



Review

Revamping Ecosystem Services through Agroecology—The Case of Cereals

Gomathy Sethuraman ¹, Nurul Amalina Mohd Zain ¹, Sumiani Yusoff ², Yin Mei Ng ³, Niranjan Baisakh ^{4,*}
and Acga Cheng ^{1,*}

¹ Faculty of Science, Institute of Biological Sciences, University Malaya, Kuala Lumpur 50603, Malaysia; gomathy@um.edu.my (G.S.); amalina86@um.edu.my (N.A.M.Z.)

² Institute of Ocean and Earth Science, University Malaya, Kuala Lumpur 50603, Malaysia; sumiani@um.edu.my

³ Department of Applied Statistics, Faculty of Economics and Administration, University Malaya, Kuala Lumpur 50603, Malaysia; yinmei.ng@um.edu.my

⁴ School of Plant, Environmental, and Soil Science, Louisiana State University Agricultural Center, Baton Rouge, LA 70803, USA

* Correspondence: NBaisakh@agcenter.lsu.edu (N.B.); acgacheng@um.edu.my (A.C.)

Abstract: Globally, farming systems are mostly dominated by monoculture, which has the advantage of profitability at the expense of ecological systems. Recent years have witnessed an increasing momentum in global efforts to deploy sustainable agriculture practices that mimic ecological processes, with agroecology at the forefront. In addition to the ecological aspect, agroecology also encompasses economic and social aspects targeting the whole food system. Transformative agroecology has been recognized as a stepping stone to achieving several Sustainable Development Goals (SDGs), due to its great potential to build climate change-resilient farming systems while enhancing ecosystem services and reducing biodiversity loss. Nonetheless, the available literature on the recent developments and future trajectories of the adoption of agroecology approaches for improving the production of cereals, the most important group of food crops, is limited. This review aims to highlight the blueprint of agroecology that can contribute to the achievements of the SDGs, allowing explicit interpretation of the term that will benefit twenty-first century agriculture. Using cereal crops as the case study, we provide insights into how far this field has come and the main barriers to its adoption, and conclude that this approach of “science for and with society” is the way forward for building a resilient future.

Keywords: agroecology; biodiversity; climate change; rice; sustainable agriculture



check for updates

Citation: Sethuraman, G.; Mohd Zain, N.A.; Yusoff, S.; Ng, Y.M.; Baisakh, N.; Cheng, A. Revamping Ecosystem Services through Agroecology—The Case of Cereals. *Agriculture* **2021**, *11*, 204. <https://doi.org/10.3390/agriculture11030204>

Academic Editors: Michele Pisante and Fabio Stagnari

Received: 15 February 2021

Accepted: 24 February 2021

Published: 3 March 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Scientific advances have fueled the global growth in the agricultural sector for nearly a century, enabling producers from different countries to deliver abundant food domestically [1]. For example, the adoption of various agricultural technologies developed during the green revolution era in the 1960s has doubled the global production of the big three cereals—rice, wheat, and maize—within a mere two decades [2,3]. It was not until a half-century later that the sustainability of the revolution began to be questioned, especially with regard to the increased use of agricultural inputs that can affect soil health and the environment at large [1,4,5]. With an estimated 10 billion mouths to feed by the mid-century, a greener yet high-tech farming revolution is inevitable. In 2015, the United Nations created the blueprint to achieve a more resilient future, which includes a set of 17 interlinked Sustainable Development Goals (SDGs) that are universally applicable to all countries. Each of the goals outlines a specific set of targets that are interconnected in addressing different aspects of the global issues that call for holistic approaches [6]. Attaining global food and nutrition security will underpin the achievements for many SDGs, primarily SDG 2 that aims for zero hunger and SDG 3 that targets good health and well-being [7,8].