Empowering Smallholder Farmers: Effective Training Approaches for Sustainable Agriculture

Ms Mmakgabo Matlou:
ARC-Natural Resources and Engineering

Smallholder farmers play a vital role in South Africa's agricultural sector, contributing significantly to food security, poverty reduction, rural development and economic growth. However, these farmers often face challenges such as climate change, limited access to resources, lack of technical skills and knowledge, access to markets, environmental degradation and food insecurity (OECD,2006). To empower smallholder farmers and enable them to achieve sustainable growth and address these barriers, a range of effective training and education approaches are needed to provide skills and knowledge. Skills shortage is cited as a major obstacle to economic growth, social development and sustainable employment growth (DAFF, 2011). Therefore, improving human capital in agriculture is especially important where the shortage of trained farmers is a major limiting factor to development.

Education and training on the sustainable use of agricultural natural resources can assist farmers to make productive contributions to the agricultural economy in South Africa. However, one of the critical issues in the 21st century is the introduction of appropriate technologies that will effectively contribute to improved food security, sustainable agricultural production, and rural development (Olubode-Awosola & Van Schalkwyk, 2006). To promote sustainable agriculture, it is imperative to deliver agricultural training to the right people at the right time and in the right way. This involves adopting participatory training methods that place farmers at the centre of the learning process, ensuring that their unique needs, cultural contexts, local conditions, experiences and indigenous knowledge are valued. These methods include on-farm demonstrations and on-site training sessions which are effective because they allow farmers to see the practical application and benefits of innovations. By engaging farmers directly in experimentation and observation, these methods foster a deeper understanding of sustainable practices. This article presents effective strategies to capacitate and educate smallholder farmers in South Africa.

The Agricultural Research Council- Natural Resources and Engineering (ARC-NRE) has for more than 20 years successfully established on-farm experimentation as part of the participatory training approaches to disseminate information, build capacity and demonstrate new farming techniques with the smallholder farmers in various provinces of South Africa. Some of the on-farm experiments were established in the Ludondolo and Candu villages of the Mbashe local municipality in the Eastern Cape Province as part of the Conservation Agriculture Technologies (CATs) project. The aim of the project was to demonstrate and assess CATs

strategies in selected rural communities to empower rural communities with knowledge and skills to be self-reliant and be able to adapt to climate change through the implementation of Conservation Agriculture (CA) principles in dryland field crops. The study was conducted on farmers' fields with a total of 30 farmers hosting replicates of trials. Each farmer owned an average of 1.5 ha. The main crop studied was yellow maize (Zea mays L.). All the trials were managed by researchers with the support of farmers and extension officers through a collaborative research system.

Traditionally, research was conducted on-station or through researcher managed on-farm trials and the government's extension system using 'top-down' dissemination methods, and the results were transferred to the farmers. This approach ignored the knowledge already existing in the community and failed to recognize the processes by which farmers learn and adopt new practices. In recent years, there has been renewed interest to develop and implement farmer centred approaches. To change the 'top-down' approach and involve farmers in all stages of research and training, an innovation systems (IS) approach was used to implement Conservation Agriculture (CA) projects in the two villages of the Eastern Cape.

The on-farm IS research approach introduced farmer-led and collaborative-managed experimentation or trials (or experiential learning) as a key methodology, where farmers compared new CA practices with their traditional practices. In support of the experimentation, farmers were provided with materials such as knapsack and boom sprayers, production inputs (seeds, fertilizers, herbicides and pesticides) and tractor-drawn planters. A researcher or collaborative-managed and on-farm, farmer-led trials were also introduced through the process of experimentation. Farmers were also encouraged to establish two observation trials to compare CA and conventional tillage production systems.

A series of training or Farmer Field School (FFS) events corresponding with the cropping calendar for maize crop production were held to empower 30 farmers with skills and knowledge whilst implementing CA principles in their own fields. Training programme was tailored to the needs, constraints, cultural

Picture 1: Farmers presenting examples of weeds in Xhosa to other trainees.

Picture 2: Farmers collecting a soil sample during hands-n practical training.

contexts, and local conditions of smallholder farmers. This involved conducting needs assessment to identify knowledge gaps and designing programs that address site specific challenges such as soil degradation, erratic rainfall, pest infestation, weed control and low crop yields. Indigenous knowledge and local languages were also incorporated into the training sessions to ensure greater relevance and acceptance among farmers (**picture 1**). The training events were comprised of a theoretical 'discovery' of the concepts and principles involved in the implementation of best practices (about 30% of the course content) and practical, hands-on training (about 70% of the course content) (**picture 2**).

Establishment of farmer field schools (FFS) and on-site training sessions were effective methods for delivering agricultural knowledge and innovations to smallholder farmers (**picture 3 and 4**). In FFS, farmers actively participated in problem-solving activities, learned by doing and exchanged ideas with peers. By focusing on locally relevant challenges, FFS helped farmers to adopt improved practices such integrated pest, weed and soil fertility management. Additional 50 farmers received training through farmer-to-farmer extension and awareness events.

The on-farm research approach resulted in improved innovation capacity among various stakeholders. Farmers also learnt and developed new skills from the collaborative-managed trial and implemented what they have learnt in their own trials or cropping fields. This farmer-led experimentation provided farmers with an opportunity to test, adapt and adopt technologies that suit their circumstances on their cropping fields.

Participatory on-farm experimentation and on-site training provided farmers with an opportunity to evaluate crop response to alternative soil nutrient replenishment and conservation strategies. Farmers observed significant differences between CA and conventional tillage trials. The sites studied often suffered mid-season dry spells; thus, retention of mulch had an important role in moisture conservation and subsequent yield benefits compared to conventional tillage. It was also found that soil health and maize crop yield improved by 40% in the first season under CA compared to conventional tillage. The improvement was attributed to the crop residues or mulch left on the soil surface after harvesting and the use of drought tolerant cultivars. This demonstrates that CA has the potential to improve the sustainability of

Picture 3: Farmers attending a planting session using CA principles.

Picture 4: One of the trainees demonstrating calibration of a knapsack sprayer.

agricultural systems in the long-term, even for poorly-resourced farmers resulting in improved food security.

The CATs project made a significant impact in a short period in these two villages. It improved soil health, increased yields, empowered various stakeholders with skills and knowledge on sustainable utilization of natural resources, laid the foundation for sustainable development and provided valuable lessons for the South African farming sector. Some of the farmers sold maize harvest to generate household income. The participatory action learning approach has stimulated the innovative spirit of farmers and enhanced the utilisation and dissemination of valuable technical knowledge. The utilization of these IS methods and approaches has not only enhanced the relevance of the training approaches, research processes and results but has also improved the uptake and utilization of obtained results, hence reducing natural resource degradation while increasing productivity.

References:

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Inquiries :
Ms. Mmakgabo Matlou
ARC-Natural Resources and Engineering
Tel: 012 310 2655
E-mail: mmakgabom@arc.agric.za