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Effect of Incorporation of Hairy Vetch and Rye Grown as Cover Crops on Weed Suppression Related with Phenolics and Nitrogen Contents of Soil

Jwa-Kyung Sung[1)], Jung-Ah Jung[2)], Byoung-Mo Lee[2)], Sang-Min Lee[2)], Yong-Hwan Lee[2)], Du-Hoi Choi[2)], Tae-Wan Kim[3)] and Beom-Heon Song[4)]

1) Soil and Fertilizer Management Division, NAAS, RDA
2) Organic Farming Division, NAAS, RDA
3) Department of Plant Resources and Science, Hankyung National University
4) Department of Agronomy, Chungbuk National University

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Abstract: Characterization of the release of degradable components of cover crops is important for determining the quality of soil nutrients for the following crop and weed occurrence. We have examined the temporal changes in soil phenolic carbon (C) and nitrogen (N) after incorporation of cover crops (hairy vetch and rye) with different C to N ratio and their effects on subsequent weed occurrence in the. Cover crops, hairy vetch (*Vicia villosa* Roth. cv. Hungvillosa) and rye (*Secale cereale* L. cv. Winter-green), grown in a glass house for 60 days, were harvested and incorporated into soil at the rate of 35 and 25 ton ha^{-1}, respectively. The contents of total phenolics (TP) in hairy vetch- and rye-incorporated soil increased from 45.5 to 21.3 μg g^{-1} DW and decreased from 17.7 to 37.0 μg g^{-1} DW, respectively, from 10 to 50 d after incorporation (DAI). Inorganic nitrogen (InN) was substantially released from hairy vetch residues, and it remained over four-fold greater than those in the control or rye-incorporated soil at 30 DAI. In the correlation analysis, the TP content of soil correlated negatively ($r=-0.55$, $P<0.01$) with total carbon (TC), but TP content of soil did not correlate with total nitrogen (TN) or inorganic nitrogen (InN) contents of soil. Occurrence of weed species was not significantly different among the treatments, whereas weed density was decreased by the incorporation of hairy vetch- or rye-residues. Weed dry weights observed at 50 DAI revealed that the growth of weeds on

hairy vetch-incorporated soil was about ten- and four-fold greater than that on rye-incorporated and control soil, respectively. It is concluded that incorporation of hairy vetch did not suppress weed growth, but incorporation of rye significantly suppressed the emergence and growth of weed.

Keywords: Cover crop, Phenolics, Soil carbon, Soil nitrogen, Weed occurrence

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