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Crop Production in Successive Wheat-Soybean Rotation with No-Tillage Practice in Relation to the Root System Development

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Abstract: To elucidate the effect of no-tillage practice on the root system development and productivity in a wheat-soybean rotation system in Japan, we continuously cultivated these crops under tilled and non-tilled field conditions and compared the growth and yield for three years. Effect of presence or absence of tillage on the root growth was evaluated by the quantitative analysis for the root systems obtained by the core sampling method. The total shoot biomass and yield of wheat were significantly higher in the tilled field than in the non-tilled field in the first and second seasons, whereas, they were significantly higher in the non-tilled field in the third season. On the other hand, no significant difference between the tilled and non-tilled field was found in the soybean yield for the three seasons. Root length per unit area had a significant positive correlation with both the total shoot biomass and yield in wheat but not in soybean. The continuous no-tillage practice improved the soil condition for root development and resulted in an enhancement of the shoot growth and yield of wheat. In soybean, on the other hand, the root system development greatly fluctuated from season to season, especially, in the non-tilled field, but the productivity in the non-tilled field was relatively stable equivalent to that in the tilled field. Thus, stable production equivalent to that obtained by conventional tillage can be achieved by the no-tillage practice in a typical Japanese climate regardless of the fluctuation in root system development.

Keywords: [Glycine max \(L.\) Merr.](#), [No-tillage](#), [Root length density](#), [Root distribution](#), [Soybean](#), [Triticum aestivum L.](#), [Wheat](#)



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