN'S KNOWLEDGE ABOUT AGRICULTURE

Let us look at some examples of how women used their knowledge in agriculture and livestock-keeping.

PLANT PROTECTION AND PEST CONTROL IN MAJOR CROPS

From the information gathered in this study, it is apparent that the farmers paid greater attention to preventive measures in plant protection at the stage of land preparation than to controlling pests later. All respondents left half their land fallow for the next crop and watered and ploughed the fallow fields in the hottest months so that pests could be destroyed. Fields were irrigated, ploughed in and the seeds sown, and also the fields were weeded at least five to six times.

Both men and women farmers insisted that pest attacks in earlier days were not as severe as they were today. "There was no disease in crops those days. Chemical fertilisers caused pests and then chemical pesticides were brought in," said Naziran, a woman farmer. In fact, the farmers claimed that if land was properly prepared and the fertility of the soil maintained, the yield was not less than what they were getting now using the new technologies. Why then did they decide to switch over to the new practices? All the farmers in the group discussion said, pointing their fingers at one of the big landholders of Sojhla Taanvri, that he brought chemical fertilisers and pesticides into the village. "Landlords brought bad luck to the village," said a farmer. As new varieties of seeds were introduced, gradually most of the farmers started using the new technologies. Sardaraan, a woman farmer, said she wanted her husband to bring chemical pesticides because pests from the neighbouring sprayed fields entered their fields. To control pests, earlier they used non-chemical indigenous methods. For example, to control weevil in vegetable crops, they sprinkled ash on the plant leaves early in the morning; the ash stuck to the leaves because of the dew drops on the leaves and helped protect the crops.

STORAGE OF GRAINS AND PULSES

All grains to be stored were first sun-dried for a few days which helped get rid of the insects. Further, the storage container was fumigated with fuel wood smoke or dry *ajwain* (Hebane or Dill Seed) plant fire.

For storing grains and pulses, they were treated differently. For pulses, 2 ½ kg of dung cake ash is added to 40 kg of the grain. For rice, turmeric powder is added until the rice turned light yellow. For wheat, 2 kg of salt is mixed with 20 maunds (800 kg) of wheat and then stored or dry *neem* leaves are mixed with the wheat grains. For red chillies, 50 gm of mustard seed oil is added to 2 kg of ground red chillies. This is said to protect the red chillies from fungus and insects.

LIVESTOCK-KEEPING AND ANIMAL HEALTH

Problems in livestock-keeping generally included a drop in milk yield, loss of appetite in large ruminants and diseases such as foot-and-mouth, gastritis and quinsy (inflammation of the throat). Women used various treatments for these problems. These recipes include:

Drop in milk yield: If the milk yield in an animal drops, dissolve naushadar (salammoniac)[3] and sugar in milk from the animal under treatment in the following proportions and feed the animal at night for three to four days.

Naushadar 50 g, sugar ½ kg and milk 2 litres.

Loss of appetite in large ruminants: Pound the following ingredients and give it to the animal in three doses over two days: onion 1kg, salt ½ kg and molasses ½ kg. if the sickness is serious, mix 125 g each of a*jwain* (*ajowa* seeds), red chillies, mint leaves, *saunf* (fennel) and black salt. Pound these well and give the mixture to the animal in doses.

[3] The scientific name is Ammonium Chloride.

***Foot-and-mouth disease**:*
Recipe 1: Spread fish scales under the sick animal's feet and make it smell the fish scales.

Recipe 2: Dip wheat *roti* in fish curry and feed it to the animal.

Recipe 3: Cook a *roti* of gram flour and feed the animal.

Recipe 4: Boil ½ kg of *keekar* (Acacia) bark in water and pour the water on the animal's feet.

Recipe 5: Pound three onions and keep aside. Insert one pounded onion (paste) into a lump of kneaded flour and feed the animal. Repeat for three days.

***Gastritis**:* Give a piece of pickled lime to the animal as treatment. As a preventive measure, pound 250 g each of *soay* (or Indian *dill*), *ajwain* and salt (all four kinds) into a mixture and preserve it; feed the animal a fistful of the mixture a week (for small ruminants, and two fistfuls for large ruminants).

Quinsy or inflammation of the throat, especially with abscess on the tonsils (zahrbad): Boil ¼ kg of red chillies (whole) in water for some time and distil it. Heat up 50 g of mustard oil, add it to the distilled red chilli water and feed the animal when the mixture is lukewarm.

These are only a few examples. Obviously, a large body of traditional technologies is based on the knowledge and skills of the farmers than on the use of machinery and equipment. Women carry out a number of technical activities or activities with technical components. These may be farm-based jobs, processing of crops and food, storage and preservation of food, developing various recipes (appropriate for different seasons, health conditions, etc), cooking, weaving and sewing clothes (which are also women's work), and care of children and the sick and also animals. However, because these activities are oriented to family welfare and are unpaid, they are classified as domestic, rather than economic, productive or technical, work.

Village Sojhla Taanvri

A Case Study

This case study from the village Sojhla Taanvri can help one understand some aspects of agriculture before the Green Revolution, of modernisation and mechanisation.

Farmers in the village then grew wheat. There were no irrigation canals, but there was no shortage of water. In addition to river and rain water, every farm had its own well. Wheat was the main crop, grown using well water.

The size of the field depended on the water available. Generally, the size was one acre or half an acre. If the field was irrigated from a well, the size of the field was small. The size further depended on the size of the water containers used for drawing water from the well, and it could be as small as 1/20th of an acre. Water from one well was considered enough for 12 acres of land.

Other crops grown included *bajra*[4], *gawara*[5], *jawar*[6], cotton (only for domestic consumption), pulses, *toria* (oil seed), *tara meera* (oil seed) and vegetables. Today, the cropping pattern has changed; cotton is the major crop followed by wheat, and *bajra*, *jawar* and pulses are no longer grown. The wheat varieties commonly grown and highly appreciated by the women respondents were Chitta Farm, Kala Farm and Koni Kanak. The last variety grew very fast and if it was cut at an early stage for fodder, it was ready for harvest on time.

To keep the fertility of the soil, four trolley-loads of farmyard manure was used on an acre of land every second year. Generally, women carried the manure to the fields in baskets. They knew that the soil was not fertile when it hardened; leaves of the crops left on the field turned yellowish; and the yield was lower. Topsoil from mounds on uncultivated land was also used to fertilise the fields.

Animals were kept for ploughing, carrying loads, maintaining the fertility of the soil and for animal-based food. No special

[4] The English name for *bajra* is Indian millet or Pearl millet. Its scientific name is *Pennisetum Typhoideum*.

[5] *Gawara* is Cluster Bean with the scientific name of *Cyamopsis Psoraliodes.*

[6] *Jawar* is Millet Great or Sorghum with *Sorgham Vulgare* as its scientific name.

food or provision was made for animals; they fed in the jungle. In fact, a lot of food for the people was also collected from the jungle. All sick animals were treated at home and women generally prepared the medicines.

Fields were weeded five to six times a season (weeding was, in fact, almost an ongoing work). Weeds were not seen as harmful or wastes but as a source of food for humans and animals. Greens such as *baathu* (Chenopodium Albium) in wheat fields was collected and cooked into a delicacy. A combination of green leaves (mustard, fenugreek, spinach and *Baathu* leaves) was cooked together and the dish prepared is called Sarsoon ka Saag. *Baathu* is also used in Yunaani and Ayurvedic systems of medicine, especially for stomach ailments. Weeds such as *saavari, patraala* and *vissa* were offered to the animals.

Men and women together harvested the millets. Women separated the pods, which were threshed with the help of bullocks. Then women winnowed it to separate the grains and the husk. Wheat was also harvested the same way. There were no threshers in those days.

The produce was stored in containers made of mud, cow dung and straw. It was women who made the containers in various sizes. A container which can store 20 maunds (1 maund is 40 kg) took 15 days to make. Mud, straw and dung were used in equal quantities in making the containers. Dung strengthened the container walls, and also helped repel insects. It is essential to use the right kind of water, otherwise the containers would be susceptible to pest attacks. The storage containers were fumigated before the grains were stored.

Potters, carpenters, blacksmiths and people from other supporting occupations were paid in kind. For instance, potters and carpenters were paid 100 kg of grains each for their services at the end of six months which was the harvest time of main crops. Every six months there was harvest. Generally, there was a pattern of growing two major crops a year, the surplus of which was sold at the market. The surplus produce was sent to the market on camels.

"Wise people" in the village, people who traveled to other villages or places and interacted with other communities, brought back new ideas – on new experiments or better seeds or better methods used in farming elsewhere. Other farmers in the village sought this information from these "wise people".

The role and contribution of women in agriculture those days was much greater and intense than it is today. "I worked on the cotton with a spade, and prepared quilts, mattresses and pillows", said a woman. "I also used to make spools and spun thread on the spinning wheel, then made thread reels and handed them over to the weaver so that he could weave the cloth. I sewed clothes for the whole family with a needle."

Emerging Issues

1. Modern plant protection and agricultural practices are part of the larger capitalist logic of profit maximisation. In contrast to the passive consumerism encouraged by modern agriculture, traditional knowledge seeks to encourage autonomy through information-sharing and is rooted in the concept of earning a living and not of living for earning money. With the onslaught and intrusion of market forces into all aspects of rural life, a major challenge is how best traditional knowledge can be used today; indigenous knowledge is not reductionist but is rooted in the well-integrated diversities of rural life.

2. In the present-day world of patents, intellectual property rights and intellectual piracy, would it be useful to document traditional and indigenous knowledge? One response is in the negative. The other response (that which we believe in) is not to let this knowledge, which is the result of the experience and experimentation of centuries, die. It is important to record this knowledge of immense significance. Moreover, it is important to make a statement on the necessity for an alternative to the capitalist agricultural system. The challenge ahead is how to stop appropriation of people's knowledge by crass commercial interests.

3. Green revolution technologies have brought about some fundamental changes. In some cases, they have changed the soil structure. For instance, in the areas we studied, farmers used to grow millets and pulses but it is no longer possible to do so. One reason is availability of abundant water and promotion of water-intensive seeds that resultantly compel the farmers to use both chemicals-fertilizers and pesticides. Millets and pulses are snubbed with excessive water. The intensive use of chemicals has resulted in the serious problem of chemical residues in the soil. Farmers complain that some of the recipes and treatments for human and animal health which they had effectively and successfully used no longer have the same effect, especially on animals. This issue merits in-depth research and understanding of the causes of the changes that have taken place.

Need for an In-depth and Longer-term Study

The pilot study provides exciting grounds to explore further the intricacies and details in the sphere of discourse in indigenous knowledge. It requires a long-term participatory action research to study issues such as how women's knowledge systems developed, in what way they are different from the knowledge systems of men, and what role women's knowledge played in various processes of decision-making.

It is essential to bring the knowledge back to people in a practical way, to people who are desperate for better solutions, and who are so convinced that the pre-Green Revolution practices were so good for the soil, for food security, for human health and for agricultural production.

The process of bringing the knowledge back to people has to be a process of building up a relationship with people who are custodians of that knowledge, of providing the basis for a real dialogue and mutual learning and experimenting.

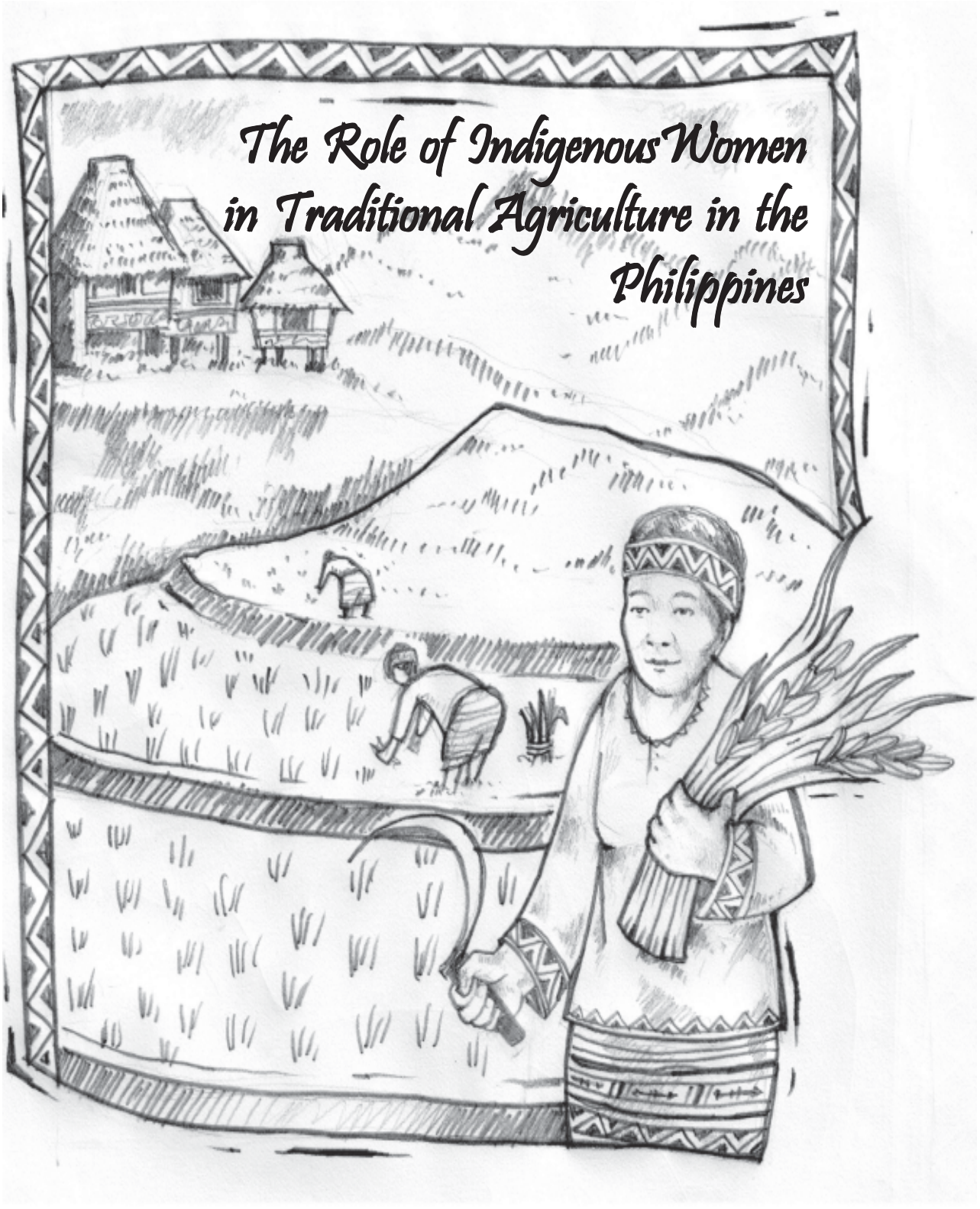
In order to substantiate the efficacy of traditional knowledge, to determine the degree of complimentarity and the possibilities

of combining and matching local practices with modern science-based technologies, to develop synergetic combinations of traditional practices and new technologies and to build on the knowledge of people, it is important to work on a longer-term programme. A team of sociologists, farmers and agricultural scientists is required to do the study in an appropriate fashion.

In order to have a complete story of indigenous knowledge in agriculture, it is important to include carpenters, weavers and blacksmiths in the study. Moreover, proper understanding is not possible unless the workings of indigenous organisations and institutions are not studied.

Greater insights are required to understand the politics of gender in the indigenous systems and their relationship with the means and modes of production. A comparison of a woman farmer today with the one in a rural society of traditional agriculture can help make some policy decisions.

The Role of Indigenous Women in Traditional Agriculture in the Philippines



The Role of Indigenous Women in Traditional Agriculture in the Philippines

by SIBAT

I.BACKGROUND

Traditional or indigenous farming systems in Philippine upland communities have proven their viability and sustainability through generations. Today, these farming systems where they continue to be practiced, have sustained relatively stable ecosystems through appropriate management of natural resources, and provided households with sources of marginal subsistence.

This is because the rich and diverse knowledge and farming systems of indigenous communities have now been threatened by conditions of war, neglect and 'developmental aggression'[1]. The latter is basically driven by commercial aims that consider land and resources as commodities for commercial appropriation and exploitation. Ironically, indigenous communities who nurture these knowledge systems have been continually denied of their ancestral claim to land and resources, bearing the brunt of ethnocidal displacement.

[1] This was a term being used by Philippine indigenous peoples referring to so-called development projects by government and commercial entities that constitute in reality a threat to their survival.

Today, traditional agriculture systems in the Philippines are in a fragile state. Much of these has been encroached by 'modern' agriculture – the diverse cropping replaced by monocrops of rice and corn, the traditional agriculture weakened if not obliterated, the natural farming methods replaced by chemical inputs, and traditional soil and water management techniques abandoned.

The vestiges of traditional farming that remain in certain areas need to be studied, in order to collect insights on sustainable practices that can be advanced. **That the indigenous women farmers play a main and critical role in traditional agricultural production, is the centerpiece of findings of this research.**

The Indigenous Women Farmers

Indigenous women today belong to the most marginalised sectors of the Philippine society. They form part of a section that must perpetually struggle and assert itself to survive as a people against forces that negate their viable and sustainable production system. And as women, they are exploited by a commodity economy and debased by a patriarchal society.

The land, from which spring their indigenous traditions, is being unabatedly abused, ravaged and sold in the name of 'development'. The fate of their knowledge systems is therefore inextricably tied to their struggle to survive against these forces.

It is in this context that the study of these traditional farming systems becomes significant. In our quest to develop viable and sustainable agricultural systems that could support even future generations, we must seek to learn from the skills and the knowledge of indigenous women who have been nurturing the land and the traditional systems of farming.

Objectives, Scope and Methods of Study

This study aims to document: (a) the state of traditional farming systems in some indigenous communities in Northern Luzon in northern Philippines and Mindanao in southern Philippines; and (b) the role and participation of indigenous women in these traditional farming systems.

The study, primarily an initial documentation of traditional practices, covers two areas in Luzon and three contiguous areas in Mindanao. The two areas in Luzon comprise *barangay* (village) Tulgao in Tinglayan municipality in the province of Kalinga and *barangay* Aduyungan in Mayoyao in the province of Ifugao; the study in these areas shows some data on the practice of upland wet-rice cultivation (irrigated terraced rice farming) among the people in the region.

The three areas in Mindanao are Mahayahay in Kumalarang, Depase in Bayog, and Dumpoc in Imelda, all in the province of Zamboanga del Sur; the study here relates to the practice of swidden cultivation (slash-and-burn farming) among the Subanen tribe. The two farming systems, wet-rice and swidden, are the two main traditional practices of indigenous groups in the country.

The areas are generally mountainous with steep slopes and narrow valleys with elevation ranging from 600 to 2,329 metres above the sea level. The environs have pine forests and grasslands. Natural vegetation on both communal and private lands has, however, been relatively depleted.

The study used various methods to collect data. Focus group discussions were held with chosen informants from among women and mixed groups in the areas. These included interviews with selected key and case informants, often at their places of work, and semi-structured interviews with households conducted at random. Opportunity interviews were also held during informal gatherings and casual activities. Personal observations were commonly used in elaborating the different processes and practices. Secondary data was collected from publications and literature from non-government organisations working in the areas. Interviews with their staff knowledgeable about the local communities also helped the study.

II. UPLAND WET-RICE CULTIVATION IN KALINGA AND IFUGAO

The Kalingas and Ifugaos are among the known upland wet-rice cultivators of the Cordillera mountain range in northern Philippines. Their rice terraces are living monuments of a legacy that has survived for ages. Their struggles to protect their lands and cultural traditions have earned them respect and provided inspiration to others facing the onslaught of developmental aggression in the region.

The role of women in these communities is defined by the historical development of their socio-political structures. The development of clans and tribes as the main socio-political structures has defined within the community a division of labour that serves the economic subsistence of its constituents.

It was the historical emergence of private ownership of land and differentiated economic status, the increased significance of the factor of strength and other qualities required of a warrior in the land-based tribal conflicts, and the division of labour between production and reproduction (between farm and household, and between community and domestic functions developing in the midst of colonial resistance) – that the role of women eventually evolved into a supportive and secondary and yet essential one.

Among the mountain terrace-builders, wealth is judged in terms of the rice terraces and other land a family owns.[1] Today, land ownership is generally classified into three categories: privately-owned, clan-owned, and communally-owned. Private land includes residential lots, terraced rice fields and *swidden* farms. Clan-owned land includes land planted with trees. Communal land covers forests, pastures, hunting grounds, sacred places and cemeteries.

[1]A family without land is considered poor and consequently of no social significance. Size is not the prime consideration in evaluating landed wealth, but rather the productivity of the land. So social status largely depends on the amount of productive land one owns. Land acquisition is basically through occupation and subsequent cultivation of areas cleared of forest growth or bush. A person who first occupies a site and builds a terrace on it is considered its owner. Necessarily, land ownership requires the complementary acquisition of water rights because without water the terraces would be of little value.

Agricultural production in the two research sites is basically for subsistence needs (done on terraced wet paddies for rice and on swiddens) and for small income (done on swiddens for few crops sold on the market for cash). Rice produce is generally insufficient for household consumption till the next cropping season. Secondary sources of income are therefore sought during the lean months of March to June when most households face food shortage. A traditional agricultural calendar that involves community participation is being followed in traditional farming. Cultural practices form part of the agricultural production cycle, and are held around each activity.

Women play a main and unshared role in many if not all stages of production, especially in Aduyungan. Cultural rituals are performed mostly by men, and women play supporting roles.

Tulgao

Located in the heart of Tinglayan municipality in Kalinga, deep in the Cordillera mountain range, Tulgao village has 213 households and a population of 1,040. It can be reached via a two-hour ride from the town centre of Tinglayan. The people here belong to the Tulgao tribe of the larger Kalinga ethno-linguistic group. Tulgao has one elementary school, and the nearest high school is in Tinglayan town. A government health unit and a church provide health services through a licensed midwife. Occasionally, the church runs medical missions.

Agricultural Production

Terraced rice cultivation

Rice is the primary crop planted in wet cultivated terraces. Its cultivation has more defined roles for men and women compared to other crops. The development of rice fields and the subsequent cultivation is a labour-intensive process, and is generally the task of men in the community. With only a few hand tools for clearing, cutting and digging, it takes about 2-3 years to build up a single rice field. The land is cleared of brush and other vegetation, then dug and levelled to the required size. Stones are carried from the river and stacked and arranged on the hillsides (to build terraces) and also in irrigation canals; this helps conserve soil and water. Women help by carrying black soil to be spread on the fields.

The newly built rice field needs a community ritual to seek the blessings of *Kabunyan* (the supreme being) for a bountiful harvest. A pig or chicken is offered and partaken by the family, relatives and friends. Rituals are also performed before planting (before the start of a production cycle) and at the transplanting of rice seedlings. Before

planting, a chosen male elder collects two bundles of *palay* (paddy or unhusked rice) from every house in the community to provide for an animal, usually a pig, for sacrifice. A *toor* or holiday is then declared for the community; this is to ensure uniformity of the agricultural calendar and the uniform plant maturing to avoid the likelihood of pest infestation. Later, at the start of the transplanting of rice seedlings, another male elder collects 10 *padog* (seedlings) from the traditionally chosen paddy which are planted in a designated field. The seedlings are checked the following morning for infestation or any unusual disturbance. If they are in good condition, a *toor* is declared again. Ten chosen women perform the initial planting in the *lafu* (the first rice field to be transplanted with the seedlings) the next day, which signifies the beginning of transplanting.

From planting until harvest, women regularly tend the rice fields, cleaning and weeding them. For the harvest, a woman first selects 10 stalks of paddy which she wraps in a *lingliwen* (woven blanket) to be stored in the *agamang* (rice granary); the day is then declared a rest day and the actual harvest begins the next day. Harvesting is a much-anticipated event, and usually involves men, women and even children. (See Table 1)

Table 1. Seasonal Calendar for Wet-rice Farming

MONTH	ACTIVITY	PARTICIPANTS
November - December	Land preparation/ sowing	Men/women
January - February	Transplanting of seedlings	Women
March - May	Cleaning and weeding	Women
June - July	Harvesting	All
August	Second crop, but this is not a common practice	

Organic farming, which is the traditional practice among these communities, has enabled rice farming without the application of chemical fertilisers. The farmers leave the rice fields to fallow for several months to allow the regeneration of soil nutrients before the planting starts. Also, traditional varieties of rice have been noted to have stronger resistance to pests.

The fields are irrigated throughout the year by canals built along the farmland, through the traditional irrigation system used communally, and the modern one built by the government where households pay 12 bundles of paddy (worth about 100 pesos/US$2)per crop for their use.

The high-altitude climatic condition of Tulgao affects the maturing of the rice crop. Because of the long period of maturity (5-7 months) of the rice varieties grown, farmers here can grow only one crop.

Wet-rice production in these highlands remains limited to an average of 600 bundles of paddy (in the highlands, measurement of harvest is based on parcels of rice field; 1 bundle of paddy when pounded gives about half a kilogram of rice). The limited land area also limits production per household. On an average, a household owns 2-3 rice fields which is about one-eighth of a hectare. Average rice consumption per household in Tulgao is one *ganta* (2.5 kg) of milled rice per day, and only about 10 households have sufficient rice supply until the next harvest.

The data in Table 2 shows the work done and the corresponding work hours put in by a family that owns four parcels of rice fields in different parts of the village.

Table 2. Farming Work and the Number of WorkDays

Activity	Number of work days (m) = male, (f) = female and (p) = people			
	Field 1	Field 2	Field 3	Field 4
Initial ploughing (choschos)	2 days (m)	3 days (m)	1 day	2 days
Cleaning (kaat)	3 days (f)	2 days (f)	½ day	2 days
Second ploughing (pigwa)	1 day (m)	1 day (m)	1 day	2 days
Final ploughing (amma)	1 day (m)	1 day (m)	1 day	2 days
Transplanting	4 days (f)	5 days (f)	2 days	5 days
Weeding (sagamsam)	2 days (f)	2 days (f)	1 day	2 days
Cleaning (lichias)	1½ days (f)	2 days (f)	½ day	2 days
Harvesting (ani)	1 day (18 p)	1 day (22 p)	1 day (8 p)	1 day (25 p)
Drying	3 days	3 days	3 days	3 days
Total	18 ½ days	20 days	11 days	21 days

Not included here is the daily pounding and winnowing of rice for household consumption. On an average, about an hour a day is spent on pounding rice to produce a *ganta* (2.5 kg) of milled rice. Thus, pounding rice, which is normally done by women and children, is an all-season activity. Also not included here are the hours spent on maintaining irrigation canals as well as the regular repair of the terraced slopes of the rice fields.

Table 3 shows the volume of seedlings planted per rice field and the corresponding yield for each crop (relating to the family, owning four rice fields, mentioned earlier)

Table 3.
Rice Production

RICE FIELD	SEEDLINGS	HARVEST
Field 1	12 bundles	6 chalan (360 bundles)
Field 2	18 bundles	11chalan (660 bundles)
Field 3	4 bundles	3 chalan (180 bundles)
Field 4	16 bundles	5 chalan (300 bundles)
Total		25 chalan (1500 bundles of paddy or 125 gantas of rice)

SWIDDEN FARMING

Swidden farms, called *uma*, provide the secondary sources of income for most households in Tulgao. These are planted mostly with legumes, native cabbage, tobacco and sugar cane. Swidden farming in Tulgao involves both men and women, though women play greater roles in the production of legumes and vegetables.

Swidden farming starts with the clearing of *uma*, usually in the summer months of February and March when it is easier to clear the vegetation, and dry and burn it. The first three days are spent in clearing followed by a day's break; it is believed that otherwise infestation could set in. The sixth and the ninth days are again observed as rest days.

Most of the households in Tulgao plant local legume varieties in their swidden farms. Besides being a protein source, legumes are sold by women in nearby towns to earn some extra money needed for household expenses.

Table 4. The Calendar of Swidden Farming

MONTHS	ACTIVITY
March-April	Land preparation
May	Planting (first crop)
June - July	Weeding
August	Harvest (first crop)
September-October	Land preparation
December	Planting (second crop)
January-February	Weeding
March	Harvest (second crop)

Since women are the planters, they are also the seed selectors. Seeds for the next crop are selected during harvesting and drying. These seeds are sorted out and sun-dried. Tin cans, bottles and *kofoy* (dried squash) serve as containers for storage.

Table 5.
Women's Work in Swidden Farming

ACTIVITY	NUMBER OF WORK DAYS	PARTICIPANTS
Clearing	8 days	Women
Burning	½ day	Women
Final cleaning (papur-as)	3 days	Women
Sowing (osok)	2 ½ days	Women
Weeding (tullog)	2 days	Women
Harvesting (buras)	6 days	Women
Drying	2 days	Women
Winnowing, pounding, cleaning	4 days	Women
Marketing	6 days	Women

Aduyungan

Barangay Aduyungan is one of the 27 villages of the municipality of Mayoyao in Ifugao. Composed of nine *sitios* (household clusters), with a total of 145 households and a population of 1,008, Aduyungan is a mountain village with a generally cold climate. It can be reached by a 4-5-hour hike, by rough roads in the mountainous terrain, from the town centre of Mayoyao. Residents of this *barangay* belong to the Ayangan ethno-linguistic group.

There are four types of plots in the village: *muyong* (wood lot) for firewood and fruit trees; *payao* (rice fields) where rice is grown in the rainy season and vegetables in the dry months; *uma* (swidden farms) for sweet potatoes and corn; and *latangan* (house lots). The farms are mainly rain-fed while potable water comes from natural water sources such as rivers, streams, creeks and springs.

There is an elementary school which can accommodate 20 to 30 students. Only 63 per cent of the population had formal education and 70 per cent had some elementary schooling.

AGRICULTURAL PRODUCTION

Wet-rice and swidden farming are the primary economic activities in Aduyungan, and rice, *camote* (sweet potato), corn and beans are the main agricultural products which also serve as the staple food of the community. (In many upland areas of Ifugao province, rice grown in irrigated terraces lasts only four months. In the remaining eight lean months, corn and *camote* serve as the staple, and beans augment food supply when available or when corn and *camote* are in short supply.)

Though both men and women are involved in farming, women are considered the principal agricultural producers in Aduyangan as they are involved practically in all stages of farming, including land preparation, both in wet-rice and swidden farming.

Agriculture in Aduyungan has three seasons: the season for land preparation, the planting season and the harvesting season.

Table 6. Seasonal Calendar for Agricultural Production

ACTIVITY	RICE	CAMOTE	BEANS
Land preparation	July-August	April - May	April - May
Planting	August-October	September and December	May-July
Harvesting	November - December	December and February	August - September

Land preparation involves ploughing and harrowing the rice fields and the construction of dykes; ploughing and harrowing takes about four days. Women help in cleaning the fields, which lasts five to six days.

For swidden farming, both men and women clear and burn the land in preparation for planting *camote* and beans. Land

preparation for the swidden farms could extend from seven to 25 days depending on the size of the area.

Sowing, planting and/or transplanting, weeding and protecting the crop from birds that feed on rice grains are exclusively women's responsibility. Sowing is half a day's work while planting takes 10 to 15 days. Weeding takes 36 to 40 days and is done intermittently. Finally, harvesting needs 20 to 22 days. For *camote*, planting takes three to seven days, weeding from 15 to 55 days and harvesting, done twice a year, takes 30 to 48 days on an average.

The average total annual farming cost incurred by a household on all crops can reach P 8,000 a year. This includes expenses incurred on seeds, hired labour and rent for the farm implements used. Family labour is excluded from the total cost.

Table 7.
Crop Production

PRODUCE	TOTAL PRODUCTION COST	YIELD
Rice	3,000 pesos	250-300 bundles
Camote	2,500	128-160 cans
Beans	1,400	6-8 cans
Corn	1,000	5-10 gantas

(1 can= 12.5 kg)

Community Labour Co-operation and Exchange

Aduyungan has two systems of agricultural co-operation: the *ub-ubbu*, which is practised throughout the farming season and the *baddang* which is practised during the harvest.

The *ub-ubbu* is a form of labour exchange normally used for both rice and *camote* growing, where a group of villagers agree to

work together on each other's farms for easier and faster work. The group sets procedures on the sequence of work and the length of time to be exchanged. Besides speeding up farm work, this system allows women to attend to domestic chores and other household work. So it is common to find *ub-ubbu* during planting, weeding and cleaning.

Baddang, which literally means support, is both a ritual and a form of community co-operation. It is performed during the harvest season to signify that an inherited rice field is formally passed on to the next heir. On the day of the *baddang*, the in-laws of the heir, their relatives, neighbours and friends go to the rice field and help harvest the rice. A feast follows the harvest, with rice wine and pork being served, and everyone who participated in the *baddang* partakes of the feast. The end of the *baddang* signals the transfer of ownership of the field.

Rituals in Rice Farming

Rice-farming rituals in Aduyungan reflect the central role this crop plays in the life of the community. Every farming activity has a ritual associated with it —addressed to gods and goddesses for their intercession in protecting the crops and providing a bountiful harvest. Men dominate the performance of the rituals, with women playing a supportive role.

The rituals start with *pangnga* performed before sowing to ensure good germination of the seeds and protection of the seeds against rodents and chicken. A *mombaki* or native male priest performs the ritual, which involves offering three chickens — one for *Wigan* and *Bugan* who are the traditional ancestors of the Ifugaos, another for the proper germination of the seeds, and the third for the faster growth of the seeds.

Upi is performed after sowing all the rice fields in the village to ensure healthy germination of the seeds and to seek a bountiful harvest. Chickens are offered by the *mombaki* who calls on the gods and goddesses to join the festivity *Monongo,* an optional ritual offering chicken for the trouble-free growth of rice, is

observed before the start of the weeding when leaves begin to sprout on the transplanted seedlings.

Tongo chi Iguang is performed before the harvest. It involves the offering of two to three chickens in the rice granary *(abayaw*) of the host *(muntonah*). On the day of the harvest, the *mombaki* places bundles of *runos* (a type of native grass) on the main paths leading to the village to signify the start of the harvest and also the start of the *tungaw*, which decrees that no one be allowed to come into or go out of the village. The *muntonah* is expected to offer at least ten chickens or a pig as thanksgiving, and after the harvest, everyone eats and drinks at the host's house. *Hignop* is a post-harvest ritual, performed (with the offer of two chickens to the spirits) before the dried paddy is stored in the granary to ensure that the spirits do not steal the stored rice.

The last ritual in the rice-growing cycle is the *luat,* which means opening or uncovering, performed when the first of the rice bundles in the granary is to be consumed. A *mombaki* places a *bulul* (an Ifugao figure representing a native god/goddess) inside the granary to guard the rice and a chicken is killed as an offering. On the fifth day after the *lua*t, three to five rice bundles are taken out of the granary. The first bundle to be pounded and cooked would have to be eaten without viand (without any other dish) to ensure that the rice is not consumed too fast, and that, by implication, the harvest will last till the next season.

III. UPLAND SWIDDEN CULTIVATION IN SUBANEN COMMUNITIES

The *Subanen* tribe is one of the 18 *Lumad* groups in Mindanao in southern Philippines. With a population of 600,000, the *Subanen* is the biggest group of non-Muslim indigenous communities in this part of the country. The word *suba* means 'along the river', and the tribe includes nine sub-groups inhabiting the banks of major river systems and using different dialects, in Zamboanga peninsula and Misamis Occidental: *Sibugaynon, Salognon, Balangasan, Dikayunhun, Ribaloy, Lapuyan, Mangkulay, Bahalan* and *Tausung*.

To the Subanen, land is a *gasa* (gift) given to all by the *Magbabaya* (god) to nourish those who strive to enrich it. Land is an extension of life, where the Subanen cultural traditions and aspirations bear fruit. Without land, the tribe will perish. Such a concept embodies the socio-economic realities of swidden farming, the main agricultural system of the *Subanen*. This system ensures a *Subanen* the right over the land he cultivates until such time that the swidden site is left to fallow for forest regeneration. The concept of land ownership is therefore interlinked with the concept of land utilisation and nurturing.

Current trends, however, reveal three main groupings in the tribe based on the extent to which the various sub-groups are integrated into the colonised and dominant mainstream: assimilated; semi-assimilated; and traditional. As majority of the *Subanen* now fall into the first two categories, traditional practices are slowly losing their significance among its people. With the land and its people barely surviving, so also are their traditional practices.

Mahayahay, Depase and Dumpoc

All these three villages are in Zamboanga del Sur province. Mahayahay is one of the 18 *barrio*s (an old term for *barangay*, meaning community or village) of Kumalarang town, and has a population of about 600, mainly *Subanen*.

Depase, one of the 20 *barrio*s of Bayog town, has a population of 500, the majority being *Subanen.* It is accessible by a provincial motorable road. A health centre, with a midwife and a health worker, functions twice a week. A recently installed water supply system caters to the household needs of the community.

Dumpoc is one of the 18 *barangay*s of Imelda. It has a population of over 400 and 85 per cent of them are *Subanen.* The *barangay* has an elementary school. A road, locally called "election road", becomes usable only during elections when politicians improve the road for accessibility.

AGRICULTURAL PRODUCTION

These three *Subanen* communities live on subsistence farming, primarily upland swidden cultivation. Corn is their main crop, and cassava, sweet potato, vegetables and fruits are grown on a limited scale as supplementary crops. The produce from this rain-fed farming is, however, insufficient to meet even the basic food requirements of most families.

Corn Production

Corn, which forms the staple food, takes up much of the communities' farming time and effort but has a limited yield even with two crops a year. An average farm lot planted to corn (½ hectare) normally produces 5-6 sacks annually (around 3 sacks per crop, 1 sack being 50 kg) which lasts for only 4-5 months for an average family. Corn production also symbolises the current state of upland swidden farming among the Subanen, or rather what remains of it. It also carries what remains of the traditional practices that formed part of the tribe's cultural legacy.

Before new swidden farms are developed, the Subanen believe that they must seek the consent and blessings of the *Magbabaya.* A chicken is offered to the god. After sunset and with nobody in sight, a small tree is chosen and placed alongside the biggest tree in a potential farm lot. If it is still standing the next morning, they can go ahead and develop the new farm lots. But if the small tree has fallen, it is seen as a bad sign and no further work there is advised.

Land preparation is the most labour-intensive part of corn production. This work therefore involves both men and women with no specially defined roles. The cleaning of the farm lots normally begins in January and goes on until March; mostly, simple hand tools (*sanggot/saro/gilamon/guna*) are used, and the number of days required to clear an area depends on the number of people involved. The cleared vegetation is left to dry and then burned. The field is cleaned again manually before preparing the land for sowing.

Rain is an important consideration for sowing, which usually starts in April or May when the first rains are expected to fall. Recently, however, there have been erratic climate changes, and hence changes in the sowing time. Corn seeds are sown directly using the *guna*, a short crowbar. Both men and women participate in sowing.

The three communities covered in the study use traditional corn varieties. Seeds are selected from the middle portion of the stored cobs. The base and apex parts are discarded since these are either not mature enough or not suitable for planting. Traditionally, it is women who select and store the seeds.

Clearing the cornfields of weeds and other unwanted vegetation helps ensure a good harvest while discouraging pests from attacking the young corn plants. The weeding could take 15 days to one month depending on the area and the number of people involved in the work. Generally, both men and women in a household are involved in weeding.

The corn is harvested after 95-100 days (July and August), and good-quality cobs are set aside for seeds for the next planting. These cobs are bundled in leaves and placed above the fireplace; this prevents infestation and helps preserve the seeds. The remaining corn, hand-picked from the cobs (taking about a week to fill 5 sacks), is sun-dried and stored for the market or household consumption. After harvesting the first crop, clearing starts anew in preparation for the second crop beginning in October and harvested in December-January.

Corn production in these communities, being subsistence farming, demands participation of both men and women, even children, in all phases.

Table 8. Seasonal Calendar for Corn Production

MONTH	ACTIVITY	PARTICIPANT/S
January - March	Land preparation	Women/men
April-May	Planting	Women/men
June-July	Weeding/ application of fertilisers	Women/men
August	Harvest (first crop)	Women/men
August-September	Land preparation	Women/men
October	Planting	Women/men
November	Weeding	Women/men
December	Harvesting (second crop)	Women/men

Rice production

Traditionally, the Subaben had grown rice in the uplands but low productivity (yield per crop is low with an average of 30 to 40 *cavans* per crop where a *cavan* of unhusked rice is 40 kg), has prompted many to abandon this. In the lowlands similarly, yield has reduced due to increase in soil acidity due to use of modern IR varieties and chemicals introduced by migrant settlers from the Visayas. Many traditional rice varieties have been lost or are in the process of being lost.

Other Sources of Income

Other farm lots on the upland slopes and some near residential areas are planted with perennial crops such as fruit trees, bananas, cassava, sweet potato and vegetables such as eggplants, squash and string beans. Grown on a limited scale, these are meant to be used as supplementary foods. However, most of these products are usually sold in the market to meet household non-food expenses.

Table 9. Market Prices for Vegetables and Fruits

PRODUCT	PRICE
Eggplant	P 5/kg
Gabi (taro, a root crop)	P 10/3 pieces
Pepper	P 25/kg
String beans	P 1.50/bundle
Ampalaya (bitter gourd)	P 20/kg
Coconut	P 8/kg
Squash	P 3/kg
Banana	P 15/bunch

Poultry, pigs and goats are raised in the communities to provide meat to the family and to augment family income; pork, for instance, fetches P33 a kg while *litson* (roast pig) is worth P120 (US$ 230) a kg. Production, however, is very limited. Livestock is also used for rituals.

Women play a significant role in backyard gardening and livestock raising. While most men seek odd jobs in other farms and places, it is the women who tend these gardens and the livestock as a source of income and food supply. Women also assume the role of seasonal vendors, selling garden products and livestock.

The problem of landlessness in the three communities is increasing with 35-40 per cent of the population with no lands to till. Many women have become tenants relying mainly on their labour for survival, living hand-to-mouth on wages of P 60-70 (US$1.15-1.35) a day without meals; in some cases, they are paid even less.

Problems and Challenges in Subanen Swidden Farming

- Traditional upland swidden farming had been self-sufficient in the past. After cultivation for two to three years, swidden farmers rest the land to allow regeneration, and shift to new farm lots. However, the availability of such frontier land has

been dwindling with the influx of migrant population in search of more fertile lands.

- The shift to permanent cultivation in the upland swidden farms has created transitional problems. Continuous monocrop farming has affected the productivity of the farms. Soil nutrients have been greatly depleted while soil erosion has contributed to land degradation. Further, forest land has been stripped bare of its primary growth, and local tree species have been replaced with paper wood, altering the natural biodiversity of the area. Without appropriate alternatives to the old farming systems and technology, these upland farms have reached their limit of productivity.

- Access to land remains a major problem among these communities. With the number of the landless growing, land is getting concentrated in the hands of a few while other lands remain idle and unproductive. Meanwhile, the incursion of "development" projects such as dams and logging concessions in areas like Dumpoc threatens the survival of the *Subanen* communities.

- Access to capital and remunerative prices for agricultural products remains dependent on the whims of traders and rich members of the community. Most farmers in these communities are cash-strapped and depend on loans to buy chemical farm inputs and household necessities. Since the corn produce lasts for only six months, 90 per cent of the households have to buy rice from the market for the rest of the year. This leaves most farmers at the mercy of traders and rich members of the communities who collect 20 per cent interest per month on loans.

- Access to markets which are in town centres remains a problem. Dumpoc and Mahayahay, for instance, depend on horses to deliver products to the market charges for which vary, starting from from P20 (US$0.40) per sack. Milling costs are P0.80 – 1.00 per kg for corn and P0.50-0.80 per kg for rice.

Women's Role in Addressing These Challenges

In these conditions, the *Subanen* population of Mahayahay, Depase and Dumpoc have organised themselves to address their problems. Women's organisations have also been set up to address production as well as household problems. They received trainings on sustainable agriculture to help raise their skills in food crop production.

In this process, the community had also revived a very essential component of their traditional agricultural practice – co-operative labour. *Subanen* tradition has three types of labour co-operation: *pintakasi, bulo* and *hunglos* . In *pintakasi,* the owner of the farm lot provides three full meals a day to volunteer workers. In *bulo,* the owner offers only one meal (dinner). *Hunglos* involves communal labour exchange where a group of women band together for a specific work, for example, harvesting — each *hunglos* member repays the labour rendered on her farm by working on other members' farms until all farms are harvested. Most women prefer *hunglos* since it cuts down cost. Such communal labour has also now led to co-operative programmes in raising pigs, growing vegetables, herbal gardening or dress-making to provide for household needs.

IV. SUMMARY AND CONCLUSIONS

The research reveals that traditional farming in indigenous communities is very closely bound to the ownership and nurturing of the land and its resources, i.e., that land is essential to an indigenous farmer. The land plays a central part in the daily lives of indigenous communities. Their beliefs, concepts, practices, rituals and the prevailing culture relate to and speak about the land, agriculture and its bounty. Not only is the land their material base of subsistence but it personifies the territorial identity of each indigenous community, whether it is Subanen, Ifugao or Kalinga. Each indigenous community embodies a distinct historical development that characterises its rich economic, political and cultural heritage.

It is in this context that the women play their important role in indigenous agriculture, yet the principal means of the indigenous peoples' development. The salient features of women's role in production can be summarised as follows:

1. **Women's tasks in traditional farming are complex and multi-faceted, demanding most of women's time and efforts in practically all phases of the production cycle.** The research has proven this especially within the traditional wet-rice agriculture that already has elaborate and generally well-defined tasks for men and women, that allocates to women all tasks within and outside land preparation (i.e., women's domain: sowing, transplanting, weeding, cleaning and tending the fields. Drying the harvested grains and selecting seeds also require the intricate skills of women.)

   Subsistence swidden farming demands a more equitable distribution of work between the sexes. The exacting nature of the year-round work necessitates responsibilities to be shared between men and women. Labour power thus becomes an essential factor in speeding up work in every phase of the farming cycle and easing the burden, particularly since only a few simple hand tools are used. The selection and storage of seeds for the next cropping season is principally the women's task.

   Indigenous women's many roles in production add to their burden of daily household chores of cooking, cleaning and childcare, which remain as women's main responsibility.

   In other words, **the research has established that from dawn till dusk, women are occupied with the unending responsibilities of production and reproduction**.

   Further, in a warrior society like the Tulgaos in Kalinga where tribal conflicts are part of life, the burden of taking care of the family and tending the farms is left to the women when the men are occupied with defending the community against enemies.

2. **The burden and complexity of women's work in traditional agricultural production (wet-rice or swidden farming) establishes their role as the main farmers and producers.** Apart from agricultural production, women engage in earning secondary sources of income like backyard gardening, livestock raising, handicrafts and other off-farm initiatives. These efforts seek to augment household food supplies and generate cash for basic family needs. Most women also resort to farm work as hired labour for some extra income (either in cash or in kind).

3. **Women are the bearers of traditional skills and knowledge in indigenous farming systems.** The time and efforts they apply to farming has honed their skills and knowledge in all phases of production. Invariably, their knowledge and skills are necessary to ensure viable and sustainable production.

   Indigenous women's knowledge and experience extends to a whole range of agriculture-related work and practices. Their knowledge in seed preparation, soil, plant and pest management, post-harvest processing and storage has contributed to the development of traditional farming systems while providing subsistence to their families and the community.

   Indigenous women are carriers of the cultural and agricultural traditions of their communities. Innate in their reproductive role is their task of inculcating these indigenous knowledge systems as well as the community's cultural values in their offspring. Through this, the responsibility of ensuring that the land is nurtured is passed on to the next generation.

4. **Women also play a key role in the practice of agricultural labour co-operation and exchange.** The prevailing practice of labour co-operation and exchange is a legacy of the past system of communal production relations and ownership. Its revival and/or continued practice are a credit to women's initiatives in agricultural production. Besides making farm work faster and easier, labour co-operation and exchange strengthen a vital component of communal labour practice

– the absence of labour exploitation. Thus, this practice has contributed greatly to the effort of altering the dominant pattern of production relations which are exploitative and oppressive.

These roles can be summarised in two major points

- The role of women in traditional farming is undoubtedly essential to the existence and development of indigenous socio-economic and political systems. For traditional agriculture is not merely a source of food and livelihood for these communities but a part of their evolving search for skills and knowledge, as well as a source of identity and enrichment of their social and cultural life.

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It is also found in this research that the role of indigenous women in agricultural production is an inadequately appreciated one, in relation to labour valuation in an increasingly cash-based economy. Work which brings in cash is generally valued more than that which is perceived as part of household labour, and the labour of women who remain at home to tend to the farm and the family is seen as part of the normal production process, is paid lower daily wages in farm work. In the farm labour hiring system shown among the *Subanen*, work that is seen as more laborious commands higher pay, e.g., land preparation by men (who are considered principal income earners) is paid higher than farm maintenance work by women.

Women also play secondary roles in the social and cultural life of the community. Despite their vital role in economic production, women have been relegated to supporting and secondary roles in socio-political activities of the community. Women's role in decision-making primarily involves aspects related to their

defined functions in the family and production. It is the men who dominate community rituals while women assume the supporting role.

Women's role in community affairs is more often limited by their primary role in household and farm work. Men have traditionally assumed leadership in traditional tribal and clan societies.

However, more women are gradually asserting their roles in community leadership as well as in organised development projects.

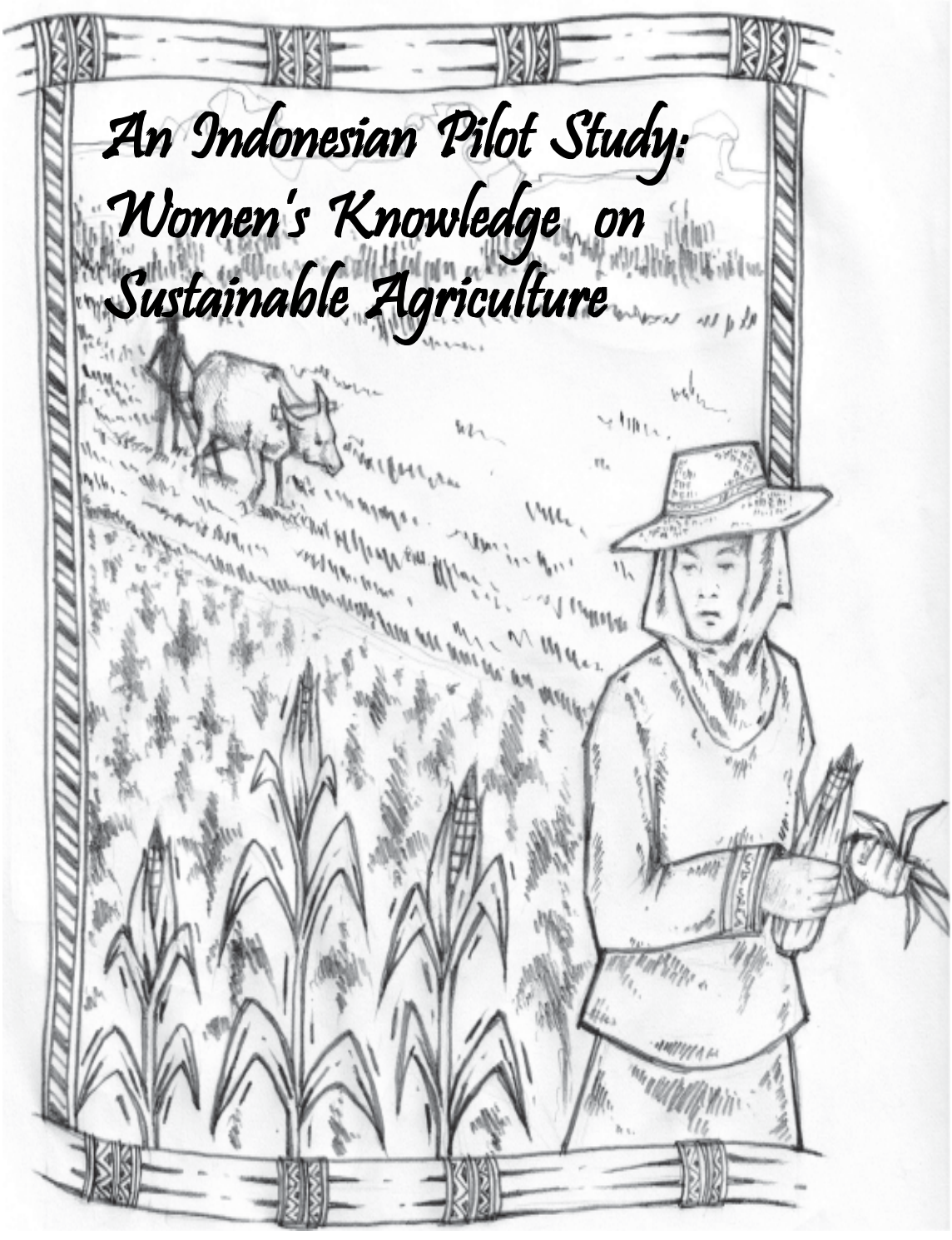
In summary, the role of women in traditional farming is undoubtedly essential to the existence and development of indigenous socio-economic and political systems. Traditional agriculture is not merely a source of food and livelihood for these communities but a part of their evolving search for skills and knowledge, as well as a source of identity and enrichment of their social and cultural life.

Finally, indigenous women are intrinsically linked to their ancestral land. The land plays a central part in their daily lives, from birth until death. Their beliefs, concepts, practices, rituals and the prevailing culture relate to and speak about the land.

And in this context, the role of indigenous women in traditional agriculture must therefore be liberating. While freeing themselves from the exploitative and oppressive nature of production, indigenous women must assert their rights to their ancestral land.

It therefore consists a part of the struggle for the indigenous peoples' right to self-determination – the right to freely determine economic, political and cultural aspirations. Without the land, the tribe will perish. Without self-determination, the land would be meaningless.

An Indonesian Pilot Study: Women's Knowledge on Sustainable Agriculture



An Indonesian Pilot Study: Women's Knowledge on Sustainable Agriculture

By Hesti R. Wijaya

I. INTRODUCTION

Agriculture cannot be sustainable when women's knowledge of farming is ignored, particularly so when general economic conditions turn adverse. This simple fact was borne out by the Indonesian farmers' experience during the recent economic crisis when food became a critical issue.

Under the Indonesian government's agricultural intensification programmes, women farmers had earlier ceded their traditional domains to bureaucrats and multinational corporations. Prompted by officials, and often under their "threats", farmers had given up their traditional agriculture and shifted to modern methods of farming, using high-yielding varieties of seeds and chemical fertilisers and pesticides, all of which had to be bought from the market. They abandoned traditional practices such as the local production (exclusively by women) of seeds and the use of cattle and green manure and other local resources. Even the "traditional family storage" system for paddy (*lumbung padi*) used by women was stopped.

When an economic crisis arose in the country later, seed and fertiliser prices shot up, pushing them beyond the reach of farmers. Having long given up local resources and practices and their traditional farming knowledge and skills having fallen into disuse and forgotten, the farmers were now left in the lurch. Had women's specific skills such as seed production been still practised and not subverted by multinational seed companies and had the use of natural manure and the family storage system not been given up, the situation might have been better and farming could have been sustained even during the economic crisis.

Besides, sustainable agriculture is not only about producing enough staple food but should also include the production of medicinal plants required to prepare traditional medicines and other health-related products for the health care of the community. As "modern medicines" replaced traditional medicines, not only did the farmers stop growing such plants but the recipe and the skills for making traditional medicinal and health products were also lost, and so also the special utensils (such as some special mortars and pestles — *pipisan* in Javanese) used for making these products. In a situation where modern medicines, which are imported, are incredibly expensive and unaffordable for most people, health care too has become a critical issue.

In all these areas, women had acquired diverse knowledge over generations, and this knowledge was inter-related and holistic. This knowledge base was also an integral part of the technologies they had developed and used but are now lost, leading to problems in times of crisis.

On the other hand, the Rice Self-sufficiency Programme introduced by the government was based on labelled high-yielding varieties of seeds which had to be bought from the market. In line with this programme, promoted by the government and often followed by farmers out of fear of officials who "threatened" them not to produce their own seeds, farmers stopped the practice of using indigenous seeds and switched to the new labelled varieties sold in the market. When the prices of these seeds increased during the economic crisis, the farmers "wished" that they could produce their own seeds but could not do so because they had lost the local seeds and the knowledge and skills for producing them. Consequently, a food crisis followed the economic crisis in many parts of the country.

Similar is the case with the practice of traditional hand-pounding and unhusking of rice. Development programmes over the past few decades had brought rice milling technology to replace the laborious hand-pounding and winnowing. Consequently, the older women farmers lost this skill, and the younger ones

totally lacked it. So they faced a problem when rice mills in Java, where 55 per cent of the population lived below the poverty line, stopped functioning during the food crisis as the hungry began to just grab the rice in the mills and take it away.

The question now is to know what remains, and how much is lost, of women's knowledge and skills in agriculture – in seed production and preservation, in preparing and using natural fertilisers and pesticides, in maintaining soil fertility and crop health, etc. Women's traditional knowledge and practices are crucial for sustainable agriculture and need to be documented.

This pilot study is an effort in that direction.

The study covered two villages, Bulupasar and Mojorejo, in East Java province, the former using the new farming technology and the latter still largely depending on traditional agriculture.

Bulupasar is about 18 km from the city of Kediri, in central East Java province, and about 240 km from Surabaya, the provincial capital. The village is well connected to Kediri by a good asphalt road. Motor vehicles are the main means of transport, giving the residents of Bulupasar good access to the market and information on agricultural produce. Almost all agricultural land in the village is irrigated, and the introduction of new agricultural technology using high-yielding varieties of seeds has caused the disappearance of indigenous crops and eroded indigenous knowledge of farming.

Mojorejo village (Blitar district) is about 40 km from the district capital of Blitar in the southern part of East Java province, and also about 240 km from Surabaya. Relatively isolated, this is a hilly area with limestone-type soil and rain-fed agriculture (though closer to being a semi-arid area). There is an asphalt road about 10 km from the village but public transport is rare.

The objectives of the study are:(i) to document women's knowledge and technology in agriculture; and (ii) to document community knowledge and technology in agriculture.

The following methods were used for the study:

(i) Observation to select sample villages based on the farming methods—one using traditional technology and another new technology (high-yielding varieties of seeds, chemical fertilisers, etc., under the Green Revolution package).

(ii) Survey using a structured questionnaire to 15 farmers aged over 50 years, each in the two selected villages.

(iii) Focus Group Discussions with communities in the selected villages.

Because of the political upheaval and the religious conflicts in Indonesia, particularly in East Java province, at the time of the study, the researchers faced some problems. (Mapping, for example, was planned but was impossible.)

II. RESULTS OF FOCUS GROUP DISCUSSION

Bulupasar

1. Changes in Crop Pattern

Bulupasar has shifted almost entirely from indigenous crops to what the farmers perceive as highly economic commodities. These crops were promoted under the development plans of the New Order Government (of Gen. Suharto) in Indonesia which came to power in 1965. The Green Revolution started in 1969 with the introduction of the First Long-term Development Plan (high-yielding rice varieties, though, had been introduced in the early 60s).

According to the villagers, the most obvious difference in agriculture between the Old Order (before 1965) and the New Order is in the crop pattern. The old crop pattern was: (i) rice-rice; (ii) rice-corn-corn; and (iii) rice-soybean (or peanut)-corn.

Farming in those days was oriented towards meeting the family's food needs, and only a small amount of the produce was sold in the market. The farmers also recalled that the size of land per farmer was larger, around twice the current average. Today, probably as a result of development, the villagers perceive greater family needs beyond food, and these needs have driven them to earn as much money as they can from their small-size land.

The current crop pattern is (i) rice-corn+small hot chilli; (ii) rice-rice-corn+small hot chilli; (iii) rice-rice-onion+small hot chilli; and (iv) rice-corn+peanut+small hot chilli. All crops, except chilli, are of the new highyielding varieties. These crops typically have shorter life spans, which allow greater land use. Every farmer in the village admitted that land use now was intense (reaching 200-300 per cent index annually); land was being exploited without considering sustainability. In the villagers' words, now the irrigated land has no rest, and it is a common practice to plant a crop even before the previous crop is harvested.

Earlier, when artificial fertilisers had not been introduced, the farmers grew a variety of Crotalaria as green manure, and time was allowed for it to decay and mix well with the soil; this ensured the fertility of the land and also that the land was not overexploited. The green manure also consisted of several varieties of Papilionaceae (e.g.,*enceng enceng* or varieties of beans such as *lembayung, mung beans, kacang* and *tunggak)*, which were planted every year to maintain soil fertility. Now the farmers rely only on chemical fertiliser, without which, they say, no crop will offer a reasonable yield. Another old practice was fallowing (*nglantang),* where land was left idle in the dry season when not much irrigation water was available, which helped protect crops from pests; the farmers believed that the sun killed pests.

With nonstop farming, now they cannot apply green manure and efforts are no longer made to improve the soil structure, which has been affected badly by the heavy use of chemical fertiliser. According to the farmers, land fertility has fallen by 30-40 per cent compared to the earlier period.

2. BIODIVERSITY

Almost all indigenous varieties of staple crops have become extinct, and the present generation of farmers have forgotten indigenous ways of cultivating crops. They prefer new varieties because the traditional varieties have low productivity, have long life spans and therefore require a long time to produce yields. Although everyone agreed that the traditional varieties were superior in terms of product quality such as palatability (tasted better and had finer structure) and plant health (better resistance to pests and diseases), and involved lower production cost as well as less labour, the development agencies' promise of getting higher income with the new varieties made them switch to the new agricultural technologies.

Recalling the indigenous varieties once cultivated, the farmers prepared the following matrix).

Table 1. Crops and varieties (indigenous and new high-yielding) in Bulupasar village

CROP	INDIGENOUS	NEW VARIETY
1. Padi sawah(rice)	Kair *	Pelita
	`Brentel *	PB 5, PB 8
	Sranggeng *	IR 26, IR 36
	Jrabangan *	Cisedane
	Sedopok *	Citandui
	Kaleh *	Citarum
	Lampeyan (bulu putih*)	IR 50
		IR 64 **
	Banglalen *	Membramo
	Merdeka *	
	Remaja *	
2. Corn	Tongkol *	Arjuna (1978)
	Mas warangan *	Jagung hibrida
	Goter ***	Pioneer
3. Small hot chilli	Empling	Empling
4. Peanut	Krentol	Krentol***
		Gajah
5. Home-garden crops	Sweet potatoes	Onions
	Popoy	Bayam
	Mango (Kopyor	Sawi
	and Podang)	Terong
	Kacan krentul	
	Egg plant	Tomato
	Spinach	Popoy
	Kenikir	Banana
	Kluwih	
	Jambu gelas	
	Uwi ***	
	Sukun	

* extinct,
** presently planted and
*** almost extinct.

Indigenous rice disappeared fairly rapidly following the Green Revolution. By 1975-76, only five to six years after the Green Revolution began, farmers had stopped cultivating indigenous rice. In fact, those who continued to plant indigenous rice (instead of high-yielding varieties under the rice intensification and BIMAS – *bimilingan massal* or mass supervision — programmes) were accused of being associated with the banned Communist Party of Indonesia. This forced farmers to stop planting it because anyone directly or indirectly associated with the Party would be punished, more often than not without trial, by the New Order Government. The adoption of the high-yielding rice varieties within this short span of time was, however, noted as a great success of the First Five-year Development Plan by the Government. Meanwhile, *wereng* (a pest) which infested the new rice varieties also attacked the already scarce traditional rice varieties, leading to their extinction.

Similar was the situation with corn. The local varieties were first replaced by the so-called national varieties (Metro varieties) in the early 70s. This was followed by the Arjuna variety in 1978 under the Corn Project in collaboration with Japan (the Japanese supervised the project even at the village level); this variety was considered to have a high yield, about twice that of the traditional variety (Goter). In 1990, this variety was replaced by hybrid corn (Jagung hybrida). Farmers may still grow Groter because its small grains are used as chicken feed; some farmers plant it because of its short cropping period (90 days) which helps avoid food scarcity after the dry season. Otherwise, this variety has almost disappeared.

Traditionally, the 'small hot chilli' was grown. Later, an attempt was made to plant the new canned chilli seeds bought off the shop-shelf (probably a foreign product) but it failed, apparently because of the very low yield and crop failures as the plants tended to dry off and die early.

3. Knowledge of Crop Cultivation

a. Seed Production

Seed production was an important component of women's knowledge of agriculture, and seed selection and preservation were perceived as women's work. What were the traditional practices?

CORN was left to mature and dry in the field, and the degree of maturity and dryness was monitored by women as well as men. For seeds, corn cobs were selected on the basis of their size, the line (straightness) of grains, absence of defects, fullness of the grains on the cob, etc. To preserve these seeds, women sun-dried the full cobs with the leaves, bundled them up and placed them on a bamboo shelf just above the traditional woodstove in the kitchen. The woodfire smoke was said to help preserve the seeds for the following season, when seed grains were picked from the middle of the cob. Women selected the seeds. Some farmers mixed the seed grains with wood ash from the kitchen stove, which, they thought, ensured a good crop.

All this knowledge is no longer used. With the introduction of hybrids, women stopped producing seeds because the yield from the hybrid seeds (selected from the hybrid crop) dropped by 70 per cent in the subsequent crop; these seeds had a low germination rate. Traditional seeds have a high germination rate, but the farmers have lost the skills of seed production. So now they buy seeds, which are quite expensive, from the market. During the economic crisis, the cost of seeds almost doubled from 8,000 rupiahs to 15,000 rupiahs (Rp.) per kg (1 US $ is Rp. 8,100).

RICE*:* Old farmers explained how they produced rice seeds in the past. The seeds were selected from the standing crop, using the following criteria:

(i) the plant must be good and healthy,

(ii) it grew uniformly,

(iii) had adequate number of 'individual plants' per bunch *(rempek)* and long stalk *(ulen),* and

(iv) no indication of defect caused by pests and diseases on the unhusked grain,and the smallest number of empty unhusked grains *(gabug).*

Plants meeting these criteria were selected, marked and harvested before the rest of the crop was harvested. The stalks were sun-dried, bundled and kept on a bamboo shelf in the kitchen above the wood-stove till the next sowing season. However, starting from the early 90s, the farmers had been instructed to use only "labelled" rice seeds, which were to be bought from the village cooperatives or shops (commercially produced seeds). Again, they followed this instruction because traditional knowledge did not provide a high yield.

SMALL HOT CHILLI being an indigenous crop, the farmers still produced the seeds. From each crop, they selected the most ripe pods, usually turned dark red. Sometimes they let them half-dry, shrink slightly and mature on the stem itself; the pods were then plucked and sun-dried, put in a bamboo basket and placed, as usual, on the bamboo shelf above the wood-stove in the kitchen until the next planting season. These dry pods were then carefully beaten with a small stick and the seeds collected for planting. Some farmers mixed these seeds with kitchen ash.

PEANUT: For peanuts (traditional), following the harvest, the bigger pods were selected, sun-dried and stored in the kitchen, as in the case of chillies and other crops. In the planting season, the pods were broken and the bigger and healthier peanut seeds were selected for sowing.

b. Soil Preparation

With the changing pattern of crops and the changing orientation of farming, soil preparation techniques have also undergone changes. In the Old Order, farming was meant to meet the food requirements of the family while today, for most farmers, the purpose of farming is to earn the maximum profit.

In this pursuit, besides wet rice cultivation, they use the land intensively with mixed cropping. And they rely on the intensive use of chemical fertiliser to maintain soil fertility and high productivity without considering sustainability.

Soil preparation for irrigated rice cultivation in the earlier days was a long process, stretching at least over a month. Some farmers recalled that it could take even up to six weeks. So specialised was the work that there were local terminologies for the various jobs and implements. The process started with cattle ploughing (*fluku*), followed by smoothening the land (*rancah*) using a cattle-drawn instrument (*gams*).The plot was then left in standing water (*lei*) for a fairly long time to kill weeds. This was followed by a second ploughing and smoothening until the plot turned muddy, and it was left in this state for about a week (*lerem*) before replanting the seedlings from the nursery.

Soil fertility was maintained using green manure, with plants specially grown during the dry season. The most popular was *lembayung,* which also produced long beans (used as vegetable). *Kratok,* a variety of Crotalaria, was another popular plant. Early in the wet season, the crop was mixed with the soil. The present generation of farmers, however, think that this is a waste of land and time, and they have cut short land preparation to the bare minimum. In their words, "You can replant your paddy field tomorrow if you harvest your current crop today !" The farmers now irrigate the field in a day. They plough and smoothen the land with *garu,* and the land is ready for replanting. Still quicker is to use a hand tractor; with a little ploughing using a "rotary" (close to the *rancah),* the rice field is replanted with seedlings. Not only does this practice not allow time for weeds to decay, but it does not give the land any "rest" from one crop to another. The farmers say that they are "forced" to do this because of the increasing shortage of irrigation water. To maintain high productivity, they use chemical fertilisers heavily.

With the intensive use of land, the technique of soil aeration has also changed. For chillies particularly, plant spacing (which was about 80 cm x 80 cm) has reduced (40 cm x 40 cm, *jejer wayang* technique) and plant density has doubled. While the earlier spacing allowed for quick soil aeration following cattle ploughing, closer spacing does not allow cattle ploughing, and ploughing is now done by human labour using hoe. In a way, the scarcity of cattle and the growing ranks of agricultural workers support this practice, though no statistical data is available.

c. Fertiliser Application

Farmers in Bulupasar started using chemical fertiliser in the 70s, with the introduction of BIMAS and intensive rice cultivation programmes followed by the Corn Intensification Project. Agricultural officers proudly said that the farmers were now "fertiliser-minded", and by the end of the Second Five-Year Development Plan in 1978, they happily noted that no farmer cultivated land without using artificial fertiliser, which was perceived as a developmental success.

The introduction of non-indigenous plants within this developmental context backed by the new production technology, including the use of chemical fertiliser, has dramatically changed the farmers' way of thinking. Most farmers believed that the new technology would bring them prosperity. Though they admitted that farming was costlier now, they never calculated the actual cost and the real income. Meanwhile, fertiliser use has increased — from one quintal (equivalent to 100 kg) of urea per hectare initially up to 5-6 quintals of all sorts of fertilisers per hectare (including urea, ZA, TSP and NPK) – and so also the cost of fertilisers. Following the structural adjustment programme, the government cut fertiliser subsidies which pushed up prices. And when there was a fertiliser scarcity following the economic crisis in 1998-99, the farmers were affected adversely - not only did fertiliser prices soar but fertilisers disappeared from the market. Farmers in Bulupasar had to travel as far as 50 km to Nganjuk to buy one quintal of urea that was allowed per person due to the limited supply. Yet there was nothing they could do

to increase productivity without chemical fertilisers; their old knowledge and skills had fallen into disuse.
The farmers now regret their neglect of indigenous knowledge and technology and the use of green or cattle manure. They now realise and discuss the merits of this old practice - that manure would improve soil fertility, improve the physical condition of the soil and that it would enrich the land biologically as in the past.

d. Pest and Disease Control

The farmers also noted that earlier, when indigenous crops and technologies were used, pest infestation and disease almost never occurred, and certainly it was much less than it is now. The only disease they had noticed was limp disease on small hot chilli. Even rats and stem borers which attacked rice crop caused only small crop losses. Pest and disease control methods were also environment-friendly: the sick plants were simply pulled out and burnt, and rats were collectively hunted.

Now there were "countless" types of pests and diseases, almost all of which did not exist in the past. As for rice, first came the w*ereng* attack in 1974, resulting in total crop failure; the pest also attacked the indigenous varieties which many farmers still grew at the time. The impact was terminal, and these indigenous varieties became extinct. Pests such as *Walang sangit* (rice ear bug with scientific name Leptocorisa oratorius) and *gugur* are common today, pushing the farmers to depend heavily on pesticides. Even the traditional variety of chilli they grow now has *pathek* disease, *Cabuk putih* pest and virus that make the leaves curl and the plants fruitless. The farmers attribute this high incidence of pest attack and disease to the fact that the land is never rested. When the land is "forced" to produce the year round, it gets no opportunity to revitalise itself and no time "to break the chains" which will help kill the pests that cause diseases.

Various chemicals are now used to control pests and disease, but the farmers know only some of these — Furadan 3G, Decis and Diazinon GOEC, for example. They rely mostly on the retailer for advice on which pesticide to use (labels in English anyway

cannot be read and protective gear is never used). The only organic/noncommercial/indigenous pesticide substance the farmers now know is a liquid made of *gadung* (a home-garden creeper) which is grated and soaked in water. But *gadung* itself has become scarce. The creeper needs tall trees to grow on, and, with the rising village population curtailing the space available for home gardens, it is becoming impossible to grow *gadung*.

e. Harvesting and Postharvest Treatment

The new varieties of crops have also brought changes in harvesting as well as postharvest treatment practices, especially in rice. In indigenous rice crop, the grains clung strongly to the stalk, and the crop was harvested by cutting each rice stalk using *aniani*, a small knife. The stalks were bundled, sun-dried and stored usually in a storage house (*lumbung*). The paddy was handpounded using long wooden pestle and mortar and then winnowed using a woven bamboo tray.

In the new high-yielding variety of rice, the grains tend to fall off the stalk. *Aniani* is not suitable for harvesting this rice and so the sickle (*arit*) is used. To avoid loss, the grains are separated and packed in bags in the field itself and later sun-dried (now usually on the cement floor of the local rice-milling unit). Rice-milling has become popular in the village in preference to traditional hand-pounding.

4. The Impact of Modern Technology

The modern farming and processing technologies have had an impact on the socioculture of the community and the sustainability of its agriculture. Below are some examples as discussed by the farmers.

In traditional agriculture, the farmers had used an indigenous grain storage (*lumbung*) system. The significance of this individual and community *lumbung* lay in the fact that it was not merely a physical structure to store grains but was also a social institution

which provided a safety net in times of food scarcity. The practice stopped with the introduction of high-yielding rice varieties because their unhusked grains are susceptible to pest attack in storage and require a different storage system. Besides, the credit system for rice farming in the new regime requires the farmers to unhusk the rice and sell it as soon as the crop is harvested.

In rice harvesting, women have been displaced by men and payments for harvesting are lower since the male workers generally have not had any social ties with the farm owners. The old *Ngratam tanggane* has given way to the *bawon*[1] system where the harvester gets a lower share (7:1 between the owner and the harvester) and the work is much harder. The low payment and the heavier work have, in turn, driven farm labourers away from rice harvesting to less strenuous and higher-paying work such as harvesting chilli.

[1]The *bawon* system is the share of harvest received based on one's service time during harvesting.

With the introduction of rice mills, women have also been displaced from another traditional job - rice pounding. Although this relieved them of the hard work in hand-pounding, it also deprived them of an important source of family income when other job opportunities in agriculture were shrinking.

For the younger generation, however, neither the indigenous nor the new farming knowledge and technology holds any attraction. Higher formal education (up to junior high school on an average) and the growing number of service and manufacturing industries in the new development paradigm have made agriculture the lowest priority for them. This trend is clearly seen in Bulupasar where most of the farmers and agricultural workers are now aged and even their number is decreasing. It is getting increasingly difficult, for example, to get women workers for transplanting rice.

The sustainability of agriculture in this village is really questionable, and this is worrying the ageing farmers. They hope that the younger generation will take some interest in farming; higher education and knowledge should not prevent them from continuing with farming, they say. The truth, though, is that, given a choice, only one out of ten among the younger generation is willing to stay on in farming.

Mojorejo

The dynamics of agriculture in Mojorejo is a little different from that in Bulupasar. Though the majority of the farmers here now grow the new varieties of rice, the traditional varieties are not extinct. Quite a few farmers still cultivate them because the new varieties are not always suitable for the local environment and local taste and preferences. In the case of corn, peanut and soyabean, however, almost all traditional varieties have been displaced by the new varieties.

Table 2. Types of crop cultivated in Mojorejo

TYPE OF CROP/FIELD	BEFORE 1965	PRESENT (1999)
1. Rice/rain-fed	Jalen **	* IR 36
	Gundul **	
	Mayangan Sembukan **	
	Ketan gajih	
	(hitam) *	
	Serayu	
Rice/irrigated	Cempo mas *	IR 64 ***
	Cempo wesi *	Cisadane*
		-becal
		Sauh/ketan *
		PB 5 , PB 8*
		Cikapundung ***
2. Corn	Goter **	Arjuna BC
	Kretek	Hibrida
	Tongkol *	CPI
	Kleci / Melati *	-pioneer
	Mliyo *	P 7
	Kodok *	Arjuna Super
	Perta*	
4. Peanut	Kerikil**	Kelinci
		Hibrida
		Menjangan
5. Cassava	Sembung randu **	
	Pandesi **	
	Forokah **	
	Jendral *	
	Mangler*	

Continuation of Table 2. Types of crop cultivated in Mojorejo

	Lengkeng Nyonya (putih)	
	Ndoko	
	Kastal *	
	Morakan *	
6. Soyabean	Kedele hijau	Wilis
		Galunggung
		Lokon
7. Home-garden	Fruits	
	Jambu klutuk,	
	Sawo, Nangka,	
	Blimbing, Mangga Pisanq, Sirsat	
	Kedondong,	
	Podang	
	- Ubi-ubian	
	Gembili, Uwi,	
	Suwek, Ganyong,	
	Garut,	
	- Arboretum	
	Jati, Kapuk,	
	Wodang Sengon	
	Soko, Johar,	
	Asem, Saman	

*Extinct, **rare and ***common

III. COMPARATIVE RESULTS FROM THE SURVEY

This section broadly compares the results of the survey of the two villages—Bulupasar which mainly practises modern agriculture and Mojorejo which still practises traditional agriculture.

1.Personal Background

Table 3 compares the personal backgrounds of respondents in the irrigated Bulupasar village and the non-irrigated Mojorejo. From Table 3, it can be seen that farming families in Bulupasar (irrigated) earn nearly 3.5 times more cash income than farming families in Mojorejo. And while one-half of all children stayed in

Table 3. Respondents: distribution by sex and age

	BULUPASAR	MOJOREJO
Women (number and %)	9 (60%)	0
Age(average years)	58	--
Marital Status		
Married	3 (20%)	--
Unmarried	--	--
Divorced	--	--
Widows	6 (40%)	--
Education		
Illiterate	--	--
Elementary school	9 (60%)	--
Above primary	--	--
Family type		
Extended family	9 (60%)	--
Nuclear family	--	--
Family size		
Children	3.67	
Female	2.67	
Male	1	
Children who farm	1.67	
Female	1	
Male	0.67	
Family income		
Cash (Rp)	5,966,667	
Non-cash		
Rice	7 qt	
Corn	1 qt	
Chilli	5 kg	
Men (number and %)	6 (40%)	15 (100%)
Age(average years)	58	52
Marital Status		
Married	6	15
Unmarried		
Divorced		
Education		
Illiterate	--	--
Elementary school	6	12
Above primary	--	3
Family type		
Joint family	3	3
Nuclear family	3	12
Family size		
Children	4	3.6
Female	2.5	2.6
Male	1.5	1.2
Children who farm	2	1.6
Female	1	1.2
Male	1	0.4
Family income		
Cash (Rp)	5,500,000	1,629,700
Non-cash	4 qt rice*	1 qt rice, 1.4 qt corn and 3.9 qt cassava
	0.27 cow	1.2 goat, 1 cow

*Quintal or qt is equivalent to 100 kilograms

farming in Bulupasar, only one-third of the boys (sons)and less than one-half of the girls did so in Mojorejo. The sustainability of farming among the traditional family farmers is thus even more questionable.

2. Traditional Practices

In the past, agriculture in these villages required no cash (Mojorejo) or very little cash (Bulupasar). Seeds were produced and owned by the farmers, fertiliser, in the form of cattle and green manure, was prepared by the farmers, and they used simple implements like hoes, ani-ani, rakes (common in both villages) and plough (Bulupasar).

Bulupasar was, in fact, once recognised for its traditional crops (particularly grains) and cultivation practices in the region. The situation changed dramatically with the introduction of high-yielding varieties of crops. The only traditional crops now left are horticultural crops such as vegetables, for example, egg-plant and hot chilli. Consequently, some traditional practices relating to these crops – seed production, soil and pest management, etc—have also survived.

The farmers earlier believed that the success of a crop depended on the guardian spirits, and that these spirits would protect the crops if offerings were made to them. Specific offerings were made at land preparation and at the start of rice transplantation, and also for the protection of crops from pests and diseases. These beliefs disappeared with the Muslim revival under the New Order regime. And with high-yielding varieties of crops, the farmers started using pesticides for protection from pests and diseases.

3. Access to Land and Labour

Farmers in both villages consider land a scarce resource now. Although the average landholding in upland Mojorejo is about twice as large (Table 4), the land here is much less productive.

Table 4.
Size of land by type of landholding

	BULUPASAR	MOJOREJO
Self cultivated	0.166	0.9
Taken on lease	0.112	0
Given on lease	0	0
Land in lieu of salary	0.2	0
Uncultivated	0	0
Total size of land-holding	0.478 (all irrigated)	0.9 (all irrigated)
Investment needed on land (Rp)	211,500,000	60,327,000

In Bulupasar, the average land-holding has been getting smaller and smaller (now probably half of what it was during the respondents' childhood). More and more farmers have also been selling their land or leasing it out because they needed money to go to cities or abroad in search of jobs.

As for availability of labour, the supply is less than the demand and it is becoming increasingly difficult to hire farm labour. Following the industry-based development model and higher education (from illiteracy to elementary school level for women, and from elementary to junior high school level for men), many, especially among the younger generation, have left the village (Bulupasar) to seek jobs in industry or the services sector.

4. Ownership of and Access to Agricultural Resources

Agricultural resources are more accessible in irrigated Bulupasar than in upland Mojorejo.

Table 5 shows the average resources currently used by farmers in the the two villages.

Table 5. Average resources used by farmers

	BULUPASAR	MOJOREJO
Capital		
Owned	Rp 416,666	Rp 650,000
Borrowed	Rp 1,286,000	Rp 37,200
Inputs owned		
Fertiliser		
Artificial	-	3.7 qt
Manure	-	50 pikuls(15 qt)
Seeds		
Corn	5 kg	8 kg
Nuts	5 kg	3 kg
Soyabean	-	4 kg
Rice	12 kg	2 kg
Chilli	4 kg	-
Pesticides	Rp.129,455	-
Borrowed from village cooperative (KUD)		
Fertiliser (urea+ZA)	Below 4.4 qt	22 kg
Seeds	21 kg	-
Pesticides	Rp 27,500	-
Machinery		
Operated by:		
Men	Tractor	-
	Rice mill	-
	Water pump(diesel)	-
Women	-	-

Continuation of Table 5. Average resources used by farmers

Implements		
Men	Hoe	Hoe
	Plough	Ganco
	Rake	Sickle
	Cengkrong	*Gejik*
	Okrok	*Wangkil*
	Gejik	-
	Sickle	-
	Wangkil	-
Women	*Wangkil*	*Wangkil*
	Gejik	*Gejik*
	Sickle	Sickle
	Kentheng	-
	Cengkrong	-

In irrigated Bulupasar, every farmer borrowed from the Village Unit Cooperative, but in upland Mojorejo, the cooperative is not so popular. Only three of the 15 farmer-respondents (20 per cent) in Mojorejo borrowed from the cooperative, and they borrowed much less than farmers in Bulupasar. The Bulupasar farmers also used more agricultural machinery and implements. In both villages, women did not use any machinery while women in Mojorejo had the least amount of agricultural equipment.

Credit and assistance from the government

As can be expected, farmers in Bulupasar, who have easier access to road and public transport, are closer to the city and have irrigated land, use more credit (from the government-formed cooperative) and government assistance.

Table 6 shows that, on an average, a farmer in Bulupasar borrows 25 times more than a farmer in Mojorejo.

Table 6. Credit (average) from government-formed cooperative

	BULUPASAR (n = 15)	MOJOREJO (n = 3)
Fertiliser	3qt	22 kg
Seeds	21 kg	0
Pesticides	2 Lt	0
Living expenses	Rp 120,000	0
Total	Rp 925,000	Rp 37,000

Extension/training services

As with credit and government assistance, irrigated Bulupasar has greater exposure to agricultural extension services than upland-farming Mojorejo (Table 7). The number of farmers who had no exposure to any extension service was four times higher in Mojorejo.

Table 7. Number of farmers by type of exposure to extension services/media

EXTENSION INSTITUTION	BULUPASAR	MOJOREJO
a) Selani project (soil conservation)	0	9
b) Access to agricultural extension	6	0
c) Radio (agricultural information)	10	3
d) Agri. extension services		
- Introducing HYV rice	6	0
- Upland farming	0	6
- IPM Field School	3	0
e) Seed distribution company (launching new HYV rice)	7	0
f) Estate Institution Cocoa Project	0	2
No exposure	1	4

5. Current Agricultural Practices

a. Irrigation and Sowing System

The two villages have different sources of water. While Mojorejo depends entirely on rain water(falling directly on the soil), Bulupasar draws water from irrigation canals, the network having been established long ago, perhaps during Dutch rule over 50 years ago. However, the canal water is not adequate to meet the demand in the dry months and a tube-well (using a diesel pump) was built about 20 years ago to provide water during the dry season.

Because of the irrigation canals, farmers in Bulupasar can plant crops any time, and following the current practice of "non-stop" intercropping and sequential cropping, they sow as many as five times a year. When the supply of irrigated water is not adequate and is regulated, they just wait their turn, which is about a week at the longest.

The sowing pattern in rain-fed Mojorejo is different. Planting here being dependent on the rain, land use is less intensive, and farmers sow only twice or thrice a year. The earliest is in early monsoon and the last before the end of the monsoon. This makes the length of crop life an important factor in deciding what to plant so that the farmers can get at least two crops a year.

The seeds they now sow are those recommended by the government and different from what they had used before the Green Revolution. The only exceptions are horticultural crops grown on irrigated land (chilli and egg-plant) or in small home-gardens (e.g., banana, guava, mango, medicinal plants, etc).

In the farmers' view, the new varieties were introduced because the government wanted to increase land productivity. Fifty per cent of the farmers interviewed stated that it was a good step forward but the rest did not fully agree; it could be a good step, they said, provided the government also took some responsibility for sustaining soil fertility and ensuring the regular supply of seeds and fertilisers. When it came to pesticides, two-thirds of the respondents said that the government should recommend modern

practices that ensure good results and not have an adverse ecological impact. The government, they pointed out, first promoted chemical pesticides aggressively and now asked the farmers to stop using them - it was hard for them to do so when the variety of pests attacking the crops was growing and so also the intensity of the attacks.

In Bulupasar, the old varieties of grain seeds, which, as mentioned earlier, were once well known in the region, are no longer available. In Mojorejo, however, two-thirds of the respondents said they could still find indigenous varieties of seeds, though some of these may not be easy to find. Many farmers also tried to grow the new varieties of crops using traditional methods. But soon, with very low productivity, they faced heavy criticism from other farmers, as well as "assault" from agricultural extension workers, and had to stop their experiments.

Table 8. Comments about new high-yielding varieties

Comment	BULUPASAR (No. of respondents)
1 Not good, a loss. Reason: although the indigenous varieties took longer to cultivate and required tedious post-harvest treatment, these tasted better.	9
2. Indifference. Reason: the changes did not make much difference.	4
3. Sensing no loss. Reason: each has its own benefits and negative points; perhaps the indigenous varieties would not survive the present intensity of pest attacks and the much greater types of diseases.	2
	MOJOREJO
1. Mixed response. Reason: the indigenous varieties had a better taste (which is a loss) but the new varieties give better results (which is a benefit) because of the shorter crop cycle which allows one more crop a year.	4
2. Not worried.	3

b. Pests, Diseases and Pesticides

Indigenous knowledge on pest and disease control was not developed in the upland rain-fed areas because pests and diseases were never a problem. In the irrigated areas of Bulupasar, measures to control pests and diseases were developed because the old farmers feared that they would affect yield badly. This is also the reason why farmers in Bulupasar accepted chemical pesticides more readily than those in Mojorejo, where pesticides were first rejected as a waste of money and effort. It was only when there was a severe pest attack in the mid-80s that they started to accept the chemicals. But soon they turned reluctant again as they found that fish and farm animals died following the use of DDT. Only two-thirds of the farmers said they now used chemicals, though not frequently.

Farmers in Bulupasar recalled that it was in the early second half of the 70s that chemical pesticides were first introduced in their village under the agricultural intensification programme. They accepted pesticides for the following reasons: (i) they did not want any crop failure; (ii) they were afraid of the government; and (iii) DDT sprayed by the Health Department also killed mosquitoes and helped control the dengue epidemic.

On their first exposure to chemical pesticides, the terrible odour made the farmers feel giddy. One farmer said that, after spraying, he threw up right there in the field. But now they have got used to the chemicals; in fact, they are rather addicted to the use of chemicals, and readily accept any chemical. They have been using so many different types of chemicals that they could not even remember the names. And the practice goes on regardless of the negative impact. For example, farm animals have died after eating grass from pesticide-sprayed farms; several types of wild birds that used to be around the farms have disappeared; and many new types of pests and diseases, not found when indigenous technologies were being used, are now attacking the crops. The farmers and their families may also suffer from the ill-effects of pesticides — such as persistent cough, breathing problems and itch.

Table 9. Pests, diseases and current and traditional methods of control

Pests and diseases:	
Rice	*Wereng* (at the start of flowering and nearing harvest), rodents, *walang sangit*, birds (closeto harvest) and kropok.
Chilli	Aphids and thrips.
Soybean	*Wereng* and caterpillars.
Corn	*Bulai* (rainy season).
Peanut	Curly leaf virus.
Possible loss:	50 - 100% loss
How are the pests managed now?	
Walang sangit	Pesticides
Birds	Scaring them away (by making noisebeating tins and other means)
Rodents	Rodenticides
Wereng	Chemicals
Current methods of crop protection:	
Corn	Pesticides (Sefin, Dramaco and Metador).
Soybean	Sefin
Long beans	Sefin
Chilli	Use of kitchen ash and chicken droppingsmixed together, indigenous seeds, and freshwater crab stuck at the tip of a bamboo stick.
Peanut	Use of kitchen ash and chicken droppings mixture, and indegenous seeds
Traditional ways of pest control (if different from present practices) :	
Walang sangit	Fresh water crab on a bamboo stick, tobaccojuice.
Peanut	Use of kitchen ash and chicken droppings mixture, and indigenous seeds.
Reasons for abandoning traditional practices:	
Fresh water crab	Scarcity of fresh water crabs.
Tobacco juice	No longer available in the market.
Kitchen ash	Lower availability.

c. Fertiliser

Chemical fertilisers were also introduced, and quickly adopted, in Bulupasar by the second half of the 70s, about a decade earlier than in Mojorejo. However, about one-fifth of the respondents in Bulupasar remembered that they were offered chemical fertilisers (urea and ZA) by the agricultural extension office in the early 60s, under the Old Order regime, but had not accepted them as it was not compulsory to use chemical fertilisers nor was credit available to buy them. Soil fertility in the two villages was then managed using cattle and green manure. With cattle in the village (unlike now), cattle manure was "abundant" and free of cost. In Mojorejo particularly, almost every farmer raised farm animals and cattle for manure. And it was a common practice, in both villages, for every farmer to produce green manure to maintain soil fertility. Now the farmers have to buy cattle manure in the market and even so it is scarce. Green manure has almost disappeared in Bulupasar as green manure crops are no longer part of the cropping pattern. Only commercial crops are grown, as suggested by agricultural extension officials, in today's profit-oriented farming.

d. Machines

As mentioned earlier, farmers in Mojorejo do not use machines in agriculture. Rather, the issue here is the replacement of bullocks by human labour in ploughing and land preparation. Cattle is now hardly used in land preparation because their number is declining rapidly as farmers no longer tend to raise cattle. About 20 per cent of the farmers said that work was more strenuous than in the past when bullocks were used in land preparation.

In Bulupasar, however, the tractor is popular. All respondents said they preferred the tractor to cattle because it saved time, gave better results and made land preparation much easier. So much is the time saved that "you can harvest your crop today, plough the land right away and plant a new crop tomorrow". The tractor, in fact, allows them to double the land utilisation factor. However, with much higher land utilisation, they are also worried that the land might get progressively less productive. All farmers are aware

that their land is being exploited continuously without break. Not only does the land seem to be getting less fertile (less responsive to chemical fertiliser) but no time is allowed to break the life cycles of pests/diseases as was the practice in the past.

e. Harvesting and Processing

The new crop varieties are generally harvested and processed using "new" methods. This is particularly so in Bulupasar, where farmers have stopped using the traditional methods for the following reasons: (i) too much work, requiring a lot of time (100 per cent); (ii) the produce occupied a lot of space in the house and the house looked dirty (60.3 per cent); and (iii) others were using new technologies (6.7 per cent).

In the traditional method in Bulupasar, rice was harvested with *ani-ani*, a small hand-held knife. Rice stalks were cut one by one, bundled and carried home by women harvesters; some portion was given to the harvesters as payment. The paddy (unhusked rice) was sun-dried and stored on bamboo shelves in the special storage room and later sold or processed (by hand-pounding, threshing and winnowing) for consumption at home. (Now, the rice is milled.) For corn, the cobs were sun-dried on the stems in the field, then chopped, bundled and transported home. The bundles were further sun-dried in the home yard and hung on a bamboo shelf in the kitchen and/or on the terrace. The grains were later hand-picked and ground manually in a stone grinder.

In Mojorejo, corn is still harvested and processed in the traditional way. Cassava is harvested and partially processed in the traditional way, after which it is sent to milling units (which have replaced traditional hand-pounding) for making flour. Cassava tubers are skinned, coarse-chipped, sun-dried, hand-pounded to some extent and stored in a bamboo container, lined with lemon leaves and covered with lemon and teak leaves, to protect it from pests; later, it is sent to the milling unit for making flour.

Table 10. Current ways and methods of harvesting

	BULUPASAR	MOJOREJO
Harvesting		
Rice	Cutting with sickle, and threshing in the rice field and sun-drying in the home yard	Cutting with sickle, and threshing in the rice field
Corn	Chopping off cobs	Chopping off cobs
Peanut	Manual plucking	Manual plucking
Storage	In sacks, kept in the room	In sacks, kept in the room
Prevention of loss	Paddy (unhusked in the field carried in sacks and marketed early	Corn (not stored to avoid *hamabubuk* and marketed early in grain form)
Processing	Paddy (sun-drying and milling)	Corn (picking grains and sun-drying)

f. Current Problems

In both villages, the main problems the farmers are faced with are: (i) problems in getting chemical fertilisers, (ii) the need to buy seeds from the market, and (iii) the high cost of farming.

5. Farm and Domestic Work by Men and Women

Both men and women are active in farming in both the villages. However, ploughing and soil preparation have remained exclusively men's work. While men are also partially involved in a few other jobs (see Table 11 for rice farming), women are involved in all the work (except ploughing and land preparation)

ranging from planting to harvesting, and exclusively in seed and nursery preparation (in Bulupasar), transplanting, weeding and harvesting.

Thus women are heavily involved in farming, contributing much to its success, and their work cannot be ignored or side-lined.

Table 11. Work done by men and women in rice farming

NATURE OF WORK	BULUPASAR	MOJOREJO
Land preparation	Men	Men
Seed and nursery preparation	Women	Women/men
Transplanting	Women	Women
Weeding	Women	Women
Fertiliser application	Women/men	Women/men
Aeration	Women/men	
Harvesting	Women	Women
Transportation	Women/men	Women/men

How have the changes in agricultural practices affected domestic work practices in the two villages? Looking at Table 12, there seems to be a tendency for men in the irrigated areas to participate a little more in domestic work than in the rural rain-fed Mojorejo. However, in both villages, cooking is still entirely women's responsibility. Men may take up other work such as child care, washing clothes (limited to washing their own clothes) and sweeping floor.

Table 12. Participation in domestic work

	BULUPASAR		MOJOREJO	
	Men(%)	Women(%)	Men(%)	Women(%)
Cooking	0	100	0	100
Washing clothes	20	80	13.3	86.7
Child care	33.3	66.7	20	80
Sweeping floor	13.3	86.7	20	80

6. LIVESTOCK-KEEPING

With the new farming methods, the old practice of livestock-keeping, especially the ruminants, is becoming less popular and slowly disappearing. This tendency is stronger in the technologically more advanced agricultural areas such as Bulupasar. Farmers in both villages said that they kept livestock as a means of "saving", to be able to raise money to meet urgent needs such as farm inputs and medical expenses. A farmer in Bulupasar said that he kept cattle for farm work so that he did not have to worry about the high expenses involved in soil preparation using hired labour; and cattle manure helped improve soil fertility without having to pay for chemical fertiliser. (However, most of the farmers in the village had stopped raising cattle.)

Table 13 shows the pattern of livestock-keeping in the two villages. Overall, Bulupasar seems to be no longer supportive of keeping farm animals, while Mojorejo, which still practises indigenous farming and uses very little pesticide, seems to support livestock-keeping to a greater extent as a "survival strategy".

Table 13. Farm animals owned

LIVESTOCK	BULUPASAR	MOJOREJO
Milk animals	0	0
Draught animals	20% of farmers (av. number of cattle: 1)	40% of farmers (2)
Small ruminants	0	80 % of farmers (av. 4 goats)
Poultry (chicken)	80 % of farmers (4 chickens)	100% of farmers (8 chickens)

Following the same pattern, farmers in Bulupasar no longer use farm-derived animal feed (husk, straw, greens, etc) except for grains while farmers in Mojorejo continue to do so. Neither, however, use traditional medicines for animals (Table 14).

Table 14. Animal feed from farming

	BULUPASAR	MOJOREJO
Husk	No	Yes
Straw	No	Yes
Greens	No	Yes
Grains	Yes	Yes
Traditional medicine	No	No

7. Economy of Crop Farming

Table 15 shows the economy of crop farming in the two villages. Farmers in Bulupasar have higher incomes from farming because of the more intensive use of land. Because of the lower farm income and greater poverty in Mojorejo, more farmers there sought additional income from other work (as village officials, farm labour, construction workers, artisans, etc) than in the economically better off Bulupasar.

Table 15. Annual approximate costs and receipts from farming

	BULUPASAR (Rp)	MOJOREJO (Rp)
Capital cost	856,333	591,250
Labour cost		
- paid in kind	650,000	0
- paid in cash	198,333	215,000
Yield	4,783,333*	1,286,500
Product allocation		
- home consumption	500,000	271,275
- marketed	4,283,333	1,015,225

* paid to labour in kind excluded

In both villages, the farmers said that modern farming cost a lot of money, unlike traditional farming. The market and prices are, however, beyond the farmers' control.

Products from the irrigated land are now usually sold in the market, whereas home-garden products, small in quantity, are consumed by the farmers. Field products may be sold by the

size of the field *(tebasan),* by weight or by volume – it may vary from crop to crop, from farmer to farmer and from season to season depending on a farmer's needs. The farmers know well the advantages and disadvantages of each system. Rice and corn, for example, are sold by *tebasan.* Small hot chillies are sold by weight. The farmers are aware that they stand to lose with *tebasan* where they sell the standing crop, and that the produce would fetch a higher price if sold in the market after postharvest treatment. The problem is, they need to spend money on harvesting, postharvest treatment, packaging and transportation. They also need to hire labour. These are too expensive and, facing a financial crunch at the end of the season, they prefer to sell the crop on the farm itself.

How do farmers in the two villages spend their income (Table 16)? Bulupasar farmers clearly spend a much greater proportion of their income on farming and crop disease management (30 and 10 per cent, respectively) than farmers in Mojorejo (20 and 3 per cent, respectively). This reflects the intensive farming and the pest problems in the area. Mojorejo farmers, on the other hand, spend a greater proportion (55 per cent) of their income on food than Bulupasar farmers (30 per cent).

Table 16. Estimate of income disposal (%)

	BULUPASAR	MOJOREJO
Farming	30	20
Livestock-keeping	2	1
Food	30	55
Clothing	3	1
Housing	5	1
Disease management	10	3
Weddings and other functions	5	6
Education of children	5	4
Emergency situations	5	4
Personal expenditures	3	2
Others	2	3
Total	100	100

8. Decision-making

Decision-making on farming methods, division of labour, income-keeping, domestic matters, etc seems to be gender stereotyped, as seen in Table 17.

Table 17. Decision-making in selected activities (%)

	BULUPASAR		MOJOREJO	
DECISION MAKER	Men	Women	Men	Women
On adoopting new methods and techniques	67	23	80.9	20.1
home-keeper	28.8	71.2	13.4	86.6
On division of labour	50	50	50	50
On domestic matters	20.1	79.9	6.7	93.3

In both villages, men dominated decision-making on the adoption of new technology. Women are mainly the income-keepers. Decision-making on the division of labour is shared equally by men and women in both the villages (because it has been the "practice for long"). The domestic arena, however, still belongs to women, more so in Mojorejo.

This gender ideology works not only among individuals and the community but also among law-makers and bureaucrats. Thus, as dictated by culture and then legalised by the Marriage Law, it is the husband who is nominated by law to be the head of the household. The heads of households, however, agreed that they could not do without the helping hand of the women.

All the respondents stated that they acquired farming skills from their parents or others in the community. None of them had gone to a formal agriculture school. Informal agricultural training (for less than a week) was offered by the New Order Government, but none of the women has been so trained, and women are not even invited to participate in the general agricultural extension programmes by government officials.

IV. CONCLUSION

In areas where new agricultural technology was widely introduced, supported by adequate irrigation and good infrastructure, the new technology overrode women farmers' traditional knowledge and technology in farming. For the older generation, traditional farming knowledge is now only a faded memory, and the younger generation no longer recognises old knowledge. However, in rain-fed areas where the new technology could be adopted only to a limited extent, traditional knowledge and technology have survived.

From this comparative study of the two villages, one using traditional farming methods and another new farming technologies, it can be further concluded that the adoption of new agricultural technology created total dependency on outside agents and the market to obtain agricultural inputs. When markets failed to provide these inputs, like during the national economic crisis, there was nothing much the farmers could do, except re-apply whatever remained of the traditional knowledge and technology.

The use of new knowledge and technology had resulted in higher agricultural productivity and higher income (which some farmers, however, questioned) but it also led to the loss of traditional knowledge, besides creating other problems. These include:

- destruction of soil health
- soil degradation due to erosion in upland areas from the use of chemical fertiliser without manure
- the disappearance of various plants, birds, fish and insects
- loss of taste in agricultural products
- loss of socio-cultural practices related to agriculture
- loss of traditional pest control methods
- loss of traditional manure production, both green and cattle manure
- loss of the traditional grain storage system that leads them to buy commodities from the market at a much higher price

- loss of status —from being a producer of food to an object in the food production system, and from being a producer of agricultural inputs to merely a consumer of these inputs
- loss of job opportunities in post-harvest processes (e.g., rice milling, grain grinding, etc) which particularly affect women because these used to be "women's jobs".

In the long run, there is the question of agricultural sustainability itself because the nonstop farm production in the new system gives no time for the land to recover. Also related to sustainability is the question of continuity of farming and the transfer of knowledge from one generation to another; surprisingly, even the new farming technology and knowledge does not seem to attract the younger generation to continue with farming.

The participatory focus group discussions in the two villages dealing with women's knowledge and technology have been an eye-opener to the community.

Can something be done to reclaim what used to be theirs ?

Can the new knowledge and technology be adapted without the losses mentioned but with high production, good prices to improve the farmers' income, and no food crisis during a larger economic crisis?

These communities can be involved in discussing this issue later, and it also offers a good opportunity for participatory action in the future.

Finally, considering that Indonesia is a large country with great diversity, we could think of extending the scope of the study to cover the various agricultural ecologies/agricultural systems in the country to have a better understanding of the changes taking place and the issues involved therein.

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About the Authors

Sarojeni V. Rengam

Sarojeni V. Rengam is the Executive Director of Pesticide Action Network Asia and the Pacific (PAN AP). She is a zoologist by training but is better known for her longstanding commitment on pesticides and women's issues. She has been working on pesticides and women's issues since 1985 and has co-authored numerous publications in these fields. Currently, she is actively involved in the area of Women in Ecological Agriculture, and coordinates this programme within PAN AP. She also works on trade, food security and food sovereignty issues.

Nasira Habib

Nasira Habib is the Director of KHOJ Research and Publication Centre, a Pakistan-based NGO she initiated to create consciousness on issues affecting people, particularly on the impact of the development process on women. She has been working in the field of community development through adult education for the past decade, and has authored a number of educational materials that is people-centred, and action-oriented.

Dr Hesti R. Wijaya

Dr Hesti R. Wijaya is the Executive director of YPP (The Rural Development Foundation) in Malang, Indonesia and is the Coordinator of the Research Centre for Women's Studies in Brawijaya University. She is actively involved in promoting women's rights and sustainable agriculture issues.

SIBAT

Sibol ng Agham at Teknolohiya or SIBAT (Wellspring of Science and Technology) is an NGO engaged in collaboration with organised groups in poorest communities in Philippine rural areas, desiring to help improve rural lives through Sustainable Agriculture (SA), one that is developed with the highest regard and responsiveness to the needs of the communities, resulting to real benefits and the strengthening of the communities' organisation and self-help. SA is a core initiative of SIBAT, carried out with the communities to attain sustainable resource management, self-reliance and self-sufficiency, especially in food crops.

SIBAT directly addresses the conservation, protection and enhancement of indigenous people's (IP) food security, biodiversity and traditional knowledge, within the respect for the IP's right to their ancestral domain/territory. SIBAT works with the IP communities against several incursive elements that have threatened their land and resources over the years (namely, the entry of inappropriate "modern" agricultural technologies, extractive industries and resource-destructive government projects), through invoking the rights of IP's to the management and defense of their land, seed and resources.

Pesticide Action Network Asia and the Pacific (PAN AP)

is one of five regional centres of PAN, a global network working to eliminate the human and environmental harm caused by pesticides, and to promote biodiversity-based ecological agriculture.

Established in 1982, the PAN International network presently links over 300 groups in 50 countries. PAN International's work is guided by five common strategic objectives. These are to:

1. Protect health and the environment by eliminating highly hazardous pesticides from the market and replacing them with sustainable solutions.
2. Resist development and stop the introduction and use of genetic engineering into agricultural production systems.
3. Promote empowerment of grassroots movements and citizens to fight agrochemical and seed corporations and challenge corporate globalisation.
4. Increase public investment, development, adoption and implementation of non-chemical alternative pest management systems.
5. Strengthen the capacity of PAN to be effective, and to develop a structure for PAN international.

Based in Penang, Malaysia, Pesticide Action Network Asia and the Pacific is linked to more than 150 groups, in 18 countries in the Asia Pacific region. PAN AP envisions "a society that is truly democratic, equal, just, culturally diverse, and based on food sovereignty, gender, justice and environmental sustainability".

PAN AP prescribes to the following development principles: a participatory holistic approach; a commitment to gender equity and genuine partnership; the need to confront social injustice and global inequities; the value of biodiversity, appropriate traditional and indigenous knowledge systems; and the recognition that our earth is one interdependent living system.

EMPOWERING PEOPLE FOR CHANGE

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PESTICIDE ACTION NETWORK ASIA & THE PACIFIC

Pesticide Action Network Asia and the Pacific
P.O. Box 1170, 10850 Penang, Malaysia
Tel: +(604) 6560381
Fax: +(604) 6583960
Email: panap@panap.net
Website: www.panap.net