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Interactions among Soil Physical, Chemical and Biological Properties under Different Farming Systems

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INTRODUCTION

The definition of soil quality has always been dynamic, changing over time within the soil science community. At first, the study focused more on fertility, the yield of crops, and less importance on a sustainable environment. Therefore, the definition of soil quality has changed in the last decade. The importance of biodiversity that exists both on the surface and within the soil began to be understood. These organisms have essential functions such as in the cycling of nutrients, the provision of nutrients for plants, the modification of the physical structure of the soil, water regimes, and the suppression of undesirable organisms in croplands.

OBJECTIVES

- Analyze the physical and chemical properties of the soil of both farms
- Analyze the microorganisms in these soil samples
- To discuss the soil ecosystem health of the farms based on the measured parameters

METHODOLOGY

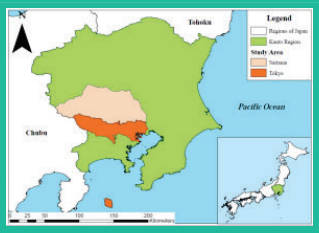

Fig. 1 Geographical map of the study areas

Fig. 2 Sampling site located in Saitama

Fig. 3 Sampling site located in Tokyo

These were sampled at a depth of the upper 5 cm of the soil. Soils were air dried and sieved to 2mm.

The chemical and physical properties were measured as water retention capacity, organic matter, total nitrogen, total phosphorus, nitrates, and ammonia.

Microbial biomass it was calculated with Direct Extration Method.

RESULTS

Table 1. Water Holding Capacity and chemical parameters in both agroecosystem

	Water Holding Capacity (%)	SOM (%)	TN (mg/kg)	TP (mg/kg)	NO_3-N (mg/kg)	NH_4-N (mg/kg)
Conventional	76.67	11.82	2343.33	267.14	0.15	6.86
Natural	61.5	6.18	1563.33	370.00	0.13	5.57

no significance difference

Table 2. Biological properties in both agroecosystem

	Number of colony forming units/g dry soil		Total Microbial biomass (µg/g)
	Total culturable fungi	Total culturable bacteria	
Conventional	$6.92 \times 10^{1a*}$	$3.15 \times 10^{3A*}$	$0.16^{\alpha*}$
Natural	$1.71 \times 10^{3b*}$	$1.10 \times 10^{4B*}$	$0.22^{\beta*}$

a, A, α significance difference p> 0.05

CONCLUSIONS

To maintain the sustainability of the production it is necessary to maintain the population of soil microorganisms. Further research is needed to understand the correlation with chemical and physical properties. As well as to begin to understand the function that each group of bacteria and fungi has, its relationship with other living organism in the soil.

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