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Early growth and pod production of ten French honey locust varieties in a semi-arid Mediterranean environment of Greece

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RESUME – “Croissance précoce et production de gousses de dix variétés françaises de févier dans un milieu semi-aride méditerranéen en Grèce”. En 1992, dix variétés clonales de févier (*Gleditsia triacanthos* L.) développées dans le sud de la France ont été transférées comme plants d’une année et plantées dans un milieu semi-aride méditerranéen de Grèce. L’objectif était de tester leur croissance et leur productivité comme arbustes fourragers pour les besoins des animaux pendant la période critique de l’automne et du début d’hiver. Dix ans après leur établissement, les résultats montrent que certaines de ces variétés se sont mieux adaptées que d’autres à leur nouveau milieu et ont produit plus de gousses par arbre. Plus précisément, la plupart ont dépassé 5 m de hauteur. Certaines variétés ont commencé à produire des gousses en 1995 mais ce n’est qu’en 1997 que la production de gousses s’est généralisée. Depuis, le nombre de gousses et le rendement par arbre ont considérablement varié d’une année à l’autre. On considère qu’il n’y a pas de variété particulière qui ressorte dans les plantations d’arbres fourragers. Il semblerait plus judicieux de mélanger au moins 3-5 variétés afin de permettre une production soutenue de gousses.

Mots-clés: Hauteur, gousses, poids, aliment bétail, systèmes sylvopastoraux.

Introduction

Honeylocust (*Gleditsia triacanthos* L.) is a fast growing leguminous tree species, native of the eastern USA, where it is commonly found on the alluvial flood plains of major rivers and on soils of limestone origin. It is a drought resistant and an alkali and salinity tolerant species (Funk, 1965). It is a multipurpose tree, but its main use is for animal shelter and feed (pods with high sugar content) and for ornamental purposes (thornless and usually fruitless clones) (Santamour and Mc Ardle, 1983). Several cultivars have been selected in USA for these two purposes. In Europe, where it was very probably introduced at the beginning of the 17th century (Putod, 1982), similar research has been conducted and several clone-varieties, suitable for animal feeding purposes, have been selected during the last 15 years (Dupraz, 1999; Papanastasis *et al.*, 1999).

The objective of this study was to test the growth and pod productivity of ten such varieties (9 French and 1 American) as fodder trees for meeting the animal needs during the critical period of autumn and early winter in a semi-arid Mediterranean environment of Greece.

Materials and methods

The research was carried out in the farm of the Forest Research Institute, 20 km NE of the city of Thessaloniki, northern Greece (40°35' North latitude and 22°58' East longitude). Soils of the study area are sandy loams, derived from deposits of the tertiary period, fairly deep (1-2m) and almost alkaline (pH 7.7). Climate is semi-arid Mediterranean with 416 mm long-term mean annual rainfall, 31.7°C mean maximum air temperature in July and 0.2°C mean minimum in January (Tsiotis, 1995). In this farm, a honey locust multi - clonal orchard was established in 1992 employing a complete randomized design. Ten thornless clones (grafted trees) selected for their productivity in pods of high value for animal feeding were included for evaluation in this orchard, nine French and the American “Millwood”. The abbreviated names for these clones were BRL, CAB, CYN, REV, SBR, SGO, SUM, TOT, VPO and MIL respectively. Each clone was represented by 5 ramets.

Height measurements were taken each year (1992-2001) at the end of growing season and pods were counted for six consecutive years from the first year of fruit bearing (1995) until 2001 with an

exception in 1998. In addition, oven dry weight of the entire pod yield per tree was estimated for three years (1996,1997 and 1999). Data were subjected to one-way analysis of variance to compare the varieties within each year; if differences were significant, the means were compared with the Duncan test at the 0.05 level.

Results and discussion

Height

The mean height for each clone-variety for the decade 1992-2001 is presented in figure 1. The differences among the ten varieties tested were statistically significant (only during the first two years ($P \leq 0.0012$ and $P \leq 0.0062$ respectively) and in the last one ($P \leq 0.0304$). However, CYN and SUM were consistently the tallest followed by SGO, TOT and CAB. The American MIL with the lowest height in the first three years improved a little its ranking position the following years, while the opposite happened with REV. Actually, the mean height ranged among the clones from 24.2 to 66.3 cm in the first year of establishment, while the range in the last year was from 389.2 to 555.3 cm. During the second year, a decrease was observed in the height attributed partly to desiccation of the leader shoot's top due to the very dry conditions prevailed during 1993 (225 mm annual precipitation) and to browsing of saplings by hares.

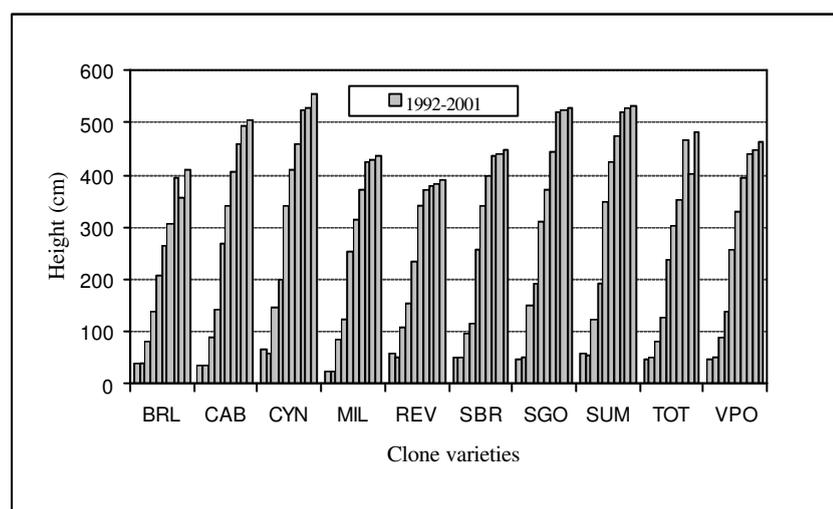


Fig. 1. Mean height of the 10 honey locust varieties during 1992-2001.

Pod numbers

The first pods of the orchard were produced in 1995 by two varieties (Fig. 2). More specifically, two ramets of the clone SBR produced 9 pods in total, while one ramet of REV just one. During the next year, 3 ramets from each of the clones SBR and REV produced pods again while six other clones started bearing fruits with the contribution of one or two ramets per clone (Dini-Papanastasi *et al.*, 1997). In 1997, the pod production was generalized (Fig. 2). MIL gave the highest number of pods/tree during 1999 and in 2000 exceeded the 1000 pods/tree. Year 2000 was the most productive for all the clones tested followed by 1999 at least for the majority of them, while 2001 was the year with the poorest production. Statistically significant differences among clones were found only during the last year 2001 ($P \leq 0.0189$). A pattern of alternate bearing (with even years as high production and odd years as low production ones) was not observed as in France (Papanastasi *et al.*, 1999). On the contrary, most clones appeared to have good production for three consecutive years. However, this pattern has to be confirmed with more observations as the plantation gets older.

Pod yield

There was a great variation in pod yield (g DM/tree) among the clones within each one of the three years but their differences were found statistically significant only during the last two ones ($P \leq 0.0453$ and $P \leq 0.0127$ respectively). More specifically, the pod yield varied during 1996 from 0 to 165 g DM/tree, while during the most productive year of 1999 from 1304 g DM/tree to 10,384 g DM/tree (Fig. 3). A variation among the three years in each clone yield was also observed, but in general the production trend was increasing with the years. For example, it was found that the mean yield of one clone ranged from 49.5 in 1996 to 8921.3 g DM/tree in 1999, while another's from 2.3 to 10,383.5 g DM/tree. Expressed in kg/ha in a 400 trees/ha orchard, the pod yields for the last year of measurement varied from 520 to 4160 kg/ha.

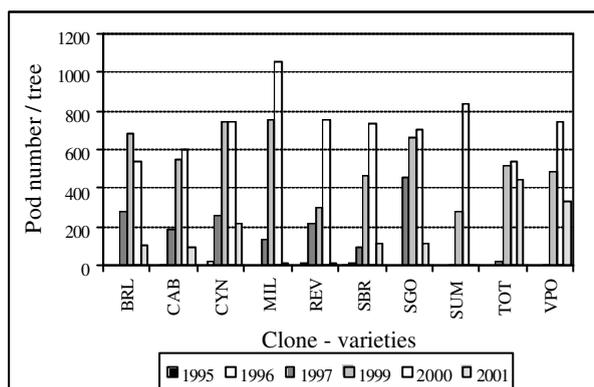


Fig. 2. Mean pod number/tree of 10 honey locust varieties for 6 years.

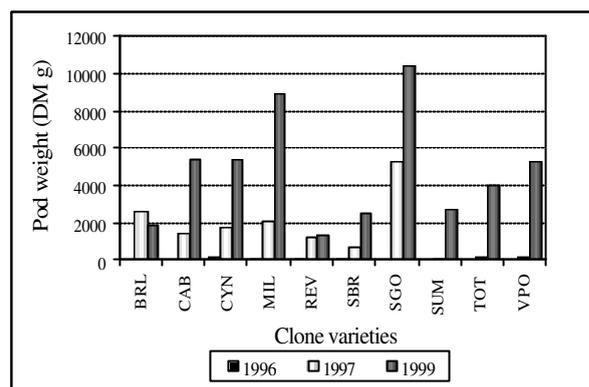


Fig. 3. Mean pod yield (g DM/tree) of 10 honey locust varieties for 3 years.

Conclusions

All clones-varieties tested started to yield appreciable amounts of pods at the sixth year after their establishment but the quantities produced were variable both among them and from one year to next. For this reason, a mixture of 35 varieties should be used for establishing plantations aiming at sustained production of pods for meeting the animal needs during the winter period.

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References

- Dini-Papanastasi, O., Cabrespina, F. F., Papanastasis V. P. 2001. Production characteristics of ten foreign *Gleditsia triacanthos* L. varieties in a semi – arid Mediterranean environment. *Annals of the Department of Forestry and Natural Environment. Aristotle University of Thessaloniki* (In Greek with English summary - In press).
- Dini-Papanastasi, O., Platis, P. D., Tsiontsis, A. I. 1997. Evaluation of foreign varieties of *Gleditsia triacanthos* L. in two sites of Central Macedonia, Greece. *In Proceedings of the 1st Panhellenic Rangeland Congress "Sustained Utilization of Rangelands and Pastures", Drama, Greece*, pp. 188-195 (In Greek with English summary).
- Dupraz, C. 1999. Fodder trees and shrubs in Mediterranean areas: browsing for the future?, *In Grasslands and Woody Plants in Europe*, Papanastasis V.P., Frame J., Nastis A.S. (eds). EGF,

- Vol. 4, Grassland Science in Europe: 145-158.
- Funk, D.T. 1965. Honeylocust (*Gleditsia triacanthos* L.). In *Silvics of Forest Trees of the United States*, U.S. Dep. Agric., Agric. Handb. 271: 198-201.
- Papanastasis, V.P., Tsiouvaras, C. N., Dini-Papanastasi, O., Vaitsis, T., Stringi, L., Cereti, C. F., Dupraz, C., Armand, D., Meuret, M., Olea, L. 1999. Selection and utilization of cultivated Fodder Trees and Shrubs in the Mediterranean Region. (Compiled by V. P. Papanastasis). *Options Méditerranéennes. SERIE B: Études et recherches*, 23, 93 pp.
- Putod, R. 1982. Les arbres fouragers. Le Févier. *Forêt Méditerranéenne* 4 (1): 33-42.
- Santamour, F.S., Jr., McArdle, A. J. 1983. Checklist of cultivars of honeylocust (*Gleditsia triacanthos* L.). *Journal of Arboriculture*, 9 (9).
- Tsiontsis, A. 1995. Meteorological data of the Forest Meteorological Stations of Northern Greece. Forest Research Institute Bulletin. Thessaloniki, Greece.