Sustainable Agricultural Development in Afghanistan

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Nearly 80% of Afghanistan’s population lives in rural areas and depends heavily on livelihoods in the agriculture sector, which, in turn, depends on agricultural production. Agricultural education is essential for fulfilling basic human and animal needs, such as food, fodder, fiber, and energy, while ensuring long-term stewardship of natural resources and the environment. Agricultural development in Afghanistan depends on agricultural education at the national and international levels. Such education is implemented by agricultural specialists and expert farmers. Scientific and research-based education is applied through agricultural schools and institutions and their faculties, whereas traditional education is provided by expert farmers through their sustainable agricultural practices. Agricultural education can have an important effect on the sustainable development of the agriculture sector. The greatest challenges to agricultural education in Afghanistan are proper management, institutional policies and strategies, research activities, funding, and continuous war and security issues. Agricultural development also requires a focus on sustainable agriculture in the curriculum. Education and training are widely recognized as contributors to national economic growth. Although many organizations and institutions are providing agricultural education to specialists as well as farmers, the lack of updated materials is a substantial challenge in Afghanistan. The two main objectives of agricultural education in Afghanistan are: (1) to give updated information on agricultural progress from around the world to Afghan farmers, and (2) to provide essential training in agricultural technology, sustainable cultivation practices, post-harvest handling, irrigation, fertilizer management, biodiversity conservation, soil health, dealing with biotic and abiotic stresses, and climate change and its effect on agriculture production.

**Key words:** Agriculture, Education, Sustainable Development

**Introduction**

Sustainable agriculture is an integrated system of plant and animal production practices with site-specific application that can be maintained over the long term. Sustainable development refers to a mode of development in which resource use aims to meet human needs while ensuring the sustainability of natural systems and the environment, so that these needs can be met not only in the present, but also for generations to come.

The Brundtland Commission coined what has become the most often-quoted definition of sustainable development: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The discipline of rural development recognizes the crucial links among agriculture, natural resources, human settlement, and biodiversity. Sustainable development clearly requires the cooperation and inputs of sectors other than agriculture, including infrastructure, education, health, and energy.

To bring about substantial change, reformers of agricultural education systems and institutions need to fully appreciate the complexity of the environment in which the shift in focus from agriculture to rural development must take place. There is a relationship between the sustainability of agriculture and education, in that good education over the long term can bring about sustainable agriculture. Agricultural education
directly affects agricultural productivity (Mason et al., 2008).

In Afghanistan, the greatest challenge to a sustainable agricultural system is the trade and marketing of agricultural products. Johnson and Ruttan (1994) noted that most of the world’s resource poor are engaged in farming, implying that the focus of development policy should be aimed at increasing farmers’ incomes. The income of farmers is directly related to national and global marketing networks. Education is thought to be most important to agricultural performance when technology or the economic environment is changing rapidly (Shultz, 1964), which is certainly the case in Afghanistan.

Education and training are widely acknowledged by researchers as contributing to national economic growth. In countries where incomes and education levels are high, human capital is the result of formal education and informal on-the-job training and is a major factor in determining differences in productivity and income among countries (Razzak and Timmins, 2010). Both formal and informal agricultural education systems are available in Afghanistan, with formal education being implemented by government agencies, international organizations and informal training being implemented traditionally by farmers.

The time has come to place science at the forefront of humanitarian concerns. Researchers must ask themselves what connection their work has with the challenges that threaten humankind (Ikeda, 2001). Science and technology play key roles in the sustainability of agriculture both worldwide and in Afghanistan. The advantages of using science and technology to improve agriculture are clear. Education for sustainable development necessitates an ethical struggle to transform knowledge into what Ikeda (2001) called a “propelling force for an eternally unfolding humanitarian quest.”

Sustainable development is no longer an attractive project to members of the developing world alone. As the world’s population increases, resources are becoming more limited and dramatic processes such as global warming are occurring; sustainable development is now a necessity for all people, including the resource-limited societies of Afghanistan. These pressing and serious environmental challenges require a cosmopolitan outlook and international solutions beyond the current static model of agricultural education and extension services.

In this study, we made multiple visits to the study site over 2 years, analyzed existing documents, and conducted interviews (Corbin and Strauss, 2008) in order to generate new ideas about improving agricultural extension work in Afghanistan. Two areas of concern:

1) Security and access.

2) Provincial diversity surfaced.

The above-mentioned areas then incorporated into the theoretical model of this study (Creswell, 1998).

Methodology

Open-ended interviews were conducted with staff and faculty members of organizations that supported and facilitated agricultural education in Afghanistan, to investigate the three initial areas of concern, namely assessment, content, and process (Merriam, 1998; Yin, 1984). Two additional areas of concern, namely security and access along with provincial diversity, were added as a result of the grounded theory developed through the study. As noted by Strauss and Corbin (1998), grounded theory is “derived from the data, systematically gathered and analyzed through the research process. Data collection, analysis, and theory development are comingled activities when using this methodology. No portion of the theoretical framework resulting from this study was preconceived; rather, it was developed through our desire to understand the respondents’ construction of reality in Afghan agricultural education. Instrumentation interview questions were developed by using information obtained from a literature review and the researchers’ first-hand knowledge from their extension efforts in Afghanistan. The final interview instrument was published in the Online Journal for Workforce Education and was validated by a panel of experts in Afghanistan (Wiersma, 1995).

Results and Discussion

Agricultural education challenges

The greatest problems of agricultural education in Afghanistan are capacity building, lack of textbooks and journals, weak media, and no connection to electronic resources. Though some of these problems have been solved in the past decade, farmers are still faced with many challenges in agricultural education (Barrick et al., 2009).

Trainer training is an important factor in sustaining agricultural education in Afghanistan. If 10 trainers could be trained by one person, by this formula after
five cycles 100,000 persons would be trained to teach sustainable agricultural practices. Having a sufficient number of trainers to serve the country would help to improve the sustainability of agricultural education and pave the way for sustainable agricultural production.

Agricultural education systems

Agricultural education affects agricultural productivity by improving the performance of ancillary business and trade (Mason et al., 2008). Conventional agriculture is increasingly based on highly specialized, highly productive farms. Abson et al. (2013) noted that this specialization results in farms that lack resilience to changing market and environmental conditions, and that by decreasing agricultural diversity the resilience of the farming system also decreases.

Both academic and traditional agricultural education are practiced in Afghanistan (Fig. 1). Traditional systems of agricultural education are implemented by farmers in rural areas. These traditional systems have been used throughout the history of this country as well as in other parts of the world. Formal education in agriculture exists in Afghanistan, with 98 agricultural schools, 26 agricultural institutes, and 21 agricultural faculties, all of which have the responsibility of releasing scientifically based agricultural knowledge to the younger generation. Such knowledge includes information on equipment, irrigation, fertilization, pesticide use, choosing the best varieties of seed, and navigating market networks. Highly qualified teachers and professors are teaching in the above-mentioned institutions as well as conducting research projects. We conclude that capacity building is in demand for young professors and teachers through funding from developed countries.

Agriculture in Afghanistan

Nearly 85% of Afghan farmers use irrigation, pesticides, fertilizers, and mechanized farm equipment in the production and handling of agricultural products. Studies to quantify the impact on production of reducing or limiting inputs to agriculture have suggested that yields per hectare would decrease by 35% to 80% depending upon the crop (Smith et al., undated). Lack of access to agricultural inputs is a major challenge among farmers in Afghanistan. Certified seeds and fertilizers are two important inputs that have not been reliably available on the market. In addition, for many farmers, sales from agricultural products cannot cover the cost of inputs. This situation suggests that Afghan farmers would benefit from training in the efficient use of agricultural inputs.

Modern portfolio theory provides analytical tools for investigating the relationships among land-use choices, expected geometric mean yields, and the expected variance in those mean yields on a landscape scale (Abson et al., 2013). Skilled use of mechanized farm equipment also plays a key role in the development of sustainable agriculture. Ag-mechanization tools are not available in rural areas of Afghanistan, where
farmers run their own agricultural operations. To a large extent, the rate of technology development and the degree of innovation in future technologies will greatly influence the stability and productivity of agriculture (Hutchins and Gehring, 1993). Understanding how to use new technology is as important as the availability of new technology to farmers. Some new technologies, such as communications technology, have been transferred to Afghanistan. However, these technologies represent only one piece of a much larger system, and to succeed Afghan farmers need access to the other pieces as well. Credible arguments suggest that production of food via high-yield agricultural techniques can meet the nutritional requirements of the global population (Avery, 1995). However, at present, no high-yielding cultivars are available to Afghan farmers, and the country’s agricultural output is insufficient to meet the population’s food needs.

**Increasing sustainable yield**

Assessment of crop variability allows breeders to develop suitable plant cultivars for improving yield and stability (Singh et al., 1985). The main factors affecting sustainable yield increases in Afghanistan are farm inputs, biodiversity, farmers’ knowledge, the social system, the political system, and the economic system (Fig. 2). The use of sustainable, best-management practices can result in high yields and less environmental damage. For example, cover cropping is an efficient way of recycling nutrients and reducing inorganic fertilizer inputs to maintain the sustainability of the production system without affecting productivity. Work to support sustainable yield increases has taken many forms, including building community agriculture infrastructure; providing seed, fertilizer, and equipment; and hiring agriculture trainers and extension personnel (Pense and Groninger, 2013). Although agricultural education in Afghanistan has been supported by many donors, Afghan farmers are still facing numerous challenges.

**Agricultural education and extension**

Agricultural education is applied through universities, schools, expert farmers, and ag-extension organizations in Afghanistan. The national agricultural extension system consists of various departments, such as those in charge of industrial crops, agricultural education, ag-mechanization, horticulture, livelihood improvement, family economics, and project implementation and evaluation (Fig. 3). The extension and education departments are in charge of curriculum development, exhibitions, publications, radio and television programs, field activities, and training (Fig. 4). Pense and Groninger (2013) established a theoretical framework by identifying five areas of concern in Afghan extension efforts (Fig. 5). The framework shows that security, provincial diversity, and sustainability, as well as their components, are important elements of sustainable agricultural development in Afghanistan.

**Conclusions**

Agricultural education plays an important role in the development of agriculture. Our research shows that this service is very weak in Afghanistan. Universities, schools, and agricultural institutes do not have access to new technology, books, journals, and electronic resources. Avery (1995) suggested that the use of high-yielding cultivars could alleviate food shortages, but this technology is not available to Afghan farmers. We conclude that the development of sustainable agriculture in Afghanistan will require advanced technology and greater availability of agricultural inputs. Diversified products and production systems are important for the stability and growth of agricultural sectors. Various wars in the country over the past 35 years have damaged the agricultural sector nearly to the point of extinction. Mason et al. (2008) explained the important role of markets in agricultural productivity. However, our research indicates that Afghan farmers do not have access to domestic or international markets. Therefore, imparting business knowledge to
Afghan farmers is an important part of meeting this challenge. Agricultural education plays a key role in sustainable agricultural productivity worldwide. The findings of this preliminary research project will be useful for the future development of agriculture in Afghanistan, hopefully paving the way for the participation of Afghan scientists in various international meetings and symposia.
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References


Fig. 5. Conceptual framework of the train-the-trainer model for agricultural extension in Afghanistan (Pense and Groninger, 2013).