INDIGENOUS KNOWLEDGE: THE BASIS FOR SURVIVAL OF THE PEASANT FARMER IN AFRICA

Mensah Bonsu,
School Of Agriculture,
University Of Cape Coast,
Cape Coast.

INTRODUCTION

Indigenous knowledge is local knowledge which is passed from one generation to the next and which is peculiar to the community. Such knowledge has not been documented in the past as the mode of transmission was knowing by doing. Attempts to impose technologies that are foreign to the local farmer have not been successful in most cases. It is strongly believed that the local knowledge of the farmer should be considered when introducing new agricultural technologies as the local farmer is endowed with a considerable wealth of knowledge which could be tapped.

In the past, traditional agriculture was characterized as being "primitive" by the colonialist and all efforts were geared towards changing the culture and the traditions of the local farmer through introduction of the so-called modern agriculture which is backed by "science driven model". It was the thinking of the colonial agricultural development planners that the traditional agriculture backed by indigenous knowledge had no future. The green revolution in Asia was considered as a success because the land use systems in that region are fairly homogenous as against the complex and rainfed agricultural systems in Africa.

In Ghana, the realization that the indigenous farming systems are primitive and unproductive led to the introduction of mechanized agriculture using the tractor in the early parts of the 1960s. In spite of huge expenses incurred through importation of tractors and their attachments, the bulk of food supply in Ghana still came from the effort of the local farmer using simple tools such as the cutlass and the hoe. In reality, the green revolution in Africa has impacted negatively on sustainable agricultural development. Soil degradation that goes with the use of the tractor has done more harm than good. Sharman (1985) sums it up that agriculture backed by modern technology has caused long term environmental problem due to continuous promotion of monoculture and use of chemical fertilizers and pesticides. Even though the green revolution increased agricultural productivity in the short

term, the long term effect on environmental degradation has given way for present agricultural planners of the developing countries to reconsider the potential of traditional agriculture in fostering sustainable agricultural production systems (Thurston, 1990).

In this paper, the survival of the peasant farmer through indigenous cropping systems, biodiversity conservation and health delivery system as well as community development is highlighted.

2.0 INDIGENOUS FARMING SYSTEMS AND THE SURVIVAL OF THE AFRICAN PEASANT FARMER

2.1 Indigenous Knowledge on Soil Types as a Basis for Agricultural Planning of the Peasant Farmer

The peasant farmer, from knowledge passed on through the ancestral lines, has a way of indentifying the suitability of different soil types for different crops grown in the locality. The peasant farmer's local knowledge of soil is crucial for effective agricultural planning, rural development and livelihood of the rural people. The common indicators of indigenous soil classification, often termed ethnopedology are soil colour, and texture (Bonsu, 1998; Birmingham, 1998). The types of crop to grow depends on the nature of soils. The ethnopedologic classification of soil types based on texture for three ethnic groups in West Africa is presented in Table 1.

The traditional farmers know that soils that are sandy in texture have poor ability to support plantation agriculture because of their poor water holding capacity and low nutrient content. When vegetation is present, the few top centimeters may contain some organic matter, which makes the soil ideal for groundnuts and some root crops such as cocoyam and cassava. The peasant farmer is also aware that hard clay soils are unsuitable for arable crop production because of their hardness. A farmer may cultivate it only where he has no alternative. The peasant farmer would normally grow pepper on hard clay soils. Loamy soils are the ideal soils the peasant farmer prefers for all types of crops.

Sometimes drainage or wetness or consistency is used in ethnopedology by the peasant farmer. A marshy soil is referred to as 'wora' by the Ashanti tribe of the Akan group of Ghana. The mosis tribe of Burkina Faso classify wet loamy clay soil as 'zinaare' and very soft soil as 'zi-bugri'. A clay soil in a low land where water stagnates is classified as zi-koteka' by the Mossi tribe of Burkina Faso. Based on topography, the Mossi tribe classifies upland soils as 'tanga' and lowland soils as 'baoogo'. The Yoruba classifies fertile soil of high base status as 'ile olora' and infertile soil of low base status as 'asale'. The ethnopedological classification of soil based on soil colour for three ethnic groups in West Africa is given in Table 2.

With no conventional scientific knowledge of soils, the peasant farmer of Africa is capable of using his indigenous knowledge to select soil types for their suitability for crop production. For example, the peasant farmer uses marshy soils in the dry season production of vegetable such as okro, garden eggs and tomatoes.

Most tribes in different African countries have a way of indigenously classifying the soil. Such indigenous soil classification systems allow the local farmer to make an appropriate use of his land by assigning specific crops to specific soil types. The indigenous soil classification systems are easily understood by the peasant farmer. These indigenous classification systems are also useful as complementary to the scientific systems of soil classification.

Table 1. The ethnopedological classification of soil types of three ethnic groups in West Africa based on texture (Bonsu, 1998; Dialla, 1993; Warren 1992).

Ethnic group	Local name	English name
Akan [Ghana]	Anwea	Sandy Soil
Mossi [Burkina Faso]	Busri	Sandy Soil
Yoruba [Nigeria]	Yanrin	Sandy Soil
Mossi [Burkina Faso]	Dagre	Hard Clay Soil
Akan [Ghana]	Etini	Hard Clay Soil
Mossi [Burkina Faso]	Bolle	Clay Soil
Yoruba [Nigeria]	Bole	Clay Soil
Yoruba [Nigeria]	Amo	Pure Clay

Table 1. continued

Akan [Ghana]	Asaee pa	Loamy Soil
Mossi [Burkina Faso]	Xeka	Lateritic Soil
Mossi [Burkina Faso]	Zikugri	Stony Soil
Mossi [Burkina Faso]	Rasempuiiga	Gravelly Soil
Yoruba [Nigeria]	Ile Ololuta	Stony Soil
Akan [Ghana]	Aboseaso	Gravelly Soil

Table 2. The ethnopedological classification of soil types of three ethnic groups in West Africa based on colour

Ethnic group	Local name	English name
Akan [Ghana]	Nete Kokoo	Well-drained brown/red Soil
Akan [Ghana]	Nete tumtum	Black Soil
Mossi [Burkina Faso]	Zi-sabille	Black Soil
Mossi [Burkina Faso]	Zi-miuugu	Red Soil
Mossi [Burkina Faso]	Zi-peele	White Soil
Mossi [Burkina Faso]	Bis-miuugu	Red Sandy Soil
Mossi [Burkina Faso]	Bis-sabille	Black Sandy Soil
Yoruba [Nigeria]	Ile-du	Dark soil
Yoruba [Nigeria]	Ile Pupa	Brown/reddish Soil
Yoruba [Nigeria]	Ile Funfun	Bleached Coarse Sandy Soil

2.2 Indigenous cropping systems and the survival of the peasant farmer

The traditional cropping system involving shifting cultivation and mixed cropping or intercropping has been the common system of crop production by the peasant farmer of Africa for centuries. Under the system of shifting cultivation or land rotation, the farmer cultivates a piece of land for a period of two to three years. When the fertility of the soil has declined, the farmer leaves the land to fallow for 10 years or more to regenerate its fertility. By fallowing the land for 10 years or more, the soil could regain about 75% of its original organic matter level of the virgin forest (Nye and Greenland, 1965).

In recent times, this system of land use has become unsustainable in Africa because of population pressure and increasing demand for land for diverse uses (Quansah *et al.*, 1992).

The traditional cropping systems in Africa vary from one country to another, but similarities exist. Even within the same country, the traditional cropping systems may vary from one ethnic group to another, depending on the climate, the nature of soils, the types of crops capable of growing in the area, socio-economic factors and food needs of the community.

Mixed cropping comprising different combination of crops is the predominant cropping system practised by the peasant farmer in most parts of Africa. The traditional mixed cropping whereby the crop combinations are inter-planted haphazardly, is the basis for scientifically research-based cropping systems such as inter-cropping, sequential cropping or relay cropping,. Centuries ago, the traditional system of mixed cropping was considered as primitive and no research efforts were put into it to appreciate the scientific basis of the peasant farmer's choice of this practice. Recently, scientist have come to understand the scientific basis of the farmer's technology of mixed cropping in terms of insurance against crop failure, the household food requirements, soil conservation and integrated pest management.

The promotion of monoculture and use of chemical fertilizers, pesticides and herbicides are being attacked because of the adverse impact their use has on the environment (Sharma, 1985). By growing different combinations of crops in a mixed cropping system, the peasant farmer is ensuring that if one crop fails, the others may survive. The system is economically useful to the farmer as an attempt is made to produce the food need of the family on one piece of land. By growing local legumes as part of the system, some amount of nitrogen could be added to the soil through biological nitrogen fixation. The combination of different crops forms a high density planting system for effective coverage of the soil surface to control erosion and runoff. The different combination of crops feeding at different depth zones of the soil provided efficient untilization of soil nutrients. Also, the presence of different types of inter-planted crops may hinder the spread of pest attack on a particular crop.

2.3 The survival of the peasant farmer through indigenous soil managementpractices

Soil management practices are those practices established with the view to improving soil fertility as well as reducing erosion and runoff on an agricultural land. The peasant farmer has been practising some traditional soil management systems long before the introduction of the so-called modern agriculture in Africa.

The use of manure from animals reared in the farm yard to maintain the fertility of soil in the peasant farmer's farm has been practised by the farmer many years ago. The compound farming technology of the African peasant farmer has survived through the ages using only organic manure collected from kraals of the farmer.

The peasant farmer of the savanna ecosystem uses the ridge and furrow system as one of the tools for soil management. With ridge and furrow system, water is conserved in the furrows resulting in reduction of erosion and increased crop yields due to increased water availability with root zone. In the Sahelian agro-ecological zones the ridge and furrow system is highly effective in the control of wind erosion as well.

In the yam growing areas of the savanna agro-ecology , the peasant farmer may grow cowpea on mounds later to be used in growing yams. Some farmers grow broad beans beside yam plants on the same mounds for the yams and the beans to share common stakes. The scientific basis of these practices is understood as the legumes fix nitrogen which may become available to the yam. A typical indigenous soil management system unique with the Matengo ethnic groups of Tanzania consists of grass-fallowed tied-ridge system (Rutatoro,1997). In this system, pits are constructed manually across the slope and mulched with dead grasses. This low input system reduces evaporation of water from the soil. In addition, the system reduces runoff and soil erosion whilst increasing soil organic matter content in the long run. The re-introduction of agro forestry system as a tool for solving soil management related problems in small-scale farming is just an improvement of peasant farming system. The system has been in use by the peasant cocoa farmer centuries ago. The peasant cocoa farmer deliberately leaves the important economic trees on his farm as a means of providing shade to protect the young cocoa seedlings. Another typical example of the agroforestry

system practised by the peasant farmer is growing crops interspersed with sheanut trees (Butteros pernum parkii) in the northern part of Ghana. In addition to the economic importance of the sheanut trees in providing sheabutter, they serve as windbreaks to check wind erosion and lodging of crops.

The peasant farmer was using the no-tillage system to improve the organic matter status of his field long before the practice was improved through scientific research. This no-tillage system which is still being used by the peasant farmer is termed 'proka'. By this 'proka' system, the land is cleared and the residue left on the soil surface between six and twelve months to rot before crops are planted.

2.4. The survival of the peasant farmer through indigenous plant protection system

The peasant farmers of Africa have developed a wide variety of indigenous plant protection techniques which are not only effective but also affordable and sustainable. The peasant farmers have been using a variety of herbs to control weeds., pests and plant diseases.

The indigenous plant protection techniques that have been used by the peasant farmer over the years to control weeds, pests on crops and plant diseases include the following:

- Use of fast growing and spreading varieties to control weeds in parts of the farm where weeds tend to be persistent. For example the use of melon and some quick spreading leguminous crops.

- Growing early maturing varieties of root crops to control root rot. For example, peasant farmers plant early maturing cassava varieties (6-month varieties) in soils with poor drainage during the dry season and the crops are harvest before the beginning of the major rainy season. There is an element of food security. This system provides food to the farmer and his household during the major planting season when food supply becomes limiting.

- The use of wood ash to control ants which are commonly associated with the incidence of root mealy bugs on crops. Dusting leaves of vegetables such as garden eggs and okro with wood ash has been used by the peasant farmer to control insect damage.

- Use of burning to sterilize the soil to control certain soil borne disease (even though burning is not a desirable practice).

- Planting different crop varieties on the same piece of land as a kind of integrated pest management (IPM) which does not involve chemical spraying to control weeds.

- Direct use of herbal extract from plants like the neem by farmers to control pests on crops is a well-known practice.

The advantage of the indigenous methods of plant protection are lower costs, biological conservation in the ecosystem, easy accessibility of materials, and lower toxic levels. Chemical pest control causes a great deal of soil, plant and air pollution.

2.5. The survival of the peasant farmer through indigenous post-harvest technology

The local food production through the peasant farming system is seasonal. This system of food crop production leads to one season of food availability alternating with a lean season of food scarcity. Because of the seasonality of the local food crop production, the peasant farmer survives during the lean season by using his indigenous knowledge to develop techniques that are simple, effective, affordable and sustainable for storage of food crops.

In the interior savanna eco-zone, grains such as maize, millet and sorghum are the important staples. Farmers store their grains in bins made of mud and roofed with thatch grass. The walls of the mud bins are plastered with sand mixed with cowdung to seal every crack to prevent insects from get across to the bins. The grains stored are used by the farmer and his family until new harvest is done.

The peasant farmer of the forest ecozone stores his seed maize on a compartment created above the fire place of his kitchen. The compartment is usually made of thatch raffa palm. The grains are kept weevil free from the smoke and heat that comes from fire used for cooking.

The peasant farmer generally store grains in barns constructed with thatch bamboo, raffa palm or wood. Plastic is tied to the base of wood used to frame the barns so as to make them slippery to prevent rodents from climbing the barns. Sometimes a smooth metal sheet is used in place of plastic.

The peasant farmer may also store their grains in air-tight bins or basket made of thatch bamboo. Neem leaves are added to keep the grains pest free. In recent times, the use of neem to control pest in stored grains has attracted research interest of the agricultural scientist.

Burning of wood, straw and capsicum (pepper)in granary room before using it for storage is among the indigenous post-harvest technologies. It is believed that this technology sterilizes the granary room and destroys any pest present. It is also the belief of the peasant farmers that a mixture of ashes, lime and crushed capsicum added to stored grain serves as irritants or dessicants to insects that cause spoilage of stored grains. Furthermore, a mixture of gypsum and sugar is used by the traditional farmer to control rodents. The premise of using this gypsum-sugar technology is that since rodents cannot vomit, they cannot expel the gypsum once it has expanded in their stomach, so they die.

2.6 Indigenous biodiversity control and food and medicinal needs of the peasant farmer.

The term biodiversity is used to describe the variety of life forms. In a wider sense, biodiversity is the variety and variability among living organisms and, the ecological complexes in which they occur. The ecological complexes are the intricate and interdependent relationships that often occur among co-existing organisms, including the ecosystem processes that are more than just the collection of its parts.

The deliberate maintenance of diversity of domesticated and non-domesticated plants and animals characterizes the farming system of the peasant farmer across the African 'continent and provides an important opportunity for systematic in situ maintenance of genetic resources. Much of this indigenous knowledge in biodiversity conservation is either being lost or maligned in some ways. The accelerated rates of loss of indigenous floral and faunal species are having negative impacts on rural communities of Africa, as most rural communities in Africa depend on these forest product for their livelihood. Therefore, indigenous management of domesticated and non-domesticated

plants and animals must complement national programmes for in situ biodiversity conservation.

The tradition pastoralists have developed and maintained varieties of indigenous livestock and poultry breeds which might have been extinct now. These breeds are adapted to harsh environmental conditions in which the so-called high performance breeds would perish. The peasant farmers of Africa have maintained these indigenous genetic resources for human survival in such harsh zones of Africa. Typical examples are the livestock breeds of the nomads of the arid zones of Africa and the local chicken of the peasant farmer. These breeds are selected on the basis for hardiness and resistance to diseases and drought rather than high productivity and performance. The peasant farmer maintains the indigenous breeds of chicken because they require little external inputs and capital as well as attention in their rearing. The quality of meat of these local breeds of chicken also meets the requirements of the traditional food preparation of the local communities.

Biodiversity control is an important aspect in the life of the peasant farmer in Africa. In Africa, the peasant women play an important role in biodiversity control. Biodiversity conservation is important to food and medicinal needs of the peasant farmer. The peasant women know the nutritive content of wild leaves, fruits, roots and tubers. The women collect the important wild species of economic importance and plant them in their gardens. These wild species are also sold on the market as source of cash income for the peasant women.

The peasant women are the custodian of seeds of local crop varieties. The peasant farmer has survived by using local crop varieties in times of adverse weather and poor soil fertility conditions. Peasant farmer have been able to conserve seeds of local crop varieties by storing them from one growing season to the other. Also, the exchange of plant materials between peasant farmers is the norm in peasant agriculture.

One aspect of the peasant farmer's way of biodiversity conservation is sparing of wild plant varieties of economic importance during cultivation. With careful look, the peasant farmer spares all wild plant varieties that are valuable nutritionally and medicinally by shielding them.

Owing to the globalization of scientific agriculture and genetic resources development of hybrid and high yielding crop varieties, the traditional

systems of seed collection, storage and exchange are being challenged. Quite often, scientists over look the fact the peasant farmers are also plant breeders and experts in biodiversity. Scientists believe that only seeds bred in scientific ways are pure and proper for use in conventional crop improvement programmes. But scientists fail to acknowledge that they scout the forests and the local markets in search of genetic plant materials of indigenous origin for use in their plant breeding programmes.

The traditionalists have maintained biodiversity by means of restrictions, taboos and sacred groves. By teaching children what is permitted to use and what is not, biodiversity has been sustained within peasant farming communities in Africa. However, the use of law enforcement by governments to preserve endangered species in biodiversity has proved quite unsuccessful. But the traditional approach to biodiversity conservation is respected by the peasant farmers as this has been their way of life.

2.7. The survival of the peasant farmer through indigenous social and legal systems

Chieftainship and village councils are the social organizations for resolving disputes at peasant farmer level. Within peasant farming communities, there are elements of solidarity, collaboration, responsibility, accountability and initiative.

Solidarity and collaboration in the peasant farmers' community are reflected in activities such as funerals and social functions.
The advantage of this way of life is to reduce the cost burden of individuals within the community. The communal spirit is the basis for responsibility, accountability and initiative. Certain days are set aside for organizing communal work to maintain environmental sanitation. Litigations are easily resolved using the traditional arbitration systems. The peasant farmer has survived socially and legally through these indigenous structures.

2.8 The role of modernization of Agriculture on indigenous farming system

Many of the traditional farming system are sustainable only under "low-input-low-output" regimes. The introduction of mechanization, fertilizers and agrochemicals has turned some of these traditional systems into "high-

input-high-output" system, most of which can only be sustained with externa support (Aluma, 2004). Historically, most of these high-input system are not sustainable.

The other factors that may cause the failure of the modernization of local agriculture in Africa include: inappropriate technology transfer, the use of few cultivars for a variety of environments, the introduction of tillage system developed for temperate soils which often results in loss of organic matter and erosion and the introduction of plant varieties and animal breeds that are not immune to diseases and pest abundant in the humid tropics (Aluma, 2004).

It is asserted that modernization of agriculture and other land use changes in Africa have brought about a reduction in genetic variability. In recent times, agricultural researchers in Africa are attempting to counteract this trend by re-introducing the genes of indigenous species back into the gene pool of local domestic crops and livestock in Africa. However, because funding for agricultural research in most African countries is donor-driven, efforts in this direction have not been very encouraging.

Therefore, it is suggested that modernization of indigenous farming systems should be based on participatory integrated management approach in which the indigenous knowledge of the traditional farmer is prominently featured. Modern design of local farm tools that reduces drudgery in the traditional farming systems, the use of various forms of organic fertilization and integrated pest management involving the use of local herbs and improved land husbandry are among the areas that modernization of traditional agriculture could be directed.

CONCLUSION

The peasant farmers in Africa have maintained their indigenous knowledge as part of structures for the sustenance of their livelihood. Without recourse to scientific know-how, the peasant farmers in Africa have been able to live in symbiosis with their very environment. Since they know their environmental conditions better than anyone else, it is erroneous to impose on them technologies that deviate completely from their normal ways of thinking. Experience shows that technologies foreign to the peasant farmer have failed to be acceptable to them. The modern agricultural planners have come to realize that the indigenous knowledge of the peasant farmer must be seriously considered if the living conditions of the peasant farmers are to be improved in a sustainable manner.

REFERENCES

Aluma, J. 2004. Sustainable Agriculture and Rural livelihood Local Knowledge innovations in Development. Indigenous Knowledge: Local path way to Global Development. World Bank Publication. Pp 24-29.

Birmingham, D. M. 1998. Learning local knowledge of soils: A focus on methodology. Indigenous knowledge and Development Monitor 6 (2): 7-10.

Bonsu, M. 1998. Indigenous Farming Systems and biodiversity conservation in Tropical Africa Proceeding, 1st African Conference on Indigenous and forest Development People, Traditional Knowledge and Biodiversity, organized by International alliance of Indigenous and Tribal People of the tropical Forest, Ethnic Minority Rights Organization of Africa and Green Earth Organization (Ghana) Sept. 7-12, 1998, GIMPA, Greenhill, Legon.

Dialla, b. E. 1993. The Mossi indigenous soil classification in Burkina Faso. Indigenous Knowledge and Development Monitor 1 (3): 17-18.

Nye, P.H. and Greenhill, D. J. 1965. The Soil under shifting cultivation. Technical communications No. 51. Commonwealth Agric Bureau, Garnham Royal, Becks, England.

Rutafora, D. F. 1997. Strength and weakness of the indigenous farming system of the Matengo people of Tanzania. Indigenous Knowledge and Development Monitor 5 (2): 6-9.

Quansah, C. Bonsu M., Mahama, S., Batsa, H. P. and Gana, B. K. 1991. Land and Water Resources Management Study. Government of Ghana and World Bank Preparatory Study, MOFA, Accra.

Sgarma, R. 1985. To develop sustainable agriculture: Scientist cannot ignore the farmers. Eco-Forum Vol. 10, No.4

Thurston, H. D. 1990. Plant disease management practices of traditional farmers. Plant diseases vol. 74, No.2.

Warren, D. M. 1992. A preliminary analysis of indigenous soil classification systems in four eco-zones of Nigeria. Discussion Paper RCMD 92/1. IITA. Ibadan, Nigeria.