

## The Role of Agricultural Biodiversity in Promoting Sustainable and Resilient Food Systems: An Analytical Perspective

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### Abstract

The promotion of resilient and sustainable food systems in India is greatly aided by agricultural biodiversity, or the variety of plant and animal species that support agricultural productivity. India is faced with several issues relating to environmental degradation, food security, and climate change. A more sustainable and resilient food system in India can be achieved through promoting agricultural biodiversity. Farmers may raise output, enhance soil quality, lower their risk of contracting pests and diseases, and diversify their crops and livestock. Additionally, given that various crops and livestock types have varying susceptibilities to climatic pressures like drought and heat, agricultural diversification can act as a buffer against climate change. By doing so, farmers will be better able to adjust to the changing environment and lessen the negative effects of weather-related calamities on food production. For policymakers, farmers, and consumers in India, promoting agricultural biodiversity should be a top priority in this situation. India can make sure that its food systems are more resilient and sustainable in the future by adopting agro ecological methods, preserving traditional crop and livestock varieties, and supporting sustainable food systems.

**Keywords:** Resilient, Sustainable, Agricultural biodiversity, Agroecological Methods, Food security.

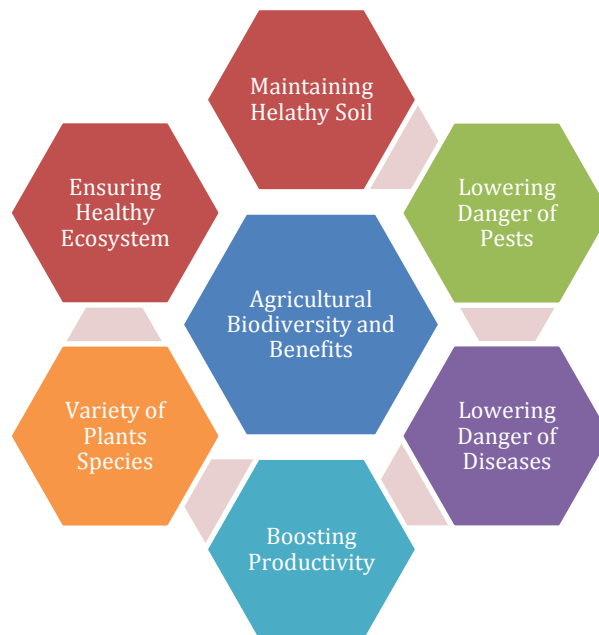
### Introduction

One of the most important steps India can take to achieve food security and resilience is to promote agricultural biodiversity through crop development programmes. Traditional crop varieties, which are a significant source of agro-biodiversity and cultural diversity, need to be conserved as well.

Farming communities protect these cultivars on smallholder farms and backyard gardens because they are typically rare and well suited to local environments. They highlight how important backyard gardens are as underutilised hubs of agro-biodiversity and cultural diversity. The preservation of historic crop varieties and the promotion of sustainable agriculture, according to them, depend on home gardens (Galluzzi et al. 2010).

In India, supporting robust and sustainable food systems is only possible with agricultural biodiversity. Maintaining healthy soils, lowering the danger of pest and disease outbreaks, and

boosting productivity all depend on a variety of plant and animal species. Through its crop enhancement projects, the Consultative Group on International Agricultural Research (CGIAR), a network of international agricultural research institutes, has significantly contributed to the advancement of agricultural biodiversity in India. New crop varieties with improved productivity and disease resistance have been created by the CGIAR. They are also better tailored to regional conditions. Open access and global cooperation have made it possible for researchers and farmers to exchange knowledge and genetic material, which has resulted in this success story (Byerlee and Dubin 2010). Figure 2 shows Agricultural Biodiversity benefits agriculture.



**Figure 2 Agricultural Biodiversity benefits to Agriculture**

Food security and climate resilience in India can both be considerably enhanced by promoting agricultural diversification through the preservation of traditional crop types. An in-depth review of the diversity and richness of the traditional crop varieties that farming communities have preserved. Smallholder farms were found to maintain a sizable level of traditional crop-variety variability. It also noted several obstacles and limitations to the preservation of traditional agricultural varieties. The absence of institutional support for conservation initiatives, the scarcity of genetic resources and germplasm, and the lack of understanding and appreciation of the importance of traditional crop varieties are some of these difficulties. It was recommended that conservation efforts be included into more general development objectives and that policymakers acknowledge the importance of agricultural biodiversity and the part it plays in fostering resilient and sustainable food systems. Achieving sustainable and resilient food systems in India and beyond can be greatly aided by promoting agricultural biodiversity through the

preservation of traditional crop varieties. The difficulties in preserving agricultural biodiversity must be addressed, and better integration of conservation activities into overarching development goals must be pursued (Gyawali et al. 2008).

## Literature Review

Li et al. (2009) assert that crop diversity is crucial for raising yields and guaranteeing food security. Farmers can lower their risk of crop failure brought on by environmental variables like pests, diseases, and drought by cultivating a variety of crops. Additionally, varied cropping systems can increase soil fertility and decrease the need for artificial fertilisers and pesticides, making agriculture more environmentally friendly and sustainable. As a result, fostering and sustaining agricultural biodiversity is essential for India's resilient food systems and sustainable food production.

According to Schipanski et al. (2016), diverse food supply networks and marketplaces are just as important for ensuring that food systems are resilient as diverse crop production. As an illustration, encouraging the use of conventional, regionally appropriate crops and crop types can diversify food supply chains and provide doors for small-scale farmers to enter and participate in local and regional markets. In addition, diverse food systems can increase the accessibility and availability of a variety of healthy foods, hence enhancing food and nutrition security. As a result, encouraging agricultural biodiversity can not only improve the sustainability and resilience of crop production but also diversify food supply chains and support India's push for sustainable and healthy meals.



**Figure 1 Benefits of Agriculture Biodiversity**

For India to advance sustainable and resilient food systems, agricultural biodiversity conservation is essential (Dulloo et al. 2017). Agriculture biodiversity is threatened by several factors, including changing land use, changing climate, and deteriorating traditional knowledge and practises. Thus, it is critical to give agricultural biodiversity conservation efforts top priority and to implement policies and programmes that encourage the preservation and responsible use of this biodiversity. For example, projects that support the preservation and use of traditional crop types should be implemented to strengthen the resilience of food systems and promote sustainable food production in India. Agricultural biodiversity greatly boosts India's food systems' ability to adapt to climate change.

The value of agricultural biodiversity was emphasized by Mijatovic et al. (2013) in boosting the adaptability of agricultural production systems, allowing them to deal with climate uncertainties, and contributing to the preservation of food security. The authors put forth an analytical framework that focused on the importance of agrobiodiversity preservation and restoration as well as the incorporation of various knowledge systems, including indigenous knowledge systems, into agricultural production systems. It is possible to support resilient and sustainable food systems in India through reviving India's lost agricultural history, such as traditional knowledge and practises. According to Koohafkan and Altieri (2016) reestablishing ties between traditional knowledge and practices and food systems can increase their resilience and their capacity to adjust to shifting environmental factors. It was suggested that reconnecting with India's long-forgotten agricultural legacy could help the country's agrobiodiversity, increase its level of food security, and advance sustainable development. Developing sustainable and resilient food systems in India requires a strong understanding of resilience.

According to Bullock et al. (2017), resilience should be seen as a fluid and context-specific mechanism that keeps variety, redundancy, and connectedness. They put forth a framework that emphasizes the value of preserving natural diversity, including agrobiodiversity, to support resilient food systems. For Indian policymakers and practitioners striving to strengthen the robustness of agricultural production systems and advance sustainable food systems, this framework can be helpful.

According to Hodbod and Eakin (2015), agricultural biodiversity strengthens food systems' resilience in a number of ways, including through diversifying production, boosting ecosystem services, and lowering sensitivity to shocks and stresses. Additionally, agricultural biodiversity gives players in the food chain the chance to respond to new problems like resource depletion and climate change by adapting to changing environmental conditions. The resilience and sustainability of India's food systems can therefore be improved by enhancing agricultural

diversification. However, by diminishing the variety of crops, landscapes, and livelihoods, industrialisation of agriculture endangers the sustainability of India's food systems.

According to Rotz and Fraser (2015), the homogeneity of agricultural techniques, concentration of market power, and concentration of hazards within the industrial food system make it susceptible to shocks and stresses. Therefore, the industrial food system is less equipped to adjust to shifting circumstances and tackle new problems like climate change and resource depletion. In order to strengthen the resilience of India's food systems and mitigate the negative effects of agricultural industrialisation, it is important to conserve and promote agricultural biodiversity. An agrobiodiversity index is one of the tools Bailey (2016) suggests for integrating agricultural biodiversity into sustainable food systems. The index offers a standard for evaluating how well food systems operate in terms of biodiversity protection and exploitation by measuring the diversity of crops, livestock, and wild relatives at the farm, landscape, and national levels. Additionally, the index can be used to pinpoint the factors that promote and obstruct the incorporation of agricultural biodiversity into mainstream practices, as well as to guide investment and policy choices that support resilient and sustainable food systems. Thus, the agrobiodiversity index can be a useful tool for fostering agricultural biodiversity and improving the long-term viability and resilience of India's food systems.

## Conclusion

In conclusion, the promotion of resilient and sustainable food systems in India is greatly aided by agricultural biodiversity. Millions of people depend on India's abundant biodiversity of crops, animals, and wild species for their livelihoods and general well-being. India's agricultural biodiversity is rapidly disappearing, which poses a serious risk to food security, dietary quality, and sustainable development. Agricultural biodiversity can improve food systems' resistance to environmental shocks and pressures like pandemics and climate change. The genetic resources needed for adaptability and the creation of robust crop and animal breeds can be found in the diversity of wild species, livestock, and crops. Additionally, a variety of ecosystem services that are crucial for sustainable agriculture, such as pollination, pest and disease management, and soil fertility, can be provided by agricultural biodiversity. Agricultural biodiversity can also help communities, especially those in rural areas, by boosting their nutrition and general health.

A healthy, varied diet full of vital nutrients that can help fight malnutrition and stave off non-communicable diseases can be provided by the wide variety of crops and livestock. As a result, it is critical to preserve and advance agricultural biodiversity in India through suitable policies, institutional frameworks, and community involvement. The biodiversity of agriculture can be improved and protected through preserving traditional crops, animal breeds, and wild species. To build resilient, sustainable food systems that can support food security, dietary needs, and

sustainable development, India must protect and promote its agricultural biodiversity. In addition to preserving and enhancing agricultural biodiversity, sustainable agriculture practises including agroforestry, sustainable agriculture, and integrated pest prevention can also promote dietary diversity, food security, and environmental sustainability.

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