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Adoption of Weed Management Practices Among Corn Farmers in Barangay Kitobo, Kitaotao, Bukidnon

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Abstract—This study focused on the adoption and effects of weeds to the yield of corn farmers in Barangay Kitobo, Kitaotao, Bukidnon. It focuses on controlling weeds and the challenges they encounter while using environmental-friendly ways to control weeds. Descriptive survey approach was used in the study and gathered information from selective corn farmers using surveys questionnaires, field visits, and face to face interviews. Results showed that mostly corn farmers were dependent on the use of herbicides to control weeds, while eco-friendly methods like mulching, crop rotation, and using of machineries were not commonly practiced. The choice of farmers in controlling weeds were greatly affected by financial problems, lack of training, and insufficient man power. Although most farmers in the Barangay were financially capable, the moderate-high expenses of using sustainable methods made it difficult for them to use these practices. The study showed that farmers need more support, like proper training, financial help, and easier access to the tools and resources they need for their work. By addressing these problems, it can help farmers use more sustainable ways to control weeds, which can lead to higher yield and minimal impact to the environment. The findings of this study will help government leaders and agricultural extension workers create programs that support small scale farmers in using sustainable ways to manage weeds.

***Index Terms*—Adoption barriers, corn farming, farmer decision-making, sustainable agriculture, weed management.**

1. Introduction

In Barangay Kitobo, Kitaotao, Bukidnon Weed problem remains one of the challenges affecting agricultural production, particularly in corn farming communities. Weeds competing with crops in terms of nutrients, water, and sunlight which can reduce crop yields and affect farmer's income. Even the availability of weed control methods including manual weeding and Chemical application, most of small-scale farmers continue to encounter different challenges in adopting Eco-friendly and holistic approaches. These challenges root cause from unstable financial, limited access to technical knowledge, and unavailability of enough resources. Understanding the behavior of corn farmers toward weed management practices is important for improving crop production and ensure prolonged sustainability in Farming systems. Justified in Rogers' Diffusion of Innovations Theory, this study investigates the key factors that influence the adoption of weed control strategies among corn farmers. The option to adopt modern techniques were influenced by different considerations such as perceived efficiency, convenience, cost, availability of information, and the Wider social and economic framework. Even the Department of Agriculture continues to promote Integrated Weed Management (IWM) as a more Well-rounded and eco-friendly strategy, its success mainly depends on farmers' awareness, attitude, and willingness to adopt modern techniques. This research aims to assess the present condition in adoption of weed management practices among corn farmers in Barangay Kitobo and to identify the major factors that influence their decision-making. Particularly, it aims to determine the typical used weed control methods, analyze the demographic and socioeconomic characteristics of the farmers, and evaluate their perceptions regarding the Effect and affordability of several approaches. By focusing on the challenges that prevent the use of sustainable weed control methods, this study contributes important observations for policymakers, agricultural extension workers, and other stakeholders. The results are expected to inform the formulation of specific measures that support capacity building, enhance resource accessibility, and improve the overall ability of small-scale farmers to adopt sustainable practices. Finally, this research aims to contribute to increased productivity, stronger food security, and improved environmental sustainability in rural agricultural communities.

2. Literature Review

Weed management is an important component of crop production due to weeds' competition with crops for essential resources. According to Giller et al., (2021) improper weed control can reduce yields by over 50%, particularly in low-income countries. Integrated weed management (IWM), which combines cultural, mechanical, biological, and chemical strategies, improved as a sustainable approach that reduces

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chemical usage and promotes soil health (Department of Agriculture, 2022).

Social and financial factors such as income, education, and land tenure were influenced by the application of weed management practices. Capable farmers are more likely to adopt modern methods, including accurate spraying and selective herbicides (Salas, Ramos, & Mendoza, 2023). Government support, particularly access to extension services, plays an important role in enhancing adoption rates by providing technical expertise and training (Manalastas, Cruz, & Pascual, 2020).

Farmers' perceptions also shape their choices, often favoring chemical herbicides for their efficiency and cost, despite environmental risks (Giller et al., 2021). In rural Philippines, manual weeding remains prevalent due to cultural familiarity and labor availability, although sustainable practices like crop rotation and mulching are gaining attention (Department of Agriculture, 2022).

Funding problems, insufficient labor, and weed resistance sort of challenges in effective weed control management. These issues are especially notable among smallholders with limited access to quality inputs and modern tools (Salas et al., 2023). Corn farming, in particular, faces increased weed pressure due to wide spacing and long growth duration, requiring integrated control strategies (Manalastas et al., 2020).

Government efforts promote sustainable practices through assistance and training, but their effectiveness depends on local adaptation. Basic policies often fail to address particular barriers; thus, adapted strategies are important for improving adoption and outcomes (Salas et al., 2023).

3. Materials and Methods

The study targeted on corn farmers' weed management practices that was conducted in Barangay Kitobo, Kitaotao, Bukidnon, from August 2024 to January 2025. This area was chosen because of its mountainous terrain, tropical climate, and primarily agricultural landscape all of which significantly affect farming practices.

Qualitative and quantitative techniques were combined in a descriptive survey research design. The study's objective was to select 50 purposefully chosen corn farmers actively involved in weed control. Data were gathered through semi-structured interviews, field observations, and structured surveys, and local agricultural officers participated in selecting participants.

The quantitative data that was gathered were analyzed using SPSS employing descriptive statistics and a five-point Likert scale, while qualitative data were analyzed through thematic analysis to identify recurring patterns. Ethical approval was acquired from Central Mindanao University, with necessary permissions secured from local authorities, ensuring informed consent and data confidentiality.

4. Results and Discussion

A. Demographic, Socioeconomic, and Farm Related Characteristics of Corn Farmers in Kitobo, Kitaotao, Bukidnon

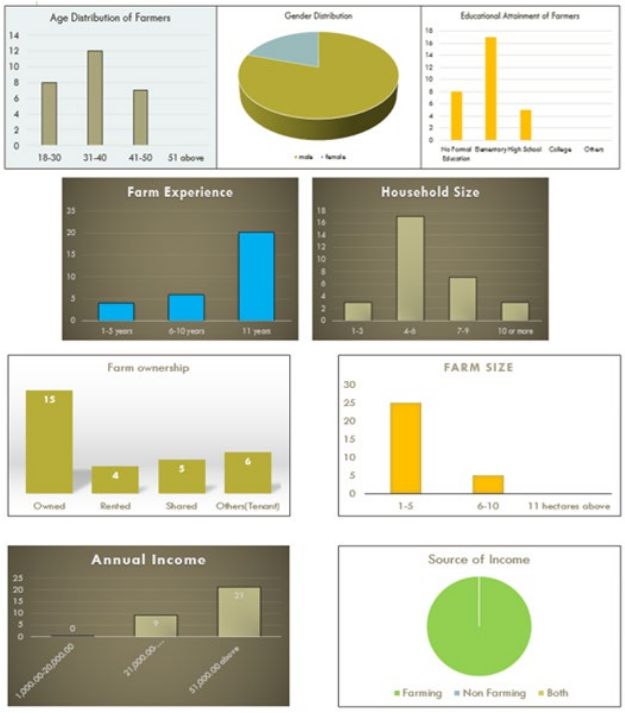

Fig. 1. Demographic, Socioeconomic, and Farm-Related characteristics of corn farmers in Kitobo, Kitaotao, Bukidnon

1) Age Distribution

Majority of the respondents (40%) drop within the productive age group of 31–40 years, reflecting a relatively young farming workers. This demographic aligns with FAO (2017) findings, which emphasize the significant role of middle-aged farmers due to their physical capability and willingness to adopt new technologies.

2) Gender Distribution

Farming remains male-dominated, with 80% of respondents being men, while women's participation (20%) is limited to supplementary roles such as marketing and processing, consistent with World Bank (2019).

3) Educational Attainment of Farmers

Educational attainment among farmers is below average, with 56.7% finished elementary education and 26.7% low educational background. Limited education may restrict adopting modern agricultural practices that require technical knowledge, as noted by Marenya and Barrett (2017). Additionally, household sizes mostly range from 4 to 6 members (56.7%), reflecting a balance between labor availability and resource constraints, consistent with the findings of Ellis (2000).

4) Farming Experience and Household Size

Farming experience is wide-ranging, with 66.7% of farmers having over 11 years in the field, indicating deep knowledge with local agricultural conditions. However, small scale farm sizes (1–5 hectares) lead (83.3%), reflecting the extent of small scale farming systems. Limited land ownership sizes present

challenges such as limited mechanization and reduced economies of scale, aligning with the observations of Hazell et al. (2010).

5) Farm Ownership, Source of Income, and Annual Income

Land tenure status among farmers varies, with 50% owning their land while others operate under tenancy (20%) or shared arrangements (16.7%). Insecure land tenure may discourage long-term investments in sustainable farming practices, as noted by Place et al. (2002). Farming is the primary livelihood source for all respondents, with 70% earning over ₱51,000 annually. However, income disparities exist, likely influenced by variations in farm size, market access, and resource availability, as supported by Jayne et al. (2010).

B. Common Weed Management Practices of Corn Farmers in Barangay Kitobo, Kitaotao, Bukidnon

The study of weed management practices among corn farmers in Barangay Kitobo, Kitaotao, Bukidnon, showed different strategies influenced by labor and resource availability and knowledge awareness. Manual weeding gained a neutral rating, stating that while farmers recognize its effectiveness, its application remains unstable, likely due to labor shortages. This aligns with the findings of Bayacag and Rola (2001), which noted that although manual weeding enhances maize yields, it is inefficient for large scale farms due to its high labor demand. In contrary, herbicide use obtained a higher mean score, reflecting dependency on chemical weed control. This trend supports Bequet (2020) who found an increasing dependence on herbicides for efficiency. However, the relatively high standard deviation suggests irregularity in usage, likely due to differences in availability and knowledge of proper application.

Mulching was the undesirable practice, as indicated in the result by its low mean score, suggesting a general resistance to adopt it for weed control. This may cause from limited awareness of its benefits or practical implementation challenges. While Rola (2001) highlights mulching's effectiveness in controlling weeds and improving soil health, its low adoption showed the need for targeted educational strategies.

Likewise, crop rotation received a neutral rating, indicating recognition of its benefits but unstable application. Coxhead and Rola (2001) emphasize its role in weed control and soil fertility improvement, yet structural limitations or knowledge gaps may limit its widespread use.

Mechanical weed control tools had the lowest mean score, indicating strong disagreement among farmers regarding their implementation. This could be due to limited access to mechanized tools or unfamiliarity with their labor-saving and cost-reducing benefits (Bayacag & Rola, 2001). Given the potential of mechanical weeding to enhance efficiency, improving access and training could encourage its adoption.

In general, the findings emphasize on dependency in using herbicides, with less adoption of sustainable weed management strategies such as mulching, crop rotation, and machine-operated tools. These results emphasize the need for targeted adjustments focusing on education, resource distribution, and capacity enhancement to promote more sustainable and integrated regional weed management practices.

C. Factors Influencing Adoption of Weed Management Practices

Various socioeconomic factors, including financial resources, availability to training, farm size, and labor, mold the adoption of effective weed management practices among corn farmers in Barangay Kitobo, Kitaotao, Bukidnon. Financial stability emerged as a barrier, with a low mean score of 2.20, showing that farmers are lacking with the funds to invest in better weed management practices. This aligns with Bequet (2020), who highlighted financial limitations as a significant challenge in adopting agricultural innovations. As a result, economically challenged farmers may continue relying on traditional, less efficient methods that do not optimize weed

Table 1
Common weed management practices of corn farmers in barangay Kitobo, Kitaotao, Bukidnon

Weed Management Practices Questions	Mean	Standard Deviation	Descriptive Rating	Qualitative Interpretation
1. I regularly practice manual weeding	3.47	0.72	Neutral (N)	The respondent neither agrees nor disagrees or occasionally practices the statement.
2. I use herbicides to manage weeds on my farm.	3.57	1.09	Agree (A)	The respondent generally agrees or frequently practices the statement.
3. I apply mulching techniques to control weed growth.	2.40	1.08	Disagree (D)	The respondent generally disagrees or rarely practices the statement.
4. I practice crop rotation to reduce weed problems.	3.00	0.73	Neutral (N)	The respondent neither agrees nor disagrees or occasionally practices the statement.
5. I integrate mechanical tools (e.g., tillers, weeders) for weed control.	1.57	0.50	Disagree (D)	The respondent generally disagrees or rarely practices the statement.

Table 2
Factors influencing adoption of weed management practices

Weed Management Practices Questions	Mean	Standard Deviation	Descriptive Rating	Qualitative Interpretation
6. My financial resources allow me to adopt effective weed management practices.	2.20	0.75	Disagree (D)	The respondent generally disagrees or rarely practices the statement.
7. I have access to training or seminars on weed management practices.	1.40	0.75	Strongly Disagree (SD)	The respondent completely disagrees or does not practice the statement at all.
8. The size of my farm influences my choice of weed management practices.	2.73	0.75	Neutral (N)	The respondent neither agrees nor disagrees or occasionally practices the statement.
9. The availability of labor affects my decision to adopt specific weed management techniques.	4.40	0.75	Agree (A)	The respondent generally agrees or frequently practices the statement.

Table 3
Perceptions of weed management practices

Weed Management Practices Questions	Mean	Standard Deviation	Descriptive Rating	Qualitative Interpretation
10. My financial resources allow me to adopt effective weed management practices.	4.20	0.75	Agree (A)	The respondent generally agrees or frequently practices the statement.
11. The cost of my chosen weed management practices is affordable.	2.20	0.75	Disagree (D)	The respondent generally disagrees or rarely practices the statement.
12. My weed management practices have minimal negative impact on the environment.	2.07	0.75	Disagree (D)	The respondent generally disagrees or rarely practices the statement.

Table 4
Factors influencing adoption of weed management practices

Weed Management Practices Questions	Mean	Standard Deviation	Descriptive Rating	Qualitative Interpretation
13.High costs hinder me from adopting sustainable weed management practices.	4.67	0.75	Strongly Agree (SA)	The respondent fully agrees or consistently practices the statement.
14. I lack knowledge or training on sustainable weed management practices.	4.67	0.75	Strongly Agree (SA)	The respondent fully agrees or consistently practices the statement.
15. Sustainable weed management practices require more labor than I can provide or afford.	4.33	0.75	Agree (A)	The respondent generally agrees or frequently practices the statement.
16. Limited availability of resources (e.g., tools, materials) affects my ability to adopt sustainable practices.	4.67	0.75	Strongly Agree (SA)	The respondent fully agrees or consistently practices the statement.
17. My farm's specific conditions (e.g., soil type, climate) make it difficult to adopt sustainable practices.	4.27	0.75	Agree (A)	The respondent generally agrees or frequently practices the statement.

control or crop yield.

Likewise, availability of training showed the lowest, with a mean of 1.40, showing a wide conflict of opinion regarding the availability of educational awareness on weed management practices. Lack of formal training programs can interfere the adoption of best weed management practices, as knowledge is important in agricultural decision-making (Department of Agriculture, 2022). Without proper training, farmers may remain dependent on traditional techniques, limiting the effectiveness of their weed management strategies.

Farm size resulted a neutral rating of 2.73, suggesting that farmers divided their opinion in regards to the effectiveness on weed control practices. Coxhead and Rola (2001) reported varied results on this relationship, emphasizing that larger farms may have better resource access but face different operational challenges.

In contrary, the availability of labor gained the highest mean score (4.40), indicating that labor constraints significantly influence weed management decisions. This finding aligns with Murage et al. (2021), who emphasized labor availability as a key determinant in agricultural practices.

D. Perceptions of Weed Management Practices

Financial resources received a high mean score (4.20), suggesting that farmers generally perceive themselves as financially capable of implementing effective weed management strategies. This aligns with studies emphasizing the role of financial capital in facilitating the adoption of modern agricultural technologies (Bequet, 2020). However, despite this confidence in financial capacity, the affordability of specific weed management practices received a much lower mean score (2.20), indicating general disagreement among farmers. This discrepancy suggests that while farmers may feel financially stable overall, the high costs associated with certain weed management strategies remain a significant barrier. Similarly, Coxhead and Rola (2001) noted that financial limitations often discourage farmers from adopting optimal agricultural practices, reinforcing the need for targeted financial support and cost-effective solutions to promote sustainable weed management. Environmental concerns also emerged as a critical issue, as farmers strongly disagreed that their weed management practices have minimal negative environmental impacts. This finding suggests a potential lack of awareness regarding sustainable alternatives and their benefits (Department of Agriculture, 2022).

E. Challenges in Adopting Sustainable Weed Management Practices

The high mean score (4.67) indicates strong agreement that financial constraints, particularly the high costs of sustainable weed management practices, pose a significant barrier. This finding supports existing research (Bequet, 2020), highlighting economic limitations as a key deterrent to adopting environmentally friendly agricultural techniques.

1) Lack of Knowledge and Training

Farmers also strongly agreed that a lack of knowledge and access to training hinders the adoption of sustainable weed management practices. Prior studies (Manalastas et al., 2020) emphasize that effective knowledge transfer through training programs is essential for enhancing the adoption of modern agricultural techniques. Expanding educational initiatives and extension services could bridge this gap and improve farmers' ability to implement sustainable strategies.

2) Labor Demands and Availability

The mean score of 4.33 suggests that labor requirements pose another major challenge. Sustainable weed management practices often demand more labor, which farmers may not be able to provide or afford (Manalastas et al., 2020).

3) Resource Limitations

Previous research (Giller et al., 2021) has shown that restricted access to agricultural resources can significantly hinder innovation and sustainability efforts.

4) Farm-Specific Environmental Conditions

The mean score of 4.27 reflects agreement that specific farm conditions, including soil type and climate, pose additional challenges to adopting sustainable practices (Duram, 1997).

5. Conclusion

This study examined the demographic, socioeconomic, and farm-related characteristics of corn farmers in Barangay Kitobo, Kitaotao, Bukidnon, with a focus on their weed management practices and adoption challenges. The results indicate that most farmers are male (80%), within the productive age group of 31–40 years, and have limited educational attainment (56.7% completed only elementary education). Most operate small farms (1–5 hectares) and rely solely on farming for their livelihood, with 70% earning over ₱51,000 annually.

The findings reveal that herbicide use is the most common weed management practice (mean score of 3.57), while sustainable methods such as mulching (2.40) and mechanical tool integration (1.57) are less frequently adopted. Key factors influencing adoption include financial constraints (2.20), lack of training opportunities (1.40), and labor availability (4.40). The significant barriers to adopting sustainable practices are high costs (4.67), lack of knowledge (4.67), and limited resource availability (4.67).

Despite perceiving themselves as financially capable, farmers struggle with the affordability of sustainable weed management methods. Addressing financial constraints, enhancing training access, and improving resource availability are essential to promoting the adoption of sustainable weed management practices in Barangay Kitobo.

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