

## The implication of extractable humic acid fractions to the Karst rocky desertification

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Rocky desertification has become an imminently issue as the intensity of human activity is growing inevitably in the Karst area of southwest China. It has been found that the development of rocky desertification varied in adjacent zones according to their dominated soil type. This study examined soil organic matter (SOM), especially the humic acid (HA) component, of a limestone soil and two other soils (the yellow soil and the yellow-brown soil) from this Karst area to investigate interactions of SOM and rocky desertification happening. To this end, three HA fractions, namely free HA (HAf), encapsulated HA (HAe) and interacted HA (HAi), were extracted according to their occurrences in the selected soils, and their compositions and chemical characteristics were comparatively studied. The results showed that although the total organic carbon (TOC) and total HA contents of the limestone soil are higher, the ratios of carbon content of total HA to TOC (HAC/TOC) and the HAf fraction to the total HA (HAf/THA) of the limestone soil are notably lower than those of the yellow soil and the yellow-brown soil. The elemental compositions and chemical function groups analysis indicated that HAe and HAI fractions maybe much more vulnerable than HAf fraction when subject to microorganisms. Therefore, we concluded that constituents and characteristics of HA in the limestone soil may be an underlying reason for easier happening of rocky desertification in limestone soil areas than other areas in the southwest China Karst area.

Soil	TOC [wt%]	Yield [g/kg]				HAC/TOC			
		HAf	HAe	HAi	THA	HAf	HAe	HAi	THA
LS	3.12	6.06	5.97	2.52	14.55	9.29	9.70	4.40	23.39
YS	2.01	7.20	3.55	1.08	11.83	18.70	9.66	3.08	31.44
YBS	2.31	9.53	3.04	0.81	13.38	21.30	7.56	1.88	30.74

**Table 1:** Yields of HA fractions and ratios of organic carbon contents in HA fractions to TOCs of soils.