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SUSTAINABLE AGRICULTURE AND FOOD - CHALLENGES AND SOLUTIONS : A REVIEW

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Abstract

The role of agriculture in human development is very difficult to overstate. This lecture explains the multifaceted areas of the global food system in all corners of sustainable agricultural development Post-2020 Era.

It emphasizes the need to eradicate poverty and hunger in the current generation as well recalls the importance of an integrated goal of agricultural and rural development at the forefront of the sustainable development agenda; the lecture aims to define the principles of developing more specific solutions that are adaptable to local solutions the facts. Perhaps the only similarity of agricultural systems around the world is that they state that most Critical resources, food. Beyond that, agricultural systems are incredibly diverse, with crops, livestock, climate, soil, tools, and technology varying from country to country and even farm to farm. Thus, we have tried our best to avoid generic recipes of any kind with the aim of increasing agricultural production. It is unlikely that a one-size-fits-all solution for business and solutions will need to be designed to address regional difficulties and challenges and a location for sustainability in agriculture. This process will require adaptation with the involvement of different stakeholders and sectors.

Our goal is to advance the process of setting global science-based goals and targets. The Sustainable Agriculture Development Goals (SDGs), the goals, indicators, and solutions we propose are intended to serve as examples to encourage further discussion in this area. The validation and design of concrete strategies will require each country with applied experiences in sustaining agriculture and increasing agricultural production. Stakeholders to actively participate in further efforts to define the post-2020 plan and to take action to promote agricultural sustainability.

***Keywords* :** Sustainable agriculture, AquaCrop model, integrated system.

Introduction

Definition of Sustainable Agriculture

Defined as "an integrated system of plant and animal production practices That have applications. ”A private field lasts for a long time That is, the practice of agriculture using the basic principles of ecology, It is based on the study of the relationships between living organisms and their environments

What’s meaning of sustainable agriculture?

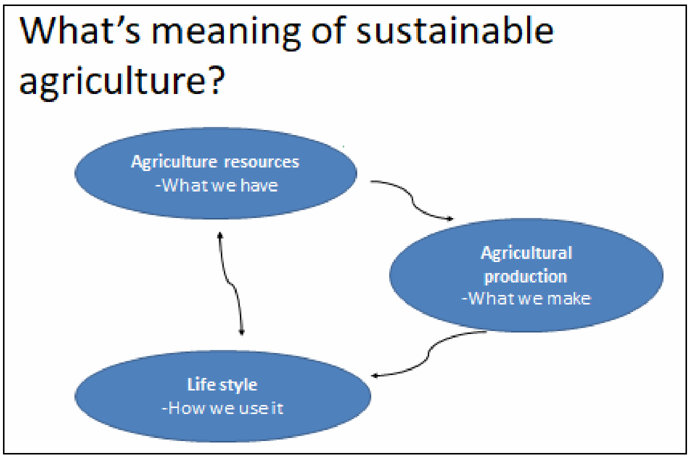

Fig. 1 : What’s meaning of sustainable agriculture

Wheat (*Triticum aestivum* L.) is the fourth largest cereal important crop worldwide, and it is also an excellent model species for the genetic and physiological studies (Dawson *et al.*, 2015). Also, it’s the unique genetic adaptation and the tolerance to the abiotic stresses are providing insights relevant to improvement in other cereal crops. Nevo and Chen (2010) mentioned that drought restrains of the crop production and the global food supply of Crops often experience periods of the atmospheric or the soil water deficit, which are often accompanied by the high temperatures, poor nutrient uptake, and the outraged soil salinity stress.

The repeatable and reoccurring real systems can be validated independently making it possible to the develop models and continue to build on them year after year, (Loomis *et al.*, 1979). The development of crop growth models began in the 1960s and have advanced and become more refined since, (El-Sharkawy, 2011). Crop models can be useful for the agronomic research tools that predict of the growth, the development and crop yield in the response to the surrounding environment (Steduto *et al.*, 2009). There are many existing crop models that are used around the world. All of the models have different structures, methods, inputs and algorithms for simulating crop growth (Todorovic *et al.*, 2009). The next section will provide the review of AquaCrop model used in this study.

The AquaCrop model is defined by Steduto *et al.* (2009) as “canopy-level and the engineering type of the model, mainly focusing on simulating an attainable crop biomass and the harvestable yield in the response to water available. The model was developed for purpose to using the fewer parameters in the balance of the simplicity, accuracy, and robustness. Water is used as main driver in AquaCrop for simulating yield production. Water is very important for crop production and was proven early on to be one of major limiting factors in crop growth (De Wit and Van Keulen, 1987).

The study of Abdel-Mumin and Bakry (2009) concluded that the food gap can be bridged in light of the rationalization of water use, in accordance with the resulting savings of water that can be achieved by optimal use of water, and through following developed methods of irrigation and water measures carefully calculated, where it is possible to expand the cultivation of important strategic crops . With regard to self-sufficiency in wheat, and assuming that the productivity of an acre of wheat is about 2.7 tons / per acre, and that the water metric per acre is about 1900 m 3, thus the area required to increase its cultivation with wheat to achieve self-sufficiency for the population during the beginning of the period to 2009 becomes about 1582 Thousand acres, its water needs are estimated at about 3.1 billion m 3, but as for the maize crop, the productivity of acres of maize is about 2.8 tons / acre, and the water metric per acre is about 3500 m 3 and thus the area that requires more cultivation of the maize to achieve Self-sufficiency is about 964 thousand f Dan, its water needs are estimated at about 3.4 billion m 3. In order to achieve self-sufficiency of municipal beans, it requires that the productivity of an acre is about 1.82 tons, and the water metric for acres is about 1400 m3, and thus the cultivated area required to increase is about 110 thousand acres, whose water needs are estimated at about 0.2 billion m3. In order to achieve self-sufficiency in edible oil, soybean and sunflower crops should be expanded, with an acre productivity of approximately 1.5, 0.9 tons, respectively, and that the water metric per acre of both is about 3.29, 2.62 thousand cubic meters. Accordingly, and considering that the average oil recovery rate is about 60% of the crop, the cultivated area required to be increased from soybean and sunflower crops amounts to about 485, 964 thousand acres, respectively, its water needs are estimated at about 1.6, 2.17 billion meters. Cube, respectively.

A Bayoumi study () showed that following the developed field irrigation systems, there is justice in the distribution of water at the beginnings and ends of canals and irrigators, especially at the level of fields located at the end of the irrigation source, indicating the importance of development in raising the acre productive efficiency of the areas located at the end of the irrigation source, and the amount of revenue On the irrigation water unit in pounds per m3 per acre, this is in addition to the lower acre costs after development compared to its counterpart before development. On the other hand, the study reached a set of recommendations, the most important of which is to expand the implementation of irrigation development in old lands to increase crop productivity and return to my unit Water and land. And conducting an economic evaluation before and after the development of the implementation areas through a timetable to assess the extent to which the objectives are achieved according to the indicators set.

Crops use the water to carry the minerals, the sucrose and the hormones through the plant. Water is also very critical factor in the chemical reaction of photosynthesis (Sheaffer and Moncada, 2008). Water-limiting conditions will result in the lower yields at the end of the season, so it is an important factor for crop modelling. These previous studies according to Mansour *et al*., (2019 a,b,c,d,e) Mansour and Aljughaiman (2012) and Tayel *et al*. (2012 a; b), Mansour *et al*., (2015a, b, c; d), Tayel *et al*., (2016), Pibars and Mansour, (2015), Pibars and Mansour (2016), and Mansour *et al*., (2014).

Areas of Sustainable Development :

Sustainable development improves the living conditions of all people, excessive use of natural resources beyond the capacity of the planet Endurance.

-Several key areas of sustainable development include:

1. Economic growth,
2. Conservation of natural resources and the environment,
3. Promote and promote sustainable agriculture,
4. Achieving social development through improving the standard of living of the population of rural people,
5. Ending hunger: There are still about 850 million people around the world are hungry yet.

   There are still about 850 million people around the world are hungry yet,
6. Food security,
   Reduce the level of malnutrition.

The most important challenges facing sustainable agricultural development

1-Poverty eradication:

By encouraging production and consumption patterns Balanced, without over-reliance and depletion of natural resources, especially in rural areas, which constitute the majority of the world's poor and agricultural-dependent areas.

2- Severe weather changes (Climate Changes):

Some areas are ravaged by severe leprosy and others in the world Heavy torrential rains and devastating floods in areas exposed to rain other.

Sustainable Agriculture (SA) Goals:

- To meet the humanitarian needs of food and clothing (his mean no poverty with SA),
- Improving the quality of the environment and the natural resource base on which it depends on the agricultural economy.
- Optimizing the use of non-renewable energy and existing resources In the fields and integration of bio-control methods and courses Natural biology whenever possible.
- Maintaining the viability of the farm economy.
- Improving the quality of life of farmers and society as a whole

The " El-Tamabdaoui" study showed that the methods of developing water resources in Egypt to provide the necessary water for horizontal expansion estimated at 8,3 million acres, represented in changing rice irrigation shifts from 4 days of work, 4 days of unemployment to 4 days of work and 6 days of unemployment after the end of Seedling season, to save about 1.5 billion m 3 annually, as well as expanding the cultivation of early varieties of rice, thus saving 15% of irrigation water, which is estimated at about 1.1 billion m 3 annually, instructing farmers to plant on terraces from feather for the cotton and maize crop To provide about one billion cubic meters annually, in addition to the possibility of using about 8 billion cubic meters of water The agricultural shelf is estimated annually at about 14 billion m 3, in addition to using about 4 billion m 3 of ground water annually, as well as developing irrigation in the lands of the valley and the delta, which can lead to providing about one billion cubic meters of water annually, and work to increase seawater desalination, provided that The provision of water is directed to benefit from this in reclaiming new lands, especially in growing crops necessary to achieve Egyptian food security, Mansour, *et al.* (2019 a,b,c,d,e) Mansour and Aljughaiman (2012) and Tayel *et al.* (2012 a; b), Mansour *et al.* (2015a, b, c; d), Tayel *et al.* (2016), Pibars and Mansour, (2015), Pibars and Mansour (2016) and Mansour *et al.* (2014).

Impact of climate changes on the strategic crops

Reduce carbon emissions:

It is planned to reach carbon emissions in 2030 from the agricultural process accounts for only about 7.5% of global emissions the different processes that lead to adaptation of the agricultural process to climatic conditions existing

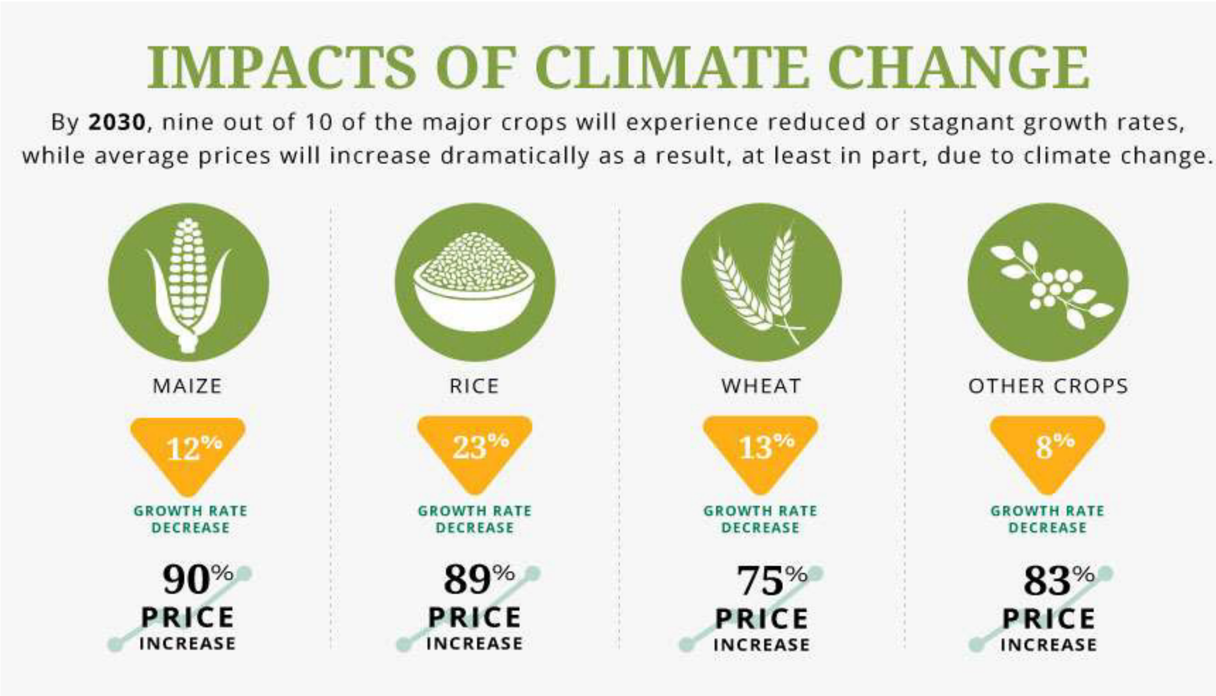

Fig. 2 : Impact of climate change on some strategic crops

Region's comparison

Table 1 : Regions likely to suffer moderate (M) and high (H) costs in the Business-As-Usual scenario of unsustainable agricultural development.

	North America	Latin America & Caribbean	Europe	Middle East & North Africa	Sub-Saharan Africa	South & Central Asia	Southeast Asia & Pacific	East Asia
Food insecurity				H	H	H	M	M
Malnutrition					H	H	M	M
Obesity, health	H	H	H	H		M	M	M
Poverty				M	H	H	M	M
Poor rural infrastructure		M		M	H	H	M	M
Conversion of natural land		H			H	M	M	M
Soil and land degradation				M	H	H	M	H
Water shortage	M			H	H	H	M	M
Water and air pollution	M		M	M		H	H	H
Biodiversity loss	M	H	M	M	M	M	H	H

Sustainable agricultural and food security

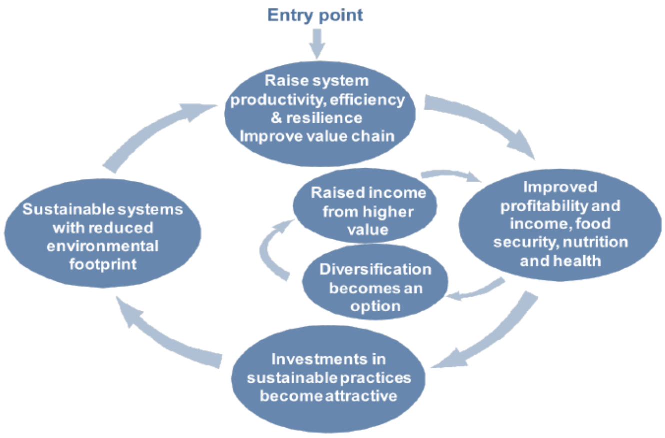

Fig. 3 : Enhancing system productivity and value is the entry point for enabling farmers to enter a virtuous circle of sustainable agricultural production and livelihood. Source: Modified from IRRI90.

Solutions for challenges of Sustainable Agricultural Solutions:

1. Promote sustainable agriculture.
2. Eradicate hunger and provide food security and good nutrition.
3. Take urgent action to address climate change and its impacts.
4. Ensure sustainable consumption and production patterns.
5. Protection and restoration of wild ecosystems Use them sustainably, manage forests sustainably, and combat Desertification, stop land degradation and reverse course, stop loss Biodiversity.
6. Conserve the oceans, seas and marine resources and use them on towards sustainable development.
7. Eradicate poverty in all its forms everywhere.
8. Promote sustained, inclusive and sustainable economic growth and employment Full and productive, providing decent work for all.
9. Strengthen the means of implementation and revitalize the global partnership to achieve Development

Conclusion

Sustainable agricultural development is the key to adaptation of the agricultural process to all Different aspects with severe climate changes that have occurred previously it is still happening so far. This is done by managing available natural resources in a balanced and consistent manner with the environment to conserve these renewable and non-renewable resources for generations coming.

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