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The ins and outs—understanding input use in regenerative agriculture: a scoping review

R.S. Voisin[1,2,3], P. Horwitz[3], S. Godrich[1,2,3], R. Sambell[1,2,3], K. Cullerton[4] and A. Devine[1,2]
[1]*School of Medical and Health Sciences, Edith Cowan University, Joondalup, WA 6027, Australia,*
[2]*Nutrition and Health Innovation Research Institute, Edith Cowan University, Joondalup, WA 6027, Australia,*
[3]*Centre for People, Place and Planet, Edith Cowan University, Joondalup, WA 6027, Australia and*
[4]*School of Public Health, University of Queensland, St Lucia, Qld 4072, Australia*

Long-term food security, important for survival of future generations, is threatened by a degrading environment and dependent upon sustainable agricultural methods.(1) Conventional agriculture relies on input of finite resources (e.g., fossil fuels, pesticides) and contributes to climate change, biodiversity loss, and soil degradation, and is consequently unsustainable.(2) Alternative, more sustainable methods of agriculture exist (e.g., organic agriculture, agroecology) and are sometimes termed "regenerative agriculture" (RA). While the definition of RA remains contentious, recent reviews aiming to clarify RA identified no-to-low external inputs as a key characteristic of the practice.(1,3) This scoping review aimed to understand what "no-to-low external input" means in the context of RA, including input types and methods of use, plus effects on food production outputs. The objective was to examine peer-reviewed and grey literature, then synthesize extracted empirical data relating to RA inputs. Here, outputs were classified as yield (e.g., grain, meat, biomass) plus fiscal considerations; other outcomes (e.g., soil health parameters, nutritional value) were also included. This review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses – extension for Scoping Reviews (PRISMA-ScR) method.(4) Four databases (Agricultural & Environmental science collection (ProQuest); Scopus; Web of Science; Science Direct) plus 69 websites (e.g. government, agricultural, educational) were searched in January 2022. Key eligibility criterion included the requirement for inputs being described explicitly with their relationship to outputs. Records retrieved from databases ($n = 110$) and websites ($n = 67$) were screened. Twenty-nine articles were included for analysis ($n = 17$, peer-reviewed; $n = 12$, grey literature). Five key organic amendment (plant nutrition) inputs were identified: mulch, manure, biochar, compost, and food industry waste. It was found that "no-to-low external inputs" within RA models are achieved by biology-promoting land-management processes that function to displace (not eliminate) external chemical inputs (e.g., synthetic fertilizer, herbicide). Three key land-management processes were identified: crop diversity (including cover crops), livestock integration, tillage reduction, plus a holistic approach (classified here as ≥ three land-management processes). Organic amendment inputs and regenerative land-management processes improve resource use efficiencies via facilitation of biological activities at both soil and farm scale thereby improving nutrient cycling. Food production outputs displayed increased diversity within RA systems. Production outputs (yield volumes) were often maintained or were highly profitable in cases of decreased output due to input savings. Reviewed literature was highly concentrated around livestock and grain production, an identified literature gap included expanding regenerative horticultural methods for core fruit and vegetable production. Additionally, improving nutrient recycling of food industry waste back into agricultural inputs can enhance sustainability. Regenerative agriculture could be a valuable tool for decreasing agriculture's environmental impact while diversifying output and maintaining yield volumes which may therefore contribute to a more food secure future.

References

1. Newton N, Frankel-Goldwater L, Bartel K, *et al.* (2020) *Front Sustain Food Syst* **4**, 577723.
2. Cembalo L, Borrello M, De Luca AI, *et al.* (2020) *Aestimum* 199–218.
3. Schreefel L, Schulte O, de Boer M, *et al.* (2020) *Glob Food Sec*, 100404.
4. Tricco A, Lillie E, Zarin W, *et al.* (2018) *Ann Intern Med* **169**, 467–473.