A SPECIAL IPC[1] WORKING PARTY ON COMMUNICATION AND OUTREACH (WP-COM) HIGHLIGHT SERIES:

'GLOBAL APPLICATIONS OF FAST-GROWING TREES IN AGROFORESTRY SYSTEMS'

Diversifying Traditional Crop Rotations Through On-Farm Planting of Short-Rotation Trees

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Overview

Environmental degradation due to natural resource exploitation, excessive withdrawal of mineral elements, and substantial application of agrochemicals, is a major consequence of the existing land management strategies in India. There is a need for investments in farming systems to diversify traditional crop rotations. Land managed to include trees and crops, with or without animals, is emerging as a diversification option for farmers. This method, known as agroforestry, is scientifically sound, practically feasible, economically viable, socially acceptable, and ecologically desirable.

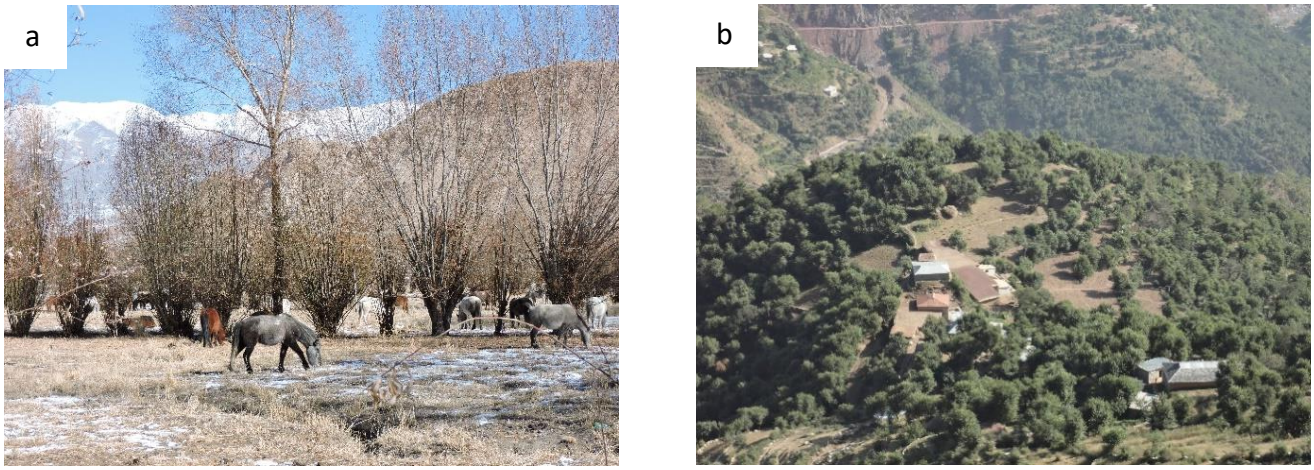

Figure 1. a) Willow-pasture model in the cold, arid region of Ladakh, India and b) a single species (*Grewia optiva* J.R. Drumm.) village fodder block.

Agroforestry is a sustainable alternative to existing land management systems that involve a limited number of crops (e.g., rice, wheat, sugarcane, cotton, vegetables, fruits) and are exhaustive of natural, financial, and human resources. At present, fast-growing trees such as *Populus deltoides* Bartr. ex Marsh., *Eucalyptus* spp., *Melia composita* Cav., *Leucaena leucocephala* (Lam.) de Wit, *Anthocephalaus cadamba* (Roxb.) Bosser, *Casuarina equisetifolia* L., *Gmelina arborea* Roxb., *Salix alba* L., *Ailanthus excelsa* Roxb., and *Tectona grandis* L.f., among other indigenous/exotic species, are meeting approximately 90 percent of domestic and industrial timber demands in India. These productive species indirectly conserve Indian forests by minimizing pressure on traditional forests for timber requirements (Fig. 1).

[1]The International Commission on Poplars and Other Fast-Growing Trees Sustaining People and the Environment (IPC)

All photos by the authors.

Outcomes

Poplars and eucalypts have become the most preferred trees for farmlands in northwestern Indian states because of their fast growth and ability to meet industrial demands (e.g., plywood, paper, packaging). Both genera can be harvested within 4 to 6 years, thus creating a highly lucrative business, since a market for their timber is readily available.

Farmers have recently realized the benefits of growing *Melia composita*, *Leucaena leucocephala*, *Anthocephalaus cadamba*, *Casuarina equisetifolia*, *Gmelina arborea*, *Salix alba*, *Tectona grandis*, and bamboo within agroforestry systems. All these species can yield high economic returns if raised intentionally under agroforestry systems, where available solar energy, nutrients, and water are efficiently utilized, and environmental concerns are ameliorated (Fig. 2).

Figure 2. Fast-growing tree genera well-suited for use in Indian agroforestry systems.

Utilizing tree-based agroforestry systems may help India achieve a “green revolution.” The current political and administrative climate in the country is in favor of on-farm trees and may promote increased adoption of agroforestry. For instance, India has a well-defined National Agroforestry Policy which facilitates the adoption of on-farm trees. Further, new socioeconomic policies have brought forestry and agriculture closer than ever to meet the objectives of the United Nations Sustainable Development Goals.

Keywords: Crop diversification, Indian agroforestry, *Populus*, *Eucalyptus*, sustainable agriculture

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