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An ecologically sustainable approach to cocoa production: the role of shade trees in influencing farmers' adoption of cocoa agroforestry systems

Cocoa Agroforestry System describe the practice of growing woody perennials (e.g. trees, shrubs, etc.), or agricultural crops with the cocoa trees on the same piece of land management unit. The term is often referred to as “a new word for an old practice” because cocoa in its natural habitat is grown understorey (shady conditions) for efficient physiological functioning. However, cocoa farmers are now shifting from the traditional shaded cocoa agroforestry systems to full sun (unshaded) systems. The growing hunger for unshaded cocoa systems is due to its short-term benefits of higher yield. Unfortunately, the opportunity cost for this drastic shift away from the use of shade trees for a short-term increased yield is the loss of greater longevity of cocoa trees and steady long-term respectable yields under shaded cocoa systems. More worrying is that, unshaded cocoa cultivation has implications for cocoa trees resilience to climate variability as less or no shade means higher impact of climate change. For example, different climatic models predict that climate change would cause a drastic decrease of climatic suitability for cocoa in current growing regions of the world by 2050. This would have repercussions for farmers livelihood, forests and natural habitats, as well as for the chocolate and confectionary industry.

Pathways to Cocoa Ecological Sustainability and Agroforestry adoption: Farmers Perspective

There have been several studies and extensive education on how to make current cocoa production sustainable through agroforestry adoption. However, the adoption rate among farmers continue to be low which has reiterated the scepticism about the impact of research on farmers' adoption of cocoa interventions. Therefore, it is important to have evidence on the understanding of farmers' own views of shade trees on their farms and the factors that influence their attitude towards unshaded cocoa system, and the appropriate interventions that could help influence their adoption of cocoa Agroforestry System.



This evidence shows that, different types of shade tree species are planted by farmers to provide permanent shade to their cocoa trees. Some shade trees are considered desirable (e.g. *Spathodea campanulata*, *Terminalia superba*, and *Terminalia ivorensis*), while others are less desirable (e.g. *Alstonei boonei* and *Ceiba pentandra*). Cocoa farmers with no formal education and older farmers were less interested in keeping the recommended number (15-18 trees per hectare) of shade trees; suggesting that as farmers grow older and gained more farming experience there is a decreased interest in long-term investment in the farm while younger farmers are naturally more willing to try ecologically sustainable technologies. The majority of the farmers believed that shade trees had a positive effect on other food crops grown under the cocoa, while the benefit of higher yield of cocoa pods was the motivation for most farmers moving towards unshaded cocoa system. The result also showed that low farmer education on shade tree inclusion in cocoa farms contributes to the gradual drift towards unshaded cocoa system. Finally, there is evidence that adoption of cocoa agroforestry would benefit from financial allocations and agriculture inputs.

Facilitate adoption of agroforestry through stronger inclusion of farmers and capacity-building measures

Cocoa farmers have a good understanding of the different shade trees on their farms. However, the limited and or disjointed participation research that takes farmers views and knowledge into consideration affects the adoption of ecologically sustainable cocoa agroforestry systems. This has grave implications for farmers livelihood, chocolate and confectionary industry and economies that depend on the cocoa sector; as climate change would likely make unshaded cocoa system unsustainable.

To facilitate the acceptability and adoption of agroforestry innovation among farmers, there is a need to enhance the engagement of farmers as important stakeholders in ecological innovations, policy- transfer and implementation. Partnerships between farmers and other stakeholders in the cocoa sector should focus on capacity-building and training related to the importance of shade trees to cocoa plants and its long-term benefits, including soil health, biodiversity conservation, climate resilience and cocoa trees sustainability.

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