

## BOOK REVIEW

### **Rooftop urban agriculture**

Orsini F., Dubbeling M., de Zeeuw H., Gianquinto G., (Eds), 2017. Springer International Publishing, 394 pp. ISBN 978-3-319-57719-7 (hardcover)

This book of 394 pages explores the amazing world of Rooftop Agriculture (RA), which represents an innovative way to provide new solutions to current issues of our society. In fact, exploiting this form of urban agriculture, community can effectively contribute to food production, landscape enhancement, climate change adaptation, social and local economic development and educational and therapeutic purposes.

In this book, a state of the art of this multifunctional undertaking is showed in order to guide agronomists, urban planners, architects, landscape designers on the planning of sustainable rooftops.

The current compilation includes 5 different parts written by an interdisciplinary team of authors that have spread their knowledge and shared their experiences about this topic.

The book begins with a current general status and dares of rooftop agriculture. In particular, the subchapter “A Panorama of Rooftop Agriculture Types” supplies a presentation of the main types of rooftops designed for different gardening or farming purposes. Moreover, in the first section it is also provided the policies that affect the development of urban agriculture forms.

The second chapter suggests the factors that must be taken into consideration when designing rooftops. All the aspects concerned the access and the loadbearing capacity of the roof, the water and energy supply and also health and safety issues need to be painstakingly planned. Regarding food production, it is recommended the use of soil-based cultivation beds or hydroponic systems, that are examined in details in this chapter. Also the advantages derived from the employment of technology for rooftop greenhouse are discussed. Elements that must be considered in the rooftop greenhouse project are presented, including its structure, covering materials, climate control and soilless cultivation system and management. Another element described in the second chapter is the possibility to integrate aquaculture with hydroponic system in rooftop as well as the way to overcome the problems derived from the different demands of fish and crop. Finally, some tools are provided in “Integrating Rooftop Agriculture into Urban Infrastructure” to combine the design of rooftop and infrastructural traits of buildings.

The third part deals with all the important aspects for rooftop agriculture management. Firstly, irrigation and drainage systems and their maintenance need to be designed. Also alternative methods to harvest water are showed, such as Rain Water Harvesting (RWH), that represents a sustainable practise for urban environment. Besides water management, the strategies regarding the mineral nutrition of soilless culture are presented. Establishing the mineral supplies, preparing the nutrient solution, planning the fertigation strategies and improving crop quality with these practices is of fundamental importance for rooftop agriculture.

In this chapter, the reader can also find an interesting section concerning the management of pests. It is promoted a free-pesticides rooftop agriculture in order to not have a negative impact on the population. To greatly understand how to

control pest infestation, it is necessary to know the physical and biotic features of this particular type of agroecosystem, that is clearly different from open fields.

Rooftop environment is similar to arid and semi-arid zones and, along with the high probability of occurring extreme weather events, this particular climatic condition must be considered in defining pests control. Moreover, main arthropod pests and their natural enemies in rooftop agriculture are presented before describing the principal technics of preventing pests and their damage. In this subchapter called “Sustainable Pest Management” diagnostic, monitoring and control tools as well as practises are specified.

Finally, beyond defence strategies, the topic of crop quality and safety is faced. Even if this argument is rarely considered, it represents a key aspect for sustainable productions.

The latter part of this book describes the multifunctional roles of RA. In particular, in “Rooftop Gardening for Improved Food and Nutrition Security in the Urban Environment” a list of the different species that can be produced in rooftop and their nutritional values are provided. This last aspect is particularly important for understanding how rooftop farming can implement food and nutrition security of population. Furthermore, RA can provide a solution for reducing habitat fragmentation by means of green network creation in urban areas. Creating micro-habitat, it is possible to enhance biodiversity and, therefore, ecosystem services. A case study in Vienna is reported in order to figure out how to plan a green corridors network, using GIS.

Rooftop agriculture, increasing green open spaces, can contribute to mitigate climate change and in “City Resilience to Climate Change” subchapter some real cases are reported as examples. From an environmental point of view, RA can also reduce the water and energy consumption along with CO<sub>2</sub> emissions, permitting the improvement of green economy.

The different types of rooftop agriculture have also a beneficial impact on both community and city level, such as food security, health increase, community empowerment and creation of green space. On the other hand, this kind of urban agriculture presents some limitations related to its cost, financing and accessibility. These constraints have to be considered by those who desire to promote RA.

To summarise the theoretical concepts of the previous chapters, 20 different project about various types of rooftops planned around the world are showed. All the details about the design, the technical operations, the strategies to implement them and their social and productive results are illustrated.

Finally, at the end of the book, a conclusion about this topic is given. Despite the incredible role that Rooftop Agriculture could assume in developing urban sustainability, its diffusion is still limited. Further research need to be carried out in order to implement the economic, legal, technological and design aspects of RA. The limitations of this kind of urban agriculture is explained with clarity and rigor, spurring the reader to examine in depth this topic.

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