Chapter 18
Smart Agriculture: Special Challenges and Strategies for Island States

Kandiah Pakeerathan

Introduction

Since the 1960s, in order to increase food production, the green revolution introduced high-yielding varieties that are now being cultivated intensively. But the ever-increasing human population requires increase in food production at the rate of 2% every year. Therefore, by 2050, we need to produce 70% more food from the limited land to feed the forecasted 9.1 billion people within the context of scarce natural resources and unexpected climate change. Overexploitation of existing natural resources in agriculture has deteriorated the physical and chemical quality of the soil, beneficial biota of the soil, water and environmental pollution, and carbon footprint. The environmentalists who are working zealously to create awareness to the general public on the importance of conservation of depleting precious natural resources suggest the sustainable agriculture or precision farming as the solution to the problem. The advances in information and communication technology opened a new era to modernize the agriculture sector as smart agriculture which integrates a variety of modern technologies, devices, protocols, and computational paradigms to improve agricultural processes [1].

Currently using smart technologies in agriculture, such as agriculture cyber-physical system (A-CPS), Internet-of-Agro-Things (IoAT), solar energy, sensor node, automatic crop disease prediction, machine learning, and convolutional neural network (CNN), are using microsensors and chips to decide depth and width of field ploughing, to detect soil nutrition availability and automatic application of required nutrition, to measure the soil and plant water availability and requirement, and to decide the irrigation intervals. Artificial intelligence (AI) is coupled with unmanned aerial vehicles (UAVs) and robots for fertilizer application, pest monitoring, disease

K. Pakeerathan (✉)
Department of Agricultural Biology, Faculty of Agriculture, University of Jaffna, Ariviyal Nagar, Kilinochchi 44000, Sri Lanka
e-mail: pakeerathank@univ.jfn.ac.lk