

Comparative Study on Three *Hypericum* Species Growing Wild in Poland

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Keywords: *Hypericum perforatum*, *H. maculatum*, *H. elegans*, herb mass, hypericins, flavonoids, time of harvest

Abstract

The developmental and chemical differences between *H. perforatum*, *H. maculatum* and *H. elegans* originating in the south of Poland (Kraków district) were investigated. The research was done in one- and two-year-old plantations, respectively, with plants harvested at four stages of development (vegetative phase, before blooming, beginning of blooming and at full blooming). The mass of raw material and the content of flavonoids and hypericins were determined for each harvest. The yield of herb and the content of active compounds were highest in *H. elegans*. Taking into consideration the mass of herb and the content of investigated compounds, the optimal time for harvest appeared to be the full blooming stage, especially in the second year of vegetation.

INTRODUCTION

The genus *Hypericum* comprises a large number of species widely distributed in many countries of Middle Europe, North America and Eastern Africa (Roth, 1990).

Of these species, three grow wild in Poland – *H. perforatum* L., *H. maculatum* Crantz, and *H. elegans* Steph. *Hypericum maculatum* and *Hypericum elegans* have not yet been used officially in Poland as medicinal raw material, but these species occasionally appear as contamination of *H. perforatum* collected from natural habitats (Brunarska et al., 1984, Nahrstedt and Butterweck, 1997, Osińska and Węglarz, 2000). The aim of this investigation was to evaluate the phenological and chemical differences among these three species originating in the south area of Poland (Kraków district).

MATERIALS AND METHODS

The research was done at the experimental field of the Department of Vegetable and Medicinal Plants in 1999, and 2000, in one- and two-year-old plantations established from the seeds collected from natural habitats. The plants were propagated by seeding and subsequent transplanting. During the vegetation period, phenological observations were done. From each species, 25 individual plants were selected at random and harvested at four stages of development (vegetative phase, before blooming, beginning of blooming and full blooming). Dry mass of shoots, the total content of flavonoids (converted into quercetin) by spectrophotometric method (Strzelecka and Kamińska, 1978), and content of hypericins by HPLC (Kowalewski et al., 1981) were determined.

RESULTS AND DISCUSSION

The results indicate that two species of *Hypericum* (*H. maculatum* and *H. elegans*) growing wild in Poland may be regarded as valuable sources of medicinal raw materials and used equivalently to *H. perforatum* herb. However, these two species differed from *H. perforatum* in phenological characteristics. *H. elegans* plants were characterised by the highest rate of growth and markedly earlier blooming (20 days earlier than *H. perforatum* and *H. maculatum*). The highest mass of herb was also observed in *H. elegans* (Table 1, 2). In the majority of samples, the total content of flavonoids and hypericins was higher in *H. elegans* and *H. maculatum* herb than in *H. perforatum*.

During vegetation period, the mass of herb, as well as the content of both

investigated groups of compounds, increased to full blooming stage (Fig. 1, 2). The results correspond with the data on *H. perforatum* obtained by Kordana and Załęcki, (1996) and Jokela and Galambosi (1998).

The yield of herb of each species was distinctly higher in the second year of vegetation. The raw materials collected in the second year of vegetation were also characterised by higher content of flavonoids and hypericins.

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Tables

Table 1. Dry mass of herb in one-year-old plantation of *Hypericum* species [g/plant]

Time of harvest	<i>H. perforatum</i>	<i>H. maculatum</i>	<i>H. elegans</i>	Mean
Vegetative stage	12.0	14.9	21.5	16.3
Before blooming	15.9	16.4	29.0	20.4
Beginning of blooming	117.4	120.1	205.6	147.7
Full blooming	151.7	160.1	245.3	185.7
Mean	74.2	77.9	125.3	

LSD_{0.05} for time of harvest = 15.43

LSD_{0.05} for species = 12.4

LSD_{0.05} for time of harvest x species = 24.28

Table 2. Dry mass of herb in two-year-old plantation [g/plant]

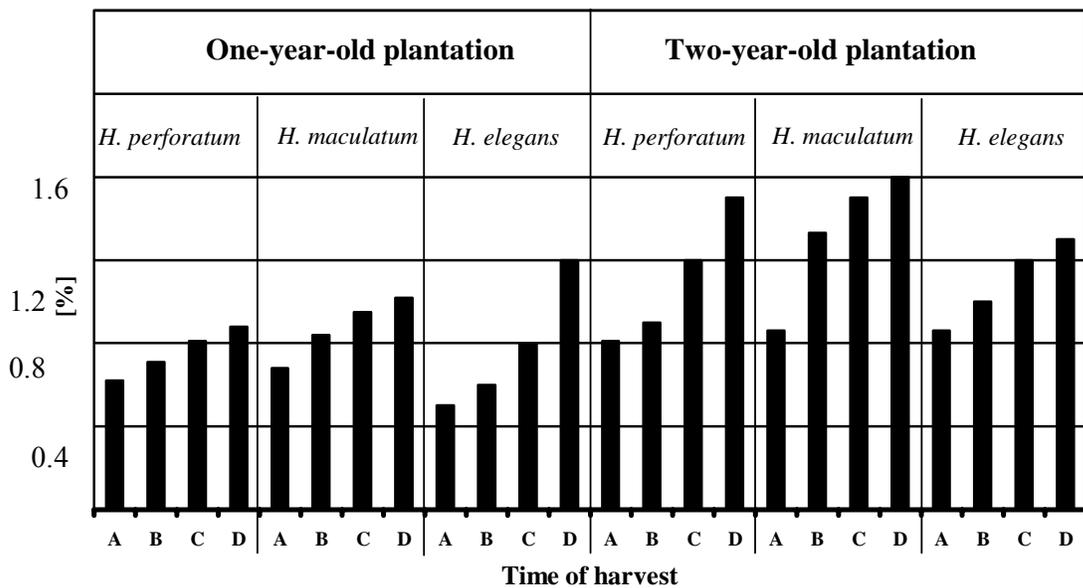
Time of harvest	<i>H. perforatum</i>	<i>H. maculatum</i>	<i>H. elegans</i>	Mean
Vegetative stage	43.2	47.1	51.5	47.3
Before blooming	198.5	205.8	229.0	211.1
Beginning of blooming	291.9	288.6	405.6	328.7
Full blooming	335.9	386.2	445.3	389.1
Mean	217.4	231.9	282.9	

LSD_{0.05} for time of harvest = 40.35

LSD_{0.05} for species = 31.76

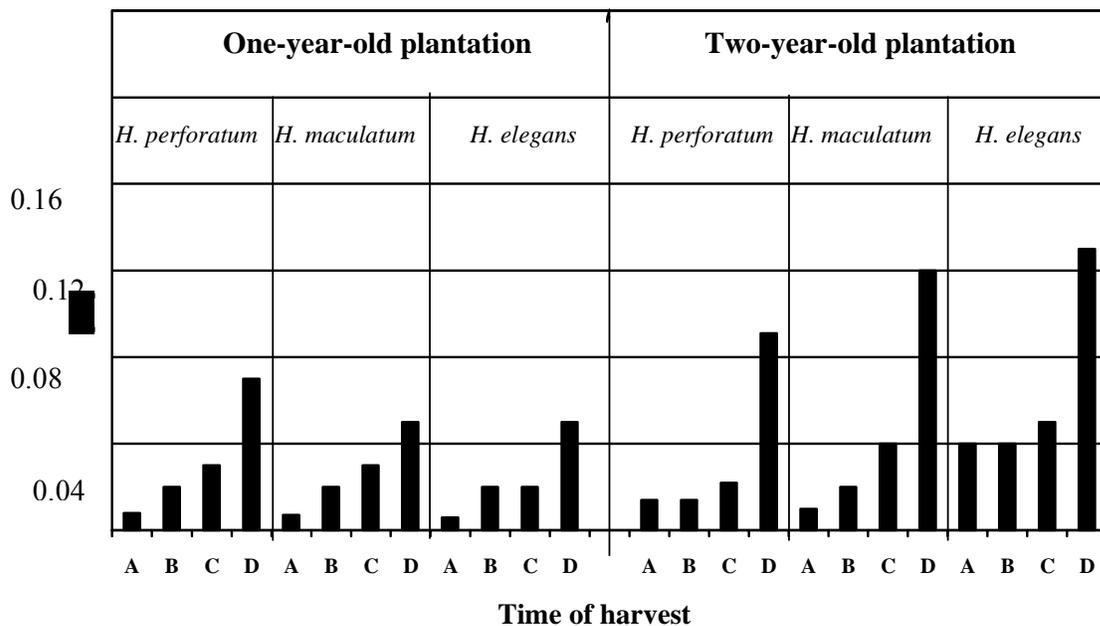
LSD_{0.05} for time of harvest x species = 63.51

Figures



A– vegetative stage B– before blooming C– beginning of blooming D– full blooming

Fig. 1. Content of flavonoids [%]



A– vegetative stage B– before blooming C– beginning of blooming D– full blooming

Fig. 2. Content of hypericins [%]