

# Global Agroforestry Adoption: A Meta Analysis of Contemporary Studies

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## Introduction

While traditional agriculture practices often cause environmental harms such as deforestation, habitat loss or nutrient leaching, agroforestry systems integrate trees and/or crops and livestock on the same landscape with benefits such as carbon sequestration, the creation of wildlife habitat, erosion control, and enhanced landscape resilience. [2]. Such agroforestry systems are practiced all around the world. Many academic studies have assessed agroforestry adoption at local and regional levels, but a comprehensive review of the adoption literature at a global scale has not been published in recent years. This meta-analysis reviewed 69 contemporary agroforestry adoption studies from 30 different countries to explore common factors that dissuade or encourage engagement with agroforestry practices.

This project seeks to answer the following questions: *What are the common influencers of agroforestry adoption around the world? What is the nature of their influence? How have agroforestry adoption studies changed over time?*

## Methods

To determine the common influencers of agroforestry engagement, we conducted a meta-analysis of 69 agroforestry adoption studies from 30 different countries. The articles included in the analysis were published between 2000 and 2020. Each study featured a particular agroforestry practice such as alley cropping, silvopasture, Riparian Forest Buffers, or improved fallows. Each study measured one of the following outcomes: adoption of agroforestry, extent of adoption of agroforestry, or interest in adoption of agroforestry.

Researchers located these articles by searching different academic databases such as Web of Science, Science Direct, and JStor with search terms such as the following: “Agroforestry,” “riparian forest buffers,” “alley cropping,” “agri-environmental” “silvopasture” “row cropping” “tree intercropping,” “home garden” “forest farming” AND “adoption”

Using a vote-count meta-analysis method, 22 common variables were identified as prominent influencers of agroforestry engagement. Variables were only included in the final analysis if they were included in at least 5 observations. \*Lastly, to establish how agroforestry adoption studies have changed over time, studies published between 2000-2009 were analyzed and compared with studies published between 2010-2020. \*In-progress

## Geographic Distribution of Studies by Country

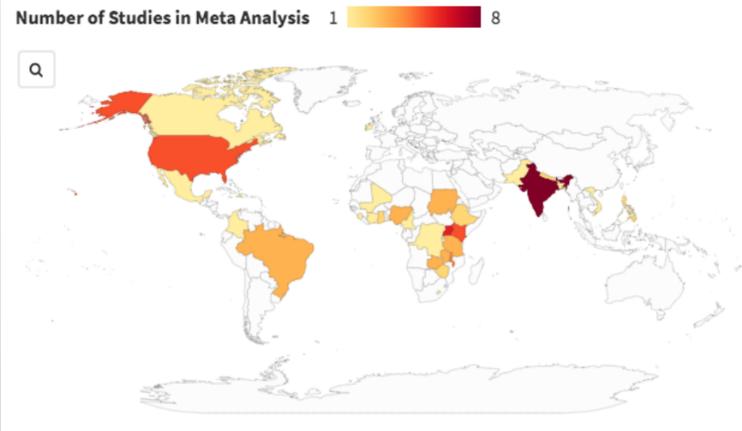


FIGURE 1. Distribution of included studies by country—Bangladesh: 1; Brazil: 3; Cameroon: 1; Canada: 1; Columbia: 1; The Democratic Republic of the Congo : 1; Ethiopia: 2; Ghana: 2; Haiti: 1; India: 8; Ireland: 1; Kenya: 5; Lesotho: 1; Malawi: 4; Mali: 1; Mexico: 1; Nepal: 2; Nigeria: 3; Pakistan: 1; Philippines: 2; Rwanda: 2; Sierra Leone: 1; Sudan: 3; Tanzania: 3; The Ivory Coast: 1; Uganda: 6; USA: 5; Vietnam: 1; Zambia: 3; Zimbabwe: 2

## Results

100 observations from 69 total studies were included in the final meta-analysis. The collected studies were geographically distributed across the world. Of the 30 nations that contributed studies, the top countries were Uganda (5), The United States of America (5), Kenya (5), Uganda (6) and India (8). [Figure 1]

**Demographic Influencers:** The variables within this category (Age, Biological Sex, Household Size, Native to Area) were often found to be significant and positively correlated with **agroforestry engagement (AE)**. However, several studies found these variables to be negatively correlated to AE. Additionally, several variables within this category were more often insignificant across the studies than significant. [Figure 2]

**Land/Monetary Influencers:** Variables within this category (Farm size, Income, Tenure status, Labor, Fertile Soil, Livestock, Primary Occupation is Farming, Access to Credit, Off-Farm Income, Slope) were frequently significant and positively correlated with AE. Though some negative correlations were found, most studies either found these variables to be significant and positively correlated with AE or insignificant. [Figure 3]

**Educational/Training Influencers:** Multiple variables within the this category did not display any negative correlations with AE. Across the studies reviewed, most variables in this category (Education, Membership to Organizations, Contact with Extension, Awareness of Agroforestry, Agroforestry Training, Experience with Agroforestry, General Farming Experience, Knowledge of Agroforestry) were found to be significant and positively correlated to AE or insignificant. [Figure 4]

## Demographic Influencers

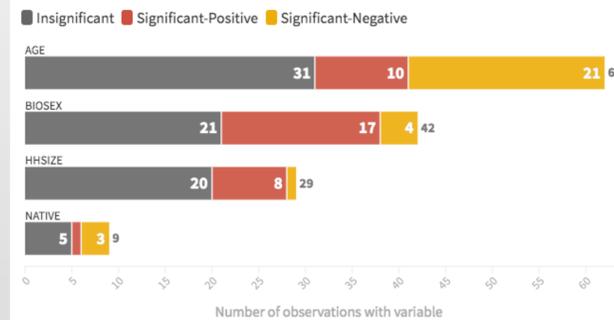


FIGURE 2. Demographic influencers of agroforestry & the number of times they were included in observations as insignificant at influencing engagement with agroforestry, significant with a positive correlation, and insignificant with a negative correlation.

## Land and Monetary Influencers

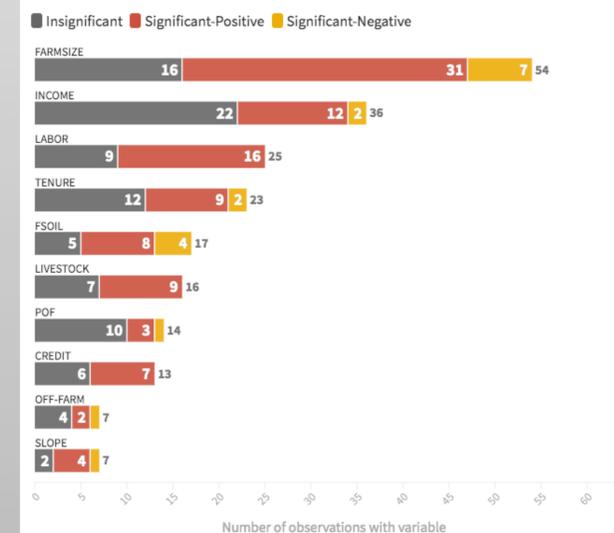


FIGURE 3. Land and Monetary influencers of agroforestry & the number of times they were included in observations as insignificant at influencing engagement with agroforestry, significant with a positive correlation, and insignificant with a negative correlation.

## Educational and Training Influencers

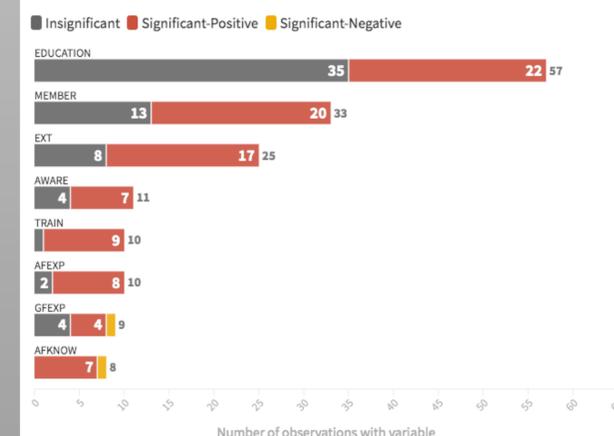


FIGURE 4. Educational and Training influencers of agroforestry & the number of times they were included in observations as insignificant at influencing engagement with agroforestry, significant with a positive correlation, and insignificant with a negative correlation.

## Discussion & Conclusions

Effective dissemination techniques, outreach, and future research endeavors could be crafted with an understanding of the variables that commonly influence engagement with agroforestry practices.

Though the variables and correlations in this study represent the most common influencers of agroforestry engagement at a global scale, solutions should still consider the specific local and regional contexts for which they will be established. For example, though income was often positively correlated with AE when significant, some observations found the variable to be significant and negatively correlated with AE [Figure 3]. Within one such observation, the study theorized that poorer smallholders were more likely to adopt agroforestry within the region in order to satisfy their families’ subsistence needs, as agroforestry practices offered farmers the opportunity to plant food crops within their trees. [1].

Unique local contexts such as this inform and affect influential variables. However, some influencers, like Agroforestry Training, consistently influence AE positively across studies, suggesting that this variable may be key in effective dissemination strategies [Figure 4]. An understanding of these common influencers of agroforestry engagement holds value for future efforts.

**References:** [1] Rajasekharan, P. & Veeraputhran, S. (2002). Adoption of intercropping in rubber smallholdings in Kerala, India: A tobit analysis. *Agroforestry Systems*, 56, 1-11. [2] Wilson, M. H. & Lovell, S. T. (2016). *Agroforestry—The Next Step in Sustainable and Resilient Agriculture*. 8(574), 1-15. doi: 10.3390/su8060574

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