

Knowledge and Practices in Organic Agriculture Production among Grade 12 Students of Gamu Agri-Fishery School, Isabela

Ricardo B. Vigan

Master of Arts Program, Northeastern College, Santiago City, Isabela, Philippines

Email of Corresponding Author: ricardovigan@gmail.com

Publication history:

Received: September 10, 2026

Revised: October 6, 2026

Accepted: October 8, 2026

Published: October 9, 2026

International Journal of Sustainable and Integrated Studies, Vol. 1, No. 3, pp. 214–225, October 2026.

Abstract

This study assessed the knowledge and practices of Grade 12 Organic Agriculture students of Gamu Agri-Fishery School in Linglingay, Gamu, Isabela, and examined the relationship between these two variables. Anchored on a Knowledge–Practice Framework informed by experiential and competency-based learning, the study employed a quantitative, cross-sectional descriptive-correlational design. Total enumeration was used involving all 35 Grade 12 Organic Agriculture students. Data were gathered through a researcher-developed structured questionnaire consisting of an objective knowledge assessment and a frequency-based practice scale. Descriptive statistics and Spearman’s rank-order correlation were employed in analyzing the data. Results showed a high level of knowledge, with an overall performance of 85.43% and 88.57% of the respondents classified as having high or very high knowledge. Organic agriculture practices were also consistently demonstrated, with an overall mean of 3.57 and 94.29% of respondents classified under the “Always” category. Students demonstrated their strongest competencies in composting, organic-input utilization, soil fertility, and farm management, while pest and disease management obtained comparatively lower results. A moderately strong positive and statistically significant relationship was found between knowledge and practices ($\rho = .641$, $p < .001$), indicating that greater knowledge tended to correspond with more frequent application of organic agriculture practices. The study concludes that the students possess substantial theoretical understanding and practical competencies in organic agriculture production. Continued integration of classroom instruction with hands-on agricultural activities is recommended, with greater emphasis on organic pest and disease management. The study supports SDG 2 on sustainable food production, SDG 4 on quality education, and related goals concerning responsible production, decent work, climate action, and environmental protection. Its sustainability impact lies in strengthening agricultural education, environmental responsibility, youth agricultural competency, and preparation for sustainable livelihoods and food-production systems.

Keywords: Agricultural Education; Knowledge; Organic Agriculture Production; Practices; Sustainable Agriculture; Sustainable Development; Technical-Vocational-Livelihood Education

1. Introduction

Organic agriculture has become increasingly relevant to discussions on sustainable food production, environmental protection, food security, rural development, and agricultural education. Unlike approaches that depend heavily on synthetic agricultural inputs, organic agriculture emphasizes ecological processes, soil health, biodiversity, recycling of organic materials, and production practices intended to reduce adverse environmental effects. Its growing importance is reflected in the continued expansion of the global organic sector. The Research Institute of Organic Agriculture FiBL and IFOAM – Organics International (2026) reported that global retail sales of organic food and beverages reached approximately €145.0 billion in 2024, while organically managed agricultural land totaled 98.9 million hectares and the number of organic producers reached approximately 4.8 million worldwide. These figures demonstrate that organic agriculture is no longer a marginal production approach but an established component of contemporary agricultural systems. The growing significance of organic agriculture also creates an educational responsibility. Sustainable agricultural systems require individuals who not only understand ecological agricultural principles but can also translate knowledge into appropriate production practices. Research suggests that the benefits and limitations of organic agriculture should be understood through evidence rather than through the assumption that organic systems are automatically superior in all environmental dimensions. Debuschewitz and Sanders (2022), after examining 93 scientific publications, emphasized that the environmental performance of organic agriculture depends partly on the indicators, production contexts, and reference units used in assessment. At the same time, recent literature identifies soil management, organic amendments, crop diversification, biofertilizers, and biological pest-management approaches as important components of sustainable organic production (Rani et al., 2023). The role of young people is particularly important in the Philippine agricultural context. According to the Philippine Statistics Authority (PSA, 2026), the Philippines had 7.72 million agricultural operators in 2022, with a median age of 49.7 years. Only 8.9% belonged to the 15–29 age group, while 49.3% were already 50 years old or older. These figures reinforce concerns about generational continuity in agriculture and highlight the importance of developing agricultural competencies among young people before they enter higher education, employment, entrepreneurship, or farming. Senior high school therefore represents a critical stage for examining agricultural knowledge and practice. In the Philippine K to 12 curriculum, the Department of Education (DepEd, 2022) specifically provides Organic Agriculture (NC II) as a Grade 12 Technical-Vocational-Livelihood specialized subject. The curriculum expects learners to understand concepts, perform core competencies in organic agriculture operations, and explore employment and livelihood opportunities related to organic agriculture. Thus, determining whether students possess adequate knowledge and whether such knowledge is reflected in actual or reported organic agriculture practices can provide useful evidence regarding the development of sustainability-related competencies among senior high school learners. Against this background, the present study focuses on the knowledge and practices of Grade 12 students on organic agriculture production. Knowledge represents students' understanding of organic agriculture principles, production methods, soil and nutrient management, organic inputs, crop care, pest management, environmental protection, and related concepts. Practices refer to the extent to which students apply or participate in appropriate organic agriculture activities. Examining both dimensions is important because knowledge alone does not necessarily demonstrate the ability or willingness to apply sustainable agricultural practices.

Agriculture faces the challenge of producing sufficient food while preserving the natural resources needed for future production. Organic agriculture addresses this concern by promoting ecological processes, recycling organic resources, reducing reliance on synthetic inputs, and supporting soil and ecosystem health. Rani et al. (2023) highlighted the contribution of organic amendments and crop diversification to soil health and sustainable crop production, while Debuschewitz and Sanders (2022) emphasized that environmental outcomes depend on production conditions, yields, land use, and assessment indicators. These perspectives underscore the importance of agricultural education in helping students understand both the scientific principles and practical applications of organic production, including soil fertility, organic inputs, crop management, pest management, farm sanitation, and responsible resource use. The growth of organic agriculture further strengthens the need for competent future agricultural practitioners. In 2024, approximately 98.9 million hectares were managed organically worldwide, involving 4.8 million producers and €145.0 billion in global organic food and beverage sales (FiBL & IFOAM – Organics International, 2026). In the Philippines, youth participation in agriculture remains limited, with only 8.9% of agricultural operators aged 15–29 (PSA, 2026). This highlights the importance of exposing senior high school students to agricultural knowledge, practical skills, and livelihood opportunities. Government programs likewise emphasize experiential agricultural learning. In 2025, 150 young farmers completed the National Youth Internship Program on Organic Agriculture and established 150 organic agriculture enterprises after completing a 21-month training and enterprise-development program (Department of Agriculture, 2025). At the secondary level, DepEd (2022) integrates conceptual and practical competencies through the Grade 12 Organic Agriculture (NC II) curriculum. However, curriculum exposure alone does not ensure equal levels of knowledge and practice because students may differ in access to facilities, inputs, training, and hands-on activities. Assessing both knowledge and practices is therefore necessary to identify students' strengths and areas requiring further development.

Recent literature highlights three major themes concerning young people and organic agriculture: agricultural knowledge, the knowledge–practice relationship, and experiential learning. Manning et al. (2024) found that primary and secondary students generally understood conventional agriculture but had limited knowledge of modern agricultural careers and technologies, indicating the need for stronger formal and informal agricultural education. Similarly, Quijano-Pagutayao (2024) assessed 383 Grade 12 students in Bukidnon and showed the importance of examining agricultural knowledge, attitudes, skills, and motivation among learners approaching decisions on higher education, employment, entrepreneurship, and livelihood. Bisenio et al. (2025) likewise found that Senior High School TVL Agriculture students recognized the environmental benefits of organic agriculture, although awareness was limited among some learners. Their study further showed that hands-on experiences increased students' interest, suggesting that practical participation can strengthen understanding and relevance. Another theme concerns the relationship between knowledge and actual practice. Arga and Labasan (2025), in a study of 21 organic farmers in Calabanga, Camarines Sur, found that 57.1% had good knowledge, 28.6% had excellent knowledge, and 14.3% had very good knowledge of organic practices. However, adoption varied, with 100% using organic fertilizers, 71.4% practicing seed saving, and 57.1% practicing crop rotation. Reported barriers included high costs of organic inputs (71.4%), lack of knowledge or training (57.1%), and insufficient government support (57.1%). Fernandez et al. (2025), studying 300 farmers in the SOCCSKSARGEN Region, also examined knowledge, attitudes, and practices, reinforcing the importance of assessing these dimensions separately. These findings suggest that knowledge does not always translate directly into practice because application may depend on resources, training, opportunities, and institutional support. Experiential and competency-based learning also emerged as an important theme. Alcantara and Andal (2025) emphasized constructivist, experiential, and skills-oriented learning among Grade 11 and Grade 12 TVL Agricultural and Fishery Arts learners. Alsiken-Nanglegan (2023) likewise found positive agricultural and socioeconomic outcomes from an Organic Agriculture Production training program in Northern Philippines, while Nanglegan (2024), using 105 accounts of change from beneficiaries in Ifugao, identified improvements in knowledge, attitudes, skills, economic conditions, and social circumstances. Sáenz et al. (2024), based on 358 organically certified farms in Spain, further showed that technical knowledge develops through multiple pathways, including formal instruction, social learning, organizations, and practical experience. Taken together, the literature indicates that knowledge and practice are related but distinct constructs; therefore, assessing both provides a more complete understanding of students' preparedness for sustainable agricultural production.

At the Philippine school and community level, recent studies indicate continuing opportunities to strengthen youth participation in sustainable agriculture. Research among TVL learners in Camarines Sur found that hands-on exposure can strengthen students' interest in organic agriculture (Bisenio et al., 2025), while research involving 383 Grade 12 students in Bukidnon demonstrated the relevance of assessing youth agricultural knowledge before their transition to further education and employment (Quijano-Pagutayao, 2024). Studies of organic agriculture training beneficiaries in Ifugao likewise demonstrate that structured training can influence knowledge, skills, and socioeconomic outcomes (Alsiken-Nanglegan, 2023; Nanglegan, 2024). These studies provide Philippine evidence that agricultural learning is strengthened when theoretical instruction is connected with actual experience. At the national level, the inclusion of Organic Agriculture (NC II) in the Grade 12 TVL curriculum provides an institutional foundation for developing organic production competencies among Filipino students (Department of Education, 2022). At the same time, the age distribution of agricultural operators presents a long-term human-resource concern: only 8.9% of operators in 2022 were aged 15–29, compared with 49.3% who were already 50 years old or above (PSA, 2026). Recent youth internship initiatives in organic agriculture demonstrate that government agencies are attempting to address this concern by combining technical training, farm exposure, mentoring, and enterprise development. Globally, the continued scale of organic production and trade increases the importance of developing agricultural literacy among future producers, consumers, entrepreneurs, technicians, and decision-makers. The presence of approximately 98.9 million hectares of organic farmland and 4.8 million organic producers worldwide indicates an established international sector with continuing demand for knowledge and technical competency (FiBL & IFOAM – Organics International, 2026). Moreover, research involving secondary students internationally suggests that schools have an important role in developing sustainability knowledge. Chiriac and Iașu (2023), for example, surveyed 496 secondary students and found that school was regarded as a major source of sustainable development knowledge. These local, national, and global conditions collectively support the need to examine how well Grade 12 students understand organic agriculture and how extensively they engage in its practices. Such evidence can help determine whether current educational experiences are merely creating awareness or are developing competencies that can be applied to sustainable agricultural production.

The present study may be anchored on a Knowledge–Practice Framework informed by experiential and competency-based learning. Under this framework, knowledge and practice are treated as connected but empirically distinct dimensions of organic agriculture competency. The knowledge dimension refers to students' cognitive understanding of the principles and procedures associated with organic agriculture. Based on the DepEd (2022) competency orientation and contemporary organic agriculture literature, this may include understanding

organic agriculture principles, soil and nutrient management, organic fertilizers and amendments, crop production, pest and disease management, utilization of organic materials, environmental protection, and appropriate production procedures. Knowledge represents what learners understand and can recognize or explain. The practice dimension, in contrast, concerns the application of relevant behaviors or production activities. This may include participation in composting or organic fertilizer preparation, appropriate handling and recycling of biodegradable farm materials, soil conservation, organic crop management, non-synthetic approaches to pest management, crop diversification or rotation where applicable, farm sanitation, and other environmentally responsible agricultural activities. These indicators should ultimately be aligned with the exact learning competencies and actual activities available to the respondents rather than assuming that every Grade 12 learner has access to a farm. The proposed relationship between the two variables is supported by knowledge–practice research in organic agriculture. Fernandez et al. (2025) demonstrated the usefulness of measuring knowledge and practices as separate dimensions, while Arga and Labasan (2025) showed that even knowledgeable farmers differed in the extent to which particular organic methods were practiced. Thus, the present study should test rather than presume that greater knowledge is associated with a higher extent of organic agriculture practices. Experiential learning further strengthens this conceptual basis. Alcantara and Andal (2025) emphasized hands-on and experiential elements in organic agriculture education, while Bisenio et al. (2025) observed that practical exposure enhanced students' interest in organic farming. The framework therefore recognizes that classroom instruction, agricultural subject exposure, participation in school gardens or farms, household farming experience, seminars or training, and similar learning opportunities may help explain differences in students' knowledge and practices. Conceptually, the study can therefore examine Knowledge of Organic Agriculture Production → Organic Agriculture Practices, while recognizing that opportunities for hands-on exposure and access to agricultural activities may influence how knowledge is translated into practice. Because the proposed study is nonexperimental, any observed association should be interpreted as a relationship rather than proof that knowledge directly causes practice.

Several research gaps justify the proposed study. First, a population gap exists. Much of the recent Philippine research on organic agriculture focuses on practicing farmers, program beneficiaries, trainees, or out-of-school youth. Arga and Labasan (2025) investigated organic farmers; Fernandez et al. (2025) examined farmers in Region XII; Alsiken-Nanglean (2023) and Nanglean (2024) investigated organic agriculture training beneficiaries; and Soverano (2026) focused on Filipino out-of-school youth. These populations provide valuable evidence, but their experiences cannot automatically represent Grade 12 students who are still developing agricultural competencies through formal education. Second, a variable gap remains in student-focused studies. Recent studies have examined agricultural knowledge, psychosocial characteristics, awareness, interest, career intention, environmental awareness, and entrepreneurial competencies among senior high school learners (Quijano-Pagutayao, 2024; Bisenio et al., 2025; Alcantara & Andal, 2025). However, fewer Philippine studies have directly examined the combination of specific organic agriculture knowledge and corresponding production practices among Grade 12 students. Third, an implementation gap exists between curriculum intentions and empirical evidence of learning outcomes. DepEd already provides a Grade 12 Organic Agriculture (NC II) competency framework, but the presence of curricular content alone cannot demonstrate that learners have mastered the concepts or are consistently applying relevant practices. Empirical assessment is therefore needed to determine areas in which learners demonstrate adequate knowledge and practice and areas where additional instruction, facilities, demonstrations, farm exposure, or extension activities may be required. Fourth, there is a knowledge-to-practice gap that deserves direct investigation. Existing research indicates that the adoption of organic methods may be constrained even among individuals with agricultural knowledge. Financial resources, training, institutional assistance, opportunities for application, and access to production materials can affect actual practices (Arga & Labasan, 2025). Among students, similar contextual conditions may influence whether theoretical knowledge becomes observable or self-reported practice. The present study is therefore justified as an assessment of the extent to which Grade 12 students possess the knowledge required for organic agriculture production and the extent to which relevant practices are applied. Its results can establish baseline evidence for improving classroom instruction, practical activities, school-based agricultural projects, competency development, and future agricultural extension initiatives. Depending on the final research questions, the study may also examine whether knowledge is significantly associated with practices and whether students' agricultural exposure is related to differences in these variables. Importantly, the present Introduction does not assume what the eventual respondents' levels of knowledge or practice will be. Whether knowledge is high or low, whether practices are frequently or rarely performed, and whether the two variables are significantly related must be determined from the actual data gathered from the Grade 12 respondents.

The study is directly aligned with SDG 2 – Zero Hunger, particularly Target 2.4, which emphasizes sustainable food-production systems and resilient agricultural practices that maintain ecosystems and progressively improve land and soil quality. Assessing young people's knowledge and practices concerning organic agriculture provides educational evidence relevant to preparing future participants in sustainable food-production systems. The study does not claim that organic agriculture alone can accomplish SDG 2; rather, it examines competencies related to one recognized approach to sustainable agricultural production. The research also supports SDG 4 – Quality Education, especially Target 4.7, which calls for learners to acquire the knowledge and skills needed to promote

sustainable development. Assessing not only what Grade 12 students know but also what they practice is particularly relevant because SDG 4.7 concerns the integration of education for sustainable development into curricula and student learning. The study further relates to SDG 8 – Decent Work and Economic Growth because competencies in organic production can support future agricultural employment, livelihood, and agripreneurship. The Department of Agriculture's youth organic agriculture program demonstrates an existing pathway from training to enterprise development, with 150 graduates establishing 150 organic agriculture enterprises in its 2025 cohort (Department of Agriculture, 2025). It is likewise relevant to SDG 12 – Responsible Consumption and Production, because organic agriculture education emphasizes responsible management of production inputs, recycling of biological resources, and environmentally responsible agricultural practices. SDG 13 – Climate Action is related through education concerning resilient and environmentally sustainable agricultural practices, while SDG 15 – Life on Land is relevant to the study's concern with soil quality, biodiversity-conscious production, and sustainable management of terrestrial resources. These alignments should be interpreted as areas to which the research can contribute educational evidence, rather than as direct environmental outcomes that can be claimed before the actual student practices are measured.

The significance of the study extends beyond agricultural education because the knowledge and practices associated with organic agriculture intersect with several dimensions of sustainability. From an educational sustainability perspective, the research can provide evidence regarding whether Grade 12 learners are developing knowledge and competencies consistent with curriculum expectations. Results can assist teachers and school administrators in identifying concepts that require reinforcement and practical skills that may benefit from additional demonstrations, laboratory activities, garden-based instruction, or farm exposure. From an environmental and ecological sustainability perspective, the study can determine students' understanding and application of practices associated with soil management, organic resource utilization, crop management, biodiversity, and reduced dependence on potentially harmful production inputs. This is important because environmental literacy becomes more meaningful when learners can connect principles with responsible actions. Recent research among senior high school students has likewise demonstrated relationships between environmental awareness and particular sustainable development practices, although such relationships may vary according to the behavior being examined (Toledo & Lingon, 2024). From a socioeconomic sustainability perspective, strengthening organic agriculture competencies among young people may expand awareness of agriculture not only as traditional farm labor but also as a field involving entrepreneurship, technology, production, processing, marketing, and livelihood creation. The country's limited proportion of young agricultural operators makes this dimension particularly important. The study can therefore contribute evidence useful for designing learning experiences that make agricultural competencies more relevant to the livelihood and career decisions of young people. From an institutional and community sustainability perspective, findings may help schools determine whether existing classroom and practical learning opportunities are sufficient and where collaboration with agricultural agencies, local government units, training institutions, farms, and community organizations may be beneficial. Sáenz et al. (2024) demonstrated that agricultural technical knowledge develops through multiple pathways, including organizations and socially based learning, emphasizing the importance of learning ecosystems beyond formal instruction alone. Ultimately, the value of the study lies in establishing empirical evidence regarding whether Grade 12 students possess both the understanding and practical orientation necessary for organic agriculture production. By identifying possible strengths and gaps between knowledge and practice, the research can support decisions concerning curriculum enhancement, experiential learning, youth agricultural engagement, sustainable livelihood preparation, and environmental education. In this manner, the study connects education, agriculture, environment, youth development, and socioeconomic opportunity within a multidisciplinary sustainability framework.

2. Material and methods

2.1 Research Design

The study will use a quantitative, cross-sectional descriptive-correlational research design. The descriptive component is appropriate because the study seeks to determine the current level of knowledge and extent of organic agriculture practices among Grade 12 students without manipulating any variable. The correlational component will be used to determine whether a significant relationship exists between students' knowledge and their reported organic agriculture practices. Creswell and Creswell (2023) explained that quantitative research is appropriate when variables can be measured numerically and analyzed statistically to describe patterns and investigate relationships among variables. In the present study, knowledge will be measured through objectively scored questionnaire items, while practices will be assessed through frequency-based statements. Since the data will be gathered at one point in time, the study is also cross-sectional in nature.

2.2 Locale of the Study

The study will be conducted at Gamu Agri-Fishery School, located in Barangay Linglingay, Gamu, Isabela. The school is under the Schools Division of Isabela and offers agriculture-related education, making it an appropriate setting for investigating students' knowledge and practices concerning organic agriculture production. The locale

is particularly appropriate because the respondents are Grade 12 students studying Organic Agriculture. This provides an educational environment in which students are expected to acquire both conceptual knowledge and practical competencies related to agricultural production. The Department of Education's Organic Agriculture (NC II) curriculum for Grade 12 emphasizes concepts and competencies in performing organic agriculture operations, supporting the relevance of assessing both what students know and what they practice (Department of Education, 2022).

2.3 Respondents of the Study

The respondents of the study will consist of 35 Grade 12 Organic Agriculture students of Gamu Agri-Fishery School in Linglingay, Gamu, Isabela. These students constitute the target population because they are currently exposed to formal instruction and practical learning activities related to organic agriculture production. The respondents are considered appropriate sources of data because the study specifically aims to assess knowledge acquired through their agricultural education and the extent to which organic agriculture practices are performed or applied. Participation will be limited to students officially enrolled in the identified Grade 12 Organic Agriculture group during the conduct of the study.

2.4 Sample and Sampling Procedure

The study will employ total enumeration or census sampling. All 35 Grade 12 Organic Agriculture students will be invited to participate in the study; therefore, no smaller sample will be drawn from the population. Total enumeration is appropriate because the target population is relatively small and accessible. Including all eligible students allows the researchers to obtain information from the entire identified population rather than estimate its characteristics from a subset. Consequently, no sample-size formula will be necessary. However, the findings will primarily represent the Grade 12 Organic Agriculture students of Gamu Agri-Fishery School and should not automatically be generalized to Grade 12 students in other schools or locations.

2.5 Research Instrument

The primary data-gathering instrument will be a researcher-developed structured questionnaire designed to measure two major variables: knowledge of organic agriculture production and organic agriculture practices. The development of the questionnaire will be guided primarily by the competencies identified in the Department of Education's Organic Agriculture (NC II) curriculum and relevant recent literature on organic agriculture education and production. The DepEd curriculum emphasizes the understanding of concepts and performance of core competencies in organic agriculture operations (Department of Education, 2022). The knowledge component will consist of objective questions covering relevant concepts and competencies in organic agriculture production. These may include principles of organic agriculture, soil and nutrient management, preparation and use of organic fertilizers or compost, crop production and management, environmentally appropriate pest and disease management, management of organic agricultural wastes, and other competencies applicable to the students' curriculum. Multiple-choice questions are recommended for this component. Each correct response will be assigned a score of 1, while an incorrect response will receive a score of 0. Individual scores will be summed to obtain the respondent's overall knowledge score. This procedure is preferable to asking students to rate how knowledgeable they believe they are because it provides a more objective assessment of actual knowledge. The practice component will measure how frequently students perform organic agriculture activities covered by their learning experiences. Statements may address practices such as preparation and application of organic fertilizers, composting, proper management of biodegradable materials, soil preparation and conservation, crop establishment and maintenance, appropriate pest-management practices, farm sanitation, and responsible use of agricultural resources. Responses may be measured using a four-point frequency scale consisting of 4 – Always, 3 – Often, 2 – Sometimes, and 1 – Never. Only practices that students can reasonably be expected to encounter or perform within their school, household, or agricultural learning experiences should be included. Before its final administration, the questionnaire should undergo content and face validation by qualified experts in organic agriculture, agricultural education, and research or measurement to determine whether the items adequately represent the constructs being measured. Roebianto et al. (2023) emphasized that content validation is important in determining whether questionnaire items adequately represent the intended variables or constructs. A Content Validity Index may be employed to systematically assess the relevance and clarity of the items. The revised instrument should also be pilot-tested among students with characteristics comparable to those of the respondents but who will not be included in the final study. Internal consistency of the objectively scored knowledge component may be examined using the Kuder-Richardson Formula 20 (KR-20), while the internal consistency of the practice scale may be assessed using Cronbach's alpha. Instrument validation and reliability assessment are important because conclusions based on questionnaire data depend on the quality of the measurement instrument (Wafudu et al., 2022).

2.6 Data Gathering Procedure

Prior to data collection, the researchers will secure permission from the appropriate school authorities of Gamu Agri-Fishery School. Coordination will also be undertaken with the concerned teacher or school personnel to identify an appropriate schedule for questionnaire administration without unnecessarily disrupting regular classes.

After approval, the purpose of the study, procedures, expected participation, confidentiality measures, and voluntary nature of participation will be explained to the respondents. Appropriate informed consent procedures will be followed. For respondents who are minors, parental or guardian consent and student assent should be obtained in accordance with applicable school and research ethics requirements. Students who are already of legal age should provide their own informed consent. The validated questionnaire will then be administered personally or through an approved school-based arrangement. Respondents will be provided sufficient time to complete the instrument independently. They will be instructed not to write identifying information unless such information is essential to the study. The researchers will retrieve the completed questionnaires, check them for completeness, assign codes to the responses, and encode the data for statistical analysis. Participation will remain voluntary, and respondents will be informed that they may decline or withdraw without academic penalty. Individual answers will be treated confidentially, and results will be presented in aggregated form. These procedures are consistent with contemporary recommendations that survey research establish clear validity procedures, informed participation, and appropriate protection of respondents (Hill et al., 2022; Wafudu et al., 2022).

2.7 Data Analysis Techniques

The collected data will be analyzed using descriptive and inferential statistics appropriate to the study objectives. Frequency and percentage may be used to describe relevant respondent characteristics if demographic variables are included in the questionnaire. For the knowledge variable, the number of correct responses will be summed to obtain each respondent's total knowledge score. The mean, standard deviation, frequency, percentage, and percentage of correct responses may be used to describe overall performance and identify knowledge areas in which students demonstrate greater or lesser understanding. Item-level percentages may also be examined to identify specific organic agriculture concepts that require instructional reinforcement. Interpretation categories for knowledge should be established before data analysis and should be based on the final number and structure of knowledge questions rather than created after observing the results. For the practice variable, the responses to the four-point frequency scale will be summarized using the weighted mean and standard deviation. When equal intervals are used for descriptive interpretation, mean scores may be interpreted as 3.26–4.00, Always; 2.51–3.25, Often; 1.76–2.50, Sometimes; and 1.00–1.75, Never. Individual practice items and the overall practice score will be examined to determine which organic agriculture activities are most and least frequently performed by the respondents. To determine whether students with greater knowledge also tend to report greater engagement in organic agriculture practices, Spearman's rank-order correlation coefficient (Spearman's rho) will be used. Spearman's rho is appropriate because the study has a relatively small population of 35 respondents and the practice data originate from an ordinal frequency scale. The relationship will be tested at a 0.05 level of significance. A statistically significant positive coefficient will indicate that higher knowledge scores tend to be associated with higher practice scores, while a nonsignificant result will indicate insufficient evidence of a relationship between the two variables in the study population. Because the research is nonexperimental and cross-sectional, any significant relationship will be interpreted as an association rather than a causal effect.

3. Results and Discussion

3.1 Knowledge of Organic Agriculture Production

The results indicate that the students demonstrated a generally high level of knowledge of organic agriculture production. From a maximum score of 30, the respondents obtained an overall mean score of 25.63, equivalent to 85.43% correct responses, with a standard deviation of 1.85. Of the 35 respondents, 11 students or 31.43% were classified as having a very high level of knowledge, 20 or 57.14% had a high level, and 4 or 11.43% had a moderate level. No respondent fell under the low knowledge category. Overall, 88.57% of the respondents demonstrated either high or very high knowledge of organic agriculture production. This result suggests that the students have developed substantial conceptual understanding of organic agriculture, which is reasonable considering that they are specifically enrolled in Organic Agriculture and are exposed to both technical instruction and competency-oriented learning. The Grade 12 Organic Agriculture NC II curriculum specifically requires learners to explain concepts and perform core competencies in organic agriculture operations (Department of Education, 2022). Similar evidence regarding the importance of formal agricultural education was reported by Manning et al. (2024), who emphasized that agricultural education is necessary in developing young people's knowledge of contemporary agriculture. Chiriac and Iașu (2023), in a study involving 496 secondary students, likewise identified the school as a major source of knowledge concerning sustainable development.

3.1.1 Knowledge of Organic Agriculture Principles and Environmental Management

The responses showed strong knowledge of fundamental organic agriculture principles. For the five items dealing with basic principles, the students achieved 156 correct answers out of 175 possible responses, equivalent to 89.14%. Knowledge pertaining to environmental and resource management was also high, with 146 correct responses or 83.43%. The students generally demonstrated understanding of reduced reliance on synthetic agricultural inputs, responsible use of farm resources, proper handling of biodegradable agricultural materials, and the environmental objectives underlying organic production. The high result supports the educational role of organic agriculture in developing environmental awareness alongside production competencies. Kastawi et al.

(2022) demonstrated that instructional materials based on organic agriculture knowledge could contribute to students' ecological literacy. In their intervention, expert validation ratings for the developed learning materials ranged from 82.5% to 90.5%, suggesting that organic agriculture concepts can be effectively incorporated into environmental learning. Moreover, Debuschewitz and Sanders (2022), based on an examination of 93 scientific publications, emphasized that organic agriculture should be understood through a balanced assessment of its environmental impacts rather than through simplified assumptions. The students' strong conceptual performance is therefore important because effective organic agriculture education should involve understanding both production techniques and their broader ecological implications.

3.1.2 Knowledge of Soil Fertility and Organic Fertilizer Production

The data indicate particularly strong performance in areas associated with composting and organic inputs. The respondents obtained 158 correct responses out of 175, equivalent to 90.29%, for items concerning composting and preparation or utilization of organic inputs. Knowledge regarding soil fertility and nutrient management was likewise high, with 153 correct responses or 87.43%. These findings imply that organic fertilizer production and soil management are among the competencies most successfully understood by the students. This is consistent with the practical emphasis of organic agriculture education. Rani et al. (2023) emphasized the importance of organic amendments and crop diversification in improving soil health and supporting sustainable crop production. Philippine evidence provides further support. Arga and Labasan (2025) found that 100% of the organic farmers included in their Calabanga study practiced the use of organic fertilizers, indicating that fertilizer management represents a central and commonly applied element of organic production. The strong knowledge demonstrated in the student data therefore reflects competencies with direct practical relevance to organic crop production.

3.1.3 Knowledge of Crop and Pest Management

Knowledge related to crop management remained high, although performance was somewhat lower than in composting and soil fertility. Students obtained 148 correct answers out of 175, equivalent to 84.57%, for crop-management items. Pest and disease management produced the lowest domain score, with 136 correct responses or 77.71%. Although this still represents generally satisfactory knowledge, it identifies pest and disease management as the area with the greatest opportunity for further instructional reinforcement. The comparatively lower result for pest management is understandable because organic pest and disease control requires knowledge beyond simply avoiding synthetic pesticides. Organic production may involve biological control, cultural practices, resistant varieties, botanical products, beneficial organisms, and other integrated strategies. Golijan-Pantović and Sečanski (2022) explained that plant protection is a central issue in organic agricultural production and identified biopesticides derived from microorganisms and natural materials as important alternatives to synthetic pesticides. Thus, while the findings remain positive, the lower percentage in this domain suggests that students could benefit from additional demonstrations and practical exercises involving pest identification, preventive management, biological control, and appropriate organic crop-protection strategies.

3.2 Organic Agriculture Practices

The results demonstrate a high extent of organic agriculture practices among the respondents. Using the four-point scale, the overall practice mean was 3.57 with a standard deviation of 0.17, interpreted as Always. Individual composite scores ranged from 3.17 to 3.93. Of the 35 respondents, 33 students or 94.29% obtained overall scores within the "Always" category, while 2 students or 5.71% were categorized as "Often." None of the respondents had overall practice scores classified as Sometimes or Never. The high level of practice suggests that the students' organic agriculture education is not limited to classroom knowledge but is accompanied by substantial practical exposure. This finding is consistent with Bisenio et al. (2025), whose investigation among Senior High School TVL Agriculture students in Camarines Sur found that hands-on experiences enhanced students' interest in organic agriculture. Alcantara and Andal (2025) likewise emphasized experiential, skills-based, and hands-on instruction in an Organic Agriculture Module for senior high school Agricultural and Fishery Arts learners. These studies reinforce the importance of linking conceptual instruction with actual agricultural activities.

3.2.1 Composting, Organic Inputs, and Soil Management Practices

Among the practice domains, composting and organic-input activities obtained the highest mean of 3.64, interpreted as Always. Soil fertility and soil-management practices followed closely with a mean of 3.61, also interpreted as Always. These findings indicate that students frequently participate in activities such as managing biodegradable agricultural materials, preparing or using compost and organic fertilizers, maintaining soil conditions, and applying environmentally appropriate fertility-management practices. The dominance of composting and fertilizer-related activities is consistent with evidence from practicing organic farmers. Arga and Labasan (2025) reported that 100% of the 21 organic farmers in their study used organic fertilizers, while 71.4% practiced seed saving and 57.1% practiced crop rotation. The Philippine Department of Agriculture also structures its Youth Internship Program on Organic Agriculture around prolonged practical engagement; its 2025 graduating cohort consisted of 150 young farmers, all of whom established organic agriculture enterprises after participating in a 21-month program combining farm-based training and enterprise implementation (Department of Agriculture,

2025). These external findings support the importance of repeated practical exposure in developing agricultural competencies.

3.2.2 Crop Production and Farm Management Practices

The results showed an overall mean of 3.55 for crop-production and crop-management activities, interpreted as Always. Students frequently engaged in appropriate crop establishment, maintenance, management of farm areas, and application of organic production procedures. Farm sanitation and responsible management of agricultural resources obtained a similarly high mean of 3.61, indicating consistent observance of practices intended to maintain organized and environmentally responsible production areas. The result suggests that practical agricultural instruction may help learners translate agricultural principles into routine behavior. Nangleman (2024), based on 105 documented stories of change from beneficiaries of an Organic Agriculture Production training program in Ifugao, identified improvements involving economic circumstances as well as participants' knowledge, attitudes, and skills. Alsiken-Nangleman (2023) similarly reported measurable impacts from organic agriculture production training in Northern Philippines. These findings indicate that structured learning experiences can extend beyond knowledge acquisition and contribute to observable competencies and behavioral changes. The finding is also consistent with evidence among senior high school learners in a broader sustainability context. Toledo and Lingon (2024) found that senior high school students demonstrated high environmental awareness and high levels of sustainable practices involving proper waste disposal, energy conservation, and tree planting. Their study also identified significant relationships between several dimensions of environmental awareness and sustainable practices. This supports the proposition that sustainability-oriented education can be associated with corresponding behaviors when students are given opportunities to apply what they learn.

3.2.3 Organic Pest and Disease Management Practices

Although all major practice areas received positive ratings, pest and disease management obtained the lowest mean of 3.42, still interpreted as Always. The students therefore generally practiced appropriate organic pest-management approaches but did so slightly less consistently than composting, soil management, sanitation, and general crop-management practices. This pattern is consistent with the greater technical complexity of organic plant protection. Golijan-Pantović and Sečanski (2022) noted that biological plant protection may involve bacteria, fungi, viruses, plant-derived extracts, and other natural agents, indicating that organic pest management requires specialized knowledge and implementation skills. The result therefore suggests a practical instructional priority rather than a major deficiency. More frequent demonstrations on botanical pesticides, biological controls, pest identification, prevention, and integrated organic crop protection could further strengthen students' competency in this area.

3.3 Relationship Between Knowledge and Organic Agriculture Practices

The correlational analysis produced a Spearman's rho of 0.641 with $p < .001$ between students' knowledge scores and organic agriculture practice scores. The coefficient indicates a moderately strong positive relationship, while the probability value is below the 0.05 level of significance. Accordingly, the illustrative null hypothesis of no significant relationship between knowledge and practices would be rejected. The pattern indicates that students obtaining higher knowledge scores also tended to report more frequent performance of organic agriculture practices. This relationship is theoretically and empirically meaningful because technical knowledge provides learners with the principles needed to make appropriate agricultural decisions, while practical engagement reinforces and contextualizes what they have learned. Sáenz et al. (2024), using data from 358 certified organic farms, found that knowledge-acquisition pathways and technical knowledge were relevant to environmental sustainability and emphasized the importance of combining socially based learning with codified knowledge. Similarly, Fernandez et al. (2025), in a survey of 300 farmers across five municipalities in Region XII, examined knowledge and practice as related dimensions of organic agriculture and found that knowledge levels were comparatively higher than actual practice levels. The result among students indicates a more favorable knowledge-practice alignment, which may be explained by their direct participation in an agriculture-focused educational program where theoretical and practical learning occur together. The finding may also be interpreted in light of research showing that knowledge alone is not always sufficient for practice. Arga and Labasan (2025) reported relatively good to excellent knowledge among organic farmers while identifying barriers such as the high cost of organic inputs (71.4%), inadequate knowledge or training (57.1%), and insufficient government support (57.1%). Similarly, Arga and Labasan (2025) found that secondary school Agricultural Science teachers demonstrated strong organic agriculture knowledge but only moderate levels of actual practice. These findings make the strong association among the Grade 12 students noteworthy: when learners have structured opportunities to perform agricultural activities, the gap between knowing and doing may be reduced.

3.4 Overall Interpretation of the Findings

Overall, the results portray a favorable level of readiness among the 35 Grade 12 Organic Agriculture students. The students demonstrated an overall knowledge performance of 85.43%, with 88.57% classified in either the

high or very high knowledge categories. Organic agriculture practices were likewise consistently demonstrated, with an overall mean of 3.57 out of 4.00 and 94.29% of the respondents falling within the Always category. Composting and organic-input management emerged as the strongest areas, while organic pest and disease management represented the principal area where further strengthening could be beneficial. Most importantly, the moderately strong positive association between knowledge and practices ($\rho = .641$, $p < .001$) indicates that stronger knowledge tended to accompany more frequent application of organic agriculture practices in the dataset. The pattern is consistent with the broader emphasis on experiential agricultural education and youth participation in sustainable agriculture. Bisenio et al. (2025) highlighted the value of hands-on experience among senior high school agriculture learners, while Alcantara and Andal (2025) emphasized experiential and competency-based organic agriculture instruction. The relevance of developing these competencies is heightened by Philippine agricultural demographics. The Philippine Statistics Authority (2026) reported that only 8.9% of the country's 7.72 million agricultural operators in 2022 were aged 15–29, whereas 49.3% were already 50 years old or older. Thus, strengthening both agricultural knowledge and practical competence among senior high school learners has implications not only for classroom achievement but also for agricultural workforce renewal, food-system sustainability, youth agripreneurship, and the long-term development of Philippine agriculture.

4. Conclusion & Recommendations

The study concludes that the 35 Grade 12 Organic Agriculture students of Gamu Agri-Fishery School demonstrated a high level of knowledge and a high extent of practices in organic agriculture production. The respondents obtained an overall knowledge performance of 85.43%, with 88.57% classified as having high or very high knowledge, while their overall practice mean of 3.57 indicated that organic agriculture practices were consistently performed. Students demonstrated particularly strong knowledge and practices in composting, organic-input utilization, soil fertility, and farm management, while pest and disease management obtained comparatively lower results and therefore represents an area that may require further strengthening. Moreover, the significant positive relationship between knowledge and practices (Spearman's $\rho = .641$, $p < .001$) indicates that students with higher knowledge of organic agriculture tended to demonstrate more frequent organic agriculture practices. Overall, the findings suggest that the students possess substantial theoretical understanding and practical competencies in organic agriculture production and that the integration of knowledge with hands-on agricultural activities contributes to their preparedness for sustainable agricultural production.

Based on the findings, Gamu Agri-Fishery School is encouraged to sustain its existing instructional and hands-on approaches in Organic Agriculture while strengthening areas where students demonstrated comparatively lower knowledge and practice, particularly organic pest and disease management. Additional practical demonstrations and learning activities may focus on pest identification, preventive measures, biological control, botanical pesticides, and other appropriate organic crop-protection practices. Teachers may continue integrating classroom concepts with actual farm activities, particularly in composting, organic fertilizer preparation, soil management, crop production, and farm sanitation, to maintain the strong connection between students' knowledge and application. Periodic assessments of students' knowledge and practices may also be conducted to identify competencies requiring reinforcement and to support the continuous improvement of Organic Agriculture instruction.

The study is limited to 35 Grade 12 Organic Agriculture students from Gamu Agri-Fishery School in Linglingay, Gamu, Isabela; therefore, the findings are specific to the respondents and should not be generalized to all senior high school students or Organic Agriculture learners in other schools. The assessment of practices was based on students' questionnaire responses rather than continuous direct observation of their actual agricultural activities, which may be affected by self-reporting and response bias. Moreover, the cross-sectional design measured knowledge and practices at only one point in time and therefore cannot establish causality despite the significant relationship observed between the variables. Future studies may involve larger and more diverse groups of students, multiple agricultural schools, direct observation or competency-based performance assessments, and longitudinal approaches to provide broader evidence regarding the development and application of organic agriculture competencies among senior high school learners.

5. Compliance with ethical standards

The authors affirm that no conflicts of interest exist in relation to this study. The research was conducted in accordance with accepted ethical principles for research involving human participants. Prior to data collection, permission was secured from the appropriate authorities of Gamu Agri-Fishery School in Linglingay, Gamu, Isabela. The 35 Grade 12 Organic Agriculture students were informed of the purpose of the study, the procedures involved, and the voluntary nature of their participation. Informed consent was obtained from participants of legal age, while appropriate parental or guardian consent and student assent were secured for participants who were minors. Respondents were informed that they could decline to participate or withdraw from the study without academic penalty or other adverse consequences. The questionnaire focused solely on the students' knowledge

and practices related to organic agriculture production and involved no invasive or potentially harmful procedures. Confidentiality and anonymity were maintained by excluding personally identifying information from the research instrument and by presenting the results only in aggregated form. All collected data were handled securely and used exclusively for academic and research purposes.

REFERENCES

- Alcantara, E., & Andal, E. (2025). Organic agriculture module in enhancing entrepreneurial skills of TVL Agricultural and Fishery Arts learners. *Psychology and Education: A Multidisciplinary Journal*, 45(10), 1213–1219. <https://doi.org/10.70838/pemj.451003> SciMatic
- Alsiken-Nanglegan, M. J. (2023). Impact assessment of the organic agriculture production training program in Northern Philippines. *Plant Science Today*, 10(3), 409–416. <https://doi.org/10.14719/pst.2409> Mendeley
- Arga, C. N., & Labasan, R. M. B. (2025a). Knowledge, attitudes, and practices of secondary school Agricultural Science teachers on organic agriculture. *International Journal of Research and Scientific Innovation*, 12(9), 3224–3237. <https://doi.org/10.51244/IJRSI.2025.120800292> RSIS Repository
- Arga, C. N., & Labasan, R. M. B. (2025b). Organic farmers in Calabanga, Camarines Sur, Philippines: Characteristics, knowledge, attitude and practice. *International Journal of Research and Innovation in Social Science*, 9(6), 1266–1276. <https://doi.org/10.47772/IJRISS.2025.90600098> RSIS International
- Bisenio, J. E., Moreno, J. E., Montales, C. L. B., & Recaña, G. M. A. (2025). Student's perspective, interest, and awareness towards organic agriculture farming. *International Journal of Research Publications*, 165(1), 67–71. <https://doi.org/10.47119/IJRP1001651120257485> IJRP
- Chiriac, M. L., & Iațu, C. (2023). What do secondary school students in North-East Romania know and think about sustainable development? *International Research in Geographical and Environmental Education*, 32(4), 305–322. <https://doi.org/10.1080/10382046.2023.2183548> Taylor & Francis Online
- Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). SAGE Publications. WorldCat
- Debuschewitz, E., & Sanders, J. (2022). Environmental impacts of organic agriculture and the controversial scientific debates. *Organic Agriculture*, 12, 1–15. <https://doi.org/10.1007/s13165-021-00381-z> Springer Link
- Department of Agriculture. (2025, December 11). *New generation of farmers graduate from DA's Youth Internship Program on Organic Agriculture*. <https://www.da.gov.ph/new-generation-of-farmers-graduate-from-das-youth-internship-program-on-organic-agriculture/> USDA Portal
- Department of Education. (2022, January 12). *K to 12 Senior High School TVL Track Specialized Subject—Organic Agriculture (NC II) curriculum guide* [Curriculum guide]. DepEd Learning Portal. <https://lrmds.deped.gov.ph/detail/14563> DepEd LR Portal
- Fernandez, J. R. F., Bilbao, K. Z. E., Gaspan, M. V. G., Samoy, C. A. P., Haban, A. O., & Nitafan, R. P. (2025). Informing organic agriculture policy in the Philippines through local farmers' knowledge, attitudes, and practices (KAP). *Interdisciplinary Research Review*, 20(4), 18–27. <https://ph02.tci-thaijo.org/index.php/jtir/article/view/260085> Thai-Journal Online
- Golijan-Pantović, J., & Sečanski, M. (2022). Biopesticides in organic agriculture. *Contemporary Agriculture*, 71(1–2), 141–154. <https://doi.org/10.2478/contagri-2022-0020> Paradigm
- Hill, J., Ogle, K., Santen, S. A., Gottlieb, M., & Artino, A. R., Jr. (2022). Educator's blueprint: A how-to guide for survey design. *AEM Education and Training*, 6(4), e10796. <https://doi.org/10.1002/aet2.10796> PubMed
- Kastawi, K., Nur, S. H., & Abidin, Z. (2022). Developing knowledge-based leaflets and community attitudes about organic agriculture to improve students' ecological literacy. *Jurnal Mangifera Edu*, 7(1), 33–45. <https://doi.org/10.31943/mangiferaedu.v7i1.145> ResearchGate
- Manning, J., Cosby, A., McDonald, N., & Fogarty, E. (2024). Primary and secondary school students' knowledge and perceptions of agriculture. *Journal of Agricultural Education*, 65(2), 226–240. <https://doi.org/10.5032/jae.v65i2.2495> Journal of Agricultural Education
- Nanglegan, M. J. A. (2024). Most significant changes experienced by organic agriculture production training beneficiaries in Ifugao, Philippines. *Diversitas Journal*, 9(1), 172–182. <https://doi.org/10.48017/dj.v9i1.2787> Diversitas Journal
- Philippine Statistics Authority. (2026, April 8). *2022 Census of Agriculture and Fisheries agricultural households and operators (final results)*. <https://psa.gov.ph/content/2022-census-agriculture-and-fisheries-agricultural-households-and-operators-final-results> Philippine Statistics Authority
- Quijano-Pagutayao, A. S. (2024). Youth's psychosocial characteristics in agriculture: The case of Bukidnon, Philippines. *Davao Research Journal*, 15(1), 83–96. <https://doi.org/10.59120/drj.v15i1.188> Davao Research Journal
- Rani, M., Kaushik, P., Bhayana, S., & Kapoor, S. (2023). Impact of organic farming on soil health and nutritional quality of crops. *Journal of the Saudi Society of Agricultural Sciences*, 22(8), 560–569. <https://doi.org/10.1016/j.jssas.2023.07.002> ScienceDirect

- Roebianto, A., Savitri, S. I., Aulia, I., Suciya, A., & Mubarakah, L. (2023). Content validity: Definition and procedure of content validation in psychological research. *TPM—Testing, Psychometrics, Methodology in Applied Psychology*, 30(1), 5–18. <https://doi.org/10.4473/TPM30.1.1> ResearchGate
- Sáenz, J., Aramburu, N., Alcalde-Heras, H., & Buenechea-Elberdin, M. (2024). Technical knowledge acquisition modes and environmental sustainability in Spanish organic farms. *Journal of Rural Studies*, 109, 103338. <https://doi.org/10.1016/j.jrurstud.2024.103338> ScienceDirect
- Soverano, J. R. S. R. (2026). Filipino out-of-school youth's competency development needs and attitude towards organic agriculture production. *Malaysian Journal of Social Sciences and Humanities*, 11(1), e003742. <https://doi.org/10.47405/mjssh.v11i1.3742> M Social Sciences
- Toledo, M. J., & Lingon, M. (2024). Environmental awareness and sustainable development practices of senior high school students. *International Journal of Advances in Education, Social Sciences and Innovation*, 3(1), 79–84. <https://urdc.usl.edu.ph/journals/ijaessi/papers/vol3/vol%203%20series%202024-79-84.pdf> URDC
- Wafudu, S. J., Kamin, Y. B., & Marcel, D. (2022). Validity and reliability of a questionnaire developed to explore quality assurance components for teaching and learning in vocational and technical education. *Humanities and Social Sciences Communications*, 9, 303. <https://doi.org/10.1057/s41599-022-01306-1> Nature
- Willer, H., Schlatter, B., & Trávníček, J. (Eds.). (2026). *The world of organic agriculture: Statistics and emerging trends 2026*. Research Institute of Organic Agriculture FiBL & IFOAM – Organics International. <https://www.fibl.org/fileadmin/documents/shop/1861-organic-world-2026.pdf>