Diversity Mitigates Potential Cover Crop Disservices

Farmers increasingly use single- and multi-species cover crops to meet an array of management goals. This includes reducing nitrate losses, suppressing weeds, and boosting cash crop yields.

However, there is little research on how to design cover crop mixtures that meet multiple goals.

In a paper recently published in *Agricultural and Environmental Letters*, researchers report results from a three-year study of cover crop monocultures and mixtures in a Pennsylvania organic feed rotation. The cross-disciplinary team measured eight ecosystem services and calculated each treatment's "multifunctionality," or average of services and disservices.

Results showed that services came in two distinct "bundles." One bundle included cover crop biomass production, weed suppression, and nitrogen retention. The second included cover crop nitrogen supply, cash crop production, and profitability. There were also trade-offs; as some services increased, other disservices arose. For example, mixtures dominated by cereal rye (*Secale cereale*) accrued disservices to nitrogen supply and profitability. On average, mixtures were more multifunctional than monocultures, though some monocultures outperformed mixtures. Greater functional diversity in mixtures ameliorated disservices, increasing overall multifunctionality.

This research shows that both single- and multi-species cover crops can be used to meet multiple objectives. Farmers can achieve multifunctionality by planning for functional diversity in light of the ecosystem service bundles identified here.

Adapted from Finney, D.M., E.G. Murrell, C.M. White, B. Barab, M.E. Barbercheck et al. 2017. Ecosystem services and disservices are bundled in simple and diverse cover cropping systems. *Agric. Environ. Lett.* 2:170033. View the [open access article online at http://dx.doi.org/doi:10.2134/acl2017.09.0033](http://dx.doi.org/doi:10.2134/acl2017.09.0033)

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A cover crop mixture one month after planting in central Pennsylvania. Photo by Mac Burgess.

Dual-Purpose Potential of Winter Canola

Less water using alternative crops like winter canola can sustain the Ogallala Aquifer longer and add many rotational benefits to cereal-based cropping systems. If canola can produce good quality forage, it will be a great dual-purpose crop.

In the November–December 2017 issue of *Agronomy Journal*, researchers report results of a three-year study conducted in Eastern New Mexico to compare seasonal forage productivity and quality of three winter canola cultivars with wheat and to assess forage-harvesting effects on seed yield.

Average forage biomass production of winter canola cultivars before flowering was higher or similar compared with winter wheat, but after flowering, winter wheat forage production increased. Forage quality parameters of canola were superior compared with wheat, and the relative feed value of canola was double or close to double that of wheat. Forage quality declined after flowering in both crops.

Canola harvesting for forage before flowering reduced seed yield of canola by 20 to 40%, which was still an acceptable yield in the region. In contrast, there was no seed yield reduction in winter wheat. However, harvesting forage after flowering reduced yield in both crops. Thus, canola can produce high quality forage and seed yield in the region under limited irrigation.

Adapted from Begna, S., S. Angadi, M. Stamm, and A. Mesbah. 2017. Winter canola: A potential dual-purpose crop for the United States Southern Great Plains. *Agron. J.* 109:2508–2520. View the full article online at <http://dx.doi.org/doi:10.2134/agronj2017.02.0093>

Area farmers and researchers discussing dual-purpose potential of winter canola at Clovis, NM.

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