Chapter 20

Extension of Organic Resource Management Practices

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Farmers do not necessarily adopt agricultural practices as introduced to them by researchers but select and adjust some elements that suit their farming conditions and goals. Efforts to improve the capacity of farming communities should actively involve them in all stages of adaptive research from planning to conclusion of the project activities. When community participation is coupled with flexible technical options, the role of extension services is greatly enhanced (Chambers *et al*., 1993). A needs assessment to identify and prioritize the needs of the target community should precede any community development interventions. This goal is achieved through a process called Participatory Technology Development (PTD).

PTD is a process of purposeful and creative interaction between farmers, researchers and extension agents. It involves working together as agricultural research and development partners to identify, test, adjust, evaluate and disseminate new agricultural technologies. It builds upon the people's local knowledge and agricultural practices allowing for optimal use of locally-available resources. Farmers' participation in this process is essential as it assists development agencies to accurately identify and prioritize farmers' needs (Van Veldhuizen *et al.,* 1997).

This approach has been adopted by the Sustainable Agriculture Centre for Research and Development in Africa (SACRED-Africa) in working with farmers in western Kenya. Its strategy focuses upon identifying and resolving crop production and marketing problems encountered by farmers, promoting agricultural practices that conserve natural resources, and strengthening the capacity of farmers and rural communities to evaluate existing practices and adapting appropriate interventions. SACRED-Africa also promotes social change that reflects the cultural values, needs and responsibilities of community members.

Need exists to move beyond the project-by-project mode to a system's approach in order to better coordinate and sequence interlinked investments in agricultural research, extension and education. This approach requires public and private managers of separately governed institutions to coordinate decisions on complementary investments because the payoffs have been found to be higher if properly planned. Rather than pursued as independent extension, research or education projects, one deals with whole systems (Eicher, 1999). This needs to be accompanied with the relevant training of professional researchers and extension agents (Lynam and Blackie, 1994). Extension agents need to be engaged in applied research activities as part of their educational development while researchers need outreach experiences. This ensures that a student's formal classroom education is readily related and integrated into the context relevant to the student's subsequent employment in the agricultural sector.

Extension agents need to be educated to perform effectively not only as individual experts but as members of teams where they serve as trainers, facilitators and learners (Lacy, 1996). Training has to shift from narrow subject programs to interdisciplinary problem-solving approaches. Integrated strategic planning across related agencies with similar mandates and priorities at national and regional levels is an important strategy for research and extension collaboration both within and across government agencies, NGOs, universities and the private sector. This would give researchers and extension agents more exposure to different areas and improve their participation in decision-making, especially in the sustainable management of organic resources.

Extension and Farmer Innovation

In the past, the approach of most agricultural programs was to develop and teach farmers a set of pre-determined innovations that would increase productivity assuming that having adopted these “top-down” practices, the people would continue indefinitely to conduct farming at the new, higher level of productivity. This approach is flawed. SACRED Africa experience shows that productive agriculture requires a changing mix of technologies in order to realize agricultural development. Farmers should be encouraged to develop their own practices and in ways that they understand. The goal of agricultural extension programs should be to train and motivate farmers to teach each other various innovations from a “basket of options” and encourage them to improve on those innovations themselves. By learning to become teachers of these new technologies, farmers can spread them throughout their localities in a manner that does not require external stimulus.

The farmer-to-farmer extension approach has revealed that the relationship between a farmer and extension agent may be influenced by extension messages learned from past interactions. Poorer farmers with little education are often apathetic as attempts to improve their situation have failed in the past. To change this attitude, it is fair to initiate extension projects involving simple technologies that have been proven successful under similar circumstances. Any intervention that fails will confirm their fears that their conditions cannot be improved. In addition, most farmers learn by observing the experiences of others. Extension agents should cover new subjects at the time farmers recognize the need this information. Extension agents then state their instructional objectives from the onset and how their interactions are likely to address the farmers’ situation. The trainer should move step-by-step, starting with farmers’ knowledge and abilities regarding the technology, the resources available for implementing the technology and problems that could be encountered (Lynam and Blackie, 1994). SACRED-Africa uses this approach to introduce technologies such as composting, crop rotation and post-harvest handling to the farming communities in Western Kenya.

Often, it is useful not only to present the new skills verbally but also to demonstrate them and give farmers an opportunity to practice them because farmers learn better from observation than from lectures. Extensionists should not expect farmers to deviate much from the way they ‘do things’ but should improve their skills to solve problems and reach their farming goals. Educating farmers is often a more important task in extension than the actual transfer of technology. Farmers who understand the consequences of their own practices as a cause-and-effect relationship are empowered and better prepared to confront new situations as they emerge.

Extension and Technology Adoption

Studies in Sub-Saharan Africa reveal that development strategies comprise a mixture of food self-sufficiency, profit maximization, risk aversion and sustainability of farm production (Eicher, 1999). Increased population pressure and resource degradation have led smallholder farmers to rely upon the most conservative and inexpensive technologies and consequently, limiting the adoption of many improvements with a known capacity to increase crop yields and farm incomes (Jager *et al*., 1999; Woomer *et al*., 2002).

The dependency on indigenous technologies enables farmers to cope with the various changing environments and sustain farm productivity. Furthermore, indigenous crops may allow for the development of new farm enterprises as these crops become better marketed and commercialized (Figure 1). These technologies are relatively efficient at low productivity levels and are favored by farmers when prices of outputs are low, prices of inputs high and infrastructure underdeveloped. In the long term, however, these technologies alone cannot be relied upon to efficiently exploit the agronomic potential of soils in Sub-Saharan Africa and sustain food security. Integration of indigenous soils in Sub-Saharan Africa and sustain food security. Integration of indigenous technologies with science can greatly improve natural resource management.

Adoption of new technologies is largely determined by the characteristics of the household (education, social status, attitude, inherent skills and resource endowment), its objectives, together with the characteristics of the technology such as its relative adoption, profitability, compatibility, complexity and viability (Rogers, 1983). External factors such as infrastructure and geophysical conditions also determine the adoption of specific practices but the technology should fit local circumstances. According to Fujisaka (1993), farmers may fail to adopt new innovations for six general reasons.

The innovation addresses the wrong problem. Sometimes the innovation addresses issues that may not be relevant to the immediate production constraint especially when the problem has not been correctly identified. Although farmers easily identify problems of soil nutrient depletion and soil erosion, other problems associated with production may be more difficult to identify.

Figure 1. A farmer in Western Kenya who maintains diverse amaranth germplasm for the production and local marketing of seeds.

Farmers practice is equal or better than the innovation. Some of the technologies offered to farmers perform poorer than the farmers' own management. This may arise when technologies have not been tested in regions with different agronomic and ecological systems or when they have been developed in isolation of alternative solutions.

The innovation does not work or creates other problems that work against farmers' interests. An example drawn from Teso district in Western Kenya (Figure 2) reveals that when improved fallows were introduced as a means of improving soil fertility, one of the introduced species *Crotalaria grahamiana,* was widely attacked and extensively defoliated by caterpillars (*Amphicalla pactolicus*). Because this caterpillar would occasionally move to other plants to pupate, the farmers feared that the pests were attacking these crops. This infestation was of concern to farmers beyond the actual threat it posed but nonetheless is likely to restrict their acceptance of similar innovations in the future.

Extension fails. Extension agents may fail to present an innovation correctly causing its rejection. They may also target farmers who may not have the capacity to use the technology. A common practice by extension agents to work with "progressive farmers" may mislead researchers and extensionists on the choice of the appropriate innovations to recommend and promote to the larger diverse community of farmers.

The innovation is too costly. Farmers frequently reject innovations that are too labour and capital intensive because they lack the time, energy and cash to meet requirements of the new practice. Soil fertility management practices such as mulching, tree biomass transfer and bench terrace establishment have limited impacts due to their unrealistic labor requirements. They compete for labor with other proven farm activities. For some innovations, the costs are immediate while the benefits accrue in the longer-term. Most smallhold farmers are comfortable with innovations that give benefits within the near-term as their planning horizon tends to be determined by immediate household needs.

Figure 2. Extensive defoliation of a newly introduced crotalaria by caterpillars generated distrust of improved fallows among farmers

Social factors. Social factors such as insecure land tenure among farmers.

systems and gender imbalances may limit farmers from adopting some innovations. Farmers lacking clear title to land refrain from investing in conservation measures or tree planting. Production of crops that require frequent and often unsuccessful trips to local markets may be viewed as acceptable because of their social opportunities.

Communicating Innovations

Effective research and development that involves smallhold farmers require communication techniques that improve the ability of farmers to adopt new technologies, learn from what others are doing and overcome barriers between researchers, extensionists and farmers. Workshops and farmers' group meetings are commonly used strategies that assist to foster local initiatives (Figure 3). Visual aids such as product samples and specimens can be displayed to farmers to facilitate dialogue. Frequent interactions between households and specialized groups clear misunderstandings related to complex social and cultural norms that affect resource use and enhance appreciation of new ideas and technologies (Figure 4).

Figure 3. Members of a self-help group in Western Kenya invited agriculturalists to explain an innovative maize-legume intercropping arrangement prior to field testing in the next season.

Extension messages have to capture and maintain the attention of farmers for the duration of the message and this can be realized through seeing, hearing, touching, tasting and smelling. Communication designers should take into account these factors when preparing extension messages. Commonly used methods include the mass media (newspapers, magazines, radio and television), diagrams, sketches and posters; farm demonstrations; farming groups; and, individual farmer extension. The choice of method for communication of extension messages depends on the technology, the ability of extension agents and accessibility of client farmers. Each of these methods has advantages and disadvantages but their combined use results in greater impact from extension.

Figure 4. Rapid assessment of technology adoption by farmers; a) farmers field testing an innovation in 2001 (standing) and b) those adopting the innovation in 2003.

Conclusion

Farmer participation in planning and execution of extension work improves the impact of extension, technology dissemination and adoption. Constant communication among key players must be maintained and delivered in ways that are understandable to farmers. Farming constraints must be carefully identified and prioritized, to enhance subsequent uptake of technologies that should, in principle, compliment the farmers' practice and solve, not aggravate, a production problem.

References

Chambers, R. 1993. Reversals, institutions and change. In: Chambers, R., Pacey, A. and Thrupp, L.A. (Eds.) Farmer First: Farmer Innovation and Agricultural Research. Intermediate Technology Publications. London. pp. 181-195.

Eicher, K.C. 1999. Institutions and the African Farmer. Third Economist Distinguished Lecture. CIMMYT, Mexico D.F. 60 pp.

Fujisaka, S. 1993. Learning from six reasons why farmers do not adopt innovations intended to improve sustainability of upland agriculture. *Agricultural Systems* 46:409-425.

Jager, A.M., Bekunda, M.A. and Smaling, E.M.A. 1999. Turning Available Technologies for Improvement of Soil Fertility Management into Real Options for Farmers in Sub-Saharan Africa. Proceedings of the International Conference on Strategies for Poverty Alleviation and Sustainable Resource Management in the Fragile lands of Sub-Saharan Africa, 25-29 May 1998, Entebbe, Uganda.

Lacy, W.B. 1996. Research, extension and user partnerships: Models for collaboration and strategies for change. *Agriculture and Human Values* 13:33-41.

Lynam, J.K. and Blackie, J.M. 1994. Building Effective Agricultural Research Capacity: The African Challenge. In: J.R. Anderson (Ed.), Agricultural Technology: Policy Issues for the International Community. CAB International, Wallingford, UK. pp. 106-134.

Rodgers, E.M. 1983. Communication of Innovations. Free Press. New York.

Van den Ban, A.W. and Hawkins, H.S. 1996 Agricultural Extension, 2nd Edition. Blackwell Science. London.

Van Veldhuizen, Waters-Bayer, A. and de Zeeuw, H. 1997. Developing Technology with Farmers. A Trainer's Guide for Participatory Learning. Zed Books Ltd. London.

Woomer, P.L., Mukhwana, E.J., and Lynam, J.K. 2002. On-farm research and operational strategies in soil fertility management. In: (Vanlauwe, B. *et al*. (Eds.) Integrated Plant Nutrient Management in Sub-Saharan Africa: From Concept to Practice. CABI Publishing, Wallingford, UK. pp 313-331

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