RESPONSE OF LEUCAENA LEUCOCEPHALA K8, K67, HYBRID K743, AND OTHER VARIETIES TO THE EXTREME CLIMATIC CONDITIONS OF NORTHEASTERN MEXICO

Introduction. Leucaena has won importance in forestry research due to features of fast growth, high quality charcoal, and green leaf forage for livestock (Foroughbakhch and Hauad 1989). Management is important in areas with remnant legumes to benefit the local rural population which depend on resources from woody legumes (Foroughbakhch et al. 1987, Reid et al. 1987, Jurado and Reid 1989). Nevertheless, information is scarce on the behavior and growth parameters of northeastern Mexico leucaena species and provenances. The adaptability and growth six provenances of L. leucocephala was studied in a forest plantation in Linares, Nuevo Leon, Mexico. The aim was to create a source for raw materials such as firewood, poles, charcoal, etc.

Materials and methods. The plantation is located at Linares within the university campus (24°27'N, 99°32'W) at an elevation of 400 m. The local climate is defined as warm-subhumid with two rainy seasons and a winter dry period. Average annual rainfall is 750 mm. The mean annual temperature is 22.3°C with highs above 40°C in summer and a freeze period from December to March.

Soils are typical Vertisols of alluvial-colluvial origin, deep and dark colored. They are characterized by high clay and low macronutrients, including phosphorus and nitrogen. Selection of Leucaena varieties and provenances was based on the high growth values reported in the literature and observed locally in the field. The varieties selected were L. leucocephala K8, K67, var. Salvadorensis, L. leucocephala provenance Bustamante and Linares, N.L., Mexico and the hybrid K743 (K8 x K156; L. leucocephala x L. diversifolia). The plants were produced at the tree nursery of the Faculty of Forest Sciences. The plantation was established using a 2 x 2 m spacing, resulting in a density of 2,500 trees/ha in blocks of 10 x 10 m for each provenance in four replications.

Results and discussion.

Adaptation and survival. Interaction between the different environmental factors affected adaptability and survival of plants. All tested varieties exhibited >85% survival. The relatively low survival rate of some provenances (Linares, K8, and K743) can be attributed to specific climatic factors, especially to low winter temperatures and late frosts (Figure 1).

Growth evaluation. In general, all L. leucocephala varieties showed fast height as well as diameter growth in the first and second year of establishment. L. leucocephala K67 (6.2 m), K8 (6.1 m) and Salvadorensis (6.0 m) had the highest growth rates (Figure 2) after four years. Low winter temperatures negatively affected height growth of almost all plants. The apical buds and thin branches were injured, causing a decrease in height increment (Figure 3).

Statistical analysis using Duncan’s test show significant differences (P <0.05) in growth between the different provenances. Following these data, two subgroups can be formed: Subgroup A (most promising) - L. leucocephala K8, K67, prov. Bustamante, and hybrid K743; these were significantly taller (P < 0.01) than Subgroup B. Subgroup B - L. leucocephala var. Salvadorensis and prov. Linares show a good growth (mean height = 5.0 m) after the fourth year of establishment but were still inferior in growth to L. leucocephala K8 and K67.
Figure 1. Survival of *Leucaena leucocephala* in northeastern Mexico.

Figure 2. Growth in height and diameter of *L. leucocephala* in northeastern Mexico.

Figure 3. Height increment of four varieties of *Leucaena leucocephala* in northeastern Mexico.
Conclusions. All tested varieties adapted to the edaphic and climatic conditions of the region, but show differences in establishment due to biotic and abiotic factors. All provenances of *L. leucocephala* except that of prov. Linares show the highest growth and have potential for multiple-use. *L. leucocephala*, K67, K8, and the hybrid K743 can be used for wood and charcoal production. Studies should continue on tree spacing as it affects biological and economical variables of growth and production. Sensitivity of *L. leucocephala* to low temperatures has not limited its wide use, however. Good regeneration and capacity for vegetative regrowth makes leucaena an interesting and important alternative tree for the production of wood and forage for livestock in a silvipastoral or agroforestry management program.

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References:


