Enhancing Agricultural Sustainability in Geographically Isolated and Disadvantaged Areas (GIDA): A Study on Awareness, Perceptions, and Information-Communication-Education (ICE) Interventions for Organic Fertilizer Adoption in Digkilaan, Iligan City

Annabeth Aque, Almira Faye Guiritan, Edna Nabua

Integrated Developmental School, MSU- Iligan Institute of Technology,

9200 Iligan City, Philippines

DOI: https://dx.doi.org/10.47772/IJRISS.2024.803285S

Received: 13 August 2024; Accepted: 27 August 2024; Published: 28 September 2024

ABSTRACT

This research study focuses on enhancing agricultural sustainability in Geographically Isolated and Disadvantaged Areas (GIDA), specifically in Digkilaan, Iligan City. Through a comprehensive investigation, the study assesses the awareness and perceptions of residents regarding organic fertilizer usage. The research incorporates Information-Communication-Education (ICE) interventions, including seminars and workshops, to promote the adoption of organic farming practices. Findings reveal positive attitudes towards organic fertilizer, with a notable knowledge gap addressed through the ICE campaign. The study recommends expanding educational initiatives, strengthening government support, and encouraging community engagement to foster the sustainable integration of organic farming practices in Digkilaan.

Keywords: Agricultural sustainability, Geographically Isolated and Disadvantaged Areas (GIDA), Information-Communication-Education (ICE) campaign,) Organic fertilizer

INTRODUCTION

Geographically Isolated and Disadvantaged Areas (GIDAs) are characterized by; (a) physical factors isolating the area due to distance, weather conditions, and transportation difficulties, and (b) socio-economic factors isolating the area due to high poverty incidence, presence of vulnerable sector, communities in recovering from situation of crisis or armed conflict. These communities are marginalized populations both physically and socio-economically separating them from mainstream society (DOH, n.d.).

Digkilaan is one of the barangays in Iligan City which is considered as GIDA. From the 2020 census, residents from this area constituted 1.59% of the total population in Iligan City estimating to 5, 764. The 2020 census denoted a growth rate of 2.16% or an increase of 556 people from the previous population of 5, 208 in 2015. The said barangay is situated at approximately 8.2492, 124.3178, in the island of Mindanao. Elevation at these coordinates is estimated at 33.4 meters or 109.6 feet above mean sea level (PhilAtlas, 1990). The primary source of living in this area is farming, such that for every 10 residents, 6 of which owned a farm/ backyard. Few of the crops the residents plant are corn, fruits, vegetables, root crops, coconut trees and spices. Most of the produce from these plants were directly consumed, some were sold, and some were delivered to the marketplace. But despite that the residents in Digkilaan have been farming, few only

knew how to make organic fertilizers.

Fermented plant juice (FPJ) is one of the natural growth enhancers used in organic vegetable production (Alam, 2021). It is an organic fertilizer used in solutions for seed and soil treatments, and plant nutrition. This is done by fermenting young shoots of vigorously growing plants for 7 days in a container with the aid of brown sugar. In the fermenting process, the brown sugar draws the juices out of the plant material via osmosis and this also serves as a food source for the microbes carrying out the process. The weak alcohol produced during fermentation extracts the chlorophyll and other plant components, and the said extracts are non-toxic and edible (Durán-Lara, 2020).

Objectives of the Study

The primary aim of this study is to conduct an information-communication-education (ICE) campaign focused on creating and utilizing organic fertilizer with the aim of empowering the community for sustainable agriculture. The specific objectives of the study are as follows:

1. Assess the level of organic fertilizer awareness among the residents of Digkilaan.
2. Implement an ICE campaign to educate and inform residents about the production and application of organic fertilizer.
3. Investigate the perceptions of respondents regarding organic farming.

It is important to note that this study exclusively targeted the residents of Barangay Digkilaan, with the overarching goal of bolstering the GIDA for sustainable agriculture through the adoption of organic fertilizer practices. The educational aspect of the ICE campaign aimed to enlighten respondents about the detrimental effects of inorganic fertilizers and pesticides, not only on the targeted plants but also on the health risks posed to the immediate community. Consequently, the campaign sought to raise awareness about the benefits and simplicity associated with the production and application of organic fertilizers in cultivating plants and crops.

MATERIALS AND METHODS

The researchers collected samples and prepared an organic fertilizer solution. Moreover, flyers were created to facilitate the seamless execution of the ICE-campaign. Afterward, survey questionnaires were administered, encompassing demographic profiles. These surveys delved into the community's perceptions and were conducted following the completion of the information-communication-education initiative.

Preparation of Fermented Plant Juice (FPJ) Fertilizer

Preparation of FPJ Materials

The researchers prepared the materials to be used in making fermented plant juice which includes molasses and sap of local leafy vegetables such as alugbati (*Basella alba*), and kangkong (*Ipomoea aquatica*).

Making of Fermented Plant Juice (FPJ)

To prepare the fermented plant juice (FPJ), leafy vegetables were carefully collected and cut without rinsing to preserve surface microorganisms crucial for the fermentation process. A 1:1 ratio was maintained, combining 500 grams of cut leafy vegetables with an equal amount of molasses. The mixture was thoroughly blended in a clean container to expedite the osmotic process and extract plant juices. Following mixing, the container's opening was covered with a breathable material and sealed with a rubber band to prevent pests and contaminants. The sealed container was then positioned in a well-ventilated area, shielded

from both artificial and natural light sources, as well as extreme heat or cold conditions.

Figure 1. Collected Leafy Vegetables Samples for FPJ

The FPJ mixture underwent a 24-hour resting period, during which it was assessed for necessary adjustments in volume to prevent mold growth and ensure ample space for microbial fermentation. Following a 7-day fermentation process, the presence of bubbles signified successful fermentation, accompanied by the observation of plant material floating while liquid settled at the bottom. A subtle, sour aroma further indicated the fermentation's completion. These observations guided the harvesting of the FPJ, and the resulting filtrate was stored in a loosely sealed bottle to prevent explosion, considering that microbes continued to produce gas.

The researchers then introduced the prepared FPJ fertilizer in Digkilaan to provide residents with a tangible representation of the final organic fertilizer product. Subsequently, during the ICE campaign, residents were instructed on the step-by-step process of producing their own FPJ fertilizer.

The Conduct of Information-Communication-Education Campaign

The ICE-campaign was strategically initiated immediately after obtaining the demographic profile of the respondents. This comprehensive campaign encompassed a multifaceted approach, featuring an informative session on organic farming, a hands-on workshop guiding participants through the step-by-step process of crafting organic fertilizer.

Additionally, the campaign incorporated the crucial step of gauging the respondents' perceptions regarding the conducted ICE-campaign. This holistic engagement not only disseminated valuable knowledge but also actively involved the community in the learning process, fostering a deeper understanding and appreciation for the principles of organic farming.

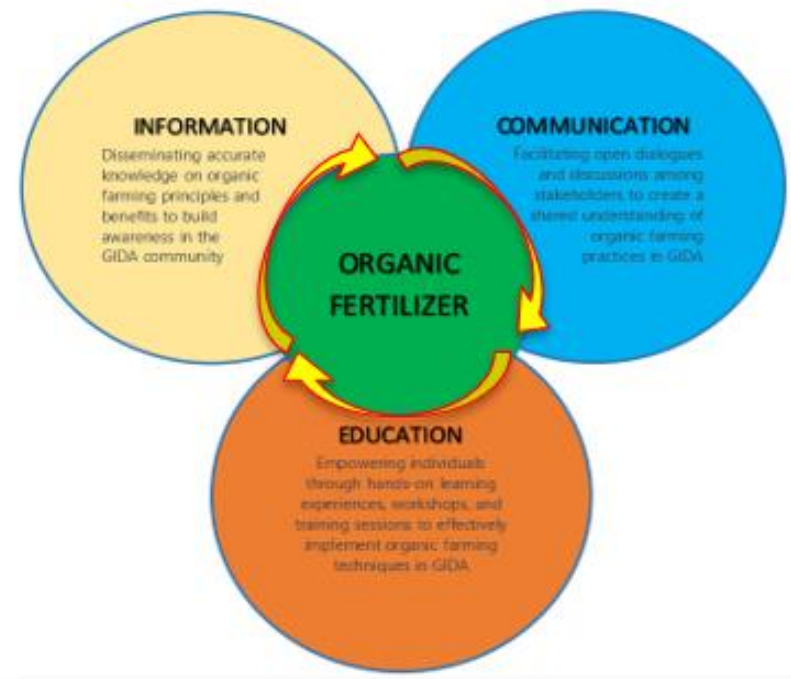

Figure 2. ICE framework on organic farming

RESULTS AND DISCUSSION

Respondent Demographics

The study collected eighteen (18) responses from residents in Barangay Digkilaan, where the majority of the respondents were involved in farming activities, cultivating crops like vegetables and corn for their livelihoods. Notably, forty-five percent (45%) of the respondents employed inorganic fertilizers, while forty-four percent (44%) did not use any fertilizers, and only eleven percent (11%) utilized organic fertilizers as shown on figure 3. The prevalent use of inorganic fertilizers was attributed to the government's supply, limiting the respondents' options.

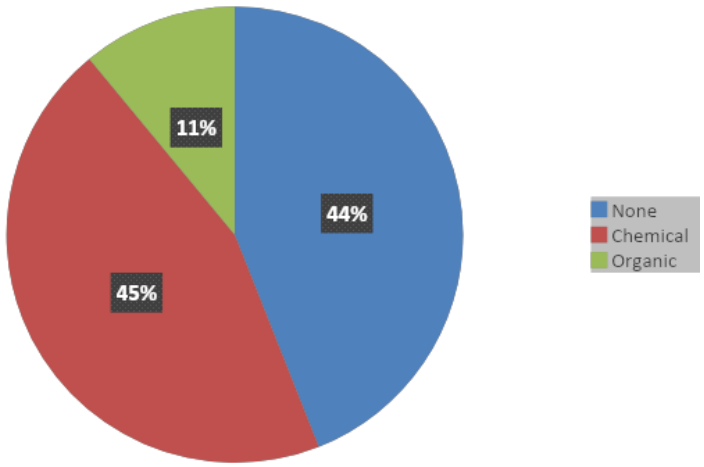

Figure 3. Type of fertilizer used by farmers in Barangay Digkilaan

As indicated in figure 4, a recognition of the issue within the community revealed that eighty-seven percent (87%) of the respondents were aware of the adverse health effects associated with inorganic fertilizers. This

issue within the community involved soil and water pollution, food quality and safety (Setboonsarng & Markandya, 2015), socioeconomic conditions of the residents (Landicho, et.al., 2014) and health and lifestyle (Porciuncula, et.al., 2020), by which, organic agriculture may be resolved (Setboonsarng & Markandya, 2015). However, only eight percent (8%) of the respondents possessed the knowledge of producing and applying organic fertilizers, as evidenced by Figure 5. This knowledge gap emphasized the necessity for targeted educational efforts aimed at enhancing the community's proficiency in organic fertilizer production and utilization.

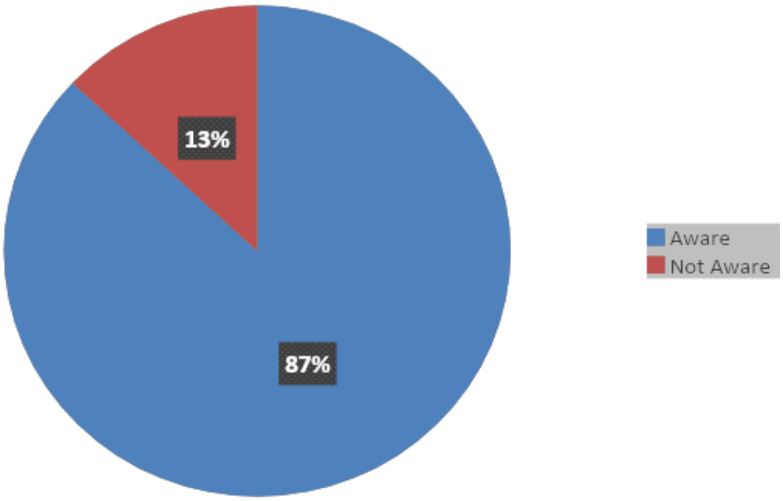

Figure 4. Awareness of respondents of the adverse health effects associated with inorganic fertilizer use

The study findings suggested a clear need for an Information-Communication-Education (ICE) campaign to address the knowledge gap and facilitate the adoption of sustainable agricultural practices (Setboonsarng & Markandya, 2015) in Digkilaan. Such campaigns can serve as practical interventions to bridge the existing disparities in fertilizer usage and promote informed decision-making among the farming community.

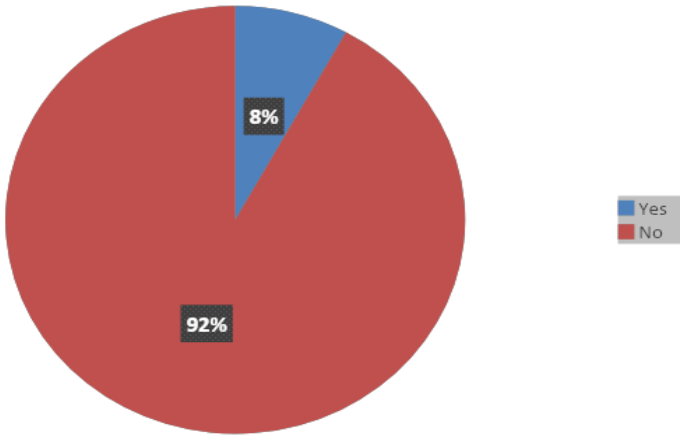

Figure 5. Respondents' knowledge of producing and applying organic fertilizers

Information-Communication-Education (ICE) campaign on the creation and application of fermented plant juice (FPJ) organic fertilizer

The Information-Communication-Education (ICE) campaign, which focused on creating and applying fermented plant juice (FPJ) organic fertilizer in Barangay Digkilaan, took place on November 7 and 11, 2023. The active involvement of eighteen participants revealed a noteworthy level of engagement during the

sessions. The initiative commenced with a seminar on organic farming and the utilization of organic fertilizer. This foundational knowledge was then reinforced through a hands-on workshop, specifically guiding participants in the step-by-step process of creating FPJ organic fertilizer. The participants displayed a notable enthusiasm and willingness to learn the process of making the organic fertilizer. Furthermore, participants were incentivized by a challenge: using the newly acquired knowledge to cultivate pechay (*Brassica rapa subsp. chinensis*). The promise of rewards was contingent upon the successful growth of the cultivated pechay, motivating practical application of the learned concepts. Following the researchers' monitoring and evaluation, the outcomes were positive. This indicates not only a successful transfer of knowledge but also the tangible effectiveness of the fermented plant juice (FPJ) organic fertilizer in promoting plant growth (Diamante, et.al., 2020; Gao, et.al., 2022; Tagotong & Corpuz, 2015). This positive response correlates the potential effectiveness of such educational initiatives in promoting sustainable agricultural practices and underscores the importance of hands-on learning experiences for community engagement and knowledge application (Halliday, 2020).

Respondents' Perception Towards Organic Fertilizer Utilization

The study employed a 30-item researcher-made perception questionnaire, which underwent face validation by content and method experts and exhibited good construct validity, as evidenced by a Cronbach's alpha of 0.753. This indicated that the questionnaire was reliable in gauging the intended perceptions among the participants.

Table 1 on the succeeding page presents a summary of survey responses, revealing a generally positive disposition among respondents in Barangay Digkilaan towards organic fertilizer practices. The mean scores reflect strong agreement in categories such as Farmers' Knowledge and Awareness, Perceived Effectiveness, Environmental and Health Concerns, and Perceptions of Crop Quality and Market Demand, all ranging from 3.566 to 3.666. This suggests that the surveyed individuals possess a robust understanding of organic fertilizers, perceive them as effective, and are concerned about environmental and health implications, as well as the quality and demand for their crops.

Table 1. Summary Table of Farmer Perception Towards Organic Fertilizer Utilization Survey

	Mean	Description
Farmers' Knowledge and Awareness	3.578	Very Positive
Perceived Effectiveness	3.600	Very Positive
Barriers to Organic Fertilizer Usage	2.478	Negative
Environmental and Health Concerns	3.667	Very Positive
Perceptions of Crop Quality and Market Demand	3.567	Very Positive
Government and Policy Support	2.711	Positive
Over-all	**3.267**	**Very Positive**

Note: 1.00 – 1.75 Very Negative 2.51 – 3.25 Positive

1.76 – 2.50 Negative 3.26 – 4.00 Very Positive

Interestingly, the category of Barriers to Organic Fertilizer Usage demonstrates a lower mean score of 2.478, indicating disagreement with perceived obstacles. This suggested a positive inclination towards adopting organic fertilizers, with respondents not perceiving significant barriers. Additionally, while there is positive sentiment towards government and policy support (2.71), there is room for improvement.

The overall mean score of 3.27 reflects a predominantly very positive perception among farmers regarding

organic fertilizer utilization, providing valuable insights for policymakers and agricultural stakeholders to further enhance support mechanisms and address barriers, ultimately fostering a more sustainable and widespread adoption of organic fertilizers in Digkilaan. Potential areas of focus include strengthening government support and addressing any remaining barriers to organic fertilizer usage. Overall, the results point towards opportunities for further advancement in sustainable agricultural practices in the community.

Table 2. Farmers' Knowledge and Awareness

STATEMENTS	MEAN	DESCRIPTION
1. Organic fertilizers are a viable alternative to chemical fertilizers.	3.89	High Awareness
2. I am aware of the different types of organic fertilizers available.	3.22	Aware
3. I understand the benefits of using organic fertilizer for crop production.	3.72	High Awareness
4. I know how to properly apply organic fertilizer in my crops.	3.44	High Awareness
5. I have received training or information on organic fertilizer usage.	3.61	High Awareness
Over-all	**3.58**	**High Awareness**

Note: 1.00-1.75 Unaware 2.51-3.25 Aware

1.76-2.50 Low Awareness 3.26-4.00 High Awareness

The survey results as shown on table 2 from the previous page indicated a positive trend on Farmers' Knowledge and Awareness regarding organic fertilizer practices in the studied area. Respondents demonstrated high awareness (mean score of 3.89) that organic fertilizer is a viable alternative to inorganic fertilizers, affirming a recognition of their efficacy. While the awareness of the different types of organic fertilizers registers a slightly lower mean score of 3.22, respondents still generally agree with this statement. Furthermore, a high awareness was observed (mean scores ranging from 3.61 to 3.72) concerning understanding the benefits of organic fertilizer usage, having knowledge on proper application methods, and receiving relevant training or information. This collective affirmation underscores a commendable level of knowledge and awareness among farmers, providing a solid foundation for the promotion and adoption of organic fertilizer practices in the surveyed community.

Table 3. Perceived Effectiveness

STATEMENTS	MEAN	DESCRIPTION
1. Organic fertilizers improve soil structure and fertility.	3.89	Very High
2. Organic fertilizers enhance crop yield and quality.	3.78	Very High
3. Organic fertilizers reduce the risk of soil degradation.	3.50	Very High
4. Organic fertilizers promote healthier and more resilient crops.	3.67	Very High
5. Organic fertilizers are cost-effective compared to in-organic fertilizers.	3.17	High
Over-all	**3.602**	**Very High**

Note: 1.00-1.75 Very Low 2.51-3.25 High

1.76-2.50 Low 3.26-4.00 Very High

As sustained in Table 3, there was a robust consensus among the respondents in Barangay Digkilaan regarding the positive attributes of organic fertilizers. Notably, the participants demonstrated a very high level of perception for effectiveness (with mean scores ranging from 3.50 to 3.89) that organic fertilizers contribute significantly to improving soil structure and fertility, enhancing crop yield and quality, reducing

the risk of soil degradation, and promoting healthier, more resilient crops. While the statement on cost-effectiveness garnered an agreement with a mean score of 3.17, it indicated a slightly more nuanced perspective, suggesting that respondents generally have high level of perception on the economic advantages of organic fertilizers, there may be room for further exploration or clarification of cost-related aspects in future interventions or educational initiatives. Overall, these findings affirmed a very high level of perceived effectiveness and understanding of the agronomic benefits associated with organic fertilizer use in the surveyed community.

Detailing the barriers to organic fertilizer usage, Table 4 revealed key insights into the perceptions of respondents in Barangay Digkilaan. Notably, participants express high perception with the statements concerning the cost of organic fertilizers (Mean = 2.56) and concerns about their availability and accessibility (Mean = 2.78). On the contrary, respondents had low perception with statements related to the effectiveness of organic fertilizers compared to inorganic alternatives (Mean = 2.22), limited knowledge hindering usage (Mean = 2.39), and challenges in integration into current crop production practices (Mean = 2.44). These results suggested that while cost and availability were acknowledged barriers, there was a generally optimistic view regarding the effectiveness, knowledge accessibility, and integration challenges associated with organic fertilizers. Addressing the cost and accessibility concerns could be pivotal in overcoming these perceived barriers and promoting wider adoption of organic fertilizer practices in the community.

Table 4. Barriers to Organic Fertilizer Usage

STATEMENTS	MEAN	DESCRIPTION
1. The cost of organic fertilizers is prohibitive for me.	2.56	High
2. I have concerns about the availability and accessibility of organic fertilizers.	2.78	High
3. I worry about the effectiveness of organic fertilizers compared to in-organic alternatives.	2.22	Low
4. Limited knowledge and guidance hinder my use of organic fertilizers.	2.39	Low
5. It is challenging to integrate organic fertilizers into my current crop production practices.	2.44	Low
Over-all	**2.48**	**Low**

Note: 1.00-1.75 Very Low 2.51-3.25 High

1.76–2.50 Low 3.26-4.00 Very High

Table 5. Environmental and Health Concerns

STATEMENTS	MEAN	DESCRIPTION
1. I believe that using organic fertilizers is environment-friendly.	3.67	Strongly Agree
2. I am concerned about the negative environmental impact of in-organic fertilizers.	3.44	Strongly Agree
3. I am worried about the health effects of in-organic fertilizer residues in crops.	3.56	Strongly Agree
4. Organic fertilizer use can contribute to reducing water pollution.	3.72	Strongly Agree

5. Organic fertilizer usage can help reduce harmful chemical runoff into water system.	3.94	Strongly Agree
Over-all	**3.66**	**Strongly Agree**

Note: 1.00-1.75 Strongly Disagree 2.51-3.25 Agree

1.76-22.50 Disagree 3.26-4.00 Strongly Agree

Table 5, which was focused on Environmental and Health Concerns, indicated a noteworthy consensus among respondents in Barangay Digkilaan regarding the benefits of organic fertilizers. The mean scores, ranging from 3.44 to 3.94, all reflected a strong agreement. Participants express a strong belief in the environmental friendliness of organic fertilizers, coupled with concerns about the negative environmental impact and health effects of inorganic fertilizers. Moreover, there was a clear recognition that organic fertilizer use can contribute significantly to reducing water pollution and mitigating harmful chemical runoff into water systems. These findings underscore a heightened awareness and positive attitude towards the environmental and health advantages associated with organic fertilizer practices, emphasizing a potential avenue for promoting sustainable agricultural approaches in the community.

Table 6. Perceptions of Crop Quality and Market Demand

STATEMENTS	MEAN	DESCRIPTION
1. Crops grown with organic fertilizers are of higher quality.	3.67	Strongly Agree
2. Consumers are willing to pay a premium for organic fertilizer-grown crops.	3.39	Strongly Agree
3. I have noticed an increase in market demand for organically grown produce.	3.35	Strongly Agree
4. I believe that using organic fertilizers can help me access niche markets.	3.67	Strongly Agree
5. Organic fertilizer usage can improve the marketability of my crops.	3.72	Strongly Agree
Over-all	**3.56**	**Strongly Agree**

Note: 1.00-1.75 Strongly Disagree 2.51-3.25 Agree

1.76-2.50 Disagree 3.26-4.00 Strongly Disagree

The outcomes concerning Perceptions of Crop Quality and Market Demand, as illustrated in Table 6, revealed a favorable agreement among respondents in Barangay Digkilaan regarding the impact of organic fertilizer on agriculture. The mean scores for statements 1 to 5 range from 3.35 to 3.72, all indicating a strong agreement. Notably, respondents strongly agreed that crops cultivated with organic fertilizers exhibit higher quality, and there was a shared belief in the willingness of consumers to pay a premium for such produce. Moreover, participants express confidence in the potential for organic fertilizers to enhance market access through niche markets and improve overall crop marketability. These positive perceptions support the community's inclination toward adopting organic fertilizer practices, indicating awareness of market dynamics and potential economic benefits in organic farming.

The assessment of Government and Policy Support, as outlined in the provided data as outlined in Table 7, shed light on respondents' perceptions regarding governmental backing for organic fertilizer practices. The mean scores, ranging from 2.33 to 3.11, signified a varied perspective on the efficacy of existing policies. While there was agreement on the overall support provided by government policies and incentives for organic fertilizers (mean 2.67) and awareness of programs promoting organic farming (mean 2.83), respondents expressed disagreement regarding personal benefits derived from government support (mean 2.33). Furthermore, the consensus leaned towards agreement in terms of government regulations facilitating the distribution of organic fertilizers (mean 2.61) and the belief that more government support is necessary

to encourage wider adoption (mean 3.11). These nuanced findings suggested an opportunity for policymakers to address specific concerns and further enhance support mechanisms for promoting organic fertilizer adoption in the surveyed community.

Table 7. Government and Policy Support

STATEMENTS	MEAN	DESCRIPTION
1. Government policies and incentives support the use of organic fertilizers.	2.67	Agree
2. I am aware of government programs promoting organic farming.	2.83	Agree
3. I have benefited from government support for organic fertilizer usage..	2.33	Disagree
4. Government regulations facilitate the distribution of organic fertilizers to farmers.	2.61	Agree
5. I believe that more government support is needed to encourage organic fertilizer adoption.	3.11	Agree
Over-all	**2.71**	**Agree**

Note: 1.00-1.75 Strongly Disagree 2.51-3.25 Agree

1.76-2.50 Disagree 3.26-4.00 Strongly Disagree

CONCLUSION AND RECOMMENDATIONS

The survey conducted in GIDA particularly in Barangay Digkilaan, provided valuable insights into the current perceptions and practices related to organic fertilizer usage. The generally positive disposition towards organic farming practices, as evidenced by strong agreement in categories such as Farmers' Knowledge and Awareness, Perceived Effectiveness, and Environmental and Health Concerns, underscores the community's receptiveness to sustainable agricultural approaches. The Information-Communication-Education (ICE) campaign, particularly the workshop on making FPJ organic fertilizer, proved to be a successful initiative. The enthusiastic participation of eighteen (18) respondents and the subsequent positive outcomes, especially in the cultivation of pechay (*Brassica rapa subsp. chinensis*), highlight the potential impact of targeted educational programs on promoting practical adoption of organic farming techniques.

To accelerate the sustainable integration of organic farming practices in Barangay Digkilaan (GIDA), the following recommendations are proposed:

Expand Educational Initiatives: Based on the success of the ICE campaign, there is a need to expand and sustain educational programs on organic farming practices. Regular workshops, seminars, and training sessions can further enhance the community's knowledge and skills, fostering a continuous shift towards sustainable organic farming.

Government Support: While there is a positive perception of government policies supporting organic fertilizer usage, efforts should be directed towards ensuring tangible benefits reach individual farmers. Strengthening existing programs and introducing incentives for organic farming can further encourage widespread adoption.

Community Engagement: Encouraging community involvement through challenges and rewards, as demonstrated with the pechay (*Brassica rapa subsp. chinensis*) cultivation, proves effective. Similar initiatives can be organized to maintain momentum and motivate continuous application of organic farming

techniques.

Monitoring and Evaluation: Establishing a system for ongoing monitoring and evaluation of the impact of organic farming practices in Barangay Digkilaan is crucial. This will provide valuable feedback for refining educational strategies and ensuring sustained positive outcomes.

By combining targeted education, government support, community engagement, and ongoing evaluation, Barangay Digkilaan can continue to advance its journey towards sustainable and organic agricultural practices, benefiting both the environment and the well-being of the GIDA residents.

ACKNOWLEDGEMENT

The researchers extend their gratitude to the Barangay Captain of Digkilaan for granting permission to conduct the Information-Communication-Education (ICE) initiatives in the area. Appreciation is also directed towards the Digkilaan Central School Principal for generously providing a venue for the ICE activities. Special acknowledgment is reserved for the dedicated course adviser, whose guidance proved invaluable throughout the research and educational campaign. The researchers are thankful for the support and assistance from the teachers who facilitated sessions and to the residents of Barangay Digkilaan for their active and enthusiastic participation. Without their collaboration, the research endeavor aimed at promoting sustainable agricultural practices would not have been possible. The collective support, along with the guidance of the course adviser, significantly contributed to the success of the efforts in fostering agricultural sustainability in the community.

REFERENCES

1. Alam, E. A. (2021). Lettuce Grown in the Open Field and Protected Culture Applied with Different Fermented Plant Juices. Lukad: An Online Journal of Pedagogy, 1(2), 109-120.
2. Diamante, R. A., Banca, N. A., Almarza, A. C., Espina, K. J. B., & Alipe, J. R. A. (2022). Performance and Growth of Pechay Using Fermented Plant Juice. Google Scholar
3. Digkilaan, Iligan Profile – PhilAtlas. (1990, May 1). https://www.philatlas.com/mindanao/r10/iligan/digkilaan.html
4. DOH (Department of Health). n.d. "Geographically Isolated and Disadvantaged Areas (GIDA)." Accessed December 3, 2023. https://www.doh.gov.ph/faqs/Geographically-Isolated-and-Disadvantaged-Areas-GIDA
5. Landicho, L.D., Paelmo, R.F., Cabahug, R.D., Visco, R.G. & Abadillos, M.G. (2014). Prospect and challenges in food security and nutrition. In Proceedings International Promoting Organic Agriculture in the Upland Communities in the Philippines: Implications to Conference on Food Security and Nutrition. (vol. 67, 60-65). Singapore: IACSIT Press.
6. Durán-Lara, E. F., Valderrama, A., & Marican, A. (2020). Natural organic compounds for application in organic farming. Agriculture, 10(2), 41.
7. Gao, F., Li, H., Mu, X., Gao, H., Zhang, Y., Li, R., … & Ye, L. (2023). Effects of organic fertilizer application on tomato yield and quality: a meta-analysis. Applied sciences, 13(4), 2184.
8. Halliday, T. A. (2020). Use of information, education and communication (IEC)-based materials: An effective teaching-learning strategy in nutrition education. International Journal of Research and Scientific Innovation, 7(9), 350-354.
9. Porciuncula, F.L., Galang, L.M. & Parayno, R.S. (2014). Going organic: understanding the organic vegetable production environment in central Luzon, Philippines. International Journal of Scientific and Technology Research. 3(8), 81-91.
10. Setboonsarng, S. & Markandya, A. (2015). Organic agriculture and post-2015 development goals Retrieved December 3, 2023, from https://www. adb.org/sites/default/files/publication/161042/organic-agriculture-post-2015-developmentgoals.pdf

11. Tagotong, M. B., & Corpuz, O. (2015). Bio-organic fertilizer on pechay homegarden in Cotabato. American Journal of Agriculture and Forestry, 3(6-1), 6-9. Google Scholar