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Museum Koenig Bonn

## **Major study shows: Diversity in agriculture brings ecological, economic and social benefits**

Bonn, 05.04.24 – Mixing livestock and crops, integrating flower strips and trees, water and soil conservation and much more. A recent study in the journal *Science*, including collaborators from the LIB, shows: Diverse agriculture not only benefits nature, but also provides us humans with a stable food system and agricultural businesses with economic returns.

According to the study, a diverse agricultural landscape offers a promising solution for more sustainable food production, with higher ecological and social value and more efficient use of resources – but worldwide. The researchers see the greatest positive effects on food security, followed closely by biodiversity. At a time when prospects for protecting the environment and improving social conditions for farmers often seem bleak, the results outline a promising way forward for shaping global agricultural policy, the authors conclude. The broad-based study was conducted under the direction of the University of Copenhagen and the University of Hohenheim.

The conclusions are based on 24 studies from eleven countries and five continents encompassing 2,655 farms, including smallholder farms in rural Africa, plantations in Southeast Asia, as well as small and large farms in North America, Europe and Latin America. All 58 of the study's authors participated actively in its design to attempt a robust and credible interweaving of the many data sets spread across the world – from maize production in Malawi, to rubber trees in Indonesia, to silvopastoral cattle farming in Colombia and winter wheat in Germany.

An interdisciplinary and participatory data synthesis involving different data sets from several regions of the world provides new information for debates on how food can be produced in an ecologically, economically and socially valuable way.

"Our study clearly shows that diversity in agriculture is beneficial: a more diverse agriculture not only helps nature, but also us humans," emphasizes Prof. Dr. Christoph Scherber, Deputy Director of the LIB and co-author of the study as an expert on diversified farming systems.

"The diversity of livestock, diverse crop rotations or intercropping systems can make a

decisive contribution to a better future. We have now been able to show this for the first time on a broad basis with the help of our own data and facts."

For a long time, the main aim of agriculture was to ensure food security for a growing world population. However, the results of this agricultural intensification include pests in monocultures, overused and polluted soils, great susceptibility to climate change, environmental pollution and loss of biodiversity, as well as precarious economic situations in agriculture. The studies authors emphasize: A restructuring of agriculture toward more biodiversity while maintaining yield security has become necessary.

The authors of the study examined the ecological and social results of several agricultural diversification strategies, both individually and in combination. The five strategies include livestock, crop rotation, soil conservation and fertility management practices such as compost, non-crop elements such as hedgerows and water pollution control measures.

The researchers investigated how these five strategies, individually or in combination, can lead to improvements in sustainability. In this way, effects of "colorful" agricultural systems on off-farm biodiversity, ecosystem services (such as crop pollination), environmental damage reduction in general, and social dimensions such as human well-being and food security could be elucidated. The results indicate that the number of diversification measures applied has a positive impact on biodiversity, both in simple and complex landscapes.

The underlying dataset combines individual studies to cover a wide range of agricultural practices, geographical settings, and ecological and social contexts to develop a synthesis that is applicable across multiple farming systems. The data synthesis is based on a participatory process that included several group meetings and exchanges with the data providers at all stages, including the interpretation of the results.

Christoph Scherber: "In order to put these proven benefits of increased diversity in agriculture into practice, policymakers are called upon to promote incentives for the implementation of multiple diversification strategies."

**The paper is available at Science:** <http://www.science.org/doi/10.1126/science.adj1914>

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### **About the LIB**

The LIB is dedicated to researching biodiversity and its changes, the results of which are disseminated to the wider society in an educational manner. In order to better understand the current mass extinction of flora and fauna, researchers are looking for connections and causes of – often – man-made changes. The goal is to develop solutions for the preservation of ecosystems and species in order to maintain the basis of current life.

### **About the Leibniz-Association**

The Leibniz Association combines 97 independent research institutes. Their focus ranges from the natural, engineering, and environmental sciences to the humanities and the business, space, and social sciences. The Leibniz institutes focus on relevant social, economic, and ecological issues. They perform knowledge-oriented and applied research (also among the cross-disciplinary Leibniz research alliances), are or support scientific infrastructures, and offer research-based services.



Caption: Comparison of two wheat cultivation systems in Germany – right with plow tillage, left with conservation tillage. Copyright: LIB, Christoph Scherber



Caption: A flock of sheep grazing on a pasture on a farm in California, USA. The field will eventually be planted back into produce after the sheep have helped to refertilize the soil. Copyright: Olivia Smith