Tropentag, September 17-19, 2018, Ghent

"Global food security and food safety:
The role of universities"

Plant Aquaculture for Seas, Lakes and Floodplains: Will the Next Green Revolution Be Blue?

Ricardo Radulovich

University of Costa Rica, Department of Biosystems Engineering, Costa Rica

Abstract

To increase global food production capabilities aquatic agriculture is becoming an alternative of previously unsuspected potential. Based on plant aquaculture, the aim is to sustainably use seas and lakes, as well as floodplains, to establish a variety of primary food production options, equivalent in principle to cropping on land. These can thus be implemented by millions of coastal and floodplain inhabitants, largely neglected populations affected by dwindling fisheries and other limitations. Besides surface for cropping, aquatic bodies provide all the water as well as all or most other resources needed by plants to grow–of significant relevance nutrients. Plant aquaculture has recently grown via cultivation of macroalgae (seaweeds, considered plants here) at the coastal sea, and many countries around the world are advancing or exploring macroalga farming for food and other uses, as well as for ecosystem services. Less well-known, a variety of other plant-based agriculture-like options for both marine and freshwater environments are emerging and are being tested and refined as scalable innovations. Focusing on our advances in Costa Rica as well as on work being conducted elsewhere, the options presented here consist of cultivating, floating on or below water surface, at sea and/or freshwater: macroalgae, halophytes, aquatic plants and agricultural crops. These options can be implemented alone or together with filtering- and herbivore-(native) fish farming and are associated to fisheries. Although not devoid of limitations that must be properly addressed, plant aquaculture has shown to be of high all-year-round productivity in tropical environments. Additionally, previously-unknown aspects are expanding our understanding of the aquatic environment‰for example: when cultivating floating agricultural crops, due to distance from land, production can be without pests or pathogens; submerged macroalgae and aquatic plants do not transpire, and transpiration from crops floating on the water surface is equivalent to evaporation from the bare water surface, thus no water is spent; and, cultivating macroalgae attracts biodiversity and enhances fisheries. Finally, in the context of development and cost-benefit as related to funding, a brief analysis is presented on the global and local potential of these strategies as well as of main efforts needed to consolidate implementation.

Keywords: Aquaculture, aquatic, fisheries, seaweeds

Contact Address: Ricardo Radulovich, University of Costa Rica, Department of Biosystems Engineering, College of Engineering University of Costa Rica, 4385 San José, Costa Rica, e-mail: ricardo.radulovic@gmail.com