

## Chapter 6

# Soil Moisture as One of the Limiting Factors in the Production of Medicinal Plants

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### ABSTRACT

*On small production lots on which medicinal plants are grown, irrigation systems of a smaller capacity (“drip, drip” and “sprinkling” systems) are mainly used. The water for irrigation should be in keeping with the national and the potential European quality standards, and should be as “free” as possible of potential pollutants, such as feces, heavy metals, pesticides, and toxicologically hazardous matters. Therefore, in this chapter, several priority MAPs are selected according to their importance for this sector, and their needs are analyzed in drought and irrigation conditions. In this group of plants, the authors included the following: marshmallow (*Althaea officinalis* L.), peppermint (*Mentha piperita* L.), valerian (*Valeriana officinalis* L.), lovage (*Levisticum officinale* Koch), lemon balm (*Melissa officinalis* L.), ribwort plantain (*Plantago lanceolata* L.), marigold (*Calendula officinalis* L.), and basil (*Ocimum basilicum* L.).*

### INTRODUCTION

The use of medicinal and aromatic plants (MAPs) is manifold: from diet, cosmetics, health care to the use for religious and healing rituals, which are typical of many cultures. However, MAPs find one of their most important applications in pharmaceutical industry, whose development constantly increases the interest in certain plant

species. This has led to a significant increase in the use of MAPs in the last few years, especially in West European, but also, in highly-populated Asian countries, such as India and China. It is estimated that in Europe, commercial trade is done in about 2,000 MAP species, of which, 1,200 to 1,300 are native to Europe. The increasing demand for MAPs has simultaneously increased the pressure on natural resources. According

DOI: 10.4018/978-1-4666-7521-6.ch006

to the data by the European Strategy for Plant Conservation (ESPC, 2008–2014)<sup>1</sup>, 90% of MAP species originating from Europe are still collected directly from nature. On the other hand, according to the International Standard for Sustainable Wild Collection of Medicinal and Aromatic Plants (ISSC-MAP)<sup>2</sup>, the major threats to the populations of medicinal and aromatic plants are overcollection (excessive gathering) and the loss of habitat, including the conversions of land for agricultural and other purposes. That is exactly the reason why organized (plantation) growing of medicinal and aromatic plants is more and more promoted as one of the measures to protect biodiversity, instead of their collection from nature being the only source of the supply of the constantly growing market.

Medicinal plants, according to the definition by the World Health Organization, encompass those plant species whose one part or several parts contain biologically active substances that can be utilized for therapeutic purposes or for chemical synthesis pharmaceuticals. By this definition, aromatic plants are those which contain active matter of special scent or taste that is used for the preparation of fragrances, cosmetic products, alcoholic or non-alcoholic beverages and aromas for food products. They are also used to obtain essential oils. Spices are defined as “vegetable products or mixtures, free from extraneous matter, used for flavoring, seasoning or imparting aroma in foods” in keeping with the International Standards Organization (ISO) definition. Essential oils or extracts are also derived from these plant sources either as a primary or a secondary processing. According to the data by Ignjatijević (2010), during the year 2008 Serbia was on the 31<sup>st</sup> position in the world by the export value of MAPs. Although it has favorable agroecological conditions, as well as certain experience in the field of growing and collecting medicinal, aromatic and spice plants, the Republic of Serbia, as an exporting country, has been “debased” from the leading position in the region to the position of a state that only symbolically participates in

this sector. Unfortunately, the state still is not providing sufficient means to make a position such as this better, and encourage the production and processing of medicinal plant raw materials, so the existing and interested stakeholders in this sector are on their own. For example, Spain and Italy are the leaders in the European Union when it comes to the organic production of medicinal, spice and aromatic plants (Filipovic, Roljevic, & Bekic, 2013). Spanish experts have suggested that our entire production of these plants should be converted to organic, and that the production areas should be significantly increased, primarily because of the good quality of our raw materials. On the other hand, Italian experts estimate that organic production in our country could be arranged on approximately 300,000 hectares, primarily with medicinal plants (Filipović & Popović, 2014). By the Law on Organic Production, the conditions are prescribed for the establishment of organic production, and they include: (1) the provision of the spatial isolation of soil lots from pollution; (2) the content of harmful substances has to be less than the maximum allowable values; (3) air pollution has to be reduced to a minimum; and, (4) the water used for irrigation has to meet the quality standards prescribed by law.<sup>3</sup> By the constant control of the samples of irrigation water, the desired quality is reached, and thus, on the basis of the research conducted at 50 locations in Vojvodina by a group of researchers (Čuvarđić et al., 2004), the quality of soil and water was confirmed to be satisfactory for growing health-safe food.

Due to climate change and the increase of sunny and very warm days in Serbia, it is necessary to begin with the rehabilitation of already built irrigation systems, along with the construction of new ones, as soon as possible. That is very important if we take into account the forecast by international experts that food prices will grow in the next 10 years, which is also an export opportunity for Serbia. According to the principles of good agricultural and collection practices (WHO, 2010), in case of soil moisture deficit, if irriga-

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