



The potential of Biochar technology in combating rocky desertification in the Karst area of south China*

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Land degradation in the Karst region is characterized by soil erosion and subsequent exposure of bedrocks in hillsides, i.e. the rocky desertification. The primary causative forces lie in the deforestation and cultivation on the slopes of mountain topography that inherently lacks for soil deposition due to the dissolving nature of the limestone or dolomite. Realizing the far-reaching impact of the Karst land degradation, which not only impoverishes the local farmers, but also jeopardizes the ecosystem's safety in the middle and lower reaches of the Xijiang and Yangtze rivers, the important economic zones in the south and east China, the Chinese central and provincial governments pushed very hard in recent decade to implement restoration of the hill slopes. Hundreds of millions of money have been invested in this effort. The achievement, however, falls far short of the expectations because, as we believe, of the neglect of the inevitability of the mass development of the mountain slopes.

As the most intensely degraded area in southwest China, Guizhou province exemplifies the other Karst regions in south China in the development of the rocky desertification. With the establishment of the P. R. China, this mountainous province, like other regions of China, witnessed the soaring of population, of which 86% occurred in the countryside. The urge to support the increased population led to the most prevalent land reclamation in Guizhou's history. Due to lack of flat land resources, the farmers have no alternative but to turn their axes and hoes to the hillsides. The disturbances deprived the meager soil of its fragile stability and made it an easy prey to the flooding waters and thus resulted in the widespread rocky desertification. The restoration of the hillsides, therefore, must be compensated by incomes from other sources. Accordingly, we proposed an approach through increasing the productivity of the basic farmland, the fields that are located in the flat lands, and did field experiments using the Biochar technology. Here we report the results.

As a province with the dominating agriculture, Guizhou produces 10~30 million tons of crop stalks annually, of which roughly 10% were used as fodder of domestic animals or in some other ways while most were subject to the notorious field combustion. The provincial government has issued policies calling for the exploitation of this renewable resource, no breakthrough, however, has been made toward this goal due to the low economic benefit of the current straw use technologies. Should the straws be used in the biochar way, based on our data of field experiments in Guizhou province, the biomass could yield 300~900 thousand tons of charcoal, which would sequester the atmospheric CO₂ by 10~30 million tons. Meanwhile the application of the biochar in the basic farmland would enhance the production of corn and rapeseed by about 30%, and the total production of crop by 300 thousand tons. The increased benefit from these two sources is equivalent to a total of 6600 million RMB, or 244 Yuan per capita of farmers per year in the whole province. This income would enable 850 thousand hectares of hill slopes to be relieved from cultivation without impairing the food security. This area accounts for 25% of the total rocky desertification of the province, or 65% of its medium ~severe desertified hillsides.

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