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# THE CONTRIBUTIONS OF GENE COPY NUMBER VARIATION TO DROUGHT ADAPTATION IN WHITE CLOVER (*TRIFOLIUM REPENS* L.)

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As sessile organisms, plants are susceptible to changing climates, particularly drought. The accumulation and the use of cyanogenic glucosides have been hypothesized and shown to confer drought responses. However, the role of quantitative variation in these cyanogenic glucosides in confer fitness advantages in response to drought-induced water stress remains unknown. We attempted to address that question using white clover (*Trifolium repens*) plants. White clover, a widespread perennial legume, is polymorphic for cyanogenesis—the production of HCN upon tissue damage. The presence of two genes, *Ac* (conferring cyanogenic glucosides) and *Li* (conferring linamarase) are both required for an individual to be cyanogenic. Both genes also demonstrate quantitative variation. In this study, we used a 65-day growth chamber experiment to expose two replicate white clover (*T. repens*) cuttings of 98 plants (N = 196) from nine genotypic groups to either a drought or non-drought watering treatment. We measured vegetative growth, fecundity, leaf relative water content, isotopic composition, and terminal survival. We found that white clover plants exposed to drought displayed lower fitness than plants not exposed to drought. Moreover, individuals possessing cyanogenic glucosides (*Ac*) demonstrated lower vegetative fitness under water stress compared to those lacking cyanogenic glucosides. Individuals possessing more copies of the *Ac* gene were not found to have higher fitness under water stress. Finally, individuals with higher copies of the *Li* gene demonstrated higher fitness regardless of being exposed to water stress. Overall, our findings suggest that quantitative variation in cyanogenic glucosides may not confer a fitness advantage in response to drought-induced water stress under controlled growth chamber conditions, counter to previous findings. Moreover, the role of copy number for the *Li* gene in conferring fitness advantages presents avenues for further studies.