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Litterfall Deposition and Leaf Litter Nutrient Return in Different Locations in northeastern Mexico

HUMBERTO GONZALEZ RODRIGUEZ, ISRAEL CANTU SILVA, JAVIER JIMENEZ PEREZ, ROQUE G. RAMIREZ LOZANO

Universidad Autónoma de Nuevo León, Faculty of Forest Sciences, Mexico

Abstract

The study aimed to determine the litterfall production and macronutrients (Ca, K, Mg, N, and P) deposition through leaf litter in three sites with different type of vegetation. Site one (Bosque Escuela) was located at 1600 m a.s.l. in a pine forest mixed with deciduous trees, second site (Crucitas at 550 m a.s.l.) in the ecotone of a *Quercus* spp. forest and the Tamaulipan thornscrub and the third site (Campus at 350 m a.s.l.) was located at the Tamaulipan thornscrub. Litter constituents (leaves, reproductive structures, twigs and miscellaneous residues) were collected at 15-day intervals from December 2008 throughout December 2009. Collections were carried out in 10 litter traps (1.0 m × 1.0 m) randomly situated at each site of approximately 2500 m². Total annual litterfall deposition was 483, 706, and 495 13.4 g m²/year for Bosque Escuela, Crucitas, and Campus, respectively. Of total annual litter production, leaves were higher varying from 72 % (Bosque Escuela) to 66 % (Crucitas) followed by twigs from 8 % (Bosque Escuela) to 21 % (Campus), reproductive structures from 5 % (Bosque Escuela) to 14 % (Crucitas), and miscellaneous litterfall from 3 % (Crucitas and Campus) to 13 % (Bosque Escuela). The Ca annual deposition was significantly higher in Campus (13.4 g m²/year), followed by Crucitas (11.4), and Bosque Escuela (3.6). The K (0.98, 3.8 and 3.0, for Bosque Escuela, Crucitas and Campus, respectively), Mg (0.488, 1.298, and 1.165, respectively). The P deposition was 0.141, 0.260, and 0.237, respectively. On an annual basis for all sites, the order of nutrient deposition through leaf litter was: Ca>K>Mg>P; whereas, on site basis of total nutrient deposition (Ca+N+K+Mg+P) was as: Campus > Crucitas > Bosque Escuela. Ca, K, Mg, N, and P nutrient-use efficiency values in leaf litter were higher in Bosque Escuela, while lower figures were acquired in Crucitas and Campus sites. It seems that the highest litterfall deposition was found in the ecotone of a *Quercus* spp. forest and the Tamaulipan thornscrub; however, the Tamaulipan thornscrub vegetation alone had better leaf litter nutrient return. There were spatio-temporal variations in quantity of litterfall collected and return of minerals.

Keywords: Litterfall, northeastern Mexico, nutrient deposition, nutrient use efficiency, Pinus forest, Quercus forest, Tamaulipan thornscrub