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Diversifying silage provides production and environmental benefits

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Silage polyculture comprising maize, forage sorghum, soy, and sunflower growing at the Penn State Russell E. Larson Agricultural Research Center at Rock Springs. Photo by Armen Kemanian.

Can maize-based silage be supplemented with other species to create a polyculture that improves silage production resilience, landscape biodiversity, and environmental quality? Though polycultures are commonly used in pastures, their use in silage systems has largely not been explored.

In a three-year study published in *Agronomy Journal*, researchers at Penn State evaluated the production of three silage polycultures comprising maize, sorghum, soy, and/or sunflower compared with maize monocultures and assessed biomass production, nutrient content, water relations, and residual soil mineral nitrogen. They found maize plus sorghum polycultures match the yield of maize monocultures (1.8 vs. 1.9 kg m^{-2}) while polycultures with soy increased nitrogen concentration (12.9 vs. 10.8 g kg^{-1}) and those with sorghum increased potassium concentration (10.2 vs. 8.2 g kg^{-1}) of the harvested material. Additionally, the inclusion of sorghum reduced residual soil mineral nitrogen after harvest, potentially providing an environmental benefit.

Establishing polycultures in annual crops will require developing methods for planting all species with a single pass and well-thought-out weed control. With these challenges resolved, silage production based on polycultures may be a primary target to increase in-field and landscape biodiversity and potentially improve the environmental footprint of agriculture.

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Burton, A.B., Baniszewski, J., Roth, G.W., Tooker, J.F., & Kemanian, A.R. (2021). Are polycultures for silage pragmatic medleys or gallimaufries? *Agronomy Journal*.

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