

Overview on leafy (Pak Choy) vegetable industry and vertical soilless culture application for Pak Choy production in Malaysia

ABSTRACT

The agriculture industry plays a significant role in the well-being of Malaysia's economy. It provides jobs for more than 1566 thousand people and contributes 7.1% to the gross domestic product (GDP). The vegetable industry, however, is lagging behind other agricultural industries, such as oil palm, rubber, and tea. The demand for vegetables in Malaysia increased from 1.58 million metric tonnes (MT) in 2010 to 2.4 million MT in 2020, but the production was only 0.1 million MT in 2010, 1.01 million MT in 2015, and 1.7 million MT in 2020. The trade balance deficit in 2021 stood at Ringgit Malaysia (RM) 3.37 billion. The vegetable industry is under pressure from rising population, shortage of resources, and post-COVID-19 pandemic impacts. Vertical farming (VF) of vegetables is widely promoted worldwide, including Malaysia, to increase production. In VF, the vegetables are produced in environmentally controlled multi-storey buildings with different vegetables at different levels, and at any level, the vegetables are cultivated using vertical farming systems (VFSs). In that way, the production per unit area is said to be maximal. However, is Malaysia's leafy (Pak Choy) vegetable industry agronomically ready to embark on VF and VFS? There is a concern about business failure associated with promoting VF and VFS without sufficient knowledge and skills in agronomy about VF and VFS based on the local scenarios. Hence, the present paper aims to review the leafy vegetable industry, specifically Pak Choy production in Malaysia, to assess its readiness to apply VF and VFS to better the direction of future research projects. Keywords used for the search of relevant information in Science Direct, World Wide Science, Google Scholar, Google, and online newspapers were Malaysia plus vertical farming, hydroponic systems, column hydroponic system, agriculture sector, agriculture 4.0, precision agriculture, soilless culture, leafy vegetable industry, and Pak Choy production. The articles and reports obtained were reviewed. Based on the review, the leafy industry in Malaysia, specifically the Pak Choy production, is not yet agronomically ready to venture into VF and VFS, although VF and VFS have gained attention. The agronomic information about VF and VFS based on the local scenarios is still lacking. Local farmers have little guidance for operating VF and VFS. It is understood that VF is an expensive venture and will be relatively unknown to many farmers, but even the agronomic information related to VFS, which is just about the system used in VF, is seldom published. Of the many designs of VFSs in Malaysia, the Column Hydroponic System (CHS) has a markedly higher vegetable yield per unit area. Thus, more research on CHS is needed, and its agronomic and technical information should be published for the local

vegetable farmers to use to mitigate the supply shortage and the high foreign exchange of leafy vegetables in Malaysia.