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Climate Neutral Farms

ClieNFarms Practice Abstracts

Agroforestry systems for Climate Resilience and Animal Welfare

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Agroforestry systems (AFS) are a promising approach to enhancing the resilience of agriculture and supporting adaptation to the challenges posed by climate change. By integrating the cultivation of trees and arable crops - with or without livestock - on the same unit of land, AFS contributes to multiple ecosystem services and long-term system sustainability.

At the Gladbacherhof experimental farm in central Germany, a silvopastoral AFS (trees on pasture) has been established on 8 hectares of former arable land. Its primary goal is to provide shade for dairy cows, improving animal welfare as well as reducing soil erosion. A fodder hedge contributes supplementary nutrients, and the production of apples for juice and high-quality timber offers additional income streams. This system demonstrates how AFS can mitigate greenhouse gas (GHG) emissions through both carbon storage (above- and below-ground) and improve nutrient efficiency, reducing reliance on external inputs.

Over 600 trees have been planted in three row configurations: single-species rows of apple trees and mixed rows of apples with timber or biomass species. These designs reflect commonly used agroforestry configurations and allow for comparative assessments of simple and diverse systems, both in practice and research.

The practical experience gained in designing, implementing, and managing the system is continuously feeding into knowledge-sharing efforts for practitioners, policymakers, and researchers. These efforts aim to inform people about the development of support mechanisms that enable the wider adoption of AFS. Given the high upfront costs - especially for plant material, protection measures, fencing and labor - policy and financial support remain essential.



Figure 1 : Agroforestry system in Germany.



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