

Impact of Plastic Mulches on Soil Physicochemical Properties in Maize and Chili Fields in Wet Zone Sri Lanka

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Plastic mulching is used in agriculture but its influence on soil remains a topic of significant scrutiny, especially in environmentally delicate locations like the Wet Zone (WZ) in Sri Lanka. This research examines how different plastic mulching affects soil physicochemical properties in maize and chili fields within the WZ. Three seasons of Pacific F1 maize and one season of MICH 1 chili were cultivated with varying mulching treatments: Imported polyethylene UK mulch (PEUK), polyethylene local mulch (PESL), biodegradable mulch (BD), and control (no mulching). The experiment design was completely randomized design. Four replicates for each treatment and 6 for the control were used. Soil temperature and gravimetric moisture content (GMC) were monitored in-field using sensors while soil pH and EC were measured in the laboratory using the 1:2.5 soil: water extraction method biweekly. In chili, the highest soil temperature ($p < 0.05$) was in the PEUK (32.34 °C), PESL (31.85 °C), and BD (31.80 °C) mulch treatments while the GMC was significantly higher ($p < 0.05$) in the PEUK (17.96%), PESL (15.94%), and BD (17.79%) treatments than the control. Also, the soil EC and pH were significantly higher than the control ($p < 0.05$) in PEUK (100.10 $\mu\text{S cm}^{-1}$, 5.56), PESL (98.24 $\mu\text{S cm}^{-1}$, 5.53), and BD (94.81 $\mu\text{S cm}^{-1}$, 5.46) treatments respectively. For maize, the highest soil GMC was observed in the PEUK (16.72%), PESL (16.40%), and BD (15.38%) treatments than the control ($p < 0.05$), and the highest pH was observed in BD (6.04) and control (5.89). Mulching helped to conserve soil moisture and increase soil alkalinity by optimizing the pH for chili while maintaining the optimum range for maize.

Keywords: Soil Properties, Plastic Mulching, Bulk Density, Soil Ph, Soil Temperature

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