

CHEMOAUTOTROPHIC METABOLISM AND ACID PRODUCTION IN RECLAIMED SOIL FROM A LIGNITE SURFACE MINE

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Purpose of the Study: This investigation was undertaken to clarify and substantiate the involvement of chemoautotrophic bacteria in acid production in reclaimed soil from a lignite surface mine.

Procedure: The activity of chemoautotrophic bacteria was indexed using a modification of an isotopic technique reported by Belly and Brock (1973). Numbers of chemoautotrophic bacteria, heterotrophic bacteria, and fungi were determined using the Most-Probable-Number Technique. Soil moisture and soil pH were determined using the methods described by Allison et al. (1965). Statistical analysis of the data collected was performed according to the methods outlined by Zar (1974).

Findings: A significant negative correlation was determined for soil pH and the index of chemoautotrophic activity. A significant positive correlation was demonstrated between numbers of chemoautotrophic bacteria and the chemoautotrophic index. A model was constructed from the experimental parameters studied accounting for 67.7% of the variance in soil pH. The populations of the two types of chemoautotrophic bacteria studied, iron-and sulfur-oxidizing bacteria, demonstrated a good correlation with the chemoautotrophic index.

Conclusions: Results of the study suggested an intimate involvement between chemoautotrophic bacteria and decreased pH in reclaimed soil. Of the two types of chemoautotrophs, iron-oxidizing bacteria contribute more significantly to decreased soil pH.

*Masters Thesis
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