ANALYSIS OF THE INTEGRATED CROP MANAGEMENT TECHNOLOGY ON RICE FARMERS IN NORTH CENTRAL TIMOR REGENCY
(A Case Study of Rice Farmers in Biboki Anleu District)

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ABSTRACT

This study examines the adoption and implementation of Integrated Crop Management (ICM) technology on the Rice Field in Biboki Anleu Subdistrict, North Central Timor Regency. ICM is an approach that integrates various agricultural practices to enhance yields and sustainability, making it highly relevant in addressing food security challenges. The study was conducted from March to April 2025 in Biboki Anleu Subdistrict, North Central Timor Regency. The method used to measure the level of adoption of Integrated Crop Management technology was the Sturges formula. The study results show that the overall level of adoption or application of Integrated Crop Management technology among farmers is high, at 74%. However, there were significant constraints in the application of ICM in Biboki Anleu Subdistrict, including: (a) the jajar legowo planting system having a very low level of application, (b) the recommended irrigation system being in the very low category, as farmers primarily still rely on rainwater and limited irrigation debit, and (c) the implementation of Integrated Pest Management (IPM) being in the very low category because all farmers protect their crops from pests and diseases using instant methods, namely chemical pesticides.

Keywords: ICM; Technology Adoption; Rice,

ABSTRAK

Penelitian ini mengkaji adopsi dan implementasi teknologi Pengelolaan Tanaman Terpadu (IPM) pada sawah di Kecamatan Biboki Anleu, Kabupaten Timor Tengah Utara. IPM merupakan pendekatan yang mengintegrasikan berbagai praktik pertanian untuk meningkatkan hasil panen dan keberlanjutan, sehingga sangat relevan dalam mengatasi tantangan ketahanan pangan. Penelitian ini dilakukan dari Maret hingga April 2025 di Kecamatan Biboki Anleu, Kabupaten Timor Tengah Utara. Metode yang digunakan untuk mengukur tingkat adopsi teknologi Pengelolaan Tanaman Terpadu adalah rumus Sturges. Hasil penelitian menunjukkan bahwa tingkat adopsi atau penerapan teknologi Pengelolaan Tanaman Terpadu secara keseluruhan di kalangan petani cukup tinggi, yaitu sebesar 74%. Namun, terdapat kendala signifikan dalam penerapan ICM di Kecamatan Biboki Anleu, antara lain: (a) sistem tanam jajar legowo yang tingkat penerapannya sangat rendah, (b) sistem irigasi yang direkomendasikan masih tergolong sangat rendah, karena petani sebagian besar masih mengandalkan air hujan dan debit irigasi yang terbatas, dan (c) implementasi Pengendalian Hama Terpadu (PTM) masih tergolong sangat rendah karena semua petani melindungi tanaman mereka dari hama dan penyakit menggunakan metode instan, yaitu pestisida kimia.

Kata kunci: Adopsi Teknologi; ICM; Padi

INTRODUCTION

Rice is a strategic food commodity for the Indonesian nation, as around 95–97% of Indonesians rely on rice as their main staple, and rice provides more than half of per-capita energy intake(Rozi et al., 2023; Uwiringiyimana, 2025). As the main food source, its availability is constantly linked to food security issues that require continuous management to avoid hindering the development of the agricultural sector. Integrated Crop Management (ICM) (known locally as PTT) is an approach that integrates various farming practices to increase yields and sustainability, which is highly relevant in facing the challenges of food security(Akiyana & Pranoto, 2020; Yamini et al., 2025).

Due to population growth, domestic demand for rice has been increasing each year, driven in rising quality standards and variations in consumption. However, the increase in national rice production capacity has been relatively slow or stagnant (Rozi et al., 2023; Zainul et al., 2021).

East Nusa Tenggara Province (NTT) in Indonesia has significant agricultural potential but also faces challenges due to a dry climate, making water availability a frequent issue. Among various food crops, rice is a key commodity, serving as a source of economic livelihood and a daily staple for the NTT community (Kuswanto et al., 2019). However, long dry seasons can significantly affect rice production in NTT (Krisnawan et al., 2025).

North Central Timor Regency (TTU) is an administrative area in East Nusa Tenggara Province where agriculture is a major livelihood for the community. The prominence of agriculture as a livelihood in TTU is evidenced by the extensive harvested area and the volume of rice production. In 2023, TTU was the 8th largest rice-producing region in East Nusa Tenggara, with a total output of 40,129 tons of dried unmilled rice (GKG) from a harvested area of 9,922 ha. In 2023, TTU was the 8th largest rice-producing region in East Nusa Tenggara, with a total output of 40,129 tons of dried unmilled rice (GKG) from a harvested area of 9,922 Ha (BPS, 2025). The dry climate in TTU poses a challenge, as limited irrigation water availability, often dependent on the rainy season, hinders increases in production. Challenges in farmers' adoption of Integrated Crop Management technology also act as a barrier to increasing rice production(Abani et al., 2023; Lulan et al., 2017).

Biboki Anleu District consists of 9 villages: Sifaniha, Motadik, Nonotbatan, Tuamese, Maukabatan, Kotafoun, Ponu, Oemanu, and Nifutnasi. The decline in wetland rice production in TTU Regency is partly attributable to reduced output in the Biboki Anleu District, as agricultural production varies by season. During the rainy season, fields are well irrigated, leading to abundant harvests, but in the dry season, farmers face water scarcity, resulting in crop failure or reduced production.

Several factors, such as low levels of education among farmers and limited market access, challenge the agricultural sector. In Biboki Anleu District, farmers also face constraints including inadequate government extension services, water shortages, traditional farming methods, pest and disease outbreaks, use of non-high-yielding varieties, and unreliable fertilizer supplies. Despite this, the area is known as one of the largest primary wetland rice centers in North Central Timor Regency. In 2020, wetland rice production in Biboki Anleu District was recorded at 12,875.8 tons from a rice field area of 2,224 hectares. Wetland rice commodities in this region are among the leading agricultural sectors that have been cultivated traditionally for generations(Basuki et al., 2022; Ngongo et al., 2022). In 2021, Biboki Anleu District had a wetland area of 2,779 hectares, which was already technically irrigated land (Indonesia Statistic, 2021).

RESEARCH METHODS

This research was conducted in Biboki Anleu District, North Central Timor Regency. The research time was from March to April 2025. The sample in this study was selected using the Simple Random Sampling method. The total population of wetland rice farmers in Biboki Anleu District is 4,060. The sample size was determined using the Slovin formula (Jeffry J. Tejada and Joyce Raymond B. Punzalan, 2012):

$$n = \frac{N}{1+N\ e^2} \quad \text{.................. (1)}$$

Where:

n: number of samples

N: total population

1: constant

e^2: tolerance limit (10%)

Thus, the sample comprised 97 farmers.

The data used in the analysis were qualitative data from farmer interviews, quantified using the Likert scale and categorized. The data analysis method for the adoption level of Integrated Crop Management technology for wetland rice in Biboki Anleu District was based on calculating the percentage of farmers who implement ICM either in accordance with or not in accordance with recommendations, and then categorizing them.

The level of technology application for each ICM component was determined by calculating the percentage of the actual score achieved against the maximum possible score. The formula used for this calculation is as follows:

$$TAL = \frac{\text{Actual Weight}}{\text{Maximum Weight}} \times 100\% \quad \ldots\ldots..(2)$$

Where:

TAL	:	Percentage of Technology Application Level
Actual Weight	:	Sum of the weights from each sample
Maximum Weight	:	Maximum weight achievable by all samples

To determine the number of classes that should be used in data grouping (Apriani et al., 2018), the Sturges formula was used:

$$I = \frac{r}{k} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots..(3)$$

Where:

I	:	Class Interval
r	:	Range (difference between the largest and smallest value)
k	:	Number of categories

To interpret the resulting percentages, the data were grouped into distinct classes. The number of classes and the interval width were determined using the Sturges Formula (or a fixed interval method, depending on your specific framework).

The adoption levels are categorized into three primary intervals to reflect the degree of compliance with ICM recommendations:

1. High (Adopted): The implementation is fully in accordance with technical recommendations.
2. Moderate (Partially Adopted): The implementation partially meets the recommendations.

Low (Not Adopted): The implementation does not meet the technical recommendations

RESULT AND DISCUSSION

The total land use in Biboki Anleu District is 17,860 ha. Existing land use includes various types, from settlements to rice fields to swampy and critical land areas. The most significant land use type is shrubs, tall grass, and grasslands, covering 4,668 ha, while the smallest is ponds, covering 2 ha. The population of Biboki Anleu District shows that the number of male residents is higher, at 8,258, than the number of female residents, 8,024.

Level of Integrated Crop Management Technology Application

The level of Integrated Crop Management (ICM) technology application among wetland rice farmers is examined using a percentage value and divided into four categories, as shown in Figure 1.

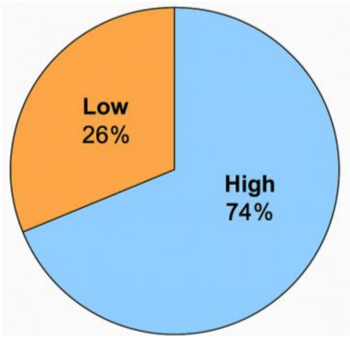

Figure 1. ICM Application Level among Wetland Rice Farmers in Biboki Anleu District (2025)

Based on the figure above, 74% of farmers use Integrated Crop Management (ICM) technology in the high category, while 26% remain in the low category. It is concluded that the level of technology application among wetland rice farmers in Biboki Anleu District is generally high, at 74%.

The finding that 74% of farmers in Biboki Anleu use Integrated Crop Management (ICM) technology at a high level, while 26% remain in the low category, aligns with research showing generally high adoption of ICM among rice farmers across various regions. Studies report that many rice farmers demonstrate high or very high adoption rates for key ICM components such as tillage, quality seeds, fertilization, and pest management, with adoption percentages often ranging from around 70% to over 80%(Akiyana & Pranoto, 2020; Ambong, 2022). Factors influencing this adoption include ease of use, perceived benefits like increased yield and income, education level, access to extension services, and availability of resources (Akiyana & Pranoto, 2020; Bakar et al., 2020; Mariano et al., 2012). However, some components, such as intermittent irrigation or integrated pest management, may have lower adoption rates than others. The conclusion that the technology application level among wetland rice farmers in Biboki Anleu District is generally high at 74% is consistent with broader evidence indicating substantial acceptance of ICM practices in rice farming communities (Ambong, 2022; Sugiman et al., 2023). This suggests effective dissemination and farmer responsiveness to ICM technologies in similar agro-ecological contexts.

Integrated Crop Management (ICM) components commonly applied by farmers include land preparation, use of new superior seed varieties, optimal number of seedlings per planting hole, planting system, irrigation management, fertilization, weed control, Integrated Pest Management (IPM), and harvesting and post-harvest practices. These components collectively aim to optimize crop yield, improve soil health, and promote sustainable farming by integrating cultural practices, pest and weed management, and efficient resource use (Yamini et al., 2025; Zhou et al., 2024). For example, perfect tillage and high-quality seeds are often widely adopted by farmers, with reported acceptance rates reaching 100% for some components, such as tillage and organic matter application (Sugiman et al., 2023). IPM is a critical part of ICM that emphasizes reducing chemical pesticide use through a combination of biological control, cultural practices, and targeted pesticide application to maintain ecological balance and biodiversity (Deguine et al., 2021; Zhou et al., 2024). Weed control within ICM involves integrated weed management strategies that combine prevention, monitoring, mechanical control, and selective herbicide use to sustainably manage weed populations (Riemens et al., 2022). Overall, these components form a holistic system designed to enhance productivity while minimizing environmental impact and supporting long-term agricultural sustainability (Fahad & Wang, 2018; Yamini et al., 2025).

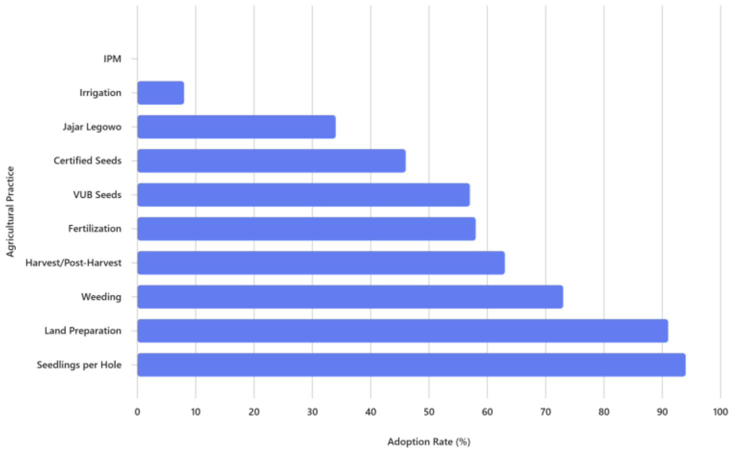

Figure 2. Application level of ICM components in Biboki Anleu District (2025)

The high application rates of land preparation (91%) and the number of seedlings per planting hole (94%) reflect farmers' adherence to recommended ICM practices, which are critical for establishing healthy crops and optimizing plant population, as shown in Table 2. In contrast, irrigation and Integrated Pest Management (IPM) show very low adoption, with many farmers relying primarily on rainfall or limited irrigation infrastructure, and continuing to use chemical pesticides rather than IPM strategies that emphasize biological control and reduced chemical inputs (Desneux et al., 2021; Pretty & Bharucha, 2015). This pattern is common in many regions

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where IPM adoption faces challenges such as cost, knowledge gaps, and limited policy support despite its proven benefits in reducing pesticide use and enhancing sustainability (Paudel et al., 2020; Pretty & Bharucha, 2015; Zhou et al., 2024). Research highlights that effective IPM involves integrating cultural practices, biological controls, and targeted pesticide use to manage pests sustainably, but transitioning from reliance on conventional chemicals remains slow among farmers (Desneux et al., 2021; Pretty & Bharucha, 2015). Similarly, irrigation management often lags due to resource constraints or traditional dependence on rainfall, limiting the full benefits of water-efficient practices within ICM. Overall, while foundational practices such as land preparation and seedling management are widely adopted, improving irrigation infrastructure and promoting IPM require focused extension efforts and support to increase farmer adoption and realize the full potential of ICM technology (Desneux et al., 2021; Paudel et al., 2020). The application of ICM components in Biboki Anleu District includes:

Land Preparation:

Table 2 shows that the high application level of land preparation, with 91% of farmers following government recommendations, indicates strong farmer awareness and capability aligned with technical standards. However, the ability to perform proper land preparation often depends on labor availability, which can limit timely and effective implementation. Research shows that improved land preparation techniques, such as using mechanized tools like the MB plough combined with disc harrow and planking, significantly enhance rice yield and plant growth compared to traditional methods. Advanced methods like multiple leveling combined with rotary tillage can also reduce preparation time while increasing yield and economic benefits by improving soil conditions and crop development (Y. Zhang et al., 2021). Land leveling quality varies with equipment used; for example, box levelers improve land levelness more effectively than power tillers during wet seasons, which is crucial for good crop establishment (M. F. Z. Omar et al., 2023). Overall, mechanization and optimized land preparation practices contribute to better productivity, but may be constrained by labor availability and access to machinery among rice field owners(Kataki et al., 2001; SHI et al., 2021)

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New Superior Variety Seeds (VUB)

The application level for VUB is high, with 57% of farmers using it in accordance with ICM recommendations, while 43% have not complied because they still use local varieties. The adoption of VUB in integrated crop management systems (ICM) has been associated with yield increases of around 8.85% to over 47% compared to non-VUB or traditional practices, along with improved economic returns (R/C ratios above 2) (Joka et al., 2024). However, adoption rates vary due to factors such as seed availability, farmer preferences, and dissemination efforts; about 57% of farmers use VUB, while others still rely on local varieties. Overall, the evidence supports that wider adoption of VUB aligned with ICM recommendations can substantially enhance rice production and farmer livelihoods (Susanti et al., 2020).

Quality and Certified Seeds

The application level is low, with 46% of farmers complying and 54% still using a mix of certified and uncertified seeds. Quality seeds are generally certified seeds that have undergone a certification process and can produce healthy seedlings with strong roots (Wunda et al., 2021). Certified seeds also reduce susceptibility to pests and diseases, resulting in more vigorous seedlings and stable crop performance (Fang et al., 2023; Mgendi et al., 2022).

Despite these benefits, adoption remains low—around 46% compliance—with many farmers still using a mix of certified and uncertified seeds due to factors like seed availability, cost, and access (Munandar et al., 2024; Setiani et al., 2023). Studies highlight the importance of government support, stakeholder cooperation, and extension services in promoting the use of certified seed to increase productivity and farmers' incomes (Akanbi, 2022). Enhancing seed quality through methods such as biochar coating or environmentally friendly seed treatments further improves seedling establishment and root activity, supporting stronger early growth (Fang et al., 2023; K. Zhang et al., 2023).

Number of Seedlings per Planting Hole

Using the recommended 1-3 seedlings per hole during rice transplanting reduces competition for soil nutrients, leading to improved nitrogen use efficiency and higher yields. Studies show that transplanting one seedling per hill with dense planting enhances effective panicle number, grain biomass, and nitrogen accumulation compared to higher seedling numbers per hill, such as six or nine seedlings, which increase competition and reduce yield efficiency (Long et al., 2022). Planting three seedlings per hole can also increase productive tillers and yield compared to planting one seedling, but exceeding this number tends to increase intra-plant competition (Afa et al., 2022). Excessive seedlings per hole (4-6 or more) may compensate for certain conditions, such as zero tillage, but generally result in lower nutrient uptake efficiency and yield stability (He et al., 2020).

Optimal seedling numbers combined with balanced nutrient management maximize growth and yield while minimizing resource competition(Zhu et al., 2023). Therefore, following the government's recommendation of 1-3 seedlings per hole is supported by research as beneficial for reducing nutrient competition and improving rice productivity (Long et al., 2022; Zhu et al., 2023). However, 6% of farmers still apply 4-6 seedlings per hole.

***Jajar Legowo* System**

The Jajar Legowo planting system, particularly the 2:1 row pattern, effectively increases plant population density and optimizes sunlight absorption by creating wider spacing that improves light penetration and air circulation around plants. This system has been shown to significantly increase rice yields, from about 4-5 tonnes per hectare with traditional methods to 7-8 tonnes per hectare under Jajar Legowo 2:1, due to improved photosynthesis and reduced competition among plants (Muslimin et al., 2021). The wider spacing also facilitates weed control, pest management, and more efficient use of fertilizer, contributing to healthier crop growth (Paiman et al., 2023). Despite these benefits, adoption remains low (34%) because the system requires more labor and technical knowledge, which poses challenges for farmers (Muslimin et al., 2021). Studies suggest that irrigation availability and farmer income influence adoption rates more than factors like age or education (Anida et al., 2021). Overall, the Jajar Legowo system is a promising technology for increasing rice productivity by optimizing plant population and sunlight use, but it needs support to overcome labor constraints for wider implementation (Maisura et al., 2020).

Irrigation

The application level is low, with only 8% of farmers complying with government recommendations and 92%

not. Most farmers still rely on rainfall, while others utilize limited irrigation flow. Globally, irrigated crops like wheat and maize show substantially higher yields, up to 22-34% more than rainfed counterparts, although water availability limits expansion in some regions (X. Wang et al., 2021). Transforming rainfed systems into irrigated ones through water harvesting and smart management can increase crop yields two to four times, improving food security and farmer incomes(Jaramillo et al., 2020).

However, many smallholder farmers still rely on rainfall due to constraints such as limited irrigation infrastructure, lack of credit, labor demands, and technical expertise (Tamekloe & Matsui, 2024). Adaptation strategies combining irrigation with efficient water management are critical for sustainable agriculture under changing climate conditions(Jobin & Sabu, 2024; Limantol et al., 2016; Naik et al., 2025).

Fertilisation

The application level is in the high category, with 58% of farmers applying fertilizer according to recommendations and 42% not. Balanced fertilization, which supplies nutrients in proportions that meet plant requirements, is essential for optimizing crop growth, yield, and quality while minimizing environmental impacts. Studies show that applying balanced amounts of nitrogen (N), phosphorus (P), potassium (K), and sulfur (S) improves nutrient use efficiency and soil nutrient balance, reducing excessive or deficient fertilization that can harm the environment (Chen et al., 2021; Mofizur et al., 2025; Pandian et al., 2024). For example, balanced NPK fertilization enhances photosynthesis, yield, and quality in crops like potatoes by promoting enzymatic and antioxidant activities (Koch et al., 2020; H. Wang et al., 2024).

Combining organic residues with recommended fertilizer doses can further improve soil nutrient buildup and reduce nutrient losses through leaching or volatilization (Paszkiewicz-Jasi & Stopa, 2025). Balanced fertilization also supports sustainable production by maintaining soil fertility over time and reducing negative environmental effects such as pollution from overuse of chemical fertilizers (Mo, 2018; Pandian et al., 2024). Overall, adherence to balanced fertilization recommendations by farmers can significantly improve crop productivity and sustainability in agricultural systems (Chen et al., 2021).

Weeding

Although 73% of farmers follow weeding recommendations, manual weeding remains labor-intensive and time-consuming, and often does not fully align with best-practice guidelines. Manual weeding provides effective weed control but involves significant physical strain due to prolonged bending and repetitive movements, which can reduce efficiency and increase labor costs (Panigrahi et al., 2025; Tiwari et al., 2022).

Integrated weed management combining mechanical and chemical methods can improve yields and reduce labor demands; for example, combining mechanical weeding with targeted herbicide use achieved higher rice yields than chemical control alone while saving time. Mechanical weeders offer increased field capacity and efficiency compared to manual hand weeding, though they may cause some crop damage and require careful selection based on field conditions(Paul et al., 2025; Woyessa, 2022; Zawada et al., 2023). Alternative non-chemical methods like flame weeding have shown promise by being faster and cheaper than manual weeding, while maintaining good weed control effectiveness(Upadhyay et al., 2024). Overall, while manual weeding is common and effective, adopting integrated or mechanized approaches can enhance efficiency, reduce labor intensity, and better align with recommended practices (Paul et al., 2025; Upadhyay et al., 2024).

Integrated Pest Management (IPM)

The application level is in the very low category, with all farmers (100%) not implementing IPM in accordance with recommendations. Farmers not implementing Integrated Pest Management (IPM) and relying solely on chemical pesticides is a common issue, despite IPM's potential to reduce pesticide use and promote sustainable agriculture. IPM integrates multiple pest control methods, cultural, biological, genetic, and targeted chemical applications, to minimize environmental impact and delay pest resistance, unlike the overuse of chemicals that often leads to resistance and ecosystem contamination (Deguine et al., 2021; Zhou et al., 2024). Evidence from Asia and Africa shows that IPM can increase yields by about 40% while reducing pesticide use by nearly 70%, demonstrating its benefits for productivity and environmental health (Pretty & Bharucha, 2015). However, challenges such as inconsistent policies, low farmer engagement, limited knowledge of ecological principles, and strong influence of the pesticide

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industry hinder widespread IPM adoption (Pretty & Bharucha, 2015; Srinivasan et al., 2022). Successful IPM programs often involve participatory approaches, education, policy support, and the integration of biological controls, such as biopesticides, which are growing in use due to their lower environmental risks (Marrone, 2025; Zhou et al., 2024). Without these supports, farmers tend to default to instant chemical solutions despite the long-term drawbacks for crop resilience and human health(Lucchi & Benelli, 2018).

Harvest and Post-Harvest

The application level is in the high category, with 63% of farmers complying with ICM recommendations, and 37% not. Timely harvesting and immediate threshing of rice are essential practices within Integrated Crop Management (ICM) to reduce post-harvest losses and maintain grain quality. Delays in these processes can increase susceptibility to mechanical damage, microbial spoilage, and nutrient degradation, negatively impacting yield and market value (Ambong, 2022; N. Zhang et al., 2021). Studies show that mechanized harvesting and adherence to recommended moisture content at harvest are widely adopted, but some farmers still delay threshing, which can compromise grain quality(Ambong, 2022). The implementation of structured post-harvest management methods, such as the Five Time (5T) management approach, has demonstrated significant reductions in losses by emphasizing timely harvesting, drying within 48 hours, and proper storage techniques(N. Zhang et al., 2021). Additionally, integrated nutrient management practices contribute to sustaining soil fertility post-harvest, supporting long-term productivity in rice systems(Urmi et al., 2022). Overall, high compliance with ICM recommendations for harvesting and post-harvest handling improves both yield stability and economic returns for farmers (Yamini et al., 2025; H. Zhang et al., 2018).

Constraints in the ICM Application

Constraints to the application of Integrated Crop Management (ICM) in Biboki Anleu District include low adoption of the jajar legowo planting system, with farmers using planting ratios that are less optimal than recommended. The irrigation system for wetland rice is poorly applied due to reliance on rainfall and limited irrigation water availability, hindering effective water management. Integrated Pest Management (IPM) implementation remains very low

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because farmers predominantly use chemical pesticides immediately, rather than adopting ecological or monitoring-based pest control methods (Abani et al., 2023; Deguine et al., 2021).

This reliance on instant chemical control reflects broader challenges in IPM adoption, including insufficient farmer engagement, limited understanding of ecological principles, and limited access to training and extension services (Bottrell & Schoenly, 2018; Zhou et al., 2024). Overcoming these barriers requires targeted education, participatory approaches, and supportive policies to promote sustainable practices that reduce pesticide dependence and improve resource use efficiency (Angon et al., 2023; Yamini et al., 2025). Addressing these constraints is essential for enhancing the sustainability and productivity of rice farming systems in the region(Abani et al., 2023; Yamini et al., 2025).

CONCLUSION

The application of Integrated Crop Management technology in Biboki Anleu District is in the high category, indicating that farmers have generally adopted it. The technology components with the very high application category are the number of seedlings per planting hole (94%) and land preparation (91%). The technology components with the very low application category are Irrigation (8% compliance) and Integrated Pest Management (IPM) (0% compliance). The low application in irrigation is due to most wetland rice irrigation relying on rainfall and minimal irrigation flow. The low adoption of IPM is due to farmers continuing to use chemical pesticides rather than the recommended IPM practices.

Farmers are advised to implement all Integrated Crop Management components more fully to increase production potential.

DECLARATION

Consent to participate

Authors are agreed

Consent to publication

The authors agree to publish this data

Conflict of interest

The authors declare no conflict of interest

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