

Introduction to Agroforestry

Introduction to Agroforestry

Key concepts, benefits, and design principles for integrating trees with crops and livestock.

1. What Is Agroforestry?

Definition	Agroforestry is the intentional integration of trees and shrubs into agricultural landscapes to create synergistic, multi-functional land-use systems.
Core Idea	Trees are not just “stand-alone” forest components; they are managed together with crops, livestock, or both to enhance productivity, sustainability, and resilience.
Scale	From a single alley-cropped field to a whole farm or landscape-level network of tree-based enterprises.

2. Main Agroforestry Practices

Practice	Typical Layout	Primary Objectives	Common Species
Alley Cropping	Crops grown in wide strips (alleys) between rows of trees or hedgerows.	Soil protection, nitrogen fixation, diversified income.	Fast-growing timber (e.g., poplar, eucalyptus), nitrogen-fixing trees (e.g., leucaena).
Silvopasture	Pasture or grazing area interspersed with scattered trees.	Shade & shelter for livestock, fodder, timber, carbon sequestration.	Acacia, oak, casuarina; fodder trees like gliricidia.
Forest Farming (Multi-Strata Cropping)	Understory crops (herbs, mushrooms, medicinal plants) cultivated beneath a forest canopy.	High-value specialty crops, biodiversity, low-input production.	Shade-tolerant herbs (e.g., ginseng, turmeric), edible mushrooms.
Windbreaks / Shelterbelts	Linear rows of trees planted along field edges or across slopes.	Reduce wind erosion, protect crops, improve microclimate.	Pines, poplars, willows, hardy shrubs.

Introduction to Agroforestry

Practice	Typical Layout	Primary Objectives	Common Species
Riparian Buffers	Trees/shrubs planted along waterways.	Water quality protection, bank stabilization, habitat.	Willow, alder, native riparian species.
Taungya / Integrated Forestry?Crop Systems	Short-term crop cultivation under young forest plantations.	Accelerate forest establishment, generate early cash flow.	Fast-growing timber species with annual crops (e.g., maize).

3. Ecological Benefits

Benefit	How It Happens	Example Impact
Soil Conservation	Tree roots reduce erosion; leaf litter adds organic matter.	30-50% reduction in topsoil loss on sloping farms.
Nutrient Cycling	Nitrogen-fixing trees (e.g., <i>Leucaena leucocephala</i>) supply N; deep roots bring up minerals.	Increased soil N by 20-40 kg/ha ¹ /yr ¹ .
Microclimate Moderation	Shade lowers temperature extremes; windbreaks reduce wind speed.	Crop yield stability under heat stress.
Biodiversity Enhancement	Habitat heterogeneity supports pollinators, natural enemies, birds.	Up to 2-3× higher beneficial insect abundance.
Carbon Sequestration	Above-ground biomass and soil organic carbon store CO ₂ .	5-10 t C/ha ¹ /yr ¹ in mixed systems.
Water Regulation	Trees improve infiltration, reduce runoff, and filter pollutants.	Decreased nitrate leaching by 30%.

4. Economic & Social Advantages