Page 189 to 191

Volume 1 • Issue 4 • 2017

Editorial

Scientia Ricerca

Innovative Techniques in Agriculture

ISSN: 2575-5196

-IRRIGATED AGRICULTURE- The Challenge to Increase Productivity While Maintaining Ecological Balance

Luis Loures*

Landscape Architect and Agronomic Engineer, Polytechnic Institute of Portalegre, Centre for Spatial and Organizational Dynamics, Portugal

***Corresponding Author:** Luis Loures, Landscape Architect and Agronomic Engineer, Polytechnic Institute of Portalegre, Centre for Spatial and Organizational Dynamics, Portugal.

Received: August 18, 2017; **Published:** September 05, 2017

Volume 1 Issue 4 September 2017

The agricultural practices we know today, came from a long and deep interaction between Man and Territory. This interaction, together with a complex system of edaphoclimatic, hydrological, geomorphological and socioeconomic factors, has led to the development of a complex landscape, reflecting the impositions introduced by two agricultural subsystems that, although distinct, may be complementary: rainfed agriculture and irrigated agriculture. In fact, although the differences between the subsystems are notorious, the reality is that there are advantages and disadvantages associated with each of them. If, on the one hand, the proponents of irrigation argue that in the rainfed one presents low productivity-although about 85% of the world's agricultural area is rainfed, its contribution is approximately 60% of the total agricultural production - the defenders of rainfed systems claim that although more productive, irrigated agriculture presents very significant environmental impacts, contributing on the short-term to a deep landscape decharacterization, all this besides high water consumptions, seen by many as one of the main negative impacts of this agricultural practice.

In this sense, the growth of intensive production in irrigated agriculture can be both a source of wealth and a serious problem, not only with regard to sustainable land use, but also with regard to the sustainable use of water, considering that, irrespective of the principles and/or practices that may be applied to irrigation management, it is clear that their environmental impacts, as is the case of soil degradation or the depletion of aquifers, should be analyzed considering the current trend for this type of agricultural practices and the increasing irrigation perimeters expanding over former areas of rainfed agriculture. Still, it should be noted that this type of agriculture, though presenting negative environmental consequences at different levels, may play a very important role in society, especially in areas of low density where it can function as an element of attraction, capable of polarizing progressively desertified areas.

These facts, associated with the globalization of production and with progressive climate change are bound to increase the entropy and instability of irrigated agriculture, especially as the expansion of this practice increases the demand and consumption of two resources, whose renewal occurs at speeds much lower than the average life expectancy of the human being, putting at risk the sustainability of these resources-water and soil. Therefore, it is not surprising that the management and use of these resources constitutes one of the most controversial and most discussed aspects of irrigation practices. This happens not only because the more intense the land use (irrigation is one of the most intense uses of the soil both at the level of use and the level of soil transformation), the greater the probability of negative impacts on it, but also because irrigated agriculture is responsible for the use of 60 to 80% of all available water. Nevertheless, because of the high percentage of water consumed by this agricultural practice and the notable impacts it has on the soil, the defenders of irrigation argue that, in relation to water, the problem is not in the high consumption but in the low storage capacity, since recent data indicate that only a small percentage of the available water for irrigation is used, and that in relation to the soil, existing data is not conclusive, regarding the impacts of irrigation on physical and chemical properties of the soil, not only because they vary according to the type of soil, but also according to the crop and type of irrigation.

Perhaps for this reason, if we continue to see a dual view of the practice of irrigation, which, although considered by many to be unsustainable, if viewed correctly, can solve most of the problems inherent in the deficit of food production, and contribute to increase the attractive potential of several low-density areas.

In an attempt to demystify, for many, the main impacts of irrigation, it is important to mention some facts, which may partly contribute to place irrigation, despite the known impacts, on the side of the solution, instead of the side of the problem, namely:

-we all know that water is a scarce commodity essential to life, and that it must therefore be preserved and respected. However, the problem of water use in agriculture is above all related to the low efficiency of the vast majority of irrigated systems, with the latest estimates pointing out that, at the level of irrigated agriculture, more than 60% of water diverted to irrigation is wasted. This waste, used by all those who want or intend to crucify irrigated agriculture, is due to several factors, among which we can highlight the incorrect management of irrigation (excess water); the use of inadequate irrigation techniques (such as flooding); the lack of maintenance, monitoring and inspection of irrigation systems; among others.

-regarding soil, which is also a scarce resource, the consequences of the continued practice of irrigation are many and diverse due to numerous factors as the composition of irrigation water, the amount of water applied to the soil, the developed cultural activities (fertilization, mobilizations, rotations, crops, phytosanitary treatments, irrigation systems, etc.), the characteristics of the soil itself. Furthermore, the various relationships established between these factors, make it difficult to individuate the effect of irrigation on each of them independently. In this sense, soil degradation, associated in part with the cultural intensification promoted by irrigation is a factor that cannot be ignored when assessing irrigation impacts. In fact, as argued in several studies, cultural intensification alone has significant impacts on soil, such as the decrease in organic matter content, as well as the thickness of the soil itself (Loures., *et al*. 2017; Nunes., *et al*. 2017; Nunes, 2003 and Vera and Romero, 1994). This situation is directly related to cultural intensification, since the greater the cultural intensity, the greater the need for soil mobilization and the greater the destruction of its organic matter (Nunes., *et al*. 2017; Santos, 1996 and Miller and Donahue, 1995). However, organic matter is not the only constituent/soil characteristic affected by irrigation practice. The pH, salinity, sodicity and soil exchange complex also undergo significant changes. As for pH, irrigation and leaching promote soil acidification (Loures., *et al*. 2017; Nunes, 2003; Santos, 1996 and Miller and Danahue, 1995), depending on factors such as water composition, cultural practices and soil type, in relation to salinity and sodicity there is an increase associated with irrigation, which is due in part to the concentration of ions in irrigation water and the highest fertilizations associated with this practice. At the level of the exchange complex, irrigation water plays a decisive role in the impact on soil (Morshedi and Samedi, 2000), since irrigation water composition is different from rainwater (Porter., *et al*. 1999, Falkiner and Smith, 1997, and Biederbeck., *et al*. 1995).

These aspects are increasingly significant from a quantitative point of view, since the development of new technologies associated with irrigation has made it possible for new areas to become suitable for cultivation, and certain crops can now be efficiently productive in any type of soli, provided that water is available. However, some of these areas are not in line with the intensive exploitation of resources associated with irrigation, and their development can and has led to serious environmental and landscape degradation problems, which have contributed to the uprooting of several researchers and environmental specialists against the development of irrigation. However, if we know the impacts of irrigation, its causes and effects, we can easily consolidate theoretical foundations based on an increasingly important scientific production (considering both professional and research activity), not only as a way of consolidating a production subsystem with the potential to be the main driver of the agricultural sector, but also to meet the new challenges ahead.

In fact, if the impacts of irrigation seem to make us believe that something is wrong and that this inversion of values can irreversibly compromise the scope and development of this subsystem, the truth is that we have enough knowledge today to water sustainably and to say that, *if done properly, agriculture will have in irrigation not a problem but the solution*.

References

1. Biederbeck V., *et al*. "Soil microbial and biochemical properties after ten years of fertilization with urea and anhydrous ammonia". *Canadian Journal of Soil Science* 76 (1995): 7-14.
2. Falkiner R and Smith C. "Changes in soil chemistry in effluent-irrigated Pinus radiata and Eucalyptus grandis plantations". *Australian Journal of Soil Research* 35 (1997): 131-147.
3. Miller R. "Soils in Our Environment, seventh edition". *Prentice Hall Eds* (1995): 649.
4. Morshedi A and Samedi A. "Hydraulic conductivity of calcareous soils as affected by salinity and sodicity. I. Effect of concentration and composition of leaching solution and type and amount of clay minerals of tested soils". *Communications in soil Science and plant analysis* 31.1 (2000): 51-67.
5. Loures L., *et al*. "Assessing the Sodium Exchange Capacity in Rainfed and Irrigated Soils in the Mediterranean Basin Using GIS". *Sustainability* 9 (2017): 405.
6. Nunes J., *et al*. "Effects of the European Union Agricultural and Environmental Policies in the Sustainability of Most Common Mediterranean Soils". *Sustainability* 9.8 (2017): 1404.
7. Nunes J. "Los suelos del perímetro regable del Caia (Portugal): Tipos, fertilidade, e impacto del riego en sus propriedades químicas". *Tesis Doctoral, Universidad de Extremadura–Faculdad de Ciencias, Badajoz* (2003):
8. Porter G., *et al*. "Soil management and supplemental irrigation effects on potato: I. Soil properties, tuber yield and quality". *Agronomy Journal* 91 (1999): 416-425.
9. Santos J., *et al*. "Fertilização–Fundamentos da utilização dos adubos e corretivos". *Colecção Euroagro, Publicações Europa-América Eds. Lisboa, Portugal* (1996): 441.
10. Vera F e Romero J. "Impacto ambiental de la actividad agraria". *Agricultura y Sociedad* 71 (1994): 153-181.

Citation: Luis Loures. "-IRRIGATED AGRICULTURE-The Challenge to Increase Productivity While Maintaining Ecological Balance". *Innovative Techniques in Agriculture* 1.4 (2017): 189-191.