**Supplemental material S5. Causal diagram literature support**

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| **Figure S6**. Pathways by which cover crops may affect the pore size distributions, the amount of water stored at field capacity, and the amount of water at saturation in no-till systems. The effects of soil erosion are not included. X→Y should be read as ‘X affects Y’. |

**Table S6**. Support for inclusion of causal relationships presented in Figure S6.

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| **Casual Arrow** | **Causal relationship** | **Citation(s)** |
| 1 | CC below-ground biomass affects soil biology | (Leslie et al., 2017; Kim et al., 2020) |
| 2 | CC above-ground biomass affects soil organic matter | (Austin et al., 2017) |
| 3 | CC below-ground biomass affects soil organic matter, more strongly than above-ground biomass | (Austin et al., 2017) |
| 4 | Soil biology affects soil organic matter cycling | (Cotrufo et al., 2013) |
| 5 | CC below-ground biomass (root exudates) affect soil aggregation | (Cotrufo et al., 2013; Austin et al., 2017) |
| 6 | Soil biology affects soil aggregation | (Cotrufo et al., 2013) |
| 7 | Soil organic matter affects soil aggregation | (Boyle et al., 1989; Kay et al., 1997; Abiven et al., 2009) |
| 8 | Root channels affect soil porosity | (Williams and Weil, 2004; Ogilvie et al., 2021) |
| 9 | Soil biology (e.g. worm activity) affects soil porosity | (Edwards et al., 1988) |
| 10 | Soil organic matter affects bulk density, which affects soil porosity | (Ruehlmann and Körschens, 2009) |
| 11 | Soil aggregation affects pore sizes | (Boyle et al., 1989) |
| 12 | Soil water at saturation is affected by soil porosity |  |
| 13 | Pore size distributions affect capillary forces, which affect soil water at field capacity |  |
| 14 | Soil porosity affects space available for water which affects soil water at field capacity |  |

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