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Carbon Sequestrations with Cocoa Production

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Tree crops like cocoa offer significant environmental and economic benefits. Small farmers can grow cocoa under tree share to create continuous income from coca fruit harvesting. This also prevents the burning of forest areas and the destruction of biodiversity habitats. Protection of these standing forests with cocoa offers an immediate solution to sequester carbon. In degraded areas, tree crops are planted to improve soil filtration and erosion reduction and offset carbon. The incorporation of compost and the adoption of organic techniques for enhancing soil fertility and control of pesticides also allow for increased carbon storage. Sequestration can become an additional income for the farmers.

INTRODUCTION

Capturing and storing atmospheric carbon in the terrestrial biosphere is one option, which has been proposed as a mitigation option for greenhouse gas reduction (GHG). In United Nations Framework Convention on Climate Change (UNFCCC) clean development mechanisms (CDM), agroforestry, forestation and reforestation are designated for carbon trade. Cocoa grows under partial share under the tree canopy.

AREA AND PRODUCTION AND PRODUCTIVITY OF COCOA

Cocoa is a commercial plantation crop grown around the world for the manufacture of chocolates, suited mostly to humid tropics. Cocoa is cultivated in India mostly from the southern States viz. Kerala, Karnataka, Andhra Pradesh and Tamil Nadu (area of 1,03,376 ha, production 27,072 MT per year). The highest area, production, and productivity in India is recorded in the state of Andhra Pradesh (39,714 ha, 10,903 M tonnes and 950 kg/ha) respectively). The average productivity of cocoa is 669 kg ha^{-1}.

CLIMATE AND SOIL

Cocoa is native to the lowland rainforest of the Amazon forming an understory of multitier cropping. It is a perennial crop with heavy

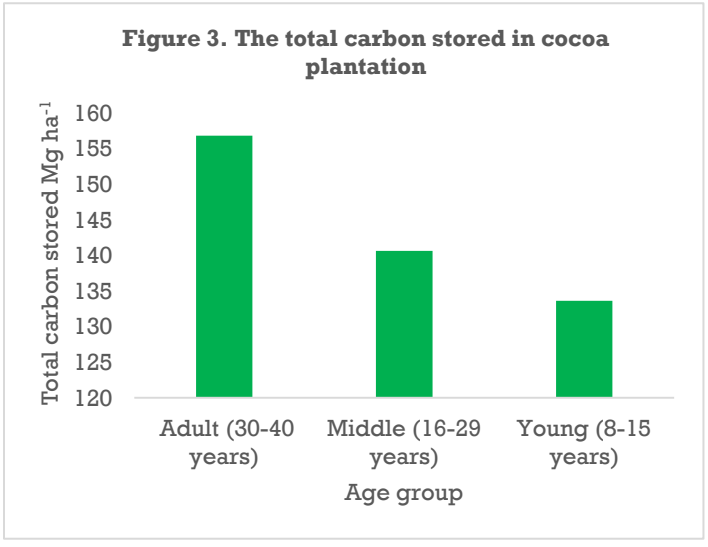
yield potential that grows well under shade. It grows with a temperature range from 15 to 35°C. It can be grown as intercrop in coconut and areca nut gardens. Three types of cocoa *viz.,* Criollo, Forastero and Trinitario. Forastero types are excelling well in India.

METHOD OF PLANTING

Main crop	Intercrop cocoa (Theobroma cacao)
Coconut (*Cocos nucifera*) The spacing requirement is 7.5 x 7.5 m (square planting)	One row of the cocoa seedling is to be planted at 3m intervals at the center of two coconut rows and one cocoa along the coconut row. This will hold about 500 cocoa plants per hectare
Areca nut (*Areca catechu*) The spacing requirement is 2.7m x 2.7m (square planting)	One row of cocoa plants at the center of two areca nut rows at 2.7m intervals. Alternate gaps of areca nut rows are to be filled. Holds about 686 plants per hectare
Oil palm (*Elaeis guineensis*) Spacing requirement is 4.5m x 4.5m (Square planting)	Five cocoa plants are to be planted between four oil palms. Holds about 400 plants per hectare.

Figure 1. Carbon Sequestration in Cocoa Agroforestry

Figure 2. Cocoa pods



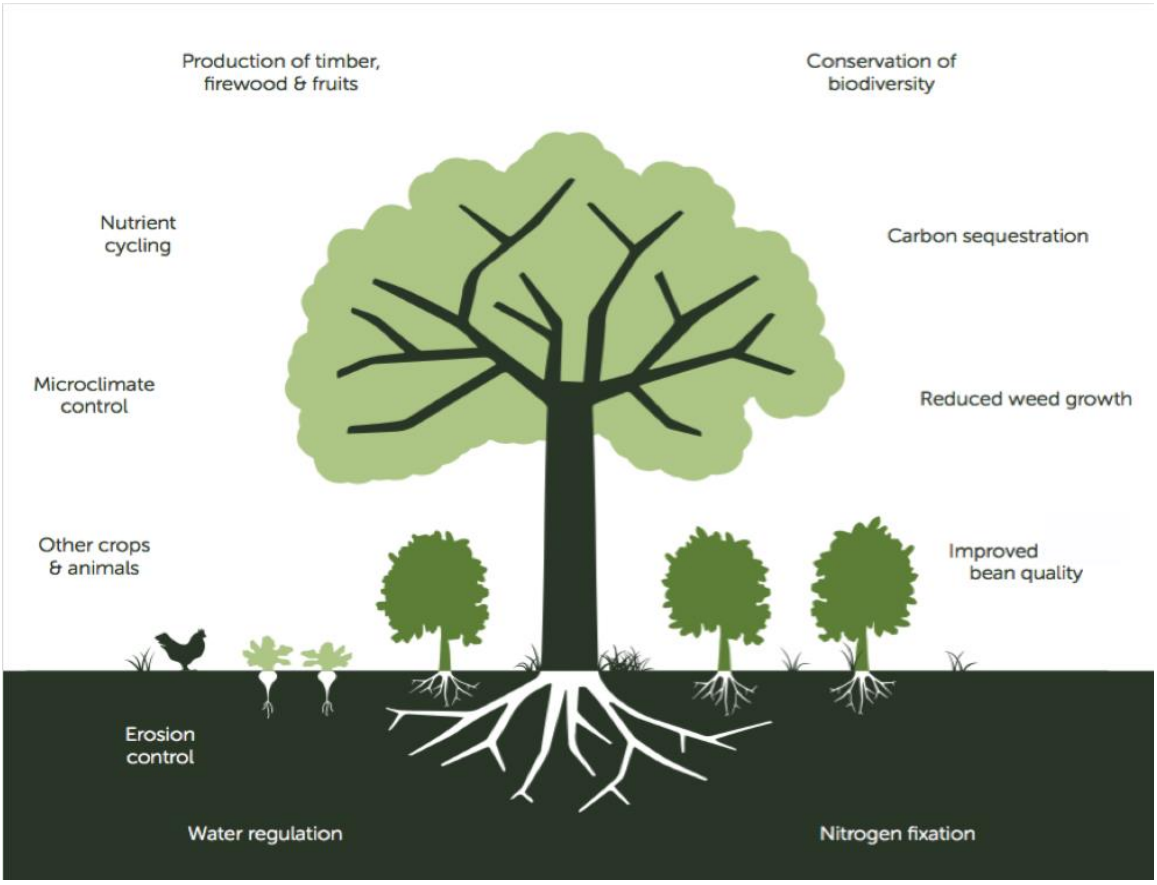


Figure 4. Benefits of Agroforestry in cocoa

SOIL FERTILITY MANAGEMENT

Coca produces heavy biomass and it needs nutrients for the development of the canopy in the initial years of establishment. After the formation of the canopy, the fertility of the soil may be maintained by recycling nutrients back into the soil through composting of leaf litter.

CONCLUSION

Cocoa is a commercial plantation crop grown around the world for the manufacture of chocolates, suited mostly to humid tropics. It is cultivated in India mostly from the southern States viz. Kerala, Karnataka, Andhra Pradesh and Tamil Nadu (area of 1,03,376 ha, production 27,072 MT per year). The highest area, production, and productivity in India is recorded in the state of Andhra Pradesh (39,714 ha, 10,903 M tonnes and 950 kg/ha) respectively). The average productivity of cocoa is 669 kg ha^{-1}. It is a shade-loving crop the crop can be planted in areca nut and coconut plantains as an inter-crop. Cocoa monoculture increases the cocoa Cherelle wilt while the wilt incidence is less under shade crops. In addition to the ab0ove it controls the microclimate, improves nutrient cycling, production of firewood and fruits, conservation of biodiversity, carbon sequestration, reduced weed growth and improved bean quality. This will decrease pressure on forests it can provide additional income along with carbon sequestration.