

Research Article



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경운방법과 시비방법이 콩 재배 토양의 생물학적 활성에 미치는 영향

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Effect of Tillage System and Fertilization Method on Biological Activities in Soil under Soybean Cultivation

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Abstract

BACKGROUND: Tillage systems and fertilization play an important role in crop growth and soil improvement. This study was conducted to determine the effects of tillage and fertilization on the microbial biomass C and dehydrogenase activity of soils in a field under cultivation of soybean.

METHODS AND RESULTS: An experimental plot, located in the temperate climate zone, was composed of two main sectors that were no-tillage (NT) and conventional tillage (CT), and they were subdivided into four plots, respectively, in accordance with types of fertilizers (non fertilizer, chemical fertilizer, hairy vetch, and liquid pig manure). Microbial biomass C and dehydrogenase activity were evaluated from May to July in 2016. The microbial biomass C and dehydrogenase activity of NT soils were significantly higher than those of CT in all fertilizer treatments, and they were further increased in hairy vetch treatment than the other fertilizer treatments in both NT and CT. The dehydrogenase activity was closely related to microbial biomass C.

CONCLUSION: It is concluded that application of green manure combined with no-tillage can provide viable management practices for enhancing microbial properties of soil.

Key words: Dehydrogenase, Hairy vetch, Microbial biomass carbon, No-tillage, Soybean

서론

(Doran and Parkin, 1994).

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Kwon, 2009).

(Suh, 1998; Noh and

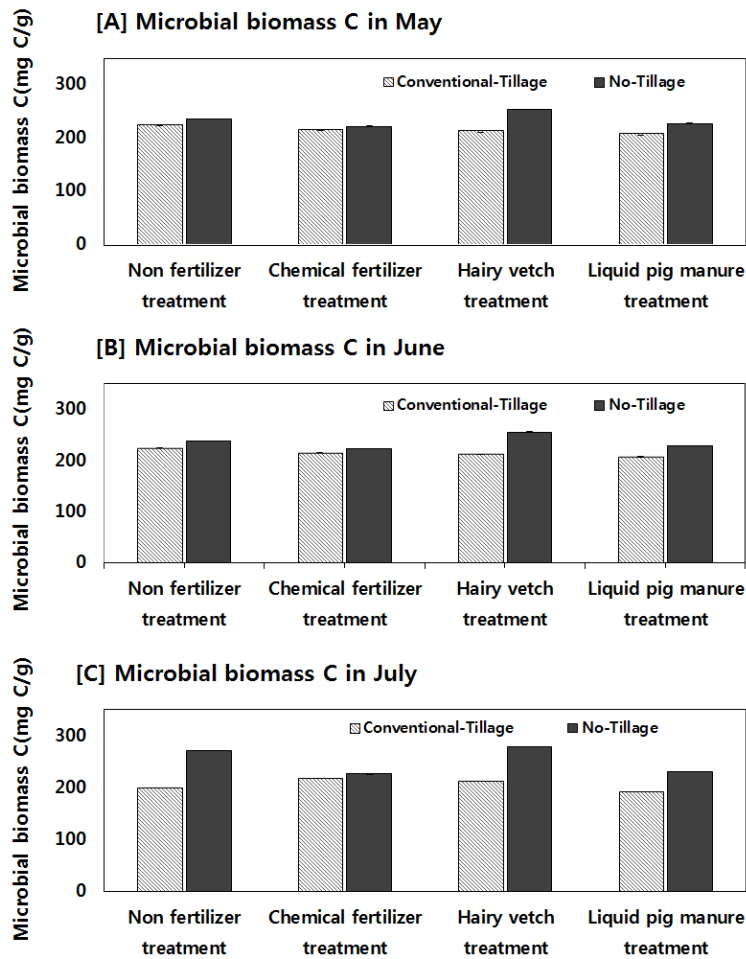


Fig. 1. Effect of tillage systems and fertilization methods on microbial biomass C in soils planted with soybean. Soil samples before the tillage and fertilizer treatment were collected in May. Soil samples of June and July were collected after sowing and in the vegetation period, respectively. Vertical bars represent SE (n=3).

통계분석
 통계분석
 SAS package (statistical analysis system, version 9.1, SAS Institute Inc.)
 ANOVA
 95%
 5%
 LSD test
 C
 3
 결과 및 고찰
 경운방법과 비료의 종류에 따른 토양 미생물 생체량 C의 변화
 C
 Fig. 1
 C
 18.91%
 가
 . 5 (/ /)
 C
 254.84 mg C g⁻¹
 가
 (p=0.05). 6 (/ /) 7
 C 5
 가
 (Alvear *et al.*, 2005; Mohammadi, 2011).
 (Ocio *et al.*, 1991; Wyland *et al.*, 1995; Wyland *et al.*, 1996). Okur *et al.* (2009)
 C
 C
 7.0~29.3 mg C g⁻¹ 가

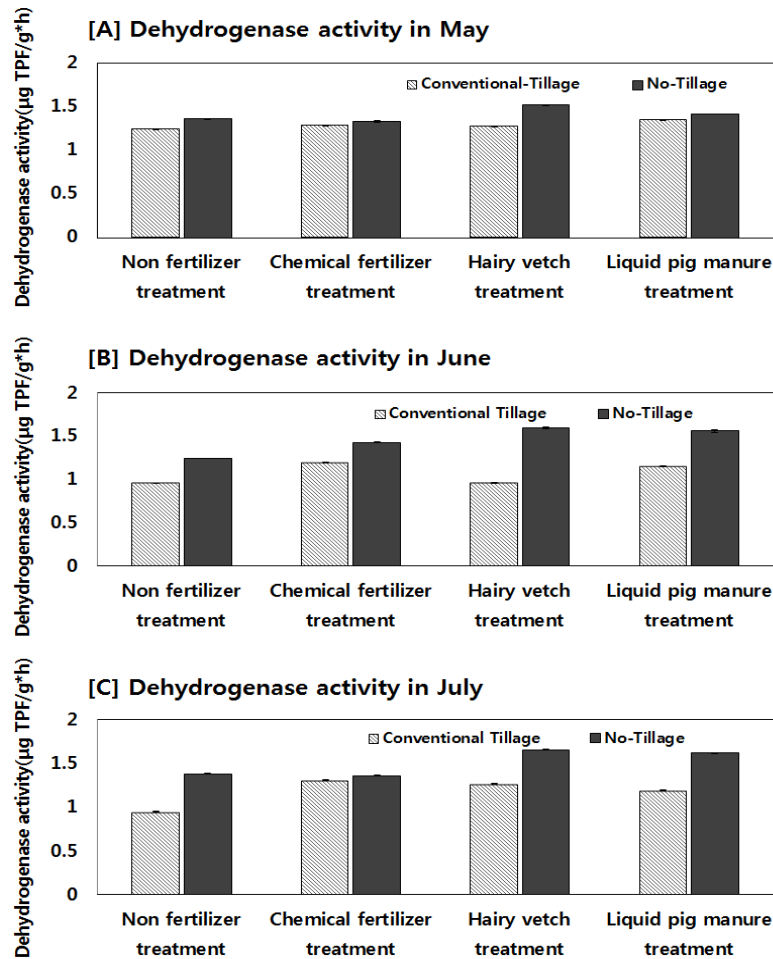


Fig. 2. Effect of tillage systems and fertilization methods on dehydrogenase activities in soils planted with soybean. Soil samples before the tillage and fertilizer treatment were collected in May. Soil samples of June and July were collected after sowing and in the vegetation period, respectively. Vertical bars represent SE (n=3).

가) 7 5%

가 가 가 가 가 ,

(Sakamoto, 1993). , 5 6

가 , , 6 가 5 ,

(Campbell *et al.*, 1991; Robinson *et al.*, 1996). 6 가

1~3% 5 가 .

(Jenkinson and Ladd, 1981). , , ,

경운방법과 비료의 종류에 따른 탈수소효소 활성의 변화 (Skujins, 1978; Ceccanti *et al.*, 1993).

6 가 5

Fig. 2 . 5 23 .

가 . 5 (/ /) 24% (Doran, 1980; Mangalassery

, *et al.*, 2015).

가 . 6 (/ / 0.06~0.19 µg TPF/g⁻¹ h⁻¹

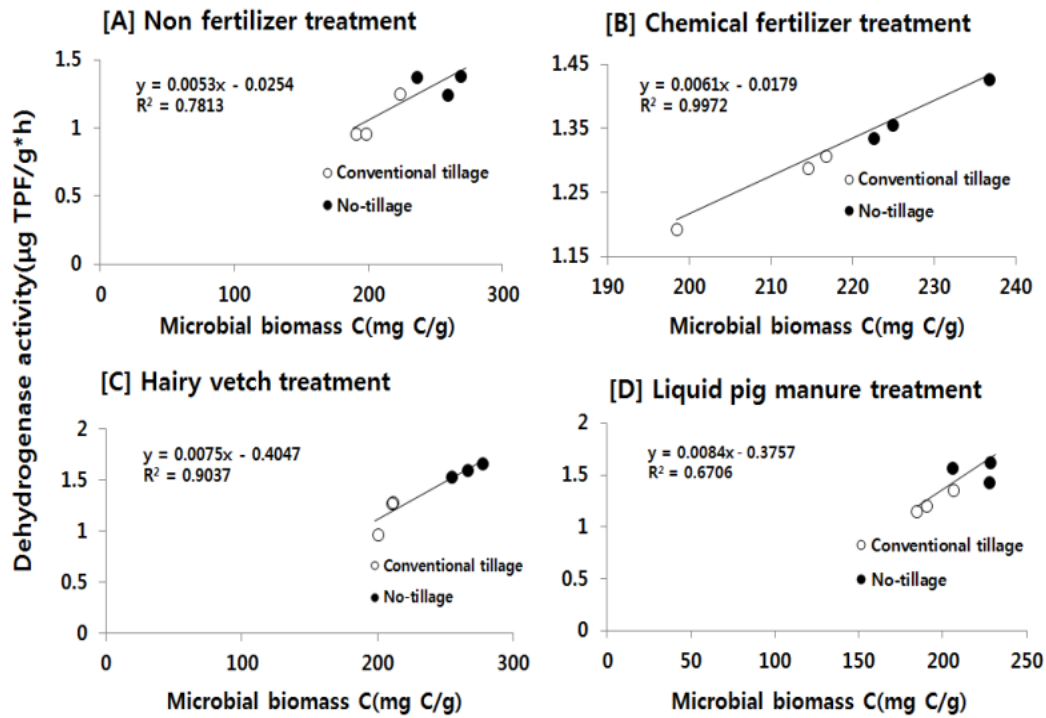


Fig. 3. Correlation between dehydrogenase activities and microbial biomass C in soils of no-tillage and conventional tillage. Soybean was cultivated under four different fertilizer treatments. The linear regression equation and R^2 value are given in each plot.

가 . C
 가 (carbon-nitrogen ratio)
 (Mullen *et al.*, 1998). C

가 . 가

토양 미생물 생체량 C와 탈수소효소 활성의 관계

C	Fig. 3
(R^2) 0.781 ($p < 0.05$)	0.0194
	0.997 ($p < 0.01$)
<0.0001	
0.904 ($p < 0.01$)	0.0036
C	0.67 ($p < 0.05$)
0.0462	

가
 (Suh *et al.*, 2010).

Notes

The author declare no conflict of interest.

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