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### 基于判别、因子分析的采煤沉陷风沙区土壤质量评价

#### Soil quality evaluation of windy desert region after coal mining subsidence based on discriminant and factor analysis

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中文关键词: [土壤](#), [煤矿](#), [试验](#), [风沙区](#), [典型判别分析](#), [因子分析](#)

英文关键词: [soils](#), [coal mines](#), [experiments](#), [windy desert region](#), [canonical discriminant analysis](#), [factor analysis](#)

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中文摘要:

为给沉陷风沙区土地利用规划、治理提供理论参考, 主要应用典型判别分析与因子分析对内蒙古鄂尔多斯市毛乌素沙地南缘补连塔矿区沉陷于2004、2005年的2个沉陷区沉陷2~3 a后的土壤质量进行了分析。结果表明, 2个沉陷区的土壤含水率、硬度、全氮与全磷显著低于对照区 ( $p<0.05$ ); 部分沉陷区内地表扰动严重的坡位体积质量显著降低 ( $p<0.05$ ), 孔隙度显著升高 ( $p<0.05$ ); 各沉陷区全钾与有机质无显著变化 ( $p>0.05$ ), 速效养分整体上有活化趋势。由典型判别分析得到一个主要反映土壤养分扰动程度的判别函数, 可将对照区与2004、2005年沉陷区样点分别划分入无影响、有影响与严重影响3个等级。通过因子分析将11个土壤指标概括为5个意义明显的综合因子, 并以雷达图与散点图形式对沉陷区样点各综合土壤质量因子得分进行了直观表达。

英文摘要:

In order to provide theoretical supporting for land utilization planning and management in windy desert region, canonical discriminant analysis and factor analysis were used to distinguish and study the soil quality of two subsidence areas (SAs) respectively subsided in 2004 and 2005 in Bulianta coal mining area located at south rim of Maowusu desert. The results showed that soil moisture content, hardness, total N and P of the two SAs were significantly lower than control area (CA) ( $p<0.05$ ). At partial slope positions with serious ground surface disturbance, volume weight declined remarkably ( $p<0.05$ ) while soil porosity increased remarkably ( $p<0.05$ ). Compared with the CA, total K and organic matter of the two SAs showed no significant variation ( $p>0.05$ ), and available nutrient displayed an activating tendency on the whole. With the calculation by a canonical discriminant function which mainly reflects the disturbance degree of soil nutrient, sample plots of CA and SAs respectively subsided in 2005, 2004 can be divided into 3 grades, which including "no effect", "had effect" and "seriously effect". 11 soil quality indexes were summarized to 5 comprehensive factors by factor analysis, and comprehensive factor scores of soil quality of the sample plots in SAs were represented visually with radar diagrams and scatter diagrams. Canonical discrimination function distinguished the situation of soil quality of CA and each SA well, and factor analysis reflected characteristic of soil quality variance of each SA comprehensively and visually.

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