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\textit{Hydnora - Euphorbia} association: a model to investigate osmotic relationships of parasitic plants.

\textit{Hydnora} is a rare and intriguing genus of subterranean holoparasitic plants in Southern Africa. Even though a number of studies have been conducted on the morphology and the habit of this genus, very little is known about the structural and functional attributes. We selected the \textit{H. triceps: E. dregeana} association to unravel the osmotic relationships of this genus. Contact between the endophytic tissue of \textit{Hydnora} haustoria with the host root ranges from direct lumen-to-lumen links between the xylem elements and continuity between the phloem sieve elements as well as transfer cells. The $\delta^{13}$C signals of \textit{Hydnora} dry matter (-13.49±0.19) mirrored those of the host \textit{E. dregeana} (-13.43±0.22). This provided conclusive evidence of close synchronization of parasite carbon metabolism with the CAM pathway of the host. Percentage nitrogen content of \textit{Hydnora} dry matter was about 3 times lower than \textit{Euphorbia}. Significant levels of K and P enrichment (15.79±2.62 and 1.86±0.2 mg g$^{-1}$ respectively) were recorded in \textit{Hydnora} compared to the parasitized host roots (6.40±0.99 and 0.98±0.18 mg g$^{-1}$ respectively). Almost all other common mineral elements and soluble NO$_3^-$ levels were appreciably lower in \textit{Hydnora} dry matter. Structural and functional studies provided evidence of water flux from host to parasite by slow diffusion and osmosis. K$^+$ could be an important compatible osmolyte responsible for maintaining a lower water potential in \textit{Hydnora} than in the hosts. This study provides a background for future investigations of possible cellular mechanisms involved with the osmotica of root holoparasites.