The Role of Agricultural Extension and Agricultural Education for Sustainability

Orhan Özcatalbas, Muhammad Imran, Gülcin Gurkan, Hanife Durmuş, Tuğba Unlu

Department of Agricultural Economics, Akdeniz University, 07058 Antalya, Turkey

Abstract: Nowadays agricultural education and extension have become more important according to the different understanding and approach. As technology transfer has been dominant in the past, participatory approaches have emerged as an important alternative nowadays. Sustainability is among the most important agenda items of agriculture and humanity. Sustainable agriculture has become even more important today. For this reason, agricultural education and extension is an important policy and implementation tool. In particular, it is necessary to emphasize the issues of sensitization and attitude in society. The extension can assume important functions within this scope. Studies have shown that; Agricultural education and extension are important for transition to sustainable agriculture. Sustainability is addressed in terms of economic, social and environmental factors. This paper also discusses the importance of education and extension in ensuring sustainability in Turkey and the development of recommendations for the future.

Key words: Sustainable agriculture, rural extension, agricultural education, Turkey

INTRODUCTION

After the expiration of Millennium Development Goals (MDGs) in 2015, The United Nation introduced new set of goals called Sustainable Development Goals (SDGs) or known as global Goals. There are 17 Sustainable development goals, targets and indicators which will be used by UN member states to frame their agendas and political policies till 2030. The sustainable development goals that are based on millennium development goals added new sphere especially focusing on poverty eradication, protection of planet and peace and prosperity for everyone. All of the 17 SDGs are interconnected; failure or success of one will automatically impact other goals. Among other priorities, climate change, economics inequality, sustainable consumption, peace and justice, innovation, and affordable and clean energy are the new areas (UN, 2015).

Agriculture is a common thread which holds 17 SDGs more than any other sector. Agriculture still plays a very important role in the economy of many countries, by providing direct and indirect employment to rural and urban people, raw material for industry, foreign reserves from trade. The second sustainable development goal of the United Nation is, “end hunger, achieve food security and improved nutrition and promote sustainable agriculture”. As well as with all other goals, the achievement of this goal specifically is impossible without giving true importance to agriculture sector. According to United Nation fight against hunger is progressing towards complete eradication of hunger, the prevalence of hunger has declined from 15 percent in 2002-04 to 11 percent in 2014-16. Yet there are approximately 805 million people experiencing chronic hunger worldwide, out of total 526 million (65% of total) lives in Asia and Pacific, 227 million (28% of total) in Africa, 37 million (5% of total) in Latin America/ Caribbean and 15 million (2% of total) in developed countries (Anonymous, 2016). Global population has increased from 3 billion in 1950 to 7 billion in 2015 and it is predicted to reach above 9 billion in 2050. Ensuring provision of proper nutrition is also part of food security, besides addressing hunger. Receiving right quantity, quality and diversity of food in diet is nutrition security. There are 3.1 million children deaths from malnutrition, and estimated 165 million children under 5 have stunted growth. Agriculture has to play greater role in ensuring food security and nutrition security. In order to achieve targets there is need for sustainable food production system and resilient agriculture.

Since the end of the 2nd world war, agriculture has seen dramatic changes. Due to new technologies, increased chemical use, mechanization, specialization and governmental policies food and fiber productivity soared. Though these changes have had positive effects there have also been significant cost and negative effects. Major negative effects or costs are ground water contamination, topsoil depletion, neglect of living and working condition of farm laborers, the decline of family farms, increasing cost of production, and the disintegration of economic and social condition in rural communities (ASI, 2016). During the past two decades there has been an emerging movement to question the contribution of agricultural establishment to these social problems. Today, as United Nation has included sustainable Agriculture among its SDGs goals and sustainable agriculture has global acceptance and support. Sustainable agriculture not only just addresses environmental and social concerns, it also offers innovative and economically viable opportunities for growers, consumers, laborers, policymakers and many others involved in the entire food system. Basically sustainable agriculture consists of three major goals — environmental health, economic profitability and social and economic equity.

According to the National research Council (1993) sustainability is necessary to "keep the productive capacity of natural resources in step with population growth and economic demands while protecting and, where necessary, restoring environmental quality". Sustainable agriculture does not only provide food production. It also ensures efficient use of resources and productivity of soil for future generations. As a result, quality and more food is obtained and air, water and soil pollution is reduced (Özçatalbaş, 2014a). Sustainable agriculture requires the highest level of application of integrated resource management systems, giving adequate consideration to the changing environmental, social, economic, and cultural needs, conditions, available resources, and opportunities at the field, local, and more global levels, with the active participation of the producer throughout the entire process.

Why sustainability is important?

It is estimated that world population will reach 9 billion in 2050. In that period where hunger will be major threat, it will be important to ensure continuity of agriculture production and maintaining strategic importance of agriculture.

Rapidly increasing population has led to urbanization, economic activities and diversification of consumption activities. This has increased pressure on environment and natural resources (OKP, 2013), and this rapid development created many social and environmental problems in past century. Today, these problems have become a threat to human life and globe. According to estimates and studies in recent years, global warming which is the result of industrial developments is threatening global food security in near future (Özçatalbaş and Imran, 2015). For this reason food security is a basic issue in this century.

The concept of sustainability revolves around three main topics; health, environment and economy.

Human Health

The Rio Declaration on Environment and Development states that human are at the centre of concerns for sustainable development, and that they are entitled to a healthy and productive life, in harmony with nature. Sustainable development is not possible to achieve without achieving sustainable human health. Globally, millions of people die every year due to hunger, natural disaster, environmental factors, pesticides, and lack of access to quality health care and proper information about cures.

Malnutrition is a health problem faced by many people everywhere in the world. There are 1.9 billion adults overweight and 460 million people underweight worldwide. Around 41 million children under 5 years age are overweight or obese and 159 million children are stunted and 50 million are wasted (WHO, 2016). Nutritious food like fresh fruits and vegetables, meat, milk and legumes are not in access of many families or unaffordable, on the other hand food and drinks high in fat, sugar and salt readily available and cheaper which is leading to rapid increase in the number of adults and children who are obese and overweight in poor as well as in rich countries. Hunger which has been mega challenge for global community is threatening lives of millions according to estimates of FAO about 795 million people worldwide or one in nine in were suffering from chronic undernourishment in 2012-2016 (FAO,2015).

The health and safety authority of Ireland confirmed that farming is the most dangerous profession in the country (Cummins, 2017). Besides fatal injuries and accidents in farms, inputs used on farms are harmful for farm workers, children, rural people also consumers. According an estimate about 2 million tons of pesticides are used annually worldwide (De et al., 2014). Everyone in this world is exposed to pesticides, the ubiquitous dispersal of these substances is revealed by data on contamination of food as well as surface, ground, and drinking water. Children are more prone to health problems due to pesticides. Children are in more intense contact with their immediate environment as compared to adults. Malnutrition and infectious diseases in developing countries often intensify the negative effects of pesticide poisoning (TDH, 2011). Moreover, a lot of people are poisoned while applying pesticides to crops, reason for this are; expensive protective clothing, unavailability, damaged, or impracticality of protective clothing in hot and humid climates. Safety precautions are often in foreign languages and are not understood (Anonymous, 2010).

There are alarming risks of death due to environmental factors. Globally, almost 3 billion people still rely on solid fuels like, wood, crop residues, charcoal, dung or coal to heat their homes and cook in open fires. Inefficient use of these dirty fuels leads to high level of indoor air pollution; globally 4.3 million deaths were caused by indoor air pollution in 2012. Women and children are mostly affected by indoor air pollution. In 2012, worldwide 3 million deaths were caused by outdoor air pollution in both rural areas and cities. Almost 92% of the world population in 2014 was living in places which don't meet the WHO air quality guideline standards on WHO. Approximately, 0.8 million deaths were attributed to unsafe water, unsafe sanitation and lack of hygiene (WHO, 2016).

The sustainable development can only be achieved in the absence of devastating diseases. There is an urgent need to address the causes of ill health, including environmental causes, and their impact on development, with particular emphasis on women and children, as well as vulnerable groups of society, such as people with disabilities, elderly persons and indigenous people.

Environment and Economy

The single biggest threat to development is climate change and its widespread, unprecedented impacts. The first ever international political response to climate change began in 1992 at the Rio Earth summit. Rio convention included the adoption of UN Framework on climate change (UNFCC). The UNFCC now has a universal membership of almost 194 parties from the time it entered into force on 21st march 1994. The fourth assessment report of Intergovernmental Panel on Climate Change (IPCC) in 2007 warns changing weather patterns and rising sea level due to human activities. Climate change is going to impact availability of basic necessities like fresh water, food security and energy. There is a strong link between sustainable development and climate change. Poor and developing countries are more

vulnerable to climate change; particularly the least developed countries will be adversely affected and least able to cope with shocks to their system, as climate change will know no boundaries. Keeping in view the global threats of climate change a global response was required. Paris agreement whose aim is to keep global temperature rise for this century below 2 degree Celsius was adopted in December 2015 at the 21st session of the Conference of the Parties (COP21) convened in Paris, France.

Climate change is a big threat to our ability to eradicate poverty, achieve food security and sustainable development. Agriculture which is the single major force to achieve many sustainable development goals is directly or indirectly affected by climate change. Exposure of agriculture to climate change is high because farming activities directly depends on climate conditions. Climate changing will affect agricultural productivity through changing rainfall pattern, droughts, flooding and the geographical redistribution of pests and disease. According to estimates during last 50 years soil degradation has caused global agriculture productivity to decline by 13%. In 2009, weeds, pathogens and pests caused a $225 billion loss of food value in US only. At one hand agriculture is affected by climate change on the other hand agriculture also contributes to the climate change by release of greenhouse gases to the atmosphere. Agriculture influence climate change by release of Methane from livestock digestion process and stored animal manure and nitrous oxide from organic and mineral nitrogen fertilizer.

In this way agriculture has a greater role to play in coping with climate change and ensuring sustainable development.

Who are the stakeholders in sustainability?

A number of stakeholders have to play their role to ensure sustainability. These stakeholders range from producer, organizations, consumers and legislators; everyone has different functions to perform. Everyone has an important place in the whole process. One of the basic functions necessary to make it happen is education. Agriculture education should be given to every student in every school. Students should be taught about the noble profession like agriculture. They should be taught if we eat it is because of agriculture if we wear it is just because of agriculture and sustainability of agriculture is very important.

How is an education and extension for sustainability?

As it is known, the purpose of extension is to raise the living standard of the rural families in all rural areas. For that reason to develop of life standards of rural family is a very important via extension activities. It is also an important area of activity to educate rural people to use and develop the natural resources properly for the whole family (Özçatalbaş and Gürgen, 1998). Therefore, sustainability is a very important and main field of interest for extension science. Achieving sustainability can be expressed as a basic success parameter.

There is a close relationship between extension and sustainability, both of which are intertwined with social and farm life. Because sustainability refers to the continuation of life. Extension teaches how life can be sustained.

It is a value that must be accepted by all stakeholders that sustainability is a lifestyle. Accordingly, it can be said that there are two main study fields. The first is the rural extension and the agricultural extension and the second is the formal education process. It is necessary to adopt an understanding of the present and the future and the process should be run at the same time. Formal education can reach all layers of society and in the future a society can be created that embraces sustainability principles. In this context, it will be of great importance to work in the context of formal education, especially for farmer children and rural youth.

However, while these studies for the future are made absolutely; Extension is a very important tool to influence the current situation. In both applications the farmer and the family must be in focus. During the farmer and family production process, What threatens it? What affects it positively or negatively? They have to know it very well. Therefore, it should have a deep knowledge and application skills about sustainability.

As known, agricultural advisors and extension staff are important expert information sources. Here, with the number and quality of the specialists being very important for success. Participatory approaches should be emphasized instead of extension approaches based on technology transfer (Özçatalbaş and Gürgen, 1998). An important challenge is that of educating the biodiversity and agricultural researchers to genuinely engage with local knowledge. Agricultural extension programmes should be re-examined and adjusted so that they are made to contribute to creating and maintaining food security as well as biodiversity conservation on lands beyond the fences of officially designated protected areas (Abdu-raheem and Worth, 2013). Especially with participatory extension approaches, it is necessary to study with the understanding that sustainability principles will be dominated by vitality.

Conclusion

Sustainability is not only a matter of the agricultural sector, and it is a vital principle for humanity's future, and even it is a lifestyle. Sustainable agriculture does not only provide food production. It also provides use of resources efficiently and productivity soil for future generations. As a result, quality and more food is obtained and human, air, water and soil pollution is reduced (Özçatalbaş, 2014b). Sustainable agriculture requires the highest level of application of integrated resource management systems, giving adequate consideration to the changing environmental, social, economic, and cultural needs, conditions, available resources, and opportunities at the field, local, and more global levels, with the active participation of the producer throughout the entire process.

Since the main source of food production is sustainable agricultural production activities, the issue has become an important area of discussion nowadays. Accordingly, likely effects of climate change on every area will be important for agriculture producers, agricultural sector, and agricultural policy. Global warming will affect climate change, climate change will change agriculture production, and change in agriculture production will limit food production, which will further affect human life, economy and the future of locality. Economic, social and environmental impacts of drought which will stem due to climate change will have significant consequences (Özçatalbaş and Imran, 2015).

The environment, biological diversity, natural resources, practices that harm human beings should be adopted as ethical and human concerns. It is necessary to take advantage of extension, which is a magic tool in changing wrong attitudes and ideas. It should be taken into account though that it must be used with absolutely correct and appropriate approaches.

References

ABDU-RAHEEM, K. A., WORTH, S. H., 2013. Food security and biodiversity conservation in the context of sustainable agriculture: the role of agricultural extension. South African Journal of Agricultural Extension, 41(1), 01-17. Retrieved June 02, 2017, from http://www.scielo.o rg.za/scielo.php? script=sci_ arttext&pid=S0301-603X2013000100001&lng=en&tlng=en

ANONYMOUS, 2010. Facts and Figures – The Status of Global Agriculture, CropLife International Brussels. Available at: http://www.croplifeafrica. org/uploads/File/

publications/4906_PUB-BR_2009_08__10_Facts_and__figures_-_The_status_of__global_agriculture_%282008-2009%29.pdf, accessed 23 march 2017

ANONYMOUS, 2016. The Story of Agriculture and The Sustainable Development Goals, available at: https://farmingfirst.org/sdg-toolkit#section_1, accessed 23 march 2017.

ASI, 2016. Agricultural Sustainability Institute UC DAVIS. Available at: http://asi.ucdavis.edu/programs/sarep/about/what-is-sustainable-agriculture, accessed 23 March 2017.

CUMMINS, S., 2017. Farming the most dangerous profession in Ireland – 21 farm deaths in 2016, Available at: http://www.agriland.ie/farming-news/farming-the-most-dangerous-profession-in-ireland-21-farm-deaths-in-2016/, accessed 23 March 2017.

DE, A, BOSE, R., KUMAR, A., MOZUMDAR, S., 2014. Worldwide Pesticide Use, Targeted Delivery of Pesticides Using Biodegradable Polymeric Nanoparticles, SpringerBriefs in Molecular Science Nanoparticles, SpringerBriefs in Molecular Science, DOI: 10.1007/978-81-322-1689-6_2 Available at: file:///C:/Users/dell/Downloads/_9788132216889-c2.pdf9, accessed 23 March 2017.

FAO, 2015. Food and Agriculture Organization, International Fund for Agricultural Development, World Food Program. 2015. "The State of Food Insecurity in the World 2015. Strengthening the enabling environment for food security and nutrition." Rome: FAO. Available at: http://www.fao.org/3/a4ef2d16-70a7-460a-a9ac-2a65a533269a/i4646e.pdf accessed 7 September 2016.)

FRANZ, N. 2009. How Farmers Learn: Improving Sustainable Agricultural Education. Virginia Polytechnic Institute and State University, ABD.

NRC ational Research Council (1993). Sustainable agriculture and the environment in humid tropics. Washington, D. C.: The Academy Press

OKP, 2013. Republic of Turkey Ministry of Development Tenth Development Plan (2014-2018)/Türkiye Cumhuriyeti Kalkınma Bakanlığı Onuncu Kalkınma Planı (2014-2018). Ankara.

ÖZÇATALBAŞ, O., Y. GÜRGEN, 1998. Tarımsal Yayım ve Haberleşme (Agricultural Extension and Communication), Baki Kitap ve Kırtasiye Basımevi ISBN: 975-72024-02-3, Adana.

ÖZÇATALBAŞ, O. 2014a. Current Status of Advisory and Extension Services for Organic Agriculture in Europe and Turkey. "Organic Agriculture Towards Sustainability" book edited by Vytautas Pilipavicius, ISBN 978-953-51-1340-9, Published: May 7, 2014, DOI: 10.5772/58541.

ÖZÇATALBAŞ, O., 2014b. Küresel İklim Değişikliğinin Tarım Yayımı ve Politikaları Üzerine Olası Etkileri. (Possible effects of global climate change on agriculture extension and policy). National Family Farming Symposium, Ankara.

TDH, 2011. Pestizide und Kinder, Terre Des Hommes PAN Germany Osnabrück.

WHO, 2016. Ambient air pollution: a global assessment of exposure and burden of disease. Geneva: World Health Organization; 2016. Available at; http:// who.int/phe/publications/air-pollution-global-assessment/en/, accessed 23 March 2017.

WHO, 2016. Burning opportunity: clean household energy for health, sustainable development, and wellbeing of women and children. Geneva: World Health Organization; 2016. Available at; http://apps.who. int/iris/bitstream/10665/204717/1 /9789241565233_ eng.pdf, accessed 23 March 2017

WHO, 2016. Preventing disease through healthy environments. A global assessment of the burden of disease from environmental risks. Geneva: World Health Organization; 2016 Available at: http://apps.who.int/ iris/bitstream/ 10665/204585 /1/9789 241565196_eng.pdf?ua=1, accessed 23 March 2017.

WHO, 2016. What is Malnutrition, Available at; http://www.who .int/features/qa/malnutrition/en/ accessed 23 March 2017.