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Leaf anatomy offers clues to frost tolerance in forage grasses

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Ice crystals on tropical grass (Paspalum spp.) leaves. Photo courtesy of Patricio Cowper-Coles, Northeast Botanical Institute (IBONE, Corrientes, Argentina).

The importance of warm-season grasses has increased in recent years as a strategy to boost forage production. However, in subtropical regions, their susceptibility to frost can lead to substantial losses of forage stands and discourage their establishment in new areas. A group of *Paspalum* species with high forage potential exhibits a wide range of responses to frost, with some species being highly sensitive and others showing considerable tolerance. However, the mechanisms underlying this tolerance remain poorly understood.

Researchers from the Northeast Botanical Institute (IBONE, Corrientes, Argentina) selected 28 genotypes from closely related *Paspalum* species to characterize their responses to frost in a three-year field trial and under controlled freezing conditions. They documented substantial variability in frost tolerance within the group and investigated the leaf anatomical traits associated with these responses.

Frost responses varied widely among genotypes, with reasonably consistent results between field and controlled-chamber assessments. Frost-tolerant genotypes exhibited smaller diameters of water-conducting vessels at the tip of the youngest fully expanded leaf as well as a higher proportion of vascular tissue.

These leaf anatomical traits could serve as useful indicators in breeding programs aimed at developing frost-tolerant forage grasses, helping to address winter forage shortages in subtropical livestock systems.



Aerial photograph of a field plot 72 hours after freezing. Differences in freezing tolerance among Paspalum accessions are evident. From Cowper-Coles et al. (2026).

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Cowper-Coles, P., Mignolli, F., Peichoto, M. C., Vidoz, M. L., & Acuña, C. A. (2026). Foliage freezing tolerance in *Paspalum* (Poaceae) and its relationship with leaf anatomy. *Crop Science*, *66*, e70339. https://doi.org/10.1002/csc2.70339

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