Arbeitsgemeinschaft Tropische und Subtropische Agrarforschung (ATSAF) e.V.
Council for Tropical and Subtropical Agricultural Research

ATSAF Academy
Academy for International Agricultural Research for Development

Junior Scientists Tandems
Final Report

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Start and end date of stay at IARC/ GRI: 10.09.2024 – 10.03.2025
Title: Socioeconomic feasibility evaluation of agrophotovoltaic (APV) systems in Colombia

Funded by the German Federal Ministry for Economic Cooperation and Development (BMZ)

german cooperation
DEUTSCHE ZUSAMMENARBEIT

Implemented by
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

After six months of staying in Colombia for my internship at Alliance Bioversity - CIAT (also referred to as 'the Center' in the report) as part of the Junior Scientist Tandem (JST) program, I am writing this report back from Germany to inform you about my experience, the progress I made with my thesis while there, and to give feedback about the program. Firstly, though, I would like to thank ATSAF, *Deutsche Zusammenarbeit*, and GIZ for the funds provided to participate in such a rewarding program that will be pivotal for my career. I think the program is a great opportunity for people interested in pursuing a research career, like me, to get to know and experience firsthand the work of a CGIAR++ center and expand our horizons on how applied research in agricultural and rural development can be done.

I joined the JST program as part of a joint project between Alliance Bioversity – CIAT and the University of Hohenheim, aiming to deploy and research the role of agrivoltaics (AV) systems in fostering Colombia's energy transition. AV systems are an increasingly growing agricultural innovation consisting of the dual use of land for agriculture and photovoltaic (PV) energy (Figure 1). Doing so challenges the conventional understanding of land use as a zero-sum game between food production and deploying some forms of renewable energies, like solar PV installations. Up to date, most of these systems are in developed countries of the northern hemisphere, even though their potential benefits in tropical and subtropical countries may be significant due to the share of land use for agriculture and persisting energy access challenges. Since Colombia has pursued one of Latin America's most ambitious energy transition policies, exploring alternatives such as AV systems is crucial for its success.

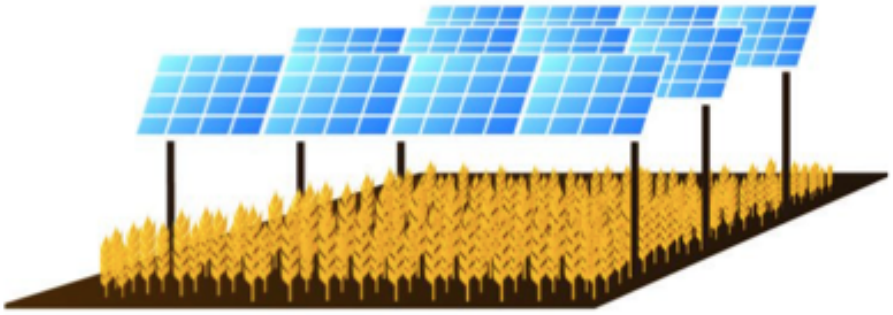

Figure 1. Visual representation of an AV system (Burgos, 2024)

The objective of my master's thesis is to shed light on the limiting and enabling socioeconomic factors for AV systems to be successfully integrated into Colombian agriculture. The intended methodology is a discrete choice experiment (DCE), which aims to estimate the probability of an individual choosing an alternative based on the attributes of the set of alternatives of the choice and the individual's characteristics. The design and implementation of the DCE is a stepwise

process that requires a deep understanding of the population where it will be conducted and constant consultation with experts on and off the field. During my six-month stay at the Alliance Bioversity - CIAT, I was able to successfully do both by relying on the plethora of staff researchers at the Center and by going on field trips supported by the Center's partner organizations along the country.

During the first two months of my internship, I focused on understanding AV systems, the specifics of the Colombian energy and agricultural sectors, and identifying the problems the innovation could tackle. Guided by my on-site supervisor, Dr. Manuel Narjes, I conducted a literature review for the two formers, focusing on AV systems in tropical regions and for small- to mid-size farmers. While doing so, I also attended the project's meetings to define a work plan and schedule to implement the early exploratory stages. Since I needed some field information to support my preliminary findings on the matter and start identifying how AV systems could make sense in Colombia, we decided it was a good idea for me to join them on a field trip to the Cesar department. I undertook 14 interviews with regional government officials and experts on energy and agriculture and a focus group with Indigenous communities to explore their previous experience with solar energy and perspectives on the potential of AV systems for the area (Picture 1).

Picture 1. Focus group with an Indigenous community in Cesar, Colombia

With the information collected from the desk research and the field trip, I returned to the Center to conceptualize the research hypothesis and objectives, complete the data collection instrument design,

and organize the upcoming field trip to implement the DCE. Under the guidance of my supervisor on-field and my external supervisor at the University of Hohenheim, Prof. Dr. Arndt Feuerbacher, and the valuable feedback from the Alliance researchers experienced in the methodology, I developed the instrument to conduct the experiment. Regarding the logistics for the data collection, the help of the Center and its country partner organizations was crucial, too.

For the data collection of the experiment, I went to the Bolivar department, also north of Colombia, to evaluate how feasible it was for smallholder farmers to install AV systems on their land. Similar to the region where the prior qualitative data gathering happened, in the semi-arid area of Bolivar, the dual use of land for agriculture and PV energy could tackle energy access and quality issues and protect the soil against extreme heat weather. To test how important those attributes were for farmers and how they assess the trade-offs implied in them, I carried out more than 80 discrete choice experiments on different types of farmers in the area for almost two weeks. To get to them, I relied on help from a partner organization in the region, “Fundación Canal del Dique,” which has been working with agricultural producers in the area for more than a decade.

Picture 2. An example of a solar PV panel in a small farm in Cesar, Colombia

The main results of the master thesis I'm writing now that I'm back in Germany will be analyzing the collected data during these two weeks. As preliminary findings, I can tell that for the farmers, the installation of such systems makes sense as long as it doesn't heavily impact their agricultural yields and if it provides a reliable and long-term solution for their energy-related problems. Findings that could be of potential use not just for the project the thesis was part of, but also for understanding better the way AV systems could be deployed in tropical and subtropical countries interested in advancing an energy transition to renewable energies.

I would like to reiterate my gratitude to the JST program for providing funding to support the hard work needed to conduct such a research-intensive master's thesis. The money allowed me to comfortably settle for six months in a place where I could rest and experience the new city I was living in, to pay for most of the field trip expenses, and to pay for my tickets from and to Colombia to Germany. But as I stated before, the impact of the program goes well beyond the financial support. In my case, it allowed me to get first-hand experience on how applied research in the field of agricultural economics is done and motivated me to keep pursuing a research-oriented career. After defending my master's thesis, I would like to either work for an International Development and Cooperation Organization such as FAO or GIZ, or to pursue a Ph.D. in the areas of environmental, development, or agricultural economics. No matter what I choose, I am confident that the experience I gained from being part of the JST program will be a professional milestone in the years to come.