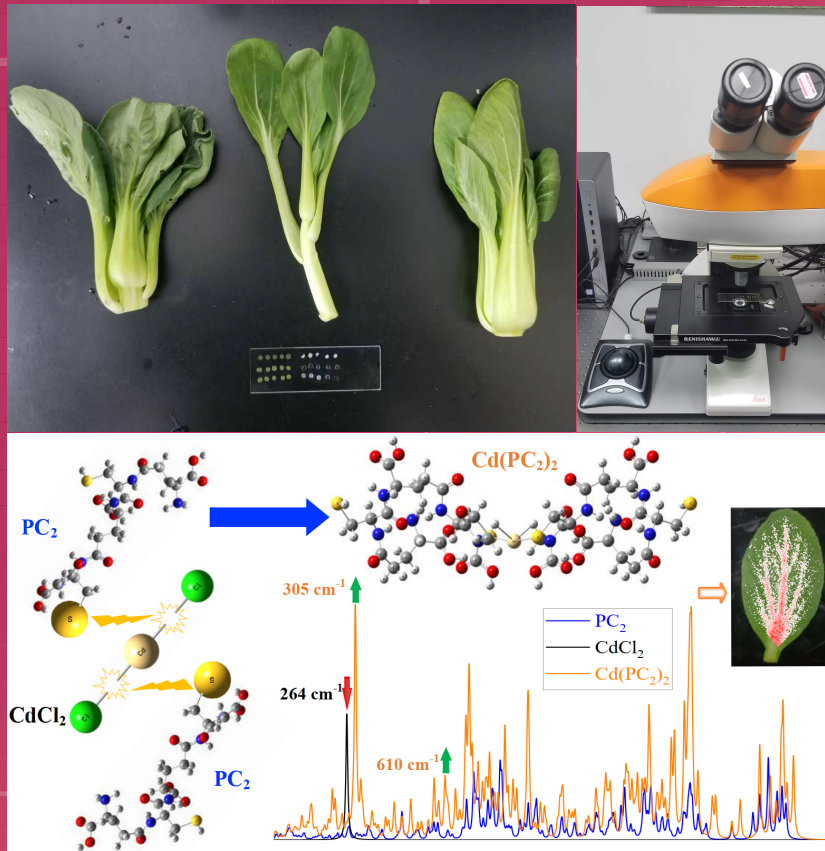




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Plants synthesize phytochelatins to chelate in vivo toxic heavy metal ions and produce nontoxic complexes for tolerating the stress. Detection of the complexes would simplify assessment of plant cattle feed for safe feeding.

Thus, a confocal Raman spectroscopy combined with density functional theory and deep learning was used for characterizing phytochelatin2 (PC2), and Cd-PC2 mixtures. This study provides a general protocol by using Raman information for structure analysis and noninvasive detection of heavy metal-PCs complexes in plants and provides a novel idea for simplifying assessment of heavy metal related feed safeties.