



Review

A study on pest and disease management practices in traditional farming systems

Subhas Dhoni Singh

Agronomy Department, University of Applied Sciences Western Switzerland technology, architecture and landscape,
150 Route de Presinge, 1254 Jussy, Switzerland.

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Traditional farming system is an ecologically based age-old farming system developed by ancient farmers through generations of their interaction with nature and natural resources for food, fodder and fiber. Indigenous knowledge is the knowledge of the indigenous people inhabiting different geographical regions of the world with their own language, culture, tradition, belief, folklore, rites and rituals. This report is an attempt to document some of the indigenous practices followed by traditional farmers for the management of pests of certain common crops grown in traditional farms in general and north east India in particular.

Key words: Agricultural farming, indigenous traditional knowledge, pest and disease management, traditional ecological knowledge.

INTRODUCTION

Traditional farming system is an ecologically based age-old farming system developed by ancient farmers through generations of their interaction with nature and natural resources for food, fodder and fiber. It is an indigenous method of cultivating crops using self reliance locally available resources without external inputs. Indigenous farming system, once prevalent all over the world is now almost vanished from the developed countries and confined to some tribal dominated regions of developing countries occupying more than half of arable land (Thurston, 1992). Wherever they are, the common feature of traditional farming is the presence of spatial and temporal heterogeneity often with complex plant age structure, mixed cropping, multiple, host-pathogen interactions and use of simple tools to plow and harvest the crop. India is rich in traditional farming systems because of diversity in agro-ecological habitats inhabited by diverse ethnic groups who have been practicing age-old farming in location specific situations since generations. It is a community based farming system that brings the local people closer and respects their environment.

Tools and techniques used by them are either unknown or least understood. However, with the advent of modern agriculture, traditional farming in India is largely confined to hilly regions that too in peripheral states where green

revolution could not influence the traditional farmers. Crops and pest scenario of crops in traditional farming system is by and large same as that of the conventional agriculture but degree of severity caused by various pests may differ. Management of crops in general and pest management approaches in particular are different among traditional farmers practicing traditional farming systems in different regions of the country because of difference in indigenous knowledge they accrued over generations of their close contact with the nature for evolving sustainable and locally adapted agriculture system.

Traditional farming system in north east of India is complex and unique of its own as the land use system in this regions is dominated by slash and burn agriculture where management of crops and pests are carried out by integrating indigenous knowledge and traditional ecological knowledge of the communities. This twin knowledge have been recognized by the world scientific communities and scientists are showing keen interest in traditional agriculture because indigenous farmers and their system may be of great help to remedy the deficiencies of pest management in modern agriculture

(Sofia et al. 2006). Attempt is being made here to document some of the indigenous practices followed by tra-

ditional farmers for the management of pests of certain common crops grown in traditional farms in general and north east India in particular.

About indigenous/traditional knowledge

Indigenous knowledge is the knowledge of the indigenous people inhabiting different geographical regions of the world with their own language, culture, tradition, belief, folklore, rites and rituals. In course of their close interactions with nature and natural resources, they are to make a certain decisions as to the solutions of their problems they encounter in their day to day life while managing the land and environmental resources for survival. Compelling situations motivate them to generate knowledge out of necessities. Therefore, indigenous knowledge so developed is based on necessities, extinct, curiosity and observations of ethnic groups to mitigate the immediate situations. Hence, indigenous knowledge is used in the decision making process as to how, when and where to act depending on the situations.

This knowledge has been tested using the thumb rule of trial and error methods over a period of time through generations and validated to make the established knowledge for the purpose for which it is designed for use of the ethnic group who propounded for the first time. Thus, indigenous knowledge varies from tribe to tribe and usually passes on to the next generations though the words of mouth, actions or even practices, usually by the elders of the family/society. In fact, these ethnic bases cumulative knowledge took generations of time to penetrate into the social fabrics of inter and intra- ethnic groups because of communications gap and orthodox nature of the society. Eventually, this local knowledge in course of time, gets socially accepted and validated which finally inters into the social life and subsequently become the Indigenous traditional knowledge (ITK) of the society as a whole. Thus, socially validated indigenous knowledge which shares common values and gains popularity with human element attached to it particularly the culture of the ethnic groups may be known by the name Indigenous traditional knowledge. However, now days it is known to people synonymously by various modern names such as indigenous technical knowledge, technical know how of indigenous people, peoples knowledge etc. (Singh and Sureja, 2008).

Indigenous traditional knowledge is distinct from international knowledge which is derived through hypothetico-inductive process such as knowledge generated in universities, research organizations, private and public research institutions through research activities. As such, scientists in recent years are keen to learn indigenous knowledge in its various dimensions as to how indigenous people view, perceive and interact with their environment and mobilize their cumulated knowledge for designing appropriate actions. Although many people, so to say self styled modern educationists have discarded this

knowledge branding them as outdated primitive knowledge, yet its importance and hidden principles, particularly in the field of agricultural and environmental issues have been recognized by international bodies such as the united nations conference on environment and development, 1992; international union for conservation of nature and natural resources, 1980 and world convention on environment and development, 1987 (Kanoujia, 2004). As such, scientist in this knowledge base economy who are in research of new ideas and innovations expect that indigenous knowledge may hold significant message which may be of use to remedy the deficiencies in modern agricultural and environment related issues (Berkes et al., 2000).

Despite its potentiality in addressing the environment issues including agriculture, indigenous traditional knowledge could not develop to its fullest extent primarily for fast technological development and secondly due to crude and outdated nature of the knowledge, that too in the process of degeneration with the passing away of elders and finally due to the exposure of the society to their modern innovations. As the elderly persons in any ethnic group hold the key and custodians of the traditional knowledge, they are the masters to make correct decisions to overcome the adverse situations of their immediate environment. Being a local need based knowledge, indigenous traditional knowledge system is based on local resources without any external inputs. Eco-friendly manipulation of their immediate environment, judicious application of plant and animal products either in raw or simple processed forms are important components of indigenous knowledge system. Land being the basis of survival of mankind, indigenous knowledge system of indigenous people revolved mostly about the ecological management of their land and environment in harmony with nature. Here lies the importance and significance of indigenous traditional knowledge and therefore it should be protected, preserved and documented in the interest of future generations before it is lost.

Indigenous disease and pest management practices in traditional farming system

In recent years there is a resurgence of interest in reviving the age old farming system through scientific approach which is known by modern man as organic farming, because of hazardous effect of excessive chemicals in agricultural system, environment and human health. Further, the negative impact of green revolution such as loss of genetic diversity of indigenous crops because most farmers confined production in mono cropping of selected crops (maize, rice, wheat) ignoring indigenous crops, stagnation in crop production even with the increase dose of chemical fertilizers, development of pesticide resistant pests, emergence of new pests which were either non existent or present as minor pest degradation of arable land to the extent of unfit for cultivation without the appli-

cation of synthetic chemical fertilizer and overall ill effects of chemical based products to human health etc are some of the challenges which invoke to look for alternative farming system that minimizes the use of chemicals (fertilizers or pesticides). Indiscriminate use of pesticides that results killing of natural enemies of pests, beneficial soil micro organisms and its residual effect in food chain necessitates the development of integrated pest management concept to minimize and judicious application of pesticides as last resort if other eco friendly alternative methods fail to contain the harmful agricultural pests. However, the success story of IPM is limited to few crops only and as such, search of viable alternatives for the management of pest is an ongoing process.

India is a large country with diverse agro-climatic habitats, arable land, crops and cropping pattern suitable for growing location specific crops being cultivated by hundreds of ethnic farming communities with their own indigenous technologies. Therefore, crop cultivation practices vary not only from one agro-climatic zone to another but also from one ethnic group to another. These ethnic farming communities are the store house of indigenous knowledge of technical knows how regarding the overall management of indigenous crops. The uniqueness of this knowledge is that it is environmentally benign, ecologically protective, socially acceptable, economically viable and sustainable. In appreciation of technical know how knowledge of ethnic groups, attempt is being made to collect, document and understand the rationale behind the traditional practices in general and pest management in particular which are disappearing at fast rate under the influence of high tech modern agriculture. While doing so, it not only preserves the age old agricultural heritage of the country and identity of Indian farmers but also promotes the scientific development of traditional practices with honour and dignity of indigenous farmers for sustainable agriculture because it holds the potential eco friendly message for pest management.

North eastern region of India bestowed with natural beauties and biodiversity resources is rich in eco friendly indigenous knowledge maintained and nourished by hundreds of ethnic tribes (more than 120 ST) and communities. Despite diversity in ethnicity, they practice a common but unique farming system locally called jhum around which their culture and tradition revolves. In this farming system farmers grow as many as 35 crops (Ramakrishnan, 2004) in mixed, multiple or polyculture form of which rice is the staple food crop that dominates the system in Manipur, Nagaland, Tripura, Arunachal Pradesh but potato in Meghalaya. Whatsoever be the cropping pattern, the cultivation practices are eco friendly and tuned to the need of the people. Irrespective of ethnic groups practicing jhum, interesting features of the system is that it has inbuilt pest and disease management mechanisms as reflected in their cultural practices such as mixed /multiple cropping, zero tillage, clean cultivation, slash and burning, green manuring, sequential cropping and harvesting, fallowing, flooding etc.

Use of plants and animal parts and products are the important components of indigenous knowledge in the management of pest and diseases of crops in jhum system. Indigenous farmers of the region also possessed rich traditional ecological knowledge such as growing location specific nitrogen fixing trees such as *Alnus nepalensis*, *Flemingia vestita* sparsely for enrichment of soil fertility keeping tree boles /trunk and erecting /pegging wooden structures amidst jhum/ terrace fields for facilitating perching of birds which prey on harmful crop pest, recycling of jhum based waste products for the management of crops etc.

Traditional cultivation practices, although it was jhum only in the past but due to population explosion, jhum cycle has been reduced due to population explosion, Jhum cycle has been reduced to 2 - 3 years, some of which have been converted to terrace wet farm while others to sedentary form of agriculture. Thus, jhum system of cultivation have undergone changes to terrace form to settled agriculture forms which one finds in mixed forms at different locations in N.E. Some of the indigenous traditional knowledge (ITK) being used by these traditional farmers in all the 3 system of crop cultivation have been explained with rationale which may be of use for integration in the existing IPM concept.

Traditional belief - a myth or reality

Indigenous people have rich store house of traditional beliefs, folklore, rituals and rites which may not hold any truth and have any practical value but expected to hold some message and therefore need in depth observation in the light of empirical sciences to discover some of these beliefs as sound agricultural practices. These beliefs include that seeds collected and thrashed on new moon day (Amawasia) for sowing in the next season are usually not infested by pest and pathogens, plant diseases are caused by halo around the sun, sowing seeds should be sprinkle first with gold water etc. North eastern region of India being the home of rich culture and nature friendly traditional knowledge, these beliefs have been shaped and nurtured by hundreds of ethnic groups scattered throughout the regions.

Conclusion

Formal pest and disease management knowledge and ecological knowledge derived through hypothetico-deductive method whereas indigenous pest management knowledge and traditional ecological knowledge derived through long experiences and perceptions accumulated by traditional farmers during the course of their interactions with the nature and natural resources need to be effectively integrated and should not be viewed in isolation.

Although indigenous pest and disease management knowledge fitted well in the age- old land use system, yet need thorough validation in view of changing agricultural

scenario from traditional to integrated farming system through inorganic and organic farming methods. Some of this validated Indigenous traditional knowledge (ITK) may be incorporated as an integral component to dovetail neatly into the IPM concept for evolving better pests and disease management strategies in any of these farming systems.

This systematic approach not only protects this fast disappearing ITK under the influence of modern agriculture but also preserve the indigenous pests and disease management identity of farming communities of this country. Therefore, this rich heritage of the county should be harnesses, preserved, documented and developed as modern science such as indigenous integrated pest management before they are lost.

REFERENCES

- Berkes F, Colding J, Folke C (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications* 10 (5): 1251-1262.
- Chhetry, GKN (2008). Personal observations.
- Ramakrishnan PS (2004). Sustainable development of jhum with conservation of biodiversity in North-East India: Where do we stand? *Man and Society* 1(1): 59-85.
- Singh RK, Sureja AK (2008). Indigenous knowledge and sustainable agricultural resources management under rainfed agro-ecosystem. *Ind. J. Trad. Knowledge* 7 (4): 642-654.
- Sofia PK, Prasad R, Vijay VK (2006). Organic farming- Tradition reinvented. *Ind. J. Trad. Knowledge* 5: 139-142.
- Thurston HD (1992). Sustainable practices for plant disease management in traditional farming systems. West views Press, Boulder.

