



Theme 1

Status and trends of global soil nutrient budget



The effect of fallow technology on soil fertility of Kastanozem of cropland in Mongolia

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INTRODUCTION

Physical and chemical processes of virgin land soil are relatively constant, while cultivation of the soil for crop production results in enormous changes in soil's physical and chemical properties, especially humus substances, which are the main indicator of soil fertility. Therefore, the justification of the present study is that the effects of fallow technology, which plays a major role in the rotational planting system under the condition of re-intensification of crop production in our country, and crops for planting on hummus and its fractions deserve detailed study.

The purpose of the study in research work on the effect of fallow technology on soil fertility.

- Detection of effects of fallow technology in soil organic residuals
- Detection of effects of fallow technology on some parameters of soil fertility

METHODOLOGY

The field experiment was conducted at the Nart Center of the University of Agriculture in Bornuur soum, Tuv aimag from 2000 to 2016. The estimated size of one floor of the experimental area is 16.8x50 m² (840 m²).



- Soil organic residue - Incineration method, %: Organic residue in the soil is determined by calculating the amount of ash or mineral residue to be burned at 500 °C.
- The intensity of soil fiber decomposition - Saturkan mesh method, %: The intensity of the soil fiber decomposition process was calculated by subtracting high-fiber materials such as cotton, linen, straw, and photographic film from the soil for a certain period of time.
- Soil respiration rate - Karpachev's method, kg/ha: determined by soil respiration or CO₂ emitted from the soil by absorption and titration of NaOH, a suitable absorbent.
- General analysis method for determining the total number of soil microorganisms, million CFU/g: The total number was calculated by diluting the coke and injecting it into Peter's cup.

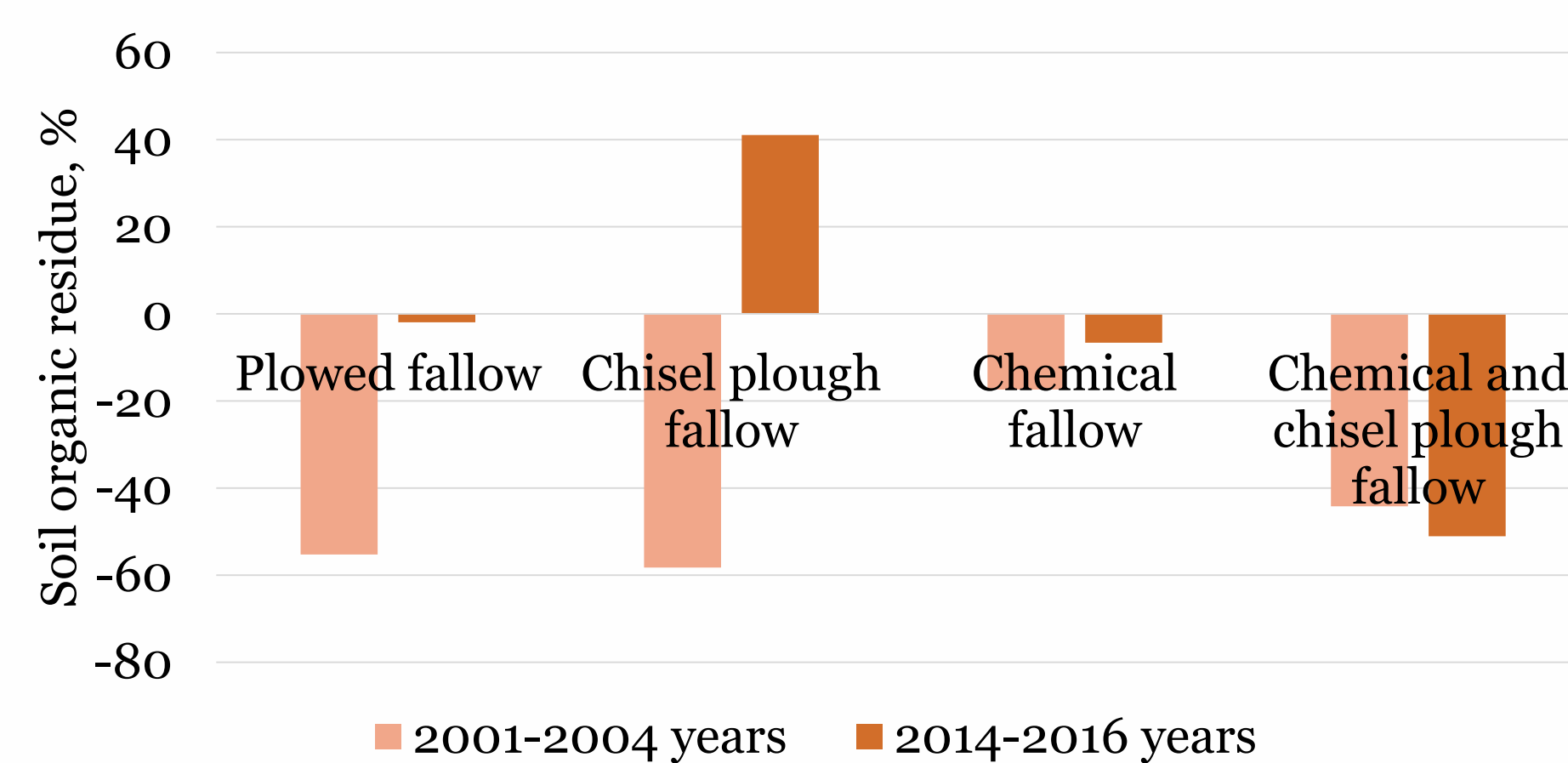
SOIL CHARACTERIZATION



Classification: Kastanozem
 pH(H₂O)=7.0~7.6
 EC=0.06~0.14 dS m⁻¹
 Max. Water Holding Capacity=44~55%(W/W)
 Bulk density (0-20cm)= 1.14~1.35 g cm⁻³
 TC(Plow layer) =15~20 g kg⁻¹
 TN(Plow layer) = 1.6~2.0 g kg⁻¹
 Available N(Plow layer) = 60~80 mg kg⁻¹ (120 kgN~180 kgN ha⁻¹)

RESULTS

Our study covers all soil cultivation technology (Plowed fallow, Chisel plough fallow, Chemical fallow, Chemical and chisel plough fallow) methods, rotations and crops used in our country and is implemented in a total area of 8 hectares close to the production technology.



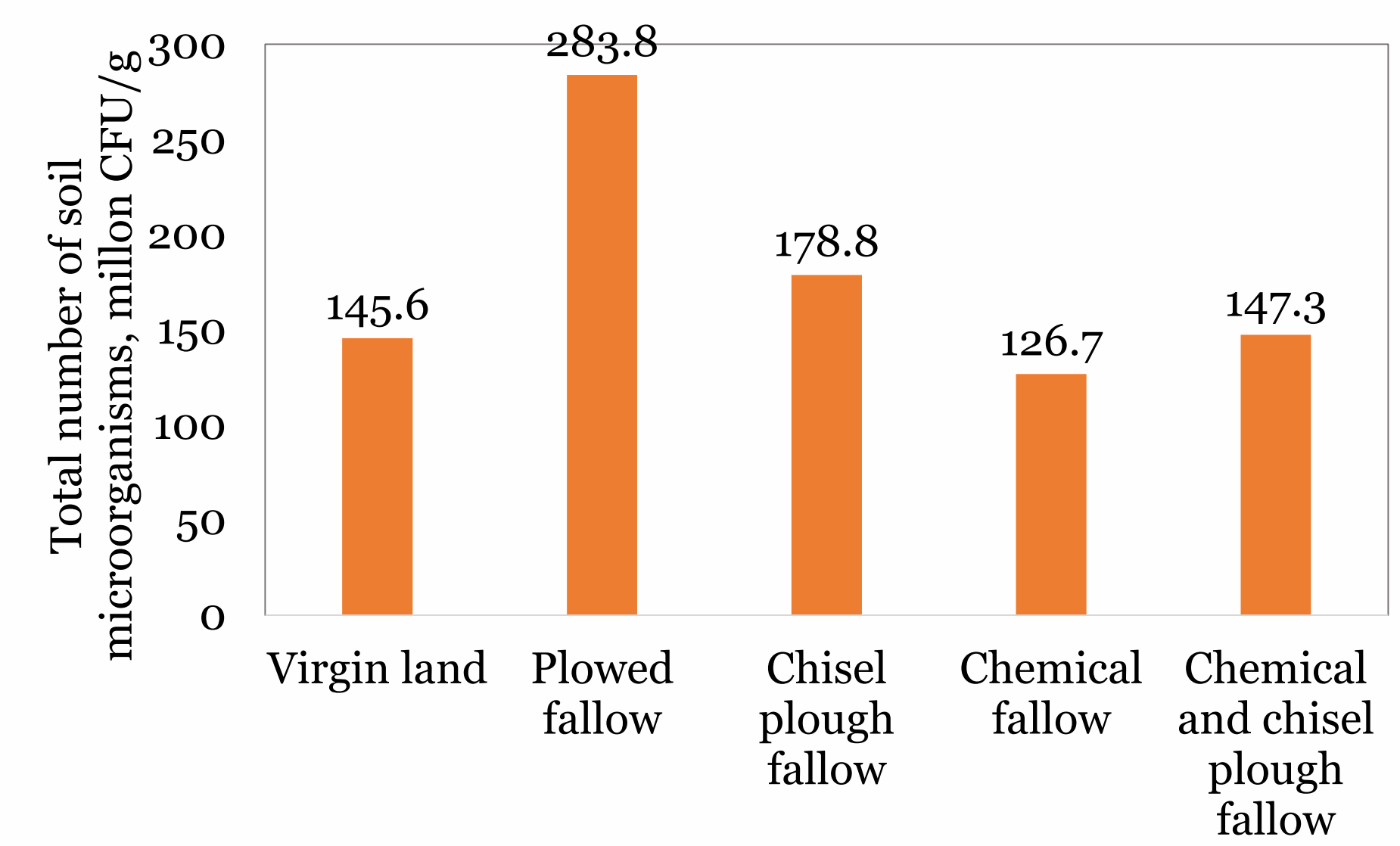
According to the results of the study of soil organic residues, the reduction of organic residues was high in 2001-2004, but in 2014-2016, the decrease in organic residues was reduced, and there is a possibility of accumulation in the chisel plough fallow.

Treatment	Soil respiration rate, kg/ha		Soil fiber decomposition, %	
	2001-2004 years	2014-2016 years	2001-2004 years	2014-2016 years
Plowed fallow	1.06	0.23	34.0	4.45
Chisel plough fallow	1.50	0.26	36.8	15.99
Chemical fallow	0.80	0.20	13.8	13.71
Chemical and chisel plough fallow	1.15	0.20	21.6	9.38

In the 2001-2004 survey, soil respiration was most intense in the plowed fallow, reaching 1.15% in September, an increase of 1.0% compared to May. Soil respiration intensity increased by 0.8% in September or 0.43% from May at the maximum chemical fallow. According to the results of the 2014-2016 survey, carbon emissions have decreased, but the results of previous years' surveys are consistent.

According to the results of the study, the intensity of soil fiber decomposition was high in 2001-2004 in the area of plowed fallow, chisel plough fallow and chemical and chisel plough fallow. Still, the variability in the chemical fallow variant was negligible during the study period.

The total number of soil microorganisms on plowed fallow increased by 283.8 million cubic meters compared to virgin land and decreased to 126.75 million cubic meters by chemical fallow.



The sharp increase in the total number of microorganisms in ploughing and cultivating the soil creates the main conditions for the intensification of microbiological processes that are the basis of biological processes in the soil

CONCLUSIONS

In the results of the study of soil organic residues, the reduction of organic residues was high in 2001-2004, but in 2014-2016, the decrease in organic residues was reduced, and there is a possibility of accumulation in the chisel plough fallow.

According to our research, the biological process is intensive, the physical characteristics are stable, and the chemical parameters are better in the alternative wheat, which shows that mulching cultivation is necessary for our country.

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Fig.1 : soil sample collection from rice-prawn land use (Kumbalangy)