

The influence of nitrogen-fertilizer and harvest time on the productivity of *Thymus vulgaris* L.

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Summary: The influence of nitrogen-fertilizer applied in 0, 50, 100 and 150 kg/ha dosages, as well as the time of the harvest carried out in full flowering and early fruit set stages were studied on the herb and essential oil production of garden thyme (*Thymus vulgaris* L.). The small plot experiment was installed in the Experimental Field of Tarbiat Modarres University near Teheran, under sandy loam soil conditions. On the basis of the results the nitrogen-fertilizer had a significant effect on the dry-matter production of the species: the herb yield, calculated on one hectare, increased from 671.88 kg up to 1021.00 kg value as a result of 150 kg nitrogen dosage. The essential oil yield proved to have a similar tendency because neither the accumulation level of essential oil, nor the ratio of thymol were effected by the nutrient supply. Analyzing the effect of harvest time changes in both dry-mass production and essential oil accumulation were observed. The highest herb yield (1238.20 kg/hectare) was obtained in early fruit set, when about 50 per cent of fruits reached their full size in the inflorescence. The accumulation level of essential oil also reached its maximum at the same development stage, showing 0.75 per cent value, which is about two fold higher comparing to the accumulation level was measured at the time of full flowering (0.41 %).

Introduction

According to the literature data garden thyme (*Thymus vulgaris* L.) was applied for curing even in ancient time. The drugs of the species, which are known as *Thymi vulgaris herba* and *Aetheroleum thymi* were widely utilized back to the historical times, and have been authorized since the sixteenth century (Hurnok, 1992). The drugs of the species are present in many up to date official descriptions, including Hungarian (Ph.Hg. VII.), Swiss (Ph.Helv. VII.), Austrian (ÖAB) and German (DAB 10) Pharmacopoeias (Anonymous, 1984). Both of the above mentioned drugs are extensively used in phyto- and aromatherapy. Garden thyme is regarded as one of the most important elements of drug mixtures and tinctures because of its antiseptic properties. The plant is effective in treating whooping cough as well as the parasitic infections. It is used for its mouthwash value in appropriate preparations such as liquid dentifrices.

The garden thyme is a perennial dwarf shrub belonging to the Lamiaceae family (Bernáth, 1993a). It grows up to 40-50 cm in height, forming many branches. The sessile leaves vary in shape from elliptic to linear or diamond-shaped towards the apex. The flowers changing in colours from white to purple are united in spikes at the top of the

branches. The fruits consist of a smooth, dark-colored 4-sectioned nutlet found in the remains of the calyx.

The garden thyme grows wild in the Mediterranean area with the preference for a sunny position in dry, gravelly soils. In many European countries, including Spain, France, Hungary, Bulgaria etc. the plant is cultivated on a middle scale (Bernáth, 1993a).

Effect of environmental factors on the production of medicinal and aromatic plants (Bernáth, 1993b), especially on garden thyme have been studied by many authors (Basker & Putievsky, 1978, McGimpsey et al. 1994, Rometsch, 1993). Furthermore, it was stated that the essential oil and thymol content of thyme were dependent on both nitrogen supply as well as the stage of development. In the latter case the appearance of flowers and the actual stage of fruit development seems to have a main importance (Ceylan et al. 1994, Omidbaigi, 1998).

Since garden thyme is cultivated commercially, the optimum amount of fertilizers and time of harvest have been the subject of many investigations (Ceylan et al. 1994, Shalaby & Razin, 1992). Our aim was to determine, whether the above mentioned environmental factors (nitrogen fertilizer and harvest time) could change the herb and essential oil production of the species cultivated under Iranian conditions.