Effects of the Artificial Grassland Reconstruction on the Soil Nutrients and Enzyme Activity in the Degraded Red Soil

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Effects of the artificial grassland reconstruction on the soil nutrients and enzyme activity in the degraded red soil

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Introduction It is an important stratagem of solving the conflict between short supply of food and lack of arable land to reconstruction the artificial grassland in the subtropical hill regions in southern China (Ouyang *et al* . 2007) . And planting forage in the degraded ecosystem also help to accelerate the establishment of environment , especially have the good effects of increasing the soil nutrients content and the enzyme activity .

Materials and methods The site was on a hill pasture in Jiangxi agricultural university , north of Nanchang , China (116°0'E , 28° 22'N , altitude 61 .2m , gradient 15°) . The soil was red soil . Treatments were : (Ⅰ) Natural grassland , with the natural vegetation of *Imperata cylindrica* , *Miscanthus sinensis* etc . ; (Ⅱ) Pure pasture of *Lespedeza cuneata* and (Ⅲ) Pure pasture of *Paspalum wettsteinii* . In sown pastures 1250kg/hm^2 of lime and 22500kg/hm^2 of stable manure were applying before establishing the pasture . In June of the next year , the pH value , total nitrogen (TN) , phosphorus (TP) and potassium (TK) , and the activities of catalase , acid phgatase and urease in different soil layer were determination .

Results The results were in Table 1 . In three grasslands the soil nutrient content (except TK) and the enzyme activity generally decreased with soil depth . In the established artificial grasslands , the soil pH rose , the soil nutrient content (except TK) and the enzyme activity in all soil layers were increased . These effects of treatment Ⅲ were better than treatment Ⅱ (except TN) . These effects in the upper soil depth were more distinct than those in the lower soil depth .

Table 1 *Effects of constructing artificial grassland on soil nutrients and enzyme activity (cm , g · kg^{-1} , mg · kg^{-1}) .*

	Soil layer	pH	TN	TP	TK	catalase	acid phgatase	urease
Ⅰ	0～5	5 .27± 0 .23^{B}	0 .65±0 .11^{C}	0 .54±0 .02^{C}	11 .93±0 .13^{AB}	18 .72±3 .29^{Bc}	0 .31±0 .07^{Cc}	0 .56±0 .05^{Aa}
	5～10		0 .43±0 .05^{D}	0 .66±0 .05^{C}	12 .34±0 .22^{A}	6 .07±2 .11De	0 .16±0 .02^{Ee}	0 .38±0 .07^{Bc}
	10～20		0 .30±0 .03^{E}	0 .34±0 .03^{D}	10 .62±0 .08^{B}	3 .11±0 .97^{Fg}	0 .05±0 .01^{Ff}	0 .25±0 .01^{CDe}
	20～30		0 .27±0 .04^{E}	0 .33±0 .05^{D}	12 .81±0 .27^{AB}	2 .00±1 .84^{Gh}	0 .05±0 .01^{Ff}	0 .23±0 .01^{Df}
Ⅱ	0～5	6 .13± 0 .19^{A}	1 .35±0 .27^{A}	1 .25±0 .04^{AB}	9 .96±0 .16^{C}	24 .81±3 .37^{Aa}	0 .36±0 .04^{BCb}	0 .57±0 .06^{Aa}
	5～10		0 .90±0 .09^{B}	0 .73±0 .02^{C}	9 .30±0 .20^{C}	17 .12±3 .06^{Bc}	0 .40±0 .02^{Bb}	0 .50±0 .03^{Ab}
	10～20		0 .50±0 .06^{CD}	0 .34±0 .01^{D}	11 .12±0 .24^{B}	4 .63±1 .68^{Ef}	0 .24±0 .02^{Dd}	0 .26±0 .01^{CDe}
	20～30		0 .43±0 .21^{D}	0 .34±0 .01^{D}	10 .31±0 .29^{B}	3 .37±0 .41^{Fg}	0 .05±0 .01^{Ff}	0 .26±0 .01^{CDe}
Ⅲ	0～5	6 .34± 0 .04^{A}	1 .08±0 .39^{B}	1 .57±0 .04^{A}	13 .70±0 .16^{A}	26 .01±2 .99^{Aa}	0 .51±0 .06^{Aa}	0 .61±0 .07^{Aa}
	5～10		0 .84±0 .17^{B}	1 .18±0 .05^{B}	10 .58±0 .08^{BC}	21 .46±2 .03^{Ab}	0 .37±0 .02^{Bb}	0 .52±0 .04^{Ab}
	10～20		0 .40±0 .03^{D}	0 .39±0 .01^{D}	12 .91±0 .15^{AB}	7 .66±1 .54^{Cd}	0 .17±0 .01^{Ee}	0 .30±0 .01^{Cd}
	20～30		0 .29±0 .03^{E}	0 .30±0 .01^{D}	11 .51±0 .06^{AB}	4 .06±1 .78^{Ef}	0 .06±0 .00^{Ff}	0 .27±0 .01^{CDde}

Discussion Reconstructing artificial grassland could increase soil nutrients content and enzyme activity through planting herbage and managing grassland . Which also enhance the differences of the vertical distribution of soil fertilizer in different soil depth . The effect of planting grass was better than planting legume in short times .

Reference

Ouyang Kehui , Wang Kun , Li Delong , Li Zhenming and Liu Bing . 2007 .Establishment of sown pastures in the hilly red soil region of the subtropics in southern China . *Tropic Grasslands* , 41(2) : 92-99 .