

Extended Abstract

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Paper/ Poster Title	Money Doesn't Grow on Trees – Or Does It? How Agroforestry System Design Makes Agroforestry More Attractive to Smallholders in Senegal.
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Abstract prepared for presentation at the 98th Annual Conference of The Agricultural Economics Society will be held at The University of Edinburgh, UK, 18th - 20th March 2024.

Abstract	200 words max
<p>In the Sahel region, agroforestry is at the core of efforts to restore and preserve fertile soils. Agroforestry as natural regeneration practice can additionally increase crop yields and/or provide tree products if the system is designed according to those objectives. However, past studies do not take output-oriented system design at the pre-adoption stage into account, when analysing smallholder's adoption decision. We aim to understand the role of agroforestry system design for smallholder's willingness to adopt and their preferences within their adoption decision. Employing Heckman two stage regression models, we firstly analyse Senegalese smallholders' willingness to adopt and secondly willingness to pay or accept compensation for three agroforestry systems that are designed to achieve different outcomes: environmental benefits; environmental benefits and increased crop yields; environmental benefits, increased crop yields and individually preferred tree products. We find, that smallholders' willingness to adopt and their preferences are higher for agroforestry systems that are designed to provide additional economic benefits. Previously detected adoption determinants differ depending on the benefits the agroforestry system aims to provide. We highlight the importance for future research and policy design to take the preferences of smallholders for potential benefits of agroforestry in the dissemination and adoption process into account.</p>	
Keywords	Agroforestry System Design; Agroforestry Benefits; Contingent Valuation; Willingness to Pay; Willingness to Accept Compensation; Senegalese Groundnut Basin
JEL Code	agriculture (Q1); environment and ecology (Q5); technological change (O3) see: www.aeaweb.org/jel/guide/jel.php?class=Q)
Introduction	100 – 250 words
<p>In the Sahel region, agroforestry is a prominent practice to combat the effects of climate change. However, practices still need to be upscaled to meet this aim. Beyond its environmental benefits, agroforestry potentially increases crop yields or provides tree products, contributing to increase and diversify income for practitioners. Until now, a successful adoption of agroforestry is defined by e.g. the existence of trees or tree quantity on farms. While the presence and quantity of trees ensures environmental outcomes to a certain degree, the potential economic benefits only realize from more sophisticated agroforestry system designs. We want to understand how the design of agroforestry systems with different potential economic outcomes is related to</p>	

smallholder farmers' willingness to adopt and their preferences for agroforestry within the adoption decision.	
Methodology	100 – 250 words
We interviewed 606 smallholder farmers in the Senegalese Groundnut Basin using a stratified random sampling design. Employing an open-ended contingent valuation method, we elicited smallholders' willingness to adopt and their willingness to pay (WTP) or willingness to accept compensation (WTA) for three hypothetical agroforestry systems. The agroforestry systems are designed to provide different benefits: environmental benefits; environmental benefits and increased crop yields; environmental benefits, increased crop yields and individually preferred tree products. For the last system we additionally elicited smallholders' preferences for locally occurring tree products, as the preference for an agroforestry system providing tree products depends on the type of tree products matching the needs and preferences of the farmer. To address potential selection bias of smallholders being willing to adopt, we employed a Heckman two stage regression design for each agroforestry system.	
Results	100 – 250 words
While willingness to adopt is high for all three agroforestry systems, it increases, if the system is designed to increase crop yields and provide individually preferred tree products. This trend equally shows in smallholders' WTP or WTA bids. With increasing economic benefits of the system, the overall WTP of smallholders increases, or their need to be compensated decreases. However, bidding behaviours for the agroforestry systems vary among the respondents. This indicates individually different preferences for agroforestry benefits. Further, adoption determinants that have been established by past studies show different effect sizes for the three systems. This indicates that drivers and constraints for agroforestry adoption depend on the design of the proposed agroforestry system. Also, agroforestry seems to be perceived as competing to alternative income sources such as off-farm employment. Additionally, we observe that smallholders' literacy and perception of climate change effects decrease the likelihood to be willing to adopt but in turn increase the WTP bids of smallholders.	
Discussion and Conclusion	100 – 250 words
With our results, contribute to the critical discourse around the conceptualization of technology adoption in agriculture. Our findings underscore the need to rethink binary adoption indicators and take complexities of the technology specific adoption process into account. Moving forward, future research should strive for a more comprehensive understanding of adoption determinants not only influencing adoption but also impacting the realization of specific agroforestry benefits through diverse adoption processes. Our study informs future agroforestry policy and projects in the Sahel, and especially in the Senegalese Groundnut Basin, about smallholders' preferences for agroforestry benefits. Designing agroforestry systems accordingly would likely not only enhance adoption, but also retention and thus long-term sustainability of agroforestry practices, agricultural productivity, increased income and food diversity.	

