**Date:** April 17, 2025

**Dataset title:** *Dataset for "Cover crop functional trait plasticity in response to soil conditions and interspecific interactions"*

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**Funding:** This work was supported by a USDA NIFA grants #2022-67011-36573 and #2019-51106-30193.

**Research overview**:

Cover crops support ecosystem services in agroecosystems, but their performance can be highly variable. Functional trait ecology provides a useful framework for understanding variation in cover crop performance across different growing conditions. However, trait variation within species remains understudied compared to variation between species. In a two-year experiment, we measured nine functional traits for three cover crop species across 13 fields on working farms that spanned a gradient of soil health. Each field contained three cover crop treatments: a functionally diverse mixture of cereal rye (*Secale cereale*), crimson clover (*Trifolium incarnatum*), and dwarf-essex rapeseed (*Brassica napus*), and rye and clover monocrops. We evaluated i) the magnitude and relative importance of intraspecific and interspecific trait variation; ii) which soil health indicators best explained trait variation; and iii) whether interspecific interactions in mixture induced trait plasticity. Despite strong trait contrasts between species, intraspecific trait variation comprised 50% of total trait variation, on average. Trait variation was best explained by particulate organic matter nitrogen (POM N), soil phosphorus, pH, and permanganate oxidizable carbon for clover; by POM N and soil phosphorus for rye; and by POM N for dwarf essex. Rye and clover also showed significant trait plasticity in mixture relative to monocrop treatments. Our study demonstrates that intraspecific and interspecific trait variation are equally important, and that examining trait variation within species can improve the ability to predict cover crop outcomes. This information can inform cropping system design in distinct contexts to promote success of component species and complementary ecosystem functions.

**Methodology:**

Plant functional traits were measured in spring of 2021 and 2022 across eight farms, each providing a different field in each year, for three different overwintering cover crop treatments: a functionally diverse mixture of cereal rye (Secale cereal), crimson clover (Trifolium incarnatum), dwarf-essex rapeseed (Brassica napus), and oat (Avena sativa), and cereal rye and crimson clover monocultures. Soil samples were collected in each field shortly after cover crop planting and analyzed for a suite of soil health indicators, including biological, chemical, and physical properties. Full details of the project and methods can be found in: Sutton, E., and Blesh, J. 2025. Cover crop functional trait plasticity in response to soil conditions and interspecific interactions. Plant and Soil. DOI : 10.1007/s11104-025-07471-x

**Files contained here:**

* Plant trait data and soil data are included the file “Trait-Soil.csv”
* Metadata for the variables in the “Trait-Soil.csv” file are included in the file “Trait-Soil\_Metadata.xlsx”

**Use and access:**

This data set is made available under a Creative Commons CCBY 4.0.

**To cite data:**

Sutton, E., Blesh, J. *Dataset for "Cover crop functional trait plasticity in response to soil conditions and interspecific interactions"* [Data set], University of Michigan - Deep Blue Data. <https://doi.org/10.7302/g97e-es21>