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Effect of Solarization and Soil Fumigation after Green Manure Incorporation on Reduction of Replant Failure in 4-Years-Old Ginseng

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[Introduction]

Ginseng root rot, caused by *Ilyonectria radicola* (*Cylindrocarpon destructans*) and *Fusarium solani* is a major cause of replant failure in continuous cropping ginseng. Accordingly, various methods have been attempted to reduction of replant failure in ginseng. Solarization is an eco-friendly and economical soil sterilization method that sterilizes soil-borne pathogens by raising the temperature using solar heat in summer. Soil fumigation is a chemical method of disinfecting soil using fumigants, such as dazomet, and is the most effective. In this study, we investigate effect of solarization and soil fumigation on reduction of replant failure in ginseng.

[Materials and Methods]

To control replant failure in soil infected with *I. radicola* and *F. solani*, soil sterilization was treated by single (M+C; Maize soil incorporation+Control, M+S; Maize soil incorporation+Solarization, M+F; Maize soil incorporation+Fumigation) or multiple (M+S+F) treatment in the field where 6-years-old ginseng were harvested. Solarization was performed by covering the plot with transparent polyethylene film after adding green manure of maize for 4 weeks in July. Soil fumigation was treated with dazomet and covered with a transparent polyethylene film to sterilize for 3 weeks in September. After treatment, ginseng seedlings were transplanted in March of the following year. And 4-years-old ginseng were harvested and measured investigation of growth characteristics, and soil samples were collected to analyze their chemical composition.

[Results and Discussion]

In soil chemical properties of 4-years-old ginseng, Electrical conductivity (EC), Organic matter(OM), P₂O₅, Ca, Mg and Na were significantly decreased in all treatments than in the control, but pH, NO₃ and K were different depending on the treatment. The growth of 4-years-old ginseng was significantly increased in all treatments than in the control. Also, the survival root rate was significantly increased in all treatments than in the control and the highest one was M+S+F treated (93.1%). These results suggest that combined treatment may be more effective in inhibiting root rot than single treatment. Taken together, multiple treatment (M+S+F) was the most effective in lowering replant failure by the amendment of soil chemical property and soil microbial community in soil of continuous cropping ginseng.

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