

# The Effect of Elevated CO<sub>2</sub> and Nitrogen Deposition on Constitutive and Induced Phenolic Levels in Pole Bean (*Phaseolus vulgaris*)

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Atmospheric carbon dioxide (CO<sub>2</sub>) levels are on the rise due primarily to the burning of fossil fuels. A previous study by Karowe & Grubb (2011) found, when grown under elevated CO<sub>2</sub>, *Brassica rapa*, a non-legume C<sub>3</sub> plant, lost the ability to induce phenolics, a type of chemical defense. It was hypothesized that the nitrogen deficiency of *B. rapa* grown under elevated CO<sub>2</sub> caused the reduction in inducibility. In this current study, we asked whether a legume, *Phaseolus vulgaris* (pole bean), by virtue of its mutualistic association with nitrogen-fixing bacteria, would not experience a decrease in the inducibility of phenolics. Furthermore, we asked whether phenolic inducibility would not be affected by future increases in atmospheric nitrogen deposition, due to fossil fuel burning. I analyzed the project data using multiple ANOVA statistical tests to determine the significance of our tested variables. The inducibility of phenolics was confirmed for *Phaseolus vulgaris*. However, in contrast to the non-legume *B. rapa*, pole bean was able to induce phenolics at both ambient and elevated CO<sub>2</sub>. Nitrogen deposition also did not affect the inducibility of phenolics for *Phaseolus vulgaris*, suggesting that pole bean, and possibly legumes in general, will still be able to defend themselves with phenolics as effectively in the future.