
BIODEGRADABLE SHOOTING TARGETS ACIDIFY SOILS, LIMIT PLANT GROWTH, AND MOBILIZE LEAD

Michael R. McTee*, MPG Ranch, Florence, Montana 59833

Dan L. Mummey, MPG Ranch, Florence, Montana 59833

Philip W. Ramsey, MPG Ranch, Florence, Montana 59833

Environmental waste from recreational shotgun shooting includes lead pellet and target debris. The main risk of lead pellets is that they can be ingested by birds as they swallow pebbles and grit that aid in digestion. Another possible vector of toxicity is when acidic soil conditions mobilize lead ions from the solid pellets into the soil and groundwater. Historically, secondary waste resulted from petroleum pitch based targets that persisted in the environment for years. To reduce the environmental lifetime of targets, biodegradable targets were developed. At a former sporting clay shooting range in Florence, Montana, we found that as biodegradable targets degraded, their sulfuric components oxidized to release acid; as a result, soil pH was as low as 2. Target abundance correlated with decreased soil pH ($\rho = -0.681$, $P < 0.001$) and decreased plant cover ($\rho = -0.770$, $P < 0.001$). These acidic soils increased the mobility of lead from shot pellets and now lead concentrations exceed background. Our results demonstrate that biodegradable shooting targets exacerbate the environmental hazards that result from lead shotfall. Careful considerations regarding target composition and shooting locations may minimize environmental exposure to toxicants.