

## Indigenous Agricultural Practices: Sweet Potato Cultivation Among the Arfak Tribe in Gueintuy, West Papua

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### ABSTRACT

Sweet potato serves as a staple crop and holds cultural and economic significance for the tribe, reflecting their deep connection to the local environment. This study explores the indigenous agricultural practices of sweet potato (*Ipomoea batatas*) cultivation among the Arfak Tribe in Gueintuy Village, West Papua. Using a mixed-methods approach, the research documents traditional farming techniques, assesses the challenges faced by farmers, and evaluates the potential for integrating sustainable practices. Data were collected through in-depth interviews, focus group discussions, and participant observations. The findings reveal that the Arfak tribe employs traditional farming methods such as shifting cultivation and crop rotation to maintain soil productivity. There is existing interrelationship between gender, education levels, and land ownership in the community. Basic education is most common and heavily linked to larger farmland sizes, emphasizing the role of primary education in agricultural livelihoods. Meanwhile, higher education (university) is less represented and may indicate a shift away from farming toward other opportunities. There are diversities of farming experience among men and women and how it correlates with the type of crops grown. Farmers with extensive experience focus on crops and vegetables, while fruit farming is practiced by individuals across all experience levels. This distribution can inform strategies for targeted training and support based on the type of crop and experience level of farmers. Labor division reflects traditional gender roles, with men handling physically intensive work and women focusing on crop care and harvesting. Kids participate minimally, focusing only on lighter tasks like nursing and harvesting

## **INTRODUCTION**

Sweet potatoes are a significant component of Indonesia's agricultural sector, serving as both a staple food and a source of income for many farmers (Mbewu et al. 2024; Ferdous et al. 2016). The country's production levels have experienced fluctuations over the years, influenced by factors such as regional agricultural practices, climatic conditions, and market demand. In the national production trends, since 2011-2015, Indonesia's sweet potato production during this period varied, with annual outputs ranging between approximately 1.9 million to 2.1 million tons. While in 2017-2018, the production was recorded at 1.914 million tons, which increased to 2.029 million tons in 2018 (Soares et al. 2023; Soplanit et al. 2021). In the regional production insights, production levels differ across provinces, reflecting local agricultural conditions and practices. Nusa Tenggara Timur (NTT) Province produced the total of sweet potato production was 41,193 tons, with notable contributions from regions such as Manggarai Barat (10,673 tons) and Sumba Barat Daya (6,142 tons).

While in Central Java Province, the province reported a production of 145,068 tons, indicating its role as a significant producer (Evizal 2020; Ibrahim et al. 2021). Between 1993 and 2015, sweet potato production across various provinces showed diverse trends, highlighting the crop's importance in different regions. According to data from the Food and Agriculture Organization (FAO), Indonesia is among the top producers of sweet potatoes globally, contributing significantly to the world's total output (Godoy et al. 2014). Sweet potato production in Indonesia is characterized by regional diversity and temporal fluctuations. Understanding these patterns is crucial for stakeholders aiming to enhance production efficiency, ensure food security, and support the livelihoods of farmers dependent on this vital crop (Leurima et al. 2023; Evizal 2020).

Agricultural practices are deeply intertwined with the cultural and ecological contexts of indigenous communities. In Indonesia, the Arfak tribe of West Papua represents one of the unique indigenous groups whose farming practices have been shaped by generations of adaptation to the local environment. Sweet potato cultivation is central to their agricultural system, serving as a staple food and an integral part of their socio-cultural traditions. Understanding these indigenous practices is essential for preserving traditional knowledge while exploring pathways to sustainable agriculture. This study examines the sweet potato cultivation methods among the Arfak Tribe in Gueintuy village, Warmare district, Manokwari, with a focus on their traditional techniques, challenges, and potential integration with modern agricultural technologies.

The Arfak tribe, residing in the mountainous regions of Manokwari, West Papua, relies heavily on subsistence agriculture. Sweet potato (*Ipomoea batatas*) has been the cornerstone of their diet and economy for centuries. The cultivation methods reflect an intricate balance between indigenous knowledge and the region's ecological conditions (IFAD 2019; Liu et al. 2020; Caballero-Serrano et al. 2019), such as high rainfall, steep terrains, and nutrient-poor soils. The significance of sweet potato extends beyond sustenance, i.e. that it is a key component in traditional ceremonies and barter systems. In one hand, it

contributes to food security, especially in remote areas with limited access to external food supplies. It showcases resilience in challenging environments where other crops struggle to thrive.

Despite the importance of these practices, modern challenges such as climate change, land degradation, and limited access to agricultural support have begun to affect their sustainability. This study delves into these dynamics to assess the current state of sweet potato cultivation and identify opportunities for improvement sweet potato as a staple food (Januariusdi and Maggangka 2022; Novira 2023; Wijka et al. 2018; Bourke 2017). Sweet potato accounts for over 70% of the Arfak tribe's caloric intake. It is cultivated on both household farms and communal lands. Manokwari's average annual rainfall exceeds 2,500 mm, making water management a critical aspect of farming. The Arfak region is characterized by steep slopes and altitudes between 500–1,500 meters above sea level. Traditional Farming Techniques. Shifting cultivation is the primary method, involving crop rotation to maintain soil fertility. Manual tools are predominantly used due to limited access to machinery (Barri et al. 2019; Bonita et al. 2002). The Arfak tribe population in Gueintuy village is estimated at around 3,000 people. Agriculture contributes to more than 80% of household incomes in the region.

There is declining soil fertility. Repeated cultivation without adequate soil replenishment has led to nutrient depletion. Increased rainfall variability and extreme weather events are disrupting planting and harvesting cycles. Limited access to modern inputs. Lack of fertilizers, pest control measures, and improved seed varieties limits productivity. Younger generations are increasingly disengaged from indigenous farming practices, risking the erosion of valuable knowledge systems. Geographic isolation and inadequate transportation infrastructure hinder access to larger markets.

This study aims to document traditional practices by analysing the indigenous sweet potato cultivation methods employed by the Arfak tribe in Gueintuy village. Assessing challenges by identifying the key challenges faced by the tribe in maintaining sustainable sweet potato production. Exploring integrative solutions by investigating how traditional knowledge can be integrated with modern agricultural technologies to enhance productivity and resilience. Promoting Sustainable practices by providing recommendations for policies and interventions that support the sustainability of indigenous agriculture in the Arfak region. Contributing to food security by highlighting the role of sweet potato cultivation in ensuring food security for remote communities. By studying the sweet potato cultivation practices of the Arfak tribe, this research contributes to a broader understanding of indigenous agricultural systems and their potential to inform sustainable farming solutions. The findings aim to bridge traditional knowledge and modern practices, ensuring resilience in food systems and the preservation of cultural heritage.

## LITERATURE REVIEW

### Field Sites

Locations of the field research chosen consisted of Gueintuy Village, Warmare District, Manokwari Regency, West Papua, Indonesia (Fig. 1). Geographical areas constitute a mountainous region with altitudes ranging from 500 to 1,500 meters above sea level. Climate is tropical rainforest climate with an average annual rainfall exceeding 2,500 mm, making it suitable for sweet potato cultivation (BPS Manokwari 2022). Population of Arfak tribe is approximately 3,000 residents, predominantly members of the Arfak Tribe. The main activities of Arfak tribe is subsistence farming with sweet potato as the staple crop.

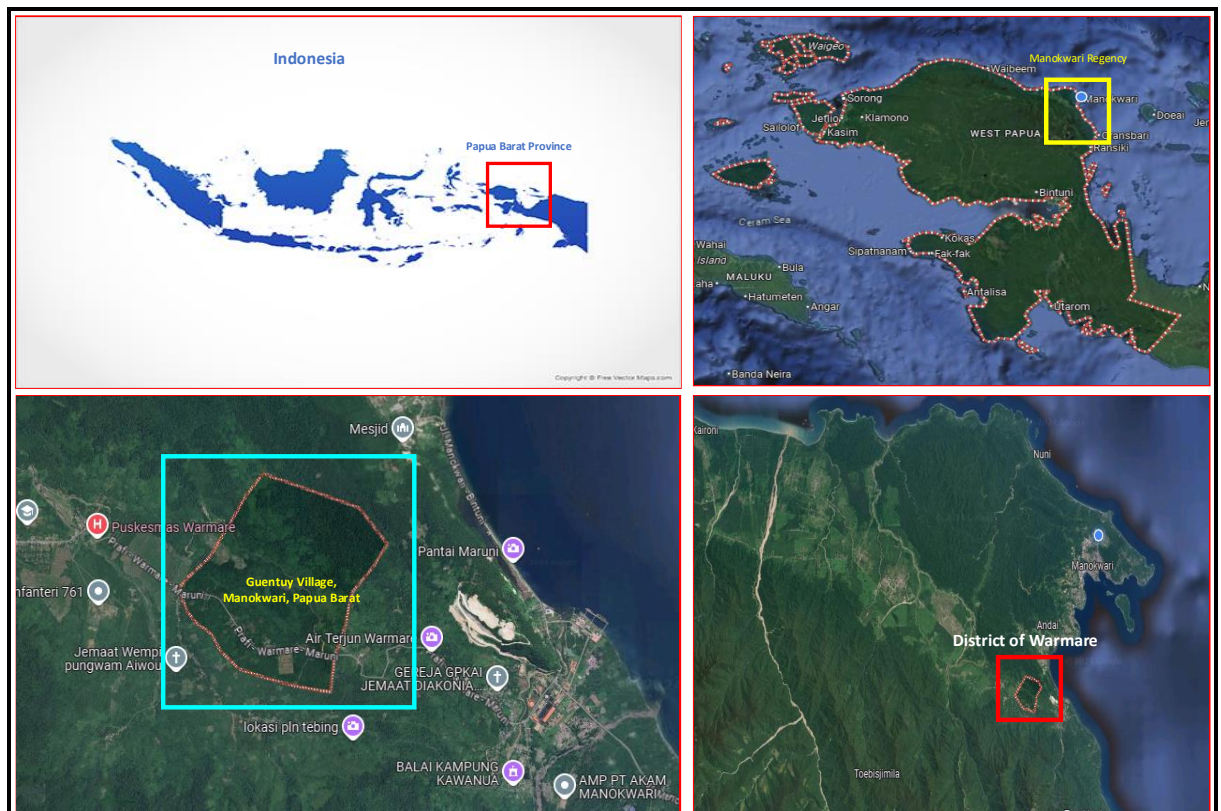


Figure 1. Site Location of Field Research in Gueintuy Village, Warmare District

### Research Design

The study employs a descriptive-exploratory design (Rao 2018; Cochran and Cox 1957), aimed at documenting traditional farming practices and assessing challenges in sweet potato cultivation. Methods of data collection consisted of primary data which was done by in-depth interviews. Conducted with 12 key informants of farmers, field research was done. Topics covered were traditional farming methods, cultural significance of sweet potato, challenges faced, and adaptation strategies. Participant observation done by observing sweet potato cultivation processes, from land preparation to harvesting. Focused on tools, techniques, and rituals associated with farming. Purposive sampling done by selecting participants based on their knowledge and involvement in sweet potato

cultivation. We also ensure representation across different age groups and genders to capture diverse perspectives.

## METHODOLOGY

### *Parameters and Data Analysis*

Parameters applied from this research are demographic of farmers including education levels, jobs, gender, experiences (yr), plant grown on farmed land, land width (ha), and working day cycles. Man-day, for man, women, and kids is calculated as follows;  $\text{Man-Day (HOK)} = \frac{\text{Total Work Hours}}{\text{Work Hours/day}}$ , where total work hours is total of hours spent by workers, and work hour per day is standard of work hours in a day (generally 8 hours/day in agricultural works) (Shamna et al. 2018). Quantitative data analysis done by using descriptive and inferential statistics (Snedecor and Cochran 1989), which consisted of calculated averages, frequencies, proportions, and non-parametric test by using K-related samples of Kendall's W.

## RESULTS AND DISCUSSION

No farmers fall into this category of age group <15 Years. This suggests that children under the age of 15 are not involved in farming activities. The majority of farmers (10 individuals) belong to this age group 15–55 Years (Fig. 2). This indicates that the active workforce in farming is primarily composed of individuals in this productive age range. Only 2 farmers are older than 55 years. This shows a lower participation of older individuals in farming, possibly due to physical demands or other factors.

The data emphasizes that farming activities are largely undertaken by the middle-aged group (15–55 years), who likely have the physical capability and economic motivation to engage in agriculture. The low number of farmers in the >55 category may reflect a transition out of farming due to aging or reliance on younger generations. The absence of individuals under 15 in farming suggests that farming is not practiced as a child labour activity in this context. This graph highlights the demographic composition of farmers, which is crucial for planning agricultural interventions, workforce management, and policy development in rural areas.

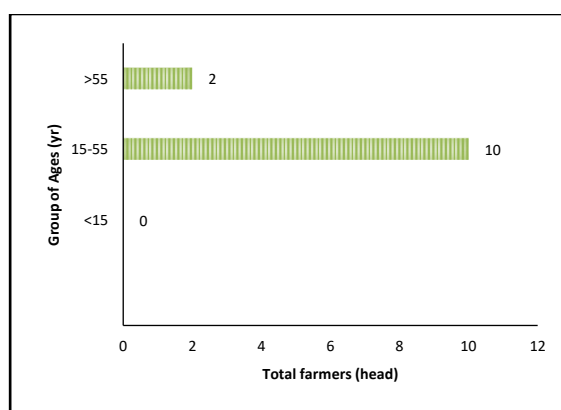


Figure 2. Distribution of Ages

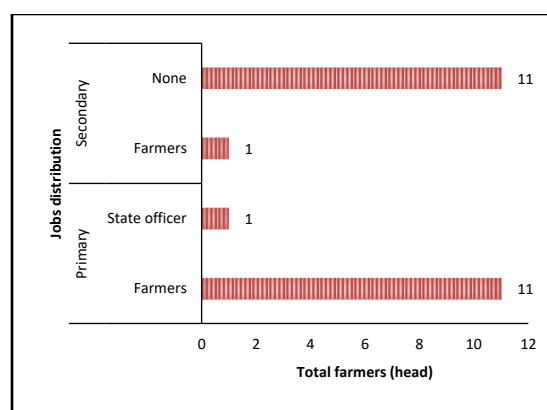


Figure 3. Distribution of Jobs

A total of 11 farmers considers farming as their primary occupation (Fig.3). This indicates that farming is the main source of livelihood for most individuals in the community. Only 1 individual is a state officer as their primary job, indicating a limited number of individuals involved in formal government employment. 11 individuals have no secondary job. This suggests that they rely solely on their primary occupation, farming, for their livelihood. Only 1 individual has farming as a secondary job, implying that farming can also be a supplemental activity for some. The majority of individuals are primarily engaged in farming, highlighting its importance as a livelihood in this community. Secondary jobs are minimal, with most individuals not engaging in additional economic activities. Farming is the predominant occupation, both as a primary and secondary source of income, although its role as a secondary job is limited. There is a data suggests a high dependency on farming for income in the region. It highlights the importance of strengthening agricultural practices and support systems to sustain livelihoods. The low presence of secondary occupations indicates potential areas for diversification to improve economic resilience.

Gender distribution consist of men 5 individuals, women: 7 individuals, and total is 12 individuals, evenly distributed across different education levels. Women form the majority (7 individuals) compared to men (5 individuals). Education levels range from basic school to university, with basic school (5 individuals) being the most common level of education. The 50 m<sup>2</sup> is mostly individuals with basic school education (6 individuals). It follows by 40 m<sup>2</sup> which is linked to individuals with senior high school education (2 individuals). The 30 m<sup>2</sup> is distributed among individuals with varying education levels (4 individuals). Only 2 individuals have university education, and they are not directly associated with specific land sizes, suggesting their involvement may be less focused on farming.

Individuals with basic education are associated with larger land sizes (50 m<sup>2</sup>), indicating that farming might be their primary livelihood (Fig. 4). Those with higher education levels (e.g., university) are fewer and less linked to direct agricultural landholding. Both men and women participate in farming, but the distribution suggests a possible relationship between education levels and gender roles in the community. This diagram highlights the interrelationship between gender, education levels, and land ownership in the community. It suggests that basic education is most common and heavily linked to larger farmland sizes, emphasizing the role of primary education in agricultural livelihoods (Wahyudin et al. 2021). Meanwhile, higher education (university) is less represented and may indicate a shift away from farming toward other opportunities (Godoy et al. 2014).

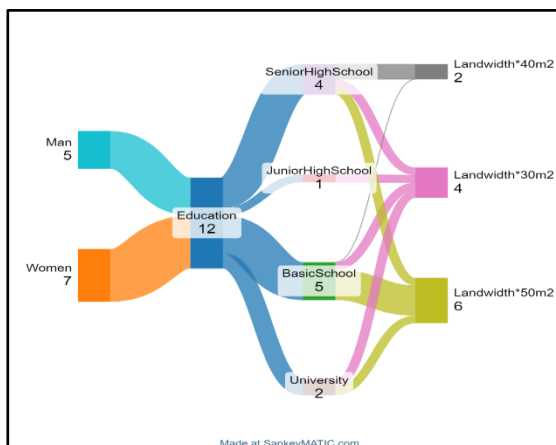


Figure 4. Distribution of Gender, Education and Land-Ownership

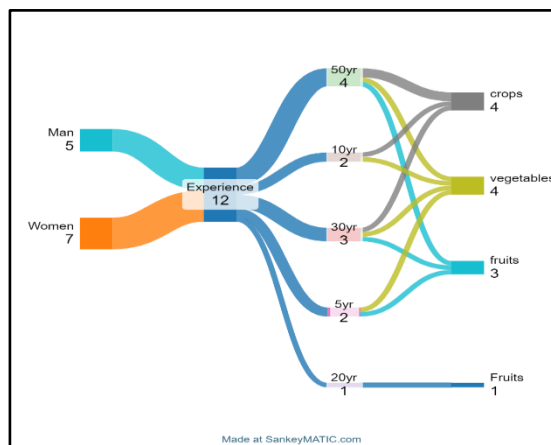


Figure 5. Distribution of Gender, Experience, and Grown Plants.

Men and women are equally involved across various experience levels (Fig. 5). Most experienced farmers (50 years) are evenly split among those growing crops and vegetables. Women are more represented in shorter farming experience categories, such as 5 years. Farmers with 50 years of experience are evenly distributed between crops (2) and vegetables (2). Farmers with 30 years of experience focus solely on fruits. Farmers with 20 years of experience also specialize in fruits (1 individual). Farmers with 10 years of experience are evenly distributed among crops and vegetables. Farmers with 5 years of experience engage in fruit farming (2 individuals). Fruit farming is undertaken by those with varying levels of experience, from 5 years to 30 years, showing that it spans a broad spectrum of expertise.

Farmers with extensive experience are involved in cultivating staple crops like vegetables and general crops, likely indicating their expertise in traditional farming. Fruit cultivation attracts farmers with diverse experience levels, suggesting it may require specific knowledge or be more profitable at varying scales (Januariusdi and Maggangka 2022; Winardi et al. 2013; Abdurahman et al. 2020; Jambormias 2016; Noor 2015). Both men and women are equally represented in farming, but women appear to dominate shorter farming experience categories, possibly indicating newer entrants to agriculture. Crops and vegetables attract farmers with longer experience, indicating these may be traditional or more stable forms of agriculture (Toansiba et al. 2021; Zulkarnain et al. 2019; Widowati 2023).

Table 1. Classifying Workers in Working Cycles on Sweet Potatoes Planting

Working cycles	Parameters	Workers			p (0,05)	X <sup>2</sup>
		Man	Women	Kids		

		Su	M	St	Su	M	St	S	M	St		
		m	n	v	m	n	v	m	n	v		
Chosing Land	Worker	13	1,0	0,29	4,00	0,33	0,65	0,00	0,00	0,00	0,00	15,16
	Workin g Hour	27	,0	2,25	1,06	6,00	0,50	1,00	0,00	0,00	0,00	34,28
	Workin gDay	19	,0	1,58	0,67	4,00	0,33	0,65	0,00	0,00	0,00	24,22
	Man- DayHO K	43	6,	0,54	0,40	1,57	0,13	0,28	0,00	0,00	0,00	60,44
Land Clearing	Worker	45	8,	0,67	0,49	,00	1,17	0,39	0,00	0,00	0,00	12,67
	Workin g Hour	10	,0	3,75	3,02	,00	4,67	2,23	0,00	0,00	0,00	38,67
	Workin gDay	10	,0	0,83	0,72	,00	2,33	0,78	0,00	0,00	0,00	19,00
	Man- DayHO K	13	8,	0,67	0,59	,14	1,76	1,07	0,00	0,00	0,00	70,89
Cutting trees and burning	Worker	75	,0	1,08	0,29	3,00	0,25	0,45	0,00	0,00	0,00	17,17
	Workin g Hour	23	,0	6,25	0,87	7,00	0,58	1,08	0,00	0,00	0,00	47,33
	Workin gDay	23	,0	1,92	0,67	4,00	0,33	0,65	0,00	0,00	0,00	23,33
	Man- DayHO K	13	8,	0,67	0,59	1,44	0,12	0,26	0,00	0,00	0,00	7,55
Fencing	Worker	70	,0	1,08	0,29	0,00	0,00	0,00	0,00	0,00	0,00	22,17
	Workin g Hour	70	,0	5,83	1,40	0,00	0,00	0,00	0,00	0,00	0,00	68

		21										
	Workin	,0	1,7	0,	0,	0,0	0,	0,	0,0	0,		51,
	gDay	0	5	97	00	0	00	00	0	00	0,00	55
	Man-	18										
	DayHO	,8	1,5	1,	0,	0,0	0,	0,	0,0	0,		11
	K	6	72	08	00	0	00	00	0	00	0,00	4,5
					14							
Planting	Worker	0,	0,0	0,	,0	1,1	0,	0,	0,0	0,		20,
		00	0	00	0	7	39	00	0	00	0,00	67
					68							
	Workin	0,	0,0	0,	,0	5,6	1,	0,	0,0	0,		49,
	g Hour	00	0	00	0	7	50	00	0	00	0,00	83
					20							
	Workin	0,	0,0	0,	,0	1,6	0,	0,	0,0	0,		52,
	gDay	00	0	00	0	7	98	00	0	00	0,00	33
	Man-				15							
	DayHO	0,	0,0	0,	,9	1,3	0,	0,	0,0	0,		66,
	K	00	0	00	9	3	41	00	0	00	0,00	67
					14							
Nursing	Worker	5,	0,4	0,	,0	1,1	0,	4,	0,3	0,		23,
		00	2	51	0	7	39	00	3	65	0,00	00
		32			17							
	Workin	,0	2,6	3,	,0	1,4	0,	4,	0,3	0,		46,
	g Hour	0	7	34	0	2	67	00	3	65	0,00	24
					66							
	Workin	,0	1,0	1,	,0	5,5	1,	4,	0,3	0,		36,
	gDay	0	0	28	0	0	51	00	3	65	0,00	44
	Man-	11			14							
	DayHO	,1	0,9	1,	,7	1,2	0,	4,	0,3	0,		54,
	K	4	3	23	1	3	67	00	3	86	0,00	00
					14							
Harvesting	Worker	5,	0,4	0,	,0	1,1	0,	4,	0,3	0,		10,
		00	2	51	0	7	39	00	3	65	0,00	17
		18			31							
	Workin	,0	1,5	2,	,0	2,5	1,	4,	0,3	0,		21,
	g Hour	0	0	11	0	8	16	00	3	65	0,00	33
					20							
	Workin	,0	1,6	2,	,0	1,7	0,	4,	0,3	0,		25,
	gDay	0	7	15	0	5	62	00	3	65	0,00	67
	Man-											
	DayHO	5,	0,4	0,	8,	0,7	0,	1,	0,0	0,		36,
	K	29	4	60	45	0	36	00	8	18	0,00	00

Choosing Land involves selecting and preparing land for cultivation. There is association (X<sup>2</sup>) between workers in this stage of working farming cycle. Land Clearing includes cleaning and preparing the land for farming. Cutting

Trees and Burning is removing large trees and clearing brush using burning methods (Mazumdar and Mazumdar 2012; Galudra et al. 2010; Vandermeulen et al. 2018; Singhal et al. 2021; Antoh 2021). Fencing is installing protective barriers around the land. Planting is seeding crops in the prepared land. Nursing is maintenance of crops, including watering and weeding (Peters 2001). Harvesting is collecting mature crops. In choosing land, Men dominate this stage, contributing the most labour in terms of workers (13), working hours (27), and working days (19). Women participate minimally (4 workers), and no contribution is recorded from kids. In land clearing, Women contribute more workers (14) and working hours (56) compared to men, but men still play a role (8 workers and 45 working hours). No kids are involved in this activity. Cutting Trees and Burning predominantly done by men (13 workers contributing 75 working hours). Women's participation is limited (3 workers contributing 7 hours), and no kids are involved. For fencing, exclusively performed by men (13 workers contributing 70 working hours and 21 days). In planting, exclusively handled by women (14 workers contributing 68 working hours and 20 days).

Nursing cycle involves participation from all groups, i.e. men for 5 workers, 32 hours, women for 14 workers, 66 hours, and kids: 4 workers, 4 hours. In harvesting working cycle, it involves contributions from all groups, but women dominate in terms of labour, i.e. men 5 workers and 18 hours, Women 14 workers and 31 hours, and kids 4 workers, 4 hours. Men take the lead in heavy, labour-intensive tasks like cutting trees, fencing, and land clearing. Women dominate stages requiring meticulous care, such as planting, nursing, and harvesting. Kids participate in nursing and harvesting, likely due to lighter labour requirements.

The Man-Day (HOK) indicates the amount of labour input across different tasks (Table 1). Men contribute the most in physically demanding activities, while women show significant contributions in planting, nursing, and harvesting. Labor division reflects traditional gender roles, with men handling physically intensive work and women focusing on crop care and harvesting (Peters 2000; Peters 2001). Kids participate minimally, focusing only on lighter tasks like nursing and harvesting. The variance in working hours and days suggests variability in task allocation and labour intensity among workers.

## **CONCLUSIONS AND RECOMMENDATIONS**

There is existing interrelationship between gender, education levels, and land ownership in the community. Basic education is most common and heavily linked to larger farmland sizes, emphasizing the role of primary education in agricultural livelihoods. Meanwhile, higher education (university) is less represented and may indicate a shift away from farming toward other opportunities. There are diversities of farming experience among men and women and how it correlates with the type of crops grown. Farmers with extensive experience focus on crops and vegetables, while fruit farming is practiced by individuals across all experience levels. This distribution can inform strategies for targeted training and support based on the type of crop and experience level of farmers. Labor division reflects traditional gender roles, with

men handling physically intensive work and women focusing on crop care and harvesting. Kids participate minimally, focusing only on lighter tasks like nursing and harvesting. Improvement can be made in terms of labour dynamics in farming, useful for optimizing task allocation and identifying areas where efficiency or support can be improved.

#### FURTHER STUDY

This research still has limitations, so further research is needed related to the topic of Indigenous Agricultural Practices: Sweet Potato Cultivation Among the Arfak Tribe in Gueintuy, West Papua in order to perfect this research and increase insight for readers.

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