Potential of Agrivoltaic Systems to Optimize Agricultural Land Use for Energy Production in Sri Lanka

R.M.S.R. Chamara[1]* and C.K. Beneragama[2]
*ruwanchamara034@gmail.com
[1] Postgraduate Institute of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka
[2] Department of Crop Science, Faculty of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka

The shift to renewable energy has currently grown in the world than ever before as a result of the economic and environmental challenges created by conventional fossil fuel-based electricity generation that is in line with the Paris agreement. Photovoltaic (PV)-based electricity generation shares a major portion of renewable energy in the world and also has a high potential in Sri Lanka because it receives an ample amount of solar radiation. Nevertheless, it needs to expand up to a considerable area of land of photovoltaic panels other than the available infrastructures like rooftops to cater to the increasing energy demand which are available to feed the ever-increasing population and could become problematic for a long period of time. In view of the future requirement of energy and food production, Agri-voltaic systems (AVS) has been proposed as a mixed system, combining photovoltaic with agriculture at the same time on the same land for both energy generation and food production while maximizing the solar efficiency on the land. The main eco-physiological constraint for crop production in the AVS is the reduction of solar radiation. However, the lessening of plant productivity can be compensated through energy harvesting from the PV panels combining to the land equivalent ratio (LER). Crop yield variation with panel shading and more crop-specific research to determine the optimum number of panels and their arrangement that do not reduce agricultural production need to be studied extensively. Since the impacts of most of the crops under the shade conditions were not studied before it is extremely difficult to recommend some crop species for their ability to shade tolerance in the system particularly below the panel area. This paper reviews the potential of the Agri-voltaic system identifying the research gaps in selecting suitable crops under the PV panels and practicalities to maximize the system.

***Keywords**:* Agrivoltaic, Photovoltaic, Food, Energy, Shade, Tolerance