UTILIZATION AND CROPPING POSSIBILITIES OF *EUPHORBIA LAGASCAE* SPRENG. IN HUNGARY

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Abstract: *Euphorbia lagascae Spreng. is an annual spurge native to south-eastern Spain and Sardinia. The species is characterized by its valuable seed oil content (48-52%) consisting of about 58-62% cis-12, 13-epoxyoleic acid, also called vernolic acid (oleic acid with an epoxy group) with attractive applications for the oleo-chemistry. As a long-chain fatty acid, vernolic acid can have various utilizations, e.g. dyes, coatings and plasticizer-stabilizer. Polyvinyl chloride can be more resistant to degradation by temperature and light when epoxyoleic acid is used in its composition. Epoxydized oils or their esthers can also be important components of phenolic resins for the electronic industry. Despite promising results, the large-scale production of the species is hindered by severe seed shattering universal in wild accessions.*

Key words*: Euphorbia lagascae*, vernin spurge, vernolic acid, fatty acid, oilseed crop

INTRODUCTION

Synthesis of seed oils is restricted to unsaturated fatty acids with the chain length of 18 carbon atoms, especially oleic and linoleic acids. However, some plant species are able to produce unusual fatty acids with chain length variations (short, very long, respectively), or with functional groups within the fatty acid molecule (conjugated double bonds, hydroxy or epoxy groups) (Vogel et al., 1993). Epoxidation is one of the most common additive reactions with double bonds of unsaturated fatty acids (Carlson and Chang, 1985).

Euphorbia lagascae can be annual, biennial and sometimes perennial. The species has been grown for very different purposes, it can be medicinal and ornamental. It is folkloristically called ”moleplant” for its capacity to repel rodents. Vernolic acid, representing the main fatty acid of *E. lagascae* had been characterized as an isomeric compound of the ricinoleic acid (11-hydroxy monoenoic acid) (Vidyarthi, 1940). After the isolation of ricinoleic acid, Gunstone proved in 1954 that vernolic acid not being a hidroxy but an epoxy fatty acid. This was the first proof of an epoxy fatty acid occurring in seed oils. *E. lagascae* apart from Vernonia spp. is considered to be the most promising natural source of vernolic acid. The oil content and the anticancer characteristics of *E. lagascae* make this species a valuable raw material for both pharmaceutical and petrochemical industry (Pascual-Villalobos, 1999). Today, the range of main distribution of the species covers the southeastern parts of Spain (Valencia, Murcia and Andalusia) but the herb is also present in the arid southeast and the coastal region of Cadiz (De Bolos and Vigo, 1990). *E. lagascae* is also indigenous to Sardinia (Pignatti, 1982). The species germinates in autumn after the first rains, flowers in March or April, and becomes ripe from April to May. The species produces a central primary shoot, which can reach the height of 60–110 cm. Seed composition of the species is characterized by its high seed oil content of about 48–52%, consisting of about 58–62% vernolic acid.

MATERIALS AND METHODS

The aim of this project was to examine production of *Euphorbia lagascae* in Hungary. The open field trials were carried out in 2011 at the University of West-Hungary, Faculty of Agriculture and Food Sciences, Department of Botany. Experimental plants were propagated by seeding and subsequent transplant raising in glasshouse. Seeding took place in glasshouse on February 2011. Date of transplanting: May 2011 in the botanic

garden. In parallel with the transplantation, a plantation of *in vivo E. lagascae* were seeded on the soil surface. The aim of the experiment was to observe the plant height and epoxy fatty acid content increasement *in vivo,* and in the case of transplanted *E. lagascae*.

Date of measurments: 7 July, 30 July and 19 August. We have measured the plant height, the leaf length and width, stem diameter, primal ramification and sub- ramification. Seed yield was determined for three times (Table 2).

The statistical analysis was accomplished with SPSS v19 software and Microsoft Excel 2007/2010. We was calculated the following values of the plant height: mean, minimum, maximum, standard deviation and standard error. Every parameters of significant level have measured.

Following the harvest, the plants were dried in a shaded and well-ventilated greenhouse. The Department of Feeding was determined the epoxy fatty acid content *in vivo* and on transplanted plants.

The fatty acid content determination consisted of several phases. The preparation phases were: the fatty acid dissolvation, saponification, esterification, collecting hexenal samples, finally was elaborated the chromatographic method by HPLC (High Performance Liquid Chromatography).

RESEARCH RESULTS

Developmental differences were observed on several parameters of *in vivo* and transplanted plants (ex. plant height) (Figure 1). On the Table 1 significant differences were shown between the mentioned plant populations. The fatty acid content was approximately the same in spite of the morphological differences (Figure 2).

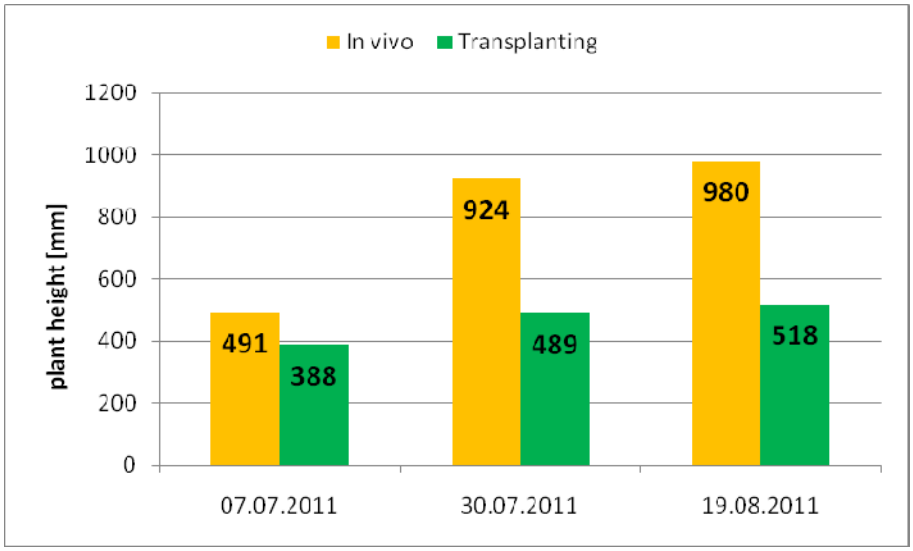

Figure 1 Plant height of measured time (2011).

Table 1

Seed yield per hectare

07. July 2011.	30. July 2011.	19. August 2011.
~ 215.625kg/ha	**~ 746.25 kg/ha**	**~ 1,087.50 kg/ha**

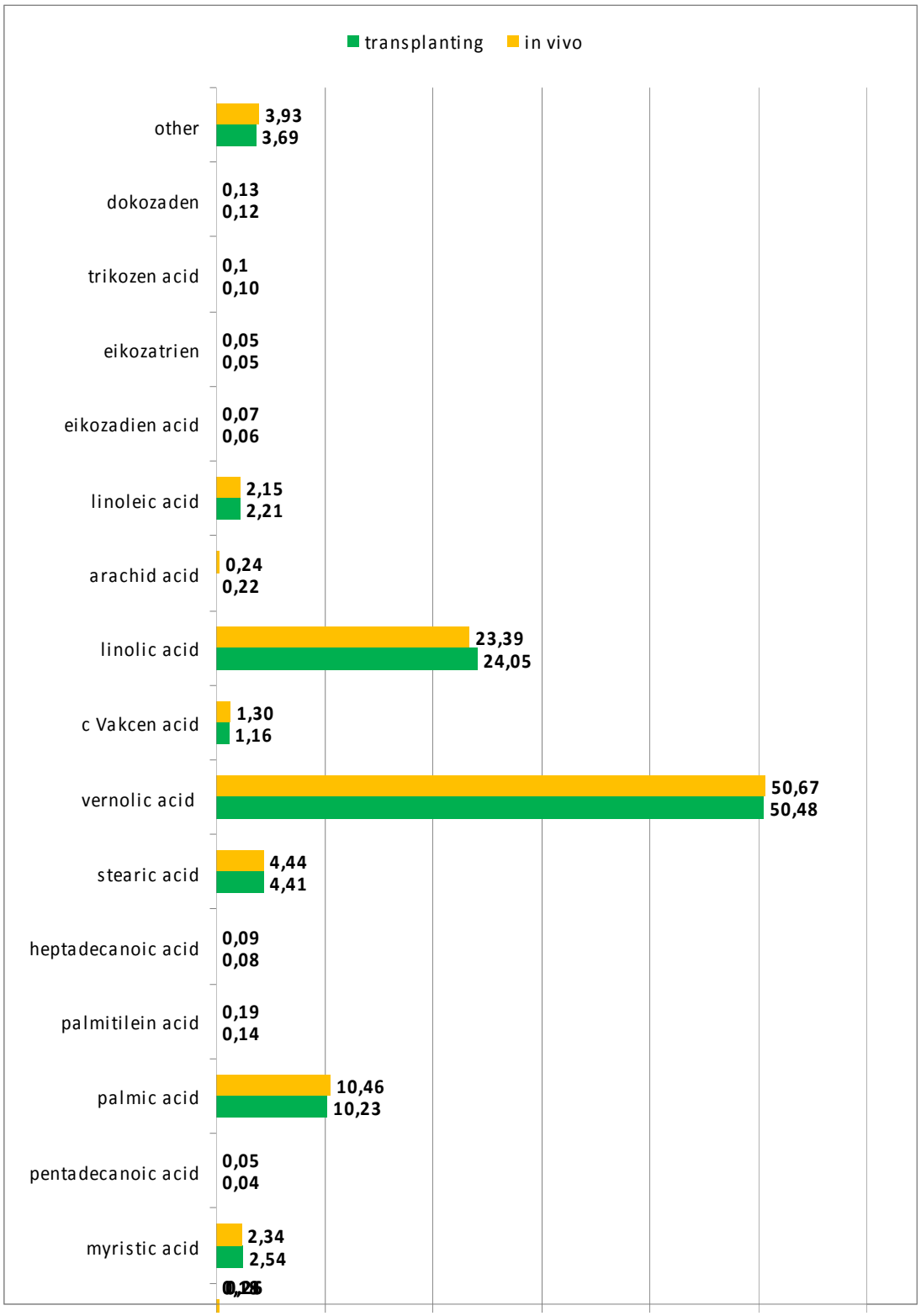

Figure 2 Fatty acid content of *in vivo* and transplanting *E. lagascae*.

Table 2

The significant level of measured time (2011)

	Significant		
	07. July	30. July	19. August
Plant height	*	***	***
Plant diameter	n.s.	***	***
Primal ramification	***	***	***
Sub-ramification	***	**	n.s.
Stem diameter	***	***	***

The mean difference is significant at the 0.1 level.
n.s. = not significant

CONCLUSIONS

The experiments was observated, that *in vivo E. lagascae* increased and development were different by transplanting plants. The development differents had observated one's propertis: plant height, the measured of biggest plant diameter, primal and sub-ramifications number, respectively stem diameter. The plant economic significant were not different of epoxy fatty acid content on *in vivo* and transplanting *E. lagascae*.

Despite promising results, the large-scale production of the species is hindered by severe seed shattering universal in wild accessions. For this reason, breeding and domestication work have been undertaken in Spain, Germany and the Netherlands in recent years. Our experiments, stand significant observated of the plant leaning, that hold plant in position accomplishment. The correct agricultural technics is not modifications.

The plant possible following applicability take notice of other typical stroke. In the stem poison latex and other irritation component important safety prescription during the harvesting and utilization.

The alternative oil-yielding plant becoming of the future function, that the petrochemistry product replaceable by oil crops, respectively so epoxy fatty acid contain chemical industry and a pharmaceutical industry used.

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