Performance of cucumber (*Cucumus sativus* L.) and sweet pepper (*Capsicum annuum* L.) in various local growing media, as alternative for rockwool in Saudi Arabia

W. Voogt[1,a], A. Alharbi[3], M. Almuwalid[4], S. Alsahly[2], J.B. Campen[1], H. van der Heide[1], M.E. Abdelaziz[2], M. Osman[3], I. Tsafaras[1], M. Qaryouti[2] and F. de Zwart[1]

[1]Wageningen UR Greenhouse Horticulture, Wageningen, The Netherlands; [2]National research and development center for sustainable agriculture, Estidamah, Riyadh, KSA; [3]College of food and Agriculture Sciences, Plant production department, King Saud University, Riyadh, KSA; [4]King Abdulaziz City for Science and Technology (KACST), Riyadh, KSA.

Abstract

Soilless culture is considered the best system for growing crops to overcome problems of soil-borne diseases and for achieving sustainable goals for saving water and nutrients. However, in many countries, the commonly used growing media, are expensive or even unavailable. To address for suitable sustainable local alternatives for the commonly used growing media, a research project was conducted at the Estidamah Research Centre at Riyadh in Saudi Arabia, studying the potential of two local substrates (volcanic rock and date palm wastes). Date palm waste (DPW) is a renewable source, locally available in large quantities since date production is a major industry in Saudi Arabia and volcanic rock (VR) is a widely available, natural, reusable and very cost-effective material. Different types of DPW were used, and pre-treated in several ways (sieved, flushed, sterilized), while VR was used from one source. Both media were compared with standard rockwool (RW) and perlite (PL) with cucumber and sweet pepper. The trials focused on the applicability water- and nutrient conditions and the crop performance in growing cycles of several months. DPW and VR were tested with the crops grown in a climate-controlled Venlo-type greenhouse with Pad-Fan cooling. The results and experiences of the first experiment were used to improve the DPW and VR treatments for the next trial. The first trial (cucumber) showed dramatic results for VR and a low score with DPW. For the next crop (sweet pepper), the fertigation strategy and design of VR substrate system were modified as well as improvements of the selection of DPW raw material and pre-treatment applications were applied. These modifications seriously improved the results, with virtually no differences for VR compared to the reference grown in RW or PL. In this respect, it could be concluded that, both VR and DPW, under conditions of right treatment, are suitable for use as local materials in soilless culture under Saudi Arabian conditions.

Keywords: date palm waste, perlite, volcanic rock, soilless culture, substrate

INTRODUCTION

Inorganic substrates such as RW and PL, are the growing media commonly used in greenhouse soilless cultivation. Though organic substrates as peat and coir are becoming more and more popular in view of the renewability of resources. In general, the choice of the growing media depends on the crop, growing system, physical, chemical, and biological properties of the substrate and not at least the cost (Cantliffe et al., 2003). Growers world-wide, try to adopt locally manufactured or locally available substrates. Furthermore, the international trend for substrate development tends toward the use of national resources and renewable raw materials. Therefore, searching for cheap and locally produced organic soilless

[a]E-mail: Wim.voogt@wur.nl

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