Annals of Agricultural & Crop Sciences

Open Access

Austin Publishing Group

Rapid Communication

# Sustainability Scenarios of Current Agricultural Practices. The Role of Carbon: Turning a Problem into an Opportunity

**Di Vita G***
University of Catania, Italy

***Corresponding author:** Giuseppe Di Vita, University of Catania, Italy

**Received:** October 07, 2016; **Accepted:** November 30, 2016; **Published:** December 07, 2016

## Rapid Communication

In recent years agro-food economics literature has widely explored the grounding of sustainability in agriculture, thus analysing concepts, motivation, issues, and context both for firms and consumers. Academic theory focused its studies on the relationship between long-term sustainability and agricultural management models in order to measure the impacts of agricultural practices on agricultural environment.

The continuing depletion of natural resources together with the increasing environmental pressures generated by human activities requires a more rational approach in the management of soil, water, energy and biological resources. In this direction several studies on global food system have emphasized the new challenges and priorities that agriculture has to face. As such, on one hand agriculture have to face the increasing world food demand for meat and vegetables and high-calorie meals; while, on the other hand, it would mitigate the climate change and global warming thus reducing the global environmental impacts. As a consequence the impact of agriculture has doubtless direct and indirect effect on the environment.

The first one is closely correlated to the soil and place of cultivation and it depends on the adoption of different farming systems, such as for instance organic, integrated or conventional agriculture. These different management systems in the European Union are expressly regulated by ad hoc Regulations whereas specific norms limit or inhibit, in any cases, the use of typology and quantity of productive inputs. Each farming system, as reported by a broad part of literature, may have different environmental impact since productivity and yield are strictly depending on specific use of different production factor such as: diesel fuel, human labour, water, electricity, machinery, manure, fertilizers, pesticides, fungicides, fito-regulators and herbicides. Nevertheless the organic agriculture seems to have the highest economic and social sustainability performances, while in terms of environmental sustainability not always studies agree with the superiority of organic agriculture.

Furthermore in the environmental balance assessment any authors have included other indicators as those linked to biodiversity and soil quality of local ecosystems. It was also shown that the collective use and shared management of natural resources represent in many cases a viable alternative for more respectful of environmental balance; particularly efficient in these terms seem to be the establishment of productive activities of family farms in rural areas. Family farms are generally more environmentally friendly since in many cases family farm businesses represent a more sustainable form of management if compared to intensive or industrial agriculture [1,2]. In this sense cooperation among producers can contribute to a more sustainable development, in many cases agricultural innovation among a wider community of producers involved in sustainable practices can be expanded through an interactive approach, leading to a collective participation in problem solving [3].

Conversely the indirect impact of agriculture is correlated to the ecosystem as a whole and it can be mainly ascribed to the green house gas emissions. In this direction many efforts have been put into analyze main drivers of global warming, and among these the main responsible of the greenhouse gases emission, is the carbon dioxide ($CO_2$). In particular, $CO_2$ management seems to be the new challenge of millennium. The need and methods to storage and reduce carbon emissions constitutes a significant opportunity to offset carbon balance in the atmosphere. As a fact agricultural soils, impoverished of their original carbon stocks, possess a remarkable capacity to re-absorb $CO_2$.

Soil is considered the leading actor in the global carbon cycle because it stores a triple amount of Carbon if compared to that obtained by plant biomass and twice with respect to the atmosphere [4,5] Although the carbon incorporation into the soil takes a long time, especially if compared to the plant biomass or even more than atmosphere, the organic matter stored in the soil is generally considered more resistant to decaying and leaching. Since that the soil organic matter accumulation depends on temporary environmental conditions, agriculture can strongly contribute to the balance of many biogeochemical component and as such that of carbon, confirming its action as essential to mitigate human activities causing climate changes.

The most appropriate management practices to increase carbon uptake in agricultural soils vary locally, depending on agronomic, environmental and socio-economic factors. Recent contributes on strategies to increase the soil carbon fixation include the soil restoration, the forests regeneration, no-tillage practices and sustainable fertilization models (such as burying of crop residues), the improving of pastures, the water conservation, the energy use optimization [6] and the establishment of "carbon based" crops alternatives to the traditional ones'. All these determinants could be also an interesting possibility for farmers' income through the offer of differentiated and sustainable products, thus representing an interesting growth outlook in the next future.




**Citation:** Di Vita G. Sustainability Scenarios of Current Agricultural Practices. The Role of Carbon: Turning a Problem into an Opportunity. Ann Agric Crop Sci. 2016; 1(3): 1015.

Academic literature has clearly shown that sustainability of productions has to be preserved along the whole supply chain "from cradle to grave" [7], production cycle as well as packaging and transports play a relevant role in the overall sustainability impact as well in consumers' perception.

Given $CO_2$ emission generated from human activities are responsible for the current climate change [8] also the beliefs and the role of consumers become equally important in limiting greenhouse emissions. As a matter of fact consumers are increasing their sensitivity towards environment issue. Economic literature on locally food production, on organic products and sustainable approach to the food consumption widely has pointed out this increasing trend. Moreover, despite the current patterns of consumption and production of agricultural and food products are little or poorly sustainable from an environmental perspective [9-11], it has been observed the clear willingness of consumers to purchase food products that have positive impact on the environment. With respect to the sustainable products, the attitudes towards these products are positive but consumers' intentions to buy are quite limited; nevertheless young age consumers seem to be more involved in sustainable food consumption [12]. According to recent studies, young consumers show a growing attention towards products with added carbon labels and, in many cases, they are willing to pay an additional price for products labelled with low carbon emission.

The reduction of carbon emissions is a worldwide global challenge and it represents the objective of many scientists that are trying to modify the role of carbon, turning a problem into an opportunity.

Within this context the need for sustainable agriculture and agro-food products has become a priority for many technologically advanced countries. Even in food sectors not directly involved in the fulfilment of the primary needs of the consumer, we are witnessing a gradual change in producers and consumer's choices. To face the future challenges of farmers and food industries strategies a multidisciplinary approach is required to be applied in the field.

In an increasingly challenging economic context the need to improve the farm competitiveness has necessarily be conjugated to the ecosystems' needs. In this direction current policies of European Union, through the Common Agricultural Policy, are pursuing the objectives to ensure viable food production linked to a sustainable use of natural resources, as well to act for the climate and contribute to a balanced territorial development. The realization of this objective requires the creation, sharing and application of new multi-level knowledge, that include several actions such as: testing new crops and cultivars, the introduction of new technologic processes linked to major water use efficiency (adopting drip and sub-irrigation), the adoption of agricultural practices that are less carbon intensive as well the enhancement of agronomic productivity per unit consumption of C-based. Equally important is the role played by policy makers through the enhancement of new organizational capability and motivation of farmers and, on the other hand, by encouraging the consumers to increase their awareness toward foodstuff with a lower ecological impact.

Finally the management of agricultural practices should be addressed to optimize the use of soil, as a whole, and to reduce energy and resources consumption, taking into account different agricultural ecosystems from a holistic and multidisciplinary approach [6,13], thus reinforcing the role of endogenous resources in combination with public initiatives.

## References

1. Dogliotti S, García MC, Peluffo S, Dieste JP, Pedemonte AJ, Bacigalupe GF, et al. Co-innovation of family farm systems: A systems approach to sustainable agriculture. Agricultural Systems. 2014; 126: 76-86.
2. Finco A, Pollonara M, Di Pronio G. Sustainable management of agriculture and biodiversity conservation. Fitosociologia. 2007; 44: 307-331.
3. Kroma, Margaret M. Organic Farmer Networks: Facilitating Learning and Innovation for Sustainable Agriculture. Journal of Sustainable Agriculture. 2006; 28: 5-28.
4. Chapin III FS, Woodwell GM, Randerson JT, Rastetter EB, Lovett GM, Baldocchi DD, et al. Reconciling Carbon-cycle Concepts, Terminology, and Methods. Ecosystems. 2006; 9: 1041-1050.
5. Mooney HA, Vitousek PM, Matson PA. Exchange of Materials between Terrestrial Ecosystems and the Atmosphere. Science. 1987; 238: 926-932.
6. Lal R. Carbon emission from farm operations. Environment international. 2004; 30: 981-990.
7. Mariani A, Vastola A. Sustainable winegrowing: current perspectives. International Journal of Wine Research. 2015; 7: 37-48.
8. Spargo JT, Alley MM, Follett RF, Wallace JV. Soil carbon sequestration with continuous no-till management of grain cropping systems in the Virginia coastal plain. Soil and Tillage Research. 2008; 100: 133-140.
9. Carlsson-Kanyama A. Food consumption patterns and Their Influence on Climate Change: Greenhouse Gas Emissions in the Life-Cycle of Tomatoes and Carrots Consumed in Sweden. Ambio. 1998; 528-534.
10. Di Vita G, Chinnici G, D'Amico M. Sustainability of olive oil production in Sicilian marginal agricultural areas. Quality Access to Success. 2015; 16: 118-125.
11. D'Amico M, Di Vita G, Chinnici G, Pappalardo G, Pecorino B. Short food supply chain and locally produced wines: Factors affecting consumer behaviour. Italian Journal of Food Science. 2014; 26: 329-334.
12. Vermeir I, Verbeke W. Sustainable food consumption among young adults in Belgium: theory of planned behaviour and the role of confidence and values. Ecological economics. 2008; 64: 542-553.
13. De Luca AI, Molari G, Seddaiu G, Toscano A, Bombino G, Ledda L, et al. Multidisciplinary and Innovative Methodologies for Sustainable Management in Agricultural Systems. Environmental Engineering and Management Journal. 2015; 14: 1571-1581.

Ann Agric Crop Sci - Volume 1 Issue 3 - 2016
**ISSN: 2573-3583** | www.austinpublishinggroup.com


**Citation:** Di Vita G. Sustainability Scenarios of Current Agricultural Practices. The Role of Carbon: Turning a Problem into an Opportunity. Ann Agric Crop Sci. 2016; 1(3): 1015.