

## Capacitating Public Schools through Sustainable School Gardening Program in Talakag and Quezon, Bukidnon, Philippines

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### Abstract

COVID-19 pandemic struck the world and various problems were faced such as food security, thus higher educational institutions like Central Mindanao University are pushed to respond. Central Mindanao University (CMU) in the Philippines initiated the establishment of a School gardening program in the public schools in Bukidnon. The school gardening program is a participatory activity with a collaborative effort between CMU, NOMCAARRD Consortium Member Institutions (CMI), and other stakeholders. This initiative of NOMCAARRD was established as an active response to the GALING-PCAARRD Kontra CoViD-19 program. The main objective of this program is to empower parents, students, and school teachers, through the transfer of selected S&T interventions to provide a source of food specially during the pandemic. This study aimed to capacitate students, parents, and school teachers, in Bukidnon; and determine the cost and return, particularly during the ongoing pandemic. A series of observations, Key Informant Interviews (KII), and focus group discussions were conducted among various stakeholders to implement the project, and Secondary data were utilized. The project was implemented among one Elementary school, and one Integrated School, in Bukidnon Philippines with Central Mindanao University (CMU) as the project's implementing agency. The project delivered a technology package (POT) covering "Pinakbet" vegetable production, mushroom production, and vermicomposting, to the participants. The implementation was fueled by market linkages, farm on-site and off-site consultation, farm capability building, partnership with the Local Government Units and private companies, and provision of farm inputs and materials. The implementation of this program is to encourage more students to engage in agricultural entrepreneurship in response to the declining trend in enrolment in agriculture courses in the Philippines. Data were gathered includes the participants' year level, gender, and analyzes their costs and returns. The program also conducted training sessions covering various aspects of agriculture and business, ranging from farming techniques to organizational management.

## INTRODUCTION

School gardening in the Philippines includes various benefits and challenges associated with these initiatives. The role of school gardens in urban areas like Metro Manila highlights the importance of urban green spaces and climate change mitigation (Cruz-Tadeja,2019). Calub et al. (2019) reported that the School-Plus-Home Gardens Project has the potential to promote sustainable development through integrated school and home gardening. The Department of Education's (2018) guidelines on the Gulayan sa Paaralan Program (GPP) underscored the role of school gardens in addressing malnutrition and fostering environmental stewardship. De la Cruz and Gregorio (2020) found that school gardens positively impacted students' academic performance and nutrition in rural areas. Monreal and Villanueva (2017) discussed the integration of gardening into the K-12+ curriculum, pointing out the advantages of practical learning for instruction. While Yao et al. (2019) examined international research on the effects of school gardening on health and well-being, Rola et al. (2018) emphasized the role that school gardens play in promoting food security and sustainability. The historical development of school gardens in the Philippines was documented by Barretto-Tesoro et al. (2020), and the sustainability problems faced by these programs were examined by Lantican et al. (2018). Finally, the importance of gardens in fostering ecological literacy in students was highlighted by Medina et al. (2016).

COVID-19 pandemic has had a significant impact on agricultural production. As a response, the Department of Science and Technology—Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (DOST-PCAARRD) has launched the GALING-PCAARRD Kontra CoViD-19 Program (FAO, 2021). The NOMCAARRD Consortium, in collaboration with its member institutions, plays a vital role in facilitating the expansion of agricultural technology transfer and commercialization, with the ultimate goal of fostering a globally competitive and sustainable society (NOMCAARRD Consortium). This initiative included Quick Response Projects (QRPs) implemented by consortia like NOMCAARRD, which provided critical support during lockdowns. Institutions such as

Central Mindanao University played vital roles in assisting communities and addressing food supply chain challenges. Thus, this study aims to capacitate students and school teachers in Bukidnon through technology transfer of the selected S&T interventions for additional income during the pandemic. Specifically, the project aims to capacitate students, parents, and school teachers, in Bukidnon; and determine cost and return analysis.

## **Methodology**

### **Locale of the Study**

Bukidnon is a province in Region 10. Bukidnon is the food basket of Mindanao and has a wide range of resources and industries. The land resources in the province are fertile and ideal for cultivating high-valued vegetables and vegetables suitable in low-lying areas. Bukidnon is crucial in Philippine vegetable production as it supports the national economy. By engaging with these sites the project gains access to a wide array of resources and industries, greatly enhancing its potential for well-rounded and holistic outcomes. The criteria for selecting a participant is the willingness to collaborate or partner with the academic community by signing a Memorandum of Agreement. The economic impact of Bukidnon's vegetable industry is significant, as it serves as a source of income provides income for farmers, creates job opportunities, and encourages businesses and entrepreneurial activities such as transportation and logistics (Rola et al., 2018; Lantican et al., 2018; Department of Agriculture, 2020; Calub et al., 2019; Medina et al., 2016). Furthermore, the success of vegetable farming in Bukidnon has encouraged sustainable agricultural practices and innovations that enhance productivity while maintaining environmental balance, reinforcing the province's pivotal role in the Philippine economy. The program was implemented in Lapok Elementary School in Talakag, Bukidnon, and San Jose Integrated School in Quezon, Bukidnon. Figure 2 shows the map of the Philippines showing the locale of the program.

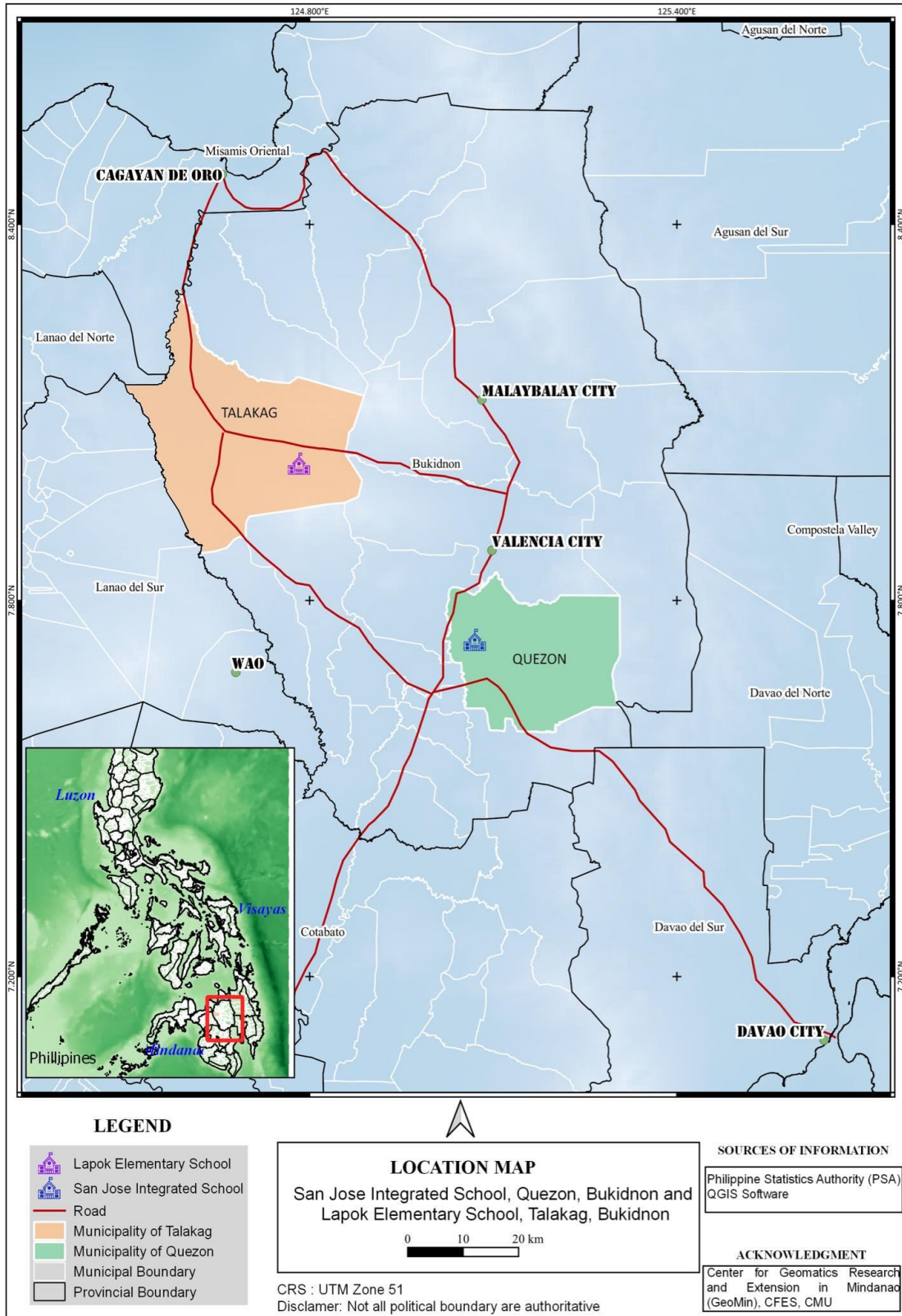


Figure 2. Map of the Philippines showing the locale of the study

The following criteria were followed in choosing the school as a participant in the study as per the discretion of the CMI:

1. **Organizational Registration:** Beneficiary organizations must be organized organizations validated at the barangay level.
2. **Minimum Membership:** Organizations must have at least 15 active members.
3. **Land Area for Diverse Farming:** Beneficiary organizations of CMU should possess a land area of at least 1,250 square meters suitable for various agricultural activities, including vegetable production, mushroom cultivation, and vermicomposting. Table 1 presents the participants of the program

**Table 1. Summary Final Participants**

| <b>CMI</b> | <b>No. Of Participants</b> | <b>Location</b>                 |
|------------|----------------------------|---------------------------------|
| <b>CMU</b> | 20: 39 SHS students        | San Jose Integrated High School |
|            | 20: 70 elem. Students      | Lapok Elementary School         |

## **RESULTS AND DISCUSSIONS**

**Profile.** The participants of the programs show a total of 120 individuals who are active in participating program's activities. High School levels were 32.5% while 67.5% were elementary students. It can be gleaned from the data that more than one-half of the participants are High School students thus it implies that the programs are targeting students who are in high school and in the stage of deciding on their college degree program thus, the program also exposes the students on the idea of getting agriculture as a degree program. Table 2 presents the

**Table 2. Number of Participants**

| <b>CMI</b>      | <b>Total No. of Participants (Group)</b> | <b>Total No. of B Participants</b> | <b>Educational Level</b> |
|-----------------|--|------------------------------------|--------------------------|
| <b>Students</b> | <b>CMU</b>                               | 39                                 | High School Students     |
|                 |  | 70                                 | Elementary Students      |

**Gender Distribution of Participants.** The gender distribution among the participants in San Jose Integrated School is female dominated by 55%, while Lapok Elementary School is comprised of female participants 45%. This implies that both participants in the public schools are female-dominated. This result is the same as the study of Quijano-Pagutayao (2020) who mentioned that public school students in Bukidnon are generally female. Table 3 shows the summary of the gender distribution of the participants.

**Table 3. Summary of the Gender Distribution of the Participants**

|                            | Total | Frequency |      | Percentage |
|----------------------------|-------|-----------|------|------------|
|                            |       | Female    | Male |            |
| San Jose Integrated School | 11    | 55        | 6    | 30         |
| Lapok Elementary School    | 9     | 45        | 14   | 70         |
|                            | 120   | 20        | 20   | 100%       |

### Capability Building Activities

Packages of Technology (POTs) and Information, Education, and Communication (IEC) were developed. The program provided comprehensive training seminars and workshops to the participants to encourage change in the behavior of the participants, the changes are in knowledge, skills, attitude, and participants.

### Package of Technology (POT)

Package of Technology (POT) refers to the variety of technologies created to provide solutions to the challenges, and needs of the intended communities in a specific geographical location tailored to address specific and to promote sustainable practices (Garcia et al., 2019). The project implemented various Packages of technologies on mushroom production technology resulting in an augmented revenue stream for the participants, whereas the adoption of vermicompost production technology and natural farming system. Students in public schools were exposed to agricultural activity to let them appreciate the beauty of agriculture and that there is money in agriculture. Implementing the package of technology has helped the environment and improved soil fertility and subsequent crop yields. These POT were implemented in Lapok Elementary School and San Jose Integrated School in Bukidnon, Philippines. The distribution of the four packages of technologies among the students, teachers, and parents in the public school has improved the competitiveness of the participants. Four Package of Technology (POTs) were distributed to the school as shown in Table 4.



**Table 4. List of Package of Technology**

| No. | Technology                        |
|-----|-----------------------------------|
| 1.  | Mushroom Production               |
| 2.  | “Pinakbet” Vegetable Production   |
| 3.  | Vermicompost Production           |
| 4.  | Natural Farming Technology System |

### Information, Education, and Communication (IEC) Materials Development

The program created a total of 13 IEC materials were developed and distributed to the participants. Table 5 presents the list of IEC materials developed under the project. IEC materials are necessary for the success of the project, representing a significant contribution to the dissemination and adoption of information (Jones & Smith, 2021; Patel, 2020). IEC materials aid as the source of knowledge, allowing the project team to disseminate vital information (Garcia et al., 2019). These materials are crucial in changing the participant's knowledge, skills, attitudes, and practices toward agriculture.

**Table 5. IEC materials developed by the project**

| NO. | Title   | DESCRIPTION  |
|-----|---|--|
| 1.  | “Talong” Giya sa Pag tanom                              | Guide on planting Eggplant   |
| 2.  | “Okra” Giya sa Pag tanom                                | Guide on Planting Okra   |
| 3.  | “Kalabasa” Giya sa Pag tanom                            | Guide on Planting Squash   |
| 4.  | “Sitaw” Giya sa Pag tanom                               | Guide on Planting String Beans   |
| 5.  | “Ampalaya” Giya sa Pag tanom                            | Guide on Planting Ampalaya   |
| 6.  | Produksyon sa Paddy Straw Mushroom                      | Guide on Paddy Straw Mushroom Production   |
| 7.  | VERMICOMPOSTING<br>“Pamaagi sa paghimo sa vermicompost” | Guide on Vermicomposting   |
| 8.  | Values Formation (English Version)                      | Values formation is the process through which individuals develop their core beliefs and principles that guide their behavior and decision-making.   |
| 9.  | Values Formation (Bisaya Version)                       |  |
| 10. | Organizational Management (English Version)             | Organizational management refers to the systematic and strategic administration of resources, processes, and people within an organization to achieve its goals and objectives effectively and efficiently   |
| 11. | Organization Management (Bisaya Version)                | Organizational management refers to the systematic and strategic administration of resources, processes, and people within an organization to achieve its goals and objectives effectively and efficiently. (Bisaya Version)                             |
| 12. | Marketing Strategies for Farm Enterprise                | Marketing strategies for a farm enterprise are tailored plans and approaches aimed at promoting agricultural products and services to target markets effectively.  |
| 13. | Bookkeeping for Farm Enterprise                         | Bookkeeping for a farm enterprise involves the systematic recording and tracking of financial transactions related to agricultural activities. It encompasses the management of income, expenses, assets, and liabilities specific to farming operations |

### Training Conducted for School Gardening Program

The following trainings were conducted under the school gardening program in Lapok and San Jose Integrated School. Vermicomposting, Pinakbet Production, Mushroom Production, and natural farming system.

Vermicomposting is an available technology in Central Mindanao University thus a series of trainings were conducted in the public school. A collaboration between the East-West Seed Company, Inc. and Central Mindanao University's Research, Development, and Extension Team (RDE Team) work hand in hand in facilitating training on "Pinakbet" vegetable production. The following crops were included in the Pinkabet production in the public school such as ampalaya, eggplant, water spinach, ladies' finger, string beans, and squash it would be planted by the students, parents, and teachers in the school garden. The training imparts knowledge and skills to help the participants grow a variety of vegetables efficiently. It is also a way of showcasing how to diversify crops for food sources. The participants in Bukidnon have received the technical assistance, seeds, agricultural inputs, and instruments promised by the project.

Another training workshop conducted was the mushroom production as it is a nutritious source of food, it can also serve as an alternative source of income.

### Cost and Return Analysis

San Jose Integrated School's cost and return analysis in Table 6 presents data on various agricultural commodities: eggplant, ladies finger, ampalaya, string beans, water spinach, and squash shown total sales of PhP 52,810.00. Mushrooms and vermicompost contribute PhP 23,000.00 and PhP 0, respectively. The overall income is Php 44,506.50, reflecting a 7.1% increase.

**Table 6. Cost and Return Analysis San Jose Integrated School**

| Commodity     | Qty | Unit | Price (PhP) | Total Sale (PhP) | Production Cost | Actual Income |
|---------------|-----|------|-------------|------------------|-----------------|---------------|
| Eggplant      | 280 | cls  | 40          | 11,200.00        |                 |               |
| Ladies Finger | 81  | cls  | 40          | 3,240.00         |                 |               |
| Ampalaya      | 270 | cls  | 50          | 13,500.00        |                 |               |
| String Beans  | 84  | cls  | 40          | 3,360.00         |                 |               |
| Water Spinach | 77  | cls  | 30          | 2,310.00         |                 |               |
| Squash        | 640 | cls  | 30          | 19,200.00        |                 |               |
|               |     |      | Sub-total:  | 52,810.00        | 17,052.00       | 35,758.00     |



|                |    |       |     |           |           |            |
|----------------|----|-------|-----|-----------|-----------|------------|
| Mushroom       | 92 | cls   | 250 | 23,000.00 | 8,251.50  | 14,748.50  |
| Vermicompost   | 0  | sacks | 250 | -         | 6,000.00  | - 6,000.00 |
| Overall Total: |    |       |     | 75,810.00 | 31,303.50 | 44,506.50  |

Table 7 also shows the cost and return analysis of Lapok Elementary school in Talakag, Bukidnon with a total vegetable sales of Php 49,680.40 while mushroom and vermicomposting sales revenue of Php 38,750 and Php 10,000, respectively. The overall income is Php 67,105.80.

**Table 7. Cost and Return Analysis – Lapok Elementary School**

| Commodity      | Qty | Unit  | Price (PhP) | Total Sale (PhP) | Production Cost | Actual Income |
|----------------|-----|-------|-------------|------------------|-----------------|---------------|
| Eggplant       | 150 | cls   | 40          | 6,000.00         |                 |               |
| Ladies Finger  | 35  | cls   | 40          | 1,400.00         |                 |               |
| Ampalaya       | 350 | cls   | 50          | 17,500.00        |                 |               |
| String Beans   | 25  | cls   | 40          | 1,000.00         |                 |               |
| Water Spinach  | 40  | cls   | 30          | 1,200.00         |                 |               |
| Squash         | 752 | cls   | 30          | 22,560.00        |                 |               |
| Sub-total:     |     |       |             | 49,660.00        | 17,052.70       | 32,607.30     |
| Mushroom       | 155 | cls   | 250         | 38,750.00        | 8,251.50        | 30,498.50     |
| Vermicompost   | 40  | sacks | 250         | 10,000.00        | 6,000.00        | 4,000.00      |
| Overall Total: |     |       |             | 98,410.00        | 31,304.20       | 67,105.80     |

## Linkages

The data presented in Table 8 outlines the linkages established between schools in various educational institutions, between 2022 and 2023. These linkages signify a concerted effort towards collaboration and community engagement. The involvement of schools such as San Jose Integrated School, and Lapok Elementary School suggests an emphasis on educational development. In addition to academic partnerships, the inclusion of East-West Seed Company signifies a dedication to sustainable agriculture, agroforestry, and rural development. These partnerships hold great significance as the organization promotes regional growth, knowledge exchange, and sustainable practices which contribute to a holistic project aimed at fostering education, community development, and environmental sustainability in the Mindanao region, ultimately benefiting both the local population and the broader ecosystem.

**Table 8. List of linkages forged from 2022-2023**

| LINKAGES  | YEAR |
|---|------|
| Central Mindanao, University, Musuan, Maramag, Bukidnon | 2022 |
| San Jose Integrated School, Quezon, Bukidnon            | 2022 |
| Lapok Elementary School, Talakag, Bukidnon              | 2022 |

### Conclusion

Capacity-building activities for parents, students, and school teachers, in Bukidnon, were implemented. Training on Pinakbet production, Mushroom Production, organizational management, marketing, and values formation, in Lapok Elementary School and San Jose Integrated School in Talakag and Quezon, Bukidnon respectively. Thirty-nine (39) Senior High School students and 70 elementary students have been capacitated and have availed the Technology Transfer of the selected S&T interventions for additional income during the pandemic. A total of 13 Information, Education, and Communication (IEC) Materials were developed for the use of the participants.

Planning is essential in ensuring that agri-entrepreneurs are well-prepared to confront unexpected problems, allowing them to continue operations even in crises. These policy inputs are vital for the 21 participants, as they provide them with the skills, they need to handle the intricacies of agribusiness during a pandemic.

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### Conflicts of Interest

The authors have disclosed no conflicts of interest.

### Author's Affiliation

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