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Characteristics of Biodegradable Films and Their Effects on Soybean Growth

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[Abstract]

Recently, the use of mulching film has increased in soybean cultivation. Polyethylene (PE) films and biodegradable films (BF) have the advantages of improving soil moisture retention, geothermal maintenance, and CO₂ maintenance as well providing weed control. Furthermore, BFs are a material that can compensate for the shortcomings of PE because it has the ability to decompose naturally by soil microorganisms, sunlight, and geothermal heat. Many researches have been carrying out studies regarding the development of BFs for these very reasons. This study was conducted better understand which films are optimal for soybean cultivation after evaluations of soybean growth and film characteristics of various BFs. BFs Farmsbio (Farm Hannong), Heulgro Film (Sejin Bio), Vonto Film (Eco-Hansung), two unnamed biodegradable films (Seojin Bio and Taesung), and a PE film were used in this study. For the control plots, no mulching was used. Experimental fields were fertilized according to conventional cultivation methods, tilled, and then covered with either BFs or PE films. After 1 week, soybean (cv. Daechan) seeds were seeded. Germination rate and plant height were measured at weekly intervals after seeding. In addition, pH, EC, and decomposition and light transmittance levels of films were measured during the experimental period. Daily average temperatures and relative humidity in soils was measured during the experimental period. There was no significant difference in germination rates and plant height in both crops grown with BFs and PE films, but crops grown in the control plot had significantly lower germination rates and growth. Soil pH was not significantly different regardless of treatments (BF, PE, and non-mulching) at 14, 28, and 42 days after seeding. In general, the EC contents in the control plots was lower than in crops grown using BFs and PE films. With the exception of some BFs, light transmittance and decomposition levels of films did not, in general, increase up to 70 days after soybean seeding. Since this study is ongoing, we are continually investigating these parameters. The average daily moisture in soil was higher in crops grown with BFs and PE films than in the control plot. However, the daily average soil temperature was not consistent regardless of treatments. Therefore, the BFs used in this study can be used without negative impacts on soybean growth.

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