**ABSTRACT**

In February 1994, soils and vegetation along a black grama (Bouteloua eriopoda) grassland/cresotebush (Larrea tridentata) shrubland transition within the Sevilleta National Wildlife Refuge in central NM, were characterized to assess relationships between total soil organic carbon (TOC), total Kjeldahl nitrogen (TKN), total phosphorus (TP), and plant community structure. Plant community structure changed across the ecotone from a grassland with over 44% grass cover and less than 2% shrub cover to a shrubland with over 8% shrub cover and less than 8% grass cover. Soil TOC, TKN, and TP, in the upper 20 cm, were not significantly different between plant communities. These results support the hypothesis that grassland desertification may, in some cases, result in a redistribution of ecosystem resources and not a net loss of resources.

**RESULTS AND DISCUSSION**

No significant (P>0.05) differences were recorded for OC, TKN, or TP between grassland, transition, and creosotebush sites (Table 1). If the transition sites and/or the creosotebush sites were at one time occupied by black grama grassland it does not appear that any

<table>
<thead>
<tr>
<th>Site</th>
<th>OC</th>
<th>TKN</th>
<th>TP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1145.1</td>
<td>133.5</td>
<td>94.5</td>
</tr>
<tr>
<td>2</td>
<td>1299.6</td>
<td>134.3</td>
<td>99.7</td>
</tr>
<tr>
<td>3</td>
<td>1030.5</td>
<td>136.0</td>
<td>92.3</td>
</tr>
<tr>
<td>Mean/SE</td>
<td>1427.7a/210.2</td>
<td>134.5a/1.0</td>
<td>95.5a/2.2</td>
</tr>
</tbody>
</table>

**METHODS**

Three sites within the Sevilleta National Wildlife Refuge representing independent transitions between black grama grassland and creosotebush shrubland were selected for study. Spatial separation between sites was maintained to ensure independent site replication. The soils and vegetation of the three plant community types (black grama, mixed black grama/cresotebush transition, and creosotebush shrubland) were characterized within each of the three sites. Aboveground cover of individual plant species as well as non-vegetative ground cover categories (bare soil, litter, gravel, etc.) were estimated using Community Structure Analysis (CSA) techniques (Pace 1981). Soils were sampled to a depth of 20 cm in bare interspaces, under shrub canopy and under grass canopy in each of the three plant community types where these canopy types existed. Standard procedures were used for analysis of soil TOC (Walkley-Black), TKN (micro-Kjeldahl), and TP (Na2CO3 fusion). Estimates of TOC, TKN, and TP were calculated by converting concentrations (%) to Mglha (based on bulk density estimates) and correcting for the amount of cover (from CSA estimates) each soil type occupied at that site. Soil data were analyzed using standard ANOVA techniques to test for significant differences between the three plant community types.

**INTRODUCTION**

Desertification was defined by the United Nations Conference on Desertification as "the diminution or destruction of the biological potential of the land that can ultimately lead to desert-like conditions" (El-Tayeb and Skujins 1989). Desertification is a widespread problem throughout the arid regions of the southwestern United States. One commonly-cited symptom of desertification is the conversion of grassland to desert scrub which is dominated by xerophytic shrubs. Desertification can lead to a reduction in forage production, an increase in soil erosion, and a loss of plant nutrients.

It has been hypothesized that conversion of grassland to shrubland increases the spatial and temporal heterogeneity of soil resources but does not necessarily result in a net loss of resources (Schlesinger et al. 1990; Grover and Musick 1990). The end result, they maintain, is that nitrogen, carbon, and other soil resources become concentrated under shrubs, the so-called "islands of fertility" concept (García-Moya and McKell 1970). We are testing this hypothesis by quantifying soil carbon, nitrogen, and phosphorus in plant communities from a grassland/shrubland ecotone. Effective restoration of productive grassland is dependent upon our knowledge of how the environment is being altered during the desertification process. If this hypothesis is correct, redistribution of available resources may be an important first step for restoration.

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net loss of TOC, TKN, and TP has occurred. Although the conversion of grassland to shrubland is often considered a form of desertification there does not appear to be any decrease in the "biological potential" of this site. It is possible that restoration of a stable grassland on creosotebush and transitional sites may be a matter of redistributing resources, reestablishing grasses and reintroducing stabilizing forces such as fire.

**Literature Cited**


