Phytoforensics of explosives: using plants to locate forgotten landmines
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Over 110 million landmines have been planted since the 1970s globally. Many landmines have been lost and forgotten, patiently waiting for the misplaced foot of an unsuspecting child or innocent civilian. Landmine casings eventually degrade allowing for explosive compounds to leach into surrounding soil and groundwater. Similar releases happen at munitions production facilities and military installations. In soil, these compounds are available for plant uptake via bulk water movement into roots. Explosives are known to cause vegetative stress, stress that is detectable remotely using hyperspectral (HS) imagery. This technology has been used for over 15 years in precision agriculture to mitigate crop stress in specific locations with airborne platforms. Quantifying leaf and canopy reflectance tracks minute changes in the way light reflects off leaves, thus indicating natural and/or anthropogenic stress; the challenge is discriminating between plant stress types and causes. Previous research demonstrated HS reflectance is a viable technique to assess explosives uptake, but prior work is limited by scope and variety of vegetation investigated. My research will expand the species database and pinpoint stress responses with HS signatures that indicate the presence of explosives in planta, mitigating both unexploded landmine issues and detecting fugitive pollutants to prevent human exposure.