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Farmers' Crop Selection and Its Alignment with Soil-Based Crop Suitability Recommendations in Barangay Bantug, Science City of Muñoz, Philippines

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ABSTRACT: This study focused on how farmers in Barangay Bantug, Science City of Muñoz, Nueva Ecija about their crop selection and whether their choices align with recommendations based on an existing study entitled "GIS-based Mapping of Crop Suitability Rating for the Re-Delineated Soil Types in Barangay Bantug". Using interviews and field observations involving 4 respondents, including local farmers and barangay officials, the responses show that rice is the most commonly planted crop. Even though the soil could support a wider variety of crops, farmers tend to only partially follow the recommended crop suitability guidelines. Their choices are shaped by factors like access to irrigation, economical factors, weather risks such as typhoons, and long-standing habits of rice farming. Overall, the responses show that while there is potential for crop diversification, farmers continue to prioritize rice because it is reliable and a crop they are familiar with. Therefore, the researchers recommend that farmers should follow soil-based crop recommendations to boost their efficiency in cultivating crops.

KEYWORDS: Crop Selection, Soil-based crop selection, Farmers' decision-making, Nueva Ecija Agriculture, Barangay Bantug, Science City of Muñoz, Nueva Ecija,

I. INTRODUCTION

1.1 Background of the Study

In agricultural communities such as Barangay Bantug, Science City of Muñoz, Nueva Ecija, farmers face challenges in selecting crops that are both profitable and suitable for their land conditions. Although scientific recommendations based on soil properties are available, crop selection is often influenced by market demand, traditional farming practices, and farmers' personal experiences. This may result in differences between recommended crops and the crops actually cultivated by farmers.

Soil characteristics such as texture, fertility, drainage, and pH greatly influence crop productivity and sustainability. These characteristics are classified through soil series, which are used as a basis for evaluating land capability and determining suitable crops for specific areas. Since soils vary across locations, proper crop selection is important for efficient agricultural planning and sustainable land use.

According to Alejo and Fiegalan (2025) in Barangay Bantug several soil types were identified in Barangay Bantug, including Maligaya clay, Maligaya clay loam, Maligaya loam, Maligaya silty clay loam, Maligaya silty clay, and Bantog clay loam. Among these, Maligaya clay loam and Bantog clay loam were found to be highly suitable for crop production, while the other soil types showed limitations related to drainage, water availability, and nutrient content.

Despite the availability of soil-based recommendations, farmers do not always follow them when selecting crops because their decisions are influenced by practical and economic considerations. These differences may lead to inefficient land use and may affect overall farm productivity.

Therefore, this study aims to evaluate farmers' crop selection in relation to soil series-based crop recommendations in Barangay Bantug, Science City of Muñoz, Nueva Ecija. By examining the relationship between actual farming practices and soil-crop recommendations, this study seeks to provide insights that may support improved agricultural planning and sustainable land-use management in agricultural communities.

1.2 Statement of the Problem

This study aims to evaluate farmers' crop selection in relation to soil series-based crop recommendations in Barangay Bantug, Science City of Muñoz, Nueva Ecija. By examining the relationship between actual farming practices and soil-crop recommendations, this study seeks to provide insights that may support improved agricultural planning and more sustainable land-use management not only for Barangay Bantug, Science City of Muñoz, Nueva Ecija but also for other agricultural communities.

Specifically, this study seeks to answer the following questions:

1. What are the common crops currently planted by farmers in Barangay Bantug, Science City of Muñoz?
2. What crops are identified as suitable for the existing soil series in the study area based on available research and soil data?
3. To what extent do farmers' crop selections align with soil series-based crop suitability recommendations?
4. What factors influence farmers' crop selection decisions in the study area?

1.3 Significance of the Study

This study is beneficial to:

Farmers. This study will assist the farmers in developing more understanding on planting different kinds of soil based crops depending on the soil type in Barangay Bantug, Science

City of Munoz. Furthermore, this study can assist farmers in making informed crop decisions.

Community. This paper will give additional knowledge to the community of Barangay Bantug, Science City of Munoz. Especially to those who buy the crops directly from the farmers as constant harvests result in more stable local food costs and a more dependable food supply.

Researchers. This study will widen the knowledge of the researchers in terms of planting a variety of crops that depend on the soil type in Barangay Bantug. Moreover, it gives the researchers certain guide for future related studies and serves better ways to solve the relevant problems.

1.4 Scope and Limitations

This study investigates the crop selection practices of farmers in Barangay Bantug, Science City of Muñoz, Nueva Ecija, and examines their alignment with existing soil series-based crop suitability recommendations. Data will be gathered through surveys, interviews, and available agricultural records from actively farming respondents. The study is limited to crop selection practices, factors influencing crop choice, and their consistency with existing recommendations. It does not cover other farming aspects such as pest management, irrigation system, or market profitability unless they directly affect crop selection. The study also relies on existing soil suitability recommendations and does not develop new classification. The findings are applicable only to the conditions in Barangay Bantug during the period of data collection.

1.5 Conceptual Framework

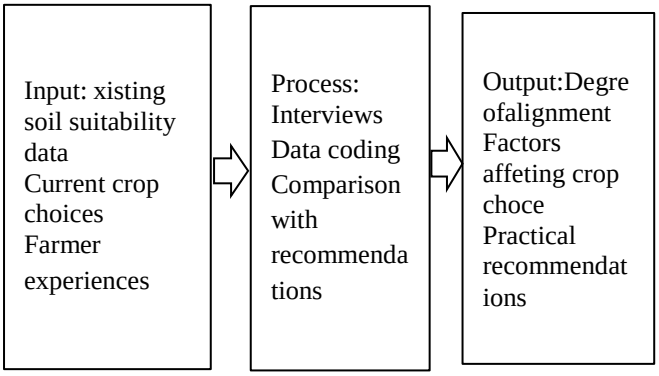

Figure 1. Paradigm of the Study

II. REVIEW OF RELATED LITERATURE

Soil plays a significant role in agriculture because it directly affects crop growth, development, and overall productivity. According to Onunwa et al. (2023), soil acts as the foundation of plant life since it provides water, nutrients, and support needed for growth. Without healthy soil, crop production becomes limited because plants cannot properly absorb what they need.

This is supported by Shwerif et al. (2020), who observed that plants grow differently depending on soil type. For example, crops grown in compost-rich soil performed better compared to those grown in clay or sandy soils, which showed slower growth due to poor drainage or low nutrient availability.

Martin and Santos (2016) highlighted that farmers have strong local knowledge about soil and farming, which is very valuable. However, they also pointed out that this knowledge alone may not always be enough when dealing with larger agricultural challenges. This shows the need to combine traditional knowledge with scientific information for better farming decisions.

In the Philippines, several studies show how soil conditions vary from one area to another and how this affects crop production. Alejo and Fiegalan (2025) identified different soil types in Barangay Bantug, some of which are more suitable for farming because they have better water retention and nutrients compared to others.

Watson et al. (2023) and Watson (2025) also found that many soils in the Philippines are only moderately suitable for crops such as rice, maize, and yam because of fertility and moisture limitations. Aquino et al. (2026) added that soil productivity also depends on slope, where lower areas are better for farming compared to higher slopes that need more soil protection.

However, there are still limited studies that focus on small communities or barangay-level farming conditions where actual farmers are directly involved in decision-making. There is also a lack of research that combines soil analysis with real experiences from farmers and local officials.

Because of this, there is a need for more localized studies that can help farmers choose the right crops based on both scientific data and real field conditions. This study aims to fill that gap by connecting soil suitability with actual observations and interviews from local farmers and barangay officials.

III. METHODOLOGY

3.1 Research Design

This study employed a localized exploratory qualitative case study approach using key informant interviews with selected agriculturally involved respondents in Barangay Bantug, Science City of Muñoz, Nueva Ecija. Data were collected through semi-structured interviews, site observations, and existing agricultural and soil suitability references to examine farmers' crop selection practices and the factors influencing their decisions.

This approach provides an in-depth understanding of crop selection practices and their alignment with existing soil suitability recommendations within Barangay Bantug. The use of interviews, observations, and secondary agricultural references provides contextual insights into crop suitability and farming practices in the area. However, the findings are limited to the experiences and conditions of the selected respondents during the period of data collection and may not fully represent other farming communities or environmental conditions.

3.2 Data Sources

The study utilized both primary and secondary data sources in evaluating farmers' crop selection in relation to soil series-based crop recommendations in Barangay Bantug, Science City of Muñoz, Nueva Ecija.

The primary data sources include:

- Semi-structured interviews with selected farmers and barangay officials
- Audio recordings gathered during the interview sessions
- "GIS-based Mapping of Crop Suitability Rating for the Re-Delineated Soil Types in Barangay Bantug"

These data sources were selected to ensure the reliability, relevance, and consistency of the information gathered for the study. The primary data obtained from interviews provided firsthand information regarding the crops currently planted,

the factors influencing farmers' crop selection, and their awareness of soil series-based crop recommendations.

It is important to note that the secondary data utilized in this study were based on existing GIS-based crop suitability mapping and soil series identification available for Barangay Bantug. These soil series classifications were used as references in determining the recommended crops suitable for the existing soil conditions within the study area. However, the recommended crops identified in the reference study may differ from the actual crops planted by farmers due to factors such as market demand, economic conditions, farming experience, and crop preference.

The information gathered from the respondents was based on their actual farming experiences and practices within Barangay Bantug. The interviews conducted during the study period were limited to the purposefully selected respondents; therefore, the collected data were utilized as participant-specific references in assessing the alignment between farmers' crop selection and soil series-based crop recommendations.

3.3 Data Procedure

The researchers gathered data by following a systematic process. The procedure involved the validation of informed consent forms, the conduct of interviews, site assessment, and secondary data collection. These steps were carried out to obtain reliable data from the participants and other sources, which served as the basis for analyzing the factors affecting crop selection of farmers in Barangay Bantug.

3.3.1 Validation of Informed Consent Forms

The researchers sought permission from the barangay officials of Barangay Bantug using an informed consent signed by the research adviser to conduct the study. The researchers also sought permission from respondents using informed consent which was signed by the research adviser to be a part of the research. After the approval, the researchers interviewed barangay officials, one of the officials is head of agriculture, along with selected farmers.

3.3.2 Interview Process

To obtain relevant data from the participants of Barangay Bantug, Science City of Muñoz, the researchers utilized a semi-structured interview, whereas the data required for the research to proceed is based on the respondent such as barangayofficials and specifically the farmers own experiences on planting different kinds of crops. The main instrument used in this study is a semi- structured interview. To help the researchers manage the interview flow, the questions are pre-planned and developed before the interview. The researchers used an audio recorder during the interviews to make sure every answer was captured accurately.Six open-ended questions connected on the topic were utilize by the researchers during the interview. The researchers conducted interviews with the participants ensuring that each session was strictly concluded within a ten-minute timeframe. To facilitate clear and authentic communication, the sessions were carried out using Filipino language allowing respondents to express their insights comfortably within the allotted timeframe.

3.3.3 Site Assessment

The researchers conducted a site assessment in Barangay Bantug, Science City of Muñoz, Nueva Ecija, to identify the factors affecting crop selection among farmers. Field observations were conducted to determine the area's physical characteristics, such as land topography, and soil condition. The researchers observed that the area is flat and suitable for agricultural activities. Additionally, the researchers examined the irrigation system in the barangay. Based on the assessment, it was found that rice is the dominant crop in the area, because of the irrigation system and flat land conditions, which strongly affect farmers' crop selection.

3.3.4 Secondary Data Collection Procedure

The study used secondary data from the research titled "GIS-based Mapping of Crop Suitability Rating for the Re-Delineated Soil Types in Barangay Bantug" as a reference for identifying soil types and evaluating current farming practices. To determine any differences between research-based recommendations and actual practices, the researchers examined if the crops planted by farmers match the suitability levels suggested in the study.

IV. RESULTS AND DISCUSSION

4.1 Profile of the Respondents

This section presents the profile of the respondents involved in the study. The respondents were selected based on their roles in agriculture and local governance in Barangay Bantug, Science City of Muñoz, Nueva Ecija. The study included four respondents. Respondent 1 and Respondent 3 are Barangay Councilors. As local officials, they are involved in implementing programs and supporting agricultural activities in the community. Their perspectives help explain how local governance influences farming practices and crop selection.

Respondent 2 and 4 are farmers, who are directly engaged in crop production. This respondent provides firsthand insights into actual farming practices, including how crops are selected and the challenges encountered in aligning these choices with soil suitability recommendations.

4.2 Coding and Interpretations

After conducting a semi-structured interview with the respondents and gathering their answers, the procedures for coding and interpretation were completed. The data was examined and analyzed by the researchers.

Table 4-1. Common Crops in Barangay Bantug

Q1: What are the common crops here in Barangay Bantug?		
Answers	**Initial Coding**	**Final Coding**
R1: "Here in Barangay Bantug, our primary crop is rice, followed by onions. After that, we plant various vegetables." **R2:** "It depends on whether it is the wet crop or dry crop season. But usually rice (palay)" **R3:** "Rice (Palay)." **R4:** "During the dry season, it's "Long Ping" (a variety of rice). For the wet season, "216" and "Triple 2" are the varieties most commonly planted."	**R1, R2, R3:** Rice (Palay) **R4:** Long Ping, 216 & Triple 2 (a variety of rice)	**R1, R2, R3, R4:** Rice (Palay)

Table 4-2. Secondary Crops in Barangay Bantug

Q2: Do you plant the following crops? (Upland rice or rice that isn't submerged in water, wetland rice or rice that are submerged in water, onions, sugarcane, corn, mango)?		
Answers	**Initial Coding**	**Final Coding**
R1:"No, we aren't accustomed to planting sugar cane here. Back in the day, when I was a child, I recall people would just plant the leftover cuttings after eating the cane, but that was about it. I see some people planting corn, but it's mostly for personal consumption. We don't produce it as a major commodity or for livestock feed here. It's the same with mangoes; they are rare here. You'll find many in the mountainous barangays, but here in Bantug, you'll only see an occasional tree that likely just grew on its own. It's not a major industry." **R2: "**No one plants sugar cane here, it is mostly wetland rice (palay) because we rely on an irrigation system, while upland rice are no longer commonly planted. No one plants corn here either. No onions as well. There are some in the San Jose area, but here in Bantug, there aren't any, probably because of the soil type.While Mango, just in backyards, maybe just one or two trees, but they aren't planted together in large numbers." **R3: "**Here in Bantug; there is no sugar cane. Corn is planted in parts of Lupao. Onions are grown in parts of San Jose. But here in Bantug? It is really just wetland rice (palay) because we have irrigation. We don't plant Upland Rice anymore since the farmers now rely on irrigation. As for mangoes, there are some, but very few—maybe only around 1%." **R4: "**No sugarcane, because it just doesn't work. No onions and sugarcanes as well. Mangoes are usually just found in backyards"	**R1:** No sugarcane; corn for personal use; rare mango **R2**: No sugarcane, corn, onions; mango in backyard. Only wetland rice **R3**: Only wetland rice are commonly planted; others absent or rare **R4**: No sugarcane, onions; mangoes on backyard	**R1, R2, R3, R4:** No sugar cane **R2, R3, R4:** No corn & onions, **R1, R2, R3, R4**: Mangoes are mostly for personal consumption and backyard only **R1:** Corn mostly for personal consumption only **R2, R3:** Only wetland rice are commonly planted **R2, R3:** Upland Rice are no longer planted since there is an irrigation system

Table 4-3. Results of the crops planted

Q3: What were the results of the crops that you planted?		
Answers	**Initial Coding**	**Final Coding**
R1: "It's just not what we grew up with. Sugar cane, for instance, takes almost a year to harvest. While it's resilient to rain, we have an excellent irrigation system here. Nueva Ecija's main product is rice—that's why it's called the "Rice Granary." Here in Muñoz, the focus is rice and onions. While some plant vegetables, it's usually just for personal use. Places like Bongabon and Rizal are the ones that truly specialize in vegetables. The yield is good whether the crop bears fruit underground or above ground." **R2**: "Typhoons or climate. Second is the variety of the rice—whether it is prone to disease or weak; insects are the enemy. Third, if you plant "hybrid" during the main crop season, it is likely not suited to the climate here. Most use hybrid for the second crop—it's really good then—but for the main crop, we use "inbred" because it's not as affected by typhoons and the harvest is okay. The results depend on the variety and season. During the dry season, planting hybrid rice results in a "really good" harvest. However, during the wet season (main crop), we use inbred varieties which result in an "okay" harvest because they are more resistant to typhoons and diseases compared to hybrid rice." **R3**: "Last September and October, the harvest was small. That was the problem because it was typhoon season. We have two seasons here: a dry season and a wet season. June to October is the rainy season, so the harvest is somewhat low because typhoons damage the rice. During the dry season, however, farmers are able to recover. The harvest they had in October is doubled now in March and April; they make up for their losses during this time. During the rainy season, the price of rice goes down, but during the dry season, the price of rice goes up." **R4**: "[There are no corns] because it just doesn't work. As well as onions and sugar cane. As per mangoes, they are usually just found in backyards. Corn cannot survive in watery areas; it will rot. Onions are the same—they won't work because it's too wet here, so the land is really only for rice. As for sugar cane, the soil for planting it needs to be sandy, like lahar, which is why we don't have it here. [The overall yield of the rice was observed to be high] but the usual problem with rice here is the insects that destroy the crops, such as "hanep" (thrips/aphids). [Problems only occur] during the wet season, it's just the natural disasters like typhoons.	**R1**: Sugar cane takes almost a year to harvest; the yield in rice and onions is good **R2**: The results of crops [rice] depend on the variety and season. **R3**: The harvest is significantly affected by seasonal changes. During wet seasons, the yield is low/small. While during the dry season, the yield substantially improves compared to the previous season. **R4**: Corns, Onions, and sugar canes do not work; Rice has an overall high yield.	**R1, R2, R3, R4**: The overall yield of rice is generally good and high. **R2 & R3**: The season has a significant impact on the results, which also rely on the variety of the crop [rice].

Table 4-4. Frequency and location of crop planting

Q4: For each crop you plant, how often do you plant it? Please include whether it is planted in the farm or in the backyard.		
Answers	**Initial Coding**	**Final Coding**
R1: "I see some people planting corn, but it's mostly for personal consumption. We don't produce it as a major commodity or for livestock feed here. It's the same with mangoes; they are rare here. You'll find many in the mountainous barangays, but here in Bantug, you'll only see an occasional tree that likely just grew on its own. It's not a major industry. Here in Muñoz, the focus is rice and onions. While some plant vegetables, it's usually just for personal use. Places like Bongabon and Rizal are the ones that truly specialize in vegetables." **R2:** "For mango–Just in backyards, maybe just one or two trees, but they aren't planted together in large numbers. Also, yes, it is purely rice here" **R3: "**As for mangoes, there are some, but very few—maybe only around 1%. They grew up with rice being the primary crop, so it has become traditional. There are also other types of vegetables planted here aside from rice but only in backyards, things like taro (gabi), string beans (sitaw), eggplant (talong), and chili (sili). It's not large-scale farming, only in the backyards, just a small amount." **R4:** "Mangoes are usually just found in backyards. And since almost everywhere here is reached by the irrigation flow. It's rare for people to use a "bomba" (water pump) (for rice farming)."	**R1**: Corn, Mangoes, and some vegetables for Personal consumption only, Onions are secondary, Rice is the local specialization **R2**: Mangoes are for backyard planting, Rice is dominance **R3**: Mangoes are very low frequency (1%), non-commercial vegetables (gabi, sitaw, eggplants, chili) are for backyard planting only. Rice being the primary crop **R4**: Mangoes for backyard planting only, Rice dominance because of irrigation availability	**R1, R2, R3, R4:** Rice remains on farm planting (large-scale), Backyard planting only for mangoes, and non-non commercial crops (gabi, sitaw, talong, sili) **R1, R2, R3:** Mango, corn, and non-commercial vegetables are planted infrequently or in limited quantities.

Table 4-5 Purpose of Planting vegetables and fruits.

Q5: If you plant vegetables or fruits, do you plant them for personal consumption or for selling?		
Answers	**Initial Coding**	**Final Coding**
R1: "I see some people planting corn, but it's mostly for personal consumption. We don't produce it as a major commodity or for livestock feed here. It's the same with mangoes; they are rare here. You'll find many in the mountainous barangays, but here in Bantug, you'll only see an occasional tree that likely just grew on its own. It's not a major industry. Here in Muñoz, the focus is rice and onions. While some plant vegetables, it's usually just for personal use. Places like Bongabon and Rizal are the ones that truly specialize in vegetables." **R2:** "For mango–Just in backyards, maybe just one or two trees, but they aren't planted together in large numbers. Also, yes, it is purely rice here" **R3: "**As for mangoes, there are some, but very few—maybe only around 1%. There are also other types of vegetables planted here aside from rice but only in backyards, things like taro (gabi), string beans (sitaw), eggplant (talong), and chili (sili). It's not large-scale farming, only in the backyards, just a small amount." **R4:** "Mangoes are usually just found in backyards. And since almost everywhere here is reached by the irrigation flow. It's rare for people to use a "bomba" (water pump) (for rice farming)."	**R1, R2, R3, R4:** Fruits such as mangoes, along with corn and vegetables, are planted only in backyards for personal consumption and are not grown on a large scale for selling.	**R1, R2, R3, R4:** Personal consumption only

Table 4-6. Factors affecting crop choices.

Q6: What are the factors affecting how you select your crops?		
Answers	**Initial Coding**	**Final Coding**
R1: "It's just not what we grew up with. Sugar cane, for instance, takes almost a year to harvest. While it's resilient to rain, we have an excellent irrigation system here. Nueva Ecija's main product is rice—that's why it's called the "Rice Granary." Here in Muñoz, the focus is rice and onions. While some plant vegetables, it's usually just for personal use. Places like Bongabon and Rizal are the ones that truly specialize in vegetables. In the past, many people planted vegetables. The soil here is good-it's loamy/loose (buhaghag), so crops grow well. You could plant peanuts or watermelon and get a good harvest. People used to plant watermelon here before, but now we focus on rice because we are directly supported by the irrigation system. And yes, because the soil is so fertile and loose, we can plant crops anywhere here. The yield is good whether the crop bears fruit underground or above ground. Additionally, Rice is what we've always known. Also, the profit is reliable. During the second cropping, rice can sell for 27 pesos per kilo, and the lowest it usually goes is 23. Why wouldn't people stick with that? Other crops can be risky because they die easily during the rainy season if a typhoon hits." **R2**: "The reasons why we don't plant different crops Maybe because it's not suited to the soil? Ever since I arrived here, it's always been all rice. They tried onions once, but they didn't earn much from it. A lot of crops were ruined, because of the weather and also the type of soil—the soil here is "lagkitin" (clayey/sticky). Maybe also because they have adapted to rice more, so they never went back to onions. But I haven't tried planting corn myself. Maybe it was possible before, and maybe it is still possible now, but the problem is that your neighbor's field is already planted with rice. Also it is very easy to get water (irrigate) here. That's why it is purely rice here. Although I also want to try other things, like rotating crops for a change, there is a lack of proper knowledge on how to plant them. For example, with watermelon, you need to be an expert. Although it's possible, it usually remains just a trial" **R3**: "The reason why corn, sugar cane, mangoes, and onions aren't planted here is that people aren't used to them. They grew up with rice being the primary crop, so it has become traditional. Common problems encountered with rice since it is the main crop is Last September and October, the harvest was small. That was the problem because it was typhoon season. We have two seasons here: a dry season and a wet season. June to October is the rainy season, so the harvest is somewhat low because typhoons damage the rice. During the dry season, however, farmers are able to recover. The harvest they had in October is doubled now in March and April; they make up for their losses during this time. But it is . It is also necessary for rice to be irrigated because the area here is irrigated, so farmers don't struggle with their water source. Their planting schedule depends on the flow of the water. There's no rice crops that rely solely on rainwater anymore. Here in Bantug, everything is already irrigated. If they want to start farming and the water hasn't arrived yet, they use water pumps." **R4**: "The reason why people don't choose to plant corn, onions, mangoes, and sugar cane here is because of the soil; it is very watery (waterlogged) here. Corn cannot survive in watery areas; it will rot. Onions are the same, they won't work because it's too wet here, so the land is really only for rice. As for sugar cane, the soil for planting it needs to be sandy, like lahar, which is why we don't have it here. The quality of the soil really affects the planting. The usual problem when it comes to rice here is the insects that destroy the crops, such as "hanep" (thrips/aphids), but there is no problem with the soil itself when it comes to rice. Also other problems affecting the rice is when during the wet season, it's just the natural disasters like typhoons."	**R1**: Tradition, crop profitability, growth duration, local specialization, typhoon risk, irrigation availability **R2**: Tradition, Soil suitability, Low Profit with crops (onions), Weather risk and crop damage, Adaption to rice, Neighbor fields (competition), Irrigation availability, Lack of knowledge on alternative crops. **R3**: Tradition, Weather/Typhoon risks,irrigation availability, planting schedule, crop adaptation, seasonal yield differences **R4**: Soil suitability (waterlogged, sandy), crop survival, natural disasters (typhoon), pests/insects, local specialization (rice)	**R1, R2, R3, R4**: Soil type (clayey, waterlogged, sandy), Weather, Typhoons, and Pests affect crop selection **R1, R2, R3**: Tradition & Familiarity **R1, R2, R4**: Rice as dominant crop **R1 & R2**: Economic Factors **R1 & R3**: Availability of irrigation support **R2**: Limited knowledge and experience

Table 4-7. Ratings of crops suitability and their soil types

Crops Suitability Rating of Soil Types						
Soil Type	***Wetland Rice***	***Upland Rice***	***Corn***	***Onion***	***Mango***	***Sugarcane***
Bantug Clay Loam	Marginally Suitable	Marginally Suitable	Highly Suitable	Highly Suitable	Highly Suitable	Highly Suitable
Maligaya Clay	Moderately Suitable	Marginally Suitable	Marginally Suitable	Highly Suitable	Highly Suitable	Marginally Suitable
Maligaya Clay Loam	Moderately Suitable	Moderately Suitable	Highly Suitable	Highly Suitable	Highly Suitable	Highly Suitable
Maligaya Loam	Moderately Suitable	Moderately Suitable	Highly Suitable	Highly Suitable	Highly Suitable	Highly Suitable
Maligaya Silty Clay	Moderately Suitable	Marginally Suitable	Marginally Suitable	Highly Suitable	Highly Suitable	Marginally Suitable
Maligaya Silty Clay Loam	Moderately Suitable	Moderately Suitable	Highly Suitable	Moderately Suitable	Highly Suitable	Highly Suitable

Source: Unpublished undergraduate study "GIS-based Mapping of Crop Suitability Rating for the Re-Delineated Soil Types in Barangay Bantug, Science City of Muñoz, Nueva Ecija, Philippines" conducted at Central Luzon State University and Bulacan Agricultural State College, 2025.

4.2.1. Analysis of Tables (Results Interpretation)

The results from Table 4-1 to Table 4-3 indicate that rice (palay), particularly wetland rice, is the dominant and most commonly cultivated crop in Barangay Bantug, Science City of Munoz, Nueva Ecija. Table 4-1 shows that rice is the primary crop identified by all respondents, while Table 4-2 confirms that wetland rice is the primary crop planted, with other crops such as corn, onions, sugarcane, and mangoes being minimally cultivated or absent in most farms. Table 4-3 further shows that rice has generally higher and more stable yields compared to other crops, although productivity is affected by seasonal changes, especially during typhoons and the wet season. Environmental conditions such as soil type, water availability, and pest occurrence also limit the success of the crops.

Table 4-4 and 4-5 indicate that farming activities in the area are largely centered on rice cultivation. Rice is regularly planted on farms, while other crops are only occasionally grown and are mostly found in backyards gardens. These non-rice crops are primarily used for household consumption rather than for commercial purposes, showing their limited role in local agricultural production.

Furthermore, Table 4-6 shows that crop selection is influenced by environmental conditions, traditional farming practices, and economic considerations. Farmers reported that soil conditions, frequent flooding, weather disturbances, and pests restrict the cultivation of other crops. At the same time, rice remains the preferred crop due to farmer familiarity, established irrigation systems, and its perceived economic stability. While Table 4-7 presents secondary GIS-based crop suitability data, which indicates that several crops are suitable for cultivation in Barangay Bantug. However, farmers still predominantly plant rice. Other crops are rarely planted due to waterlogged soil conditions and practical limitations. This shows that actual farming practices are influenced more by environmental and economic realities than by technical suitability alone.

4.3. Agricultural Conditions and Irrigation Systems in Barangay Bantug

Figure 2 Irrigation Systems in Brgy. Bantug, Science City of Muñoz

Figure 3. Irrigated Ricefields in Brgy. Bantug, Science City of Muñoz

4.3.1 Analysis of Figures

The researchers conducted field observations in Brgy. Bantug, Science City of Muñoz, the area was observed to be predominantly flat. The soil is loose and friable, and agricultural land prioritizes rice production over other crops. Mango trees and other fruit crops are primarily located in

backyard plots. Vegetables are cultivated on a small scale, mostly for household consumption, and are planted within residential yards.

The community benefits from a well-developed irrigation system, which keeps most rice fields submerged, thereby supporting wetland rice varieties. Other crops such as corn, sugarcane, and onions were rarely observed. These findings support the statements of the respondents that wetland rice is the predominantly cultivated crop in Brgy. Bantug, Science City of Muñoz.

V. SUMMARY, CONCLUSION, AND RECOMMENDATION

5.1 Summary

Based on the analysis of the collected data the following findings are revealed:

The findings show that rice remains the dominant crop planted in Brgy. Bantug, Science City of Muñoz, with limited production of other crops such as corn, onions, and mangoes, which are only grown in small quantities and are mostly planted in backyards for personal consumption. Secondary data indicate that upland rice, wetland rice, onion, mango, sugarcane, and corn are suitable crops in the area, suggesting that these crops are generally well-adapted to the soil characteristics of Brgy. Bantug. The findings further reveal that farmers' crop selection is partially aligned with soil suitability recommendations. Rice is widely planted because the clayey, fertile, and waterlogged soil, together with the available irrigation system, are highly suitable for rice production, while crops such as corn and sugarcane are avoided due to poor soil compatibility.

The crop selection among farmers is influenced by several factors, including soil suitability, reliable irrigation, and stable income. Weather conditions, particularly typhoons, also affect farmers' decisions in choosing which crops to plant. In addition, the lack of knowledge or experience in planting other crops limits crop diversification in the area. Farming practices in Brgy. Bantug remains largely traditional, and farmers continue to prefer rice because it is more familiar, less risky, and more profitable compared to other crops.

5.2 Conclusions

According to the study's findings, farmers in Barangay Bantug choose crops that are only partially in line with recommendations for crop appropriateness based on soil type. Wetland rice continues to dominate actual farming methods, despite secondary suitability data suggesting that a number of crops would be appropriate for the identified soil types. The availability of irrigation, wet fields, farming customs, perceived economic stability, typhoon risk, pest issues, and a lack of experience with other crops all have an impact on this preference in addition to soil characteristics. As a result, recommendations for crop suitability should be evaluated in conjunction with real field conditions and factors that influence farmer decision-making.

5.3 Recommendations

The following suggestions were then transmitted in regard to the research results and the conclusions drawn from them:

1. Small trials. Try planting a few different types of crops on a small piece of land first. This lets you see how they grow and if people want to buy them before you plant them everywhere.
2. Keep soil healthy. Add natural materials like compost or manure to your soil. This helps the ground stay rich and keeps your plants healthy.
3. Rotate crops. Instead of planting the same thing every time, switch your crops each season. This keeps the soil strong and helps prevent pests from moving in.
4. Seek training. Partner with government farming agencies to bring workshops to the community. These should focus on how to grow different kinds of crops and how to choose the right plants for the local soil.
5. Support land planning. When planning how to use the community's land, make sure to look at where water flows and where the current irrigation reaches to help farmers succeed.
6. Cooperative marketing. Form a local group or cooperative. By working together, you can share the costs of equipment, access better prices, and find more buyers for your product.
7. Include more farmers. Include more local farmers in your studies to get a better picture of the real challenges they face every day.
8. Test the soil and harvest. Future studies should perform actual soil tests and measure how much food is being produced such as crop yields to get more accurate data.
9. Focus on local needs. Study how to improve the way water is shared and drained on a small scale to help individual farms avoid flooding or drying out.

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REFERENCES

1. Alejo, R. J. T., & Fiegalan, F. T. (2025). GIS-based mapping of crop suitability Rating for the Re-Delineated soil types in Barangay Bantug, Science City of Muñoz, Nueva Ecija, Philippines. Southeast Asian Journal of Agriculture and Allied Sciences, 5(1), 45–61. https://doi.org/10.63943/sajaas.vol5iss1art70pp45-58
2. Aquino, E. B., Fiegalan, F. T., Mason, M. L. T., & Sarong, M. M. (2026). Topographic variability in soil fertility and crop suitability at the Department of Agriculture-Research Station-Sual, Pangasinan, Philippines. Soil Science Society of America Journal, 90, e70188. https://doi.org/10.1002/saj2.70188
3. Balacase, A. F., Badayos, R. B., Sanchez, P. B., Paterno, E., & Sta. Cruz, P. (2018). Major Soil Series of Capiz, Philippines and their Suitable Crops. Philippine Journal of Agricultural Economics, 2(1), 90–106. https://doi.org/10.7719/pjae.v2i1.548
4. Bhat, S. A., Hussain, I., & Huang, N.-F. (2023). Soil suitability classification for crop selection in precision agriculture using GBRT-based hybrid DNN surrogate models.

https://www.sciencedirect.com/science/article/abs/pii/S1574954123001383
5. Bhatt, R., Kunal, Garg, A. K., Majumder, D., & Oliveira, M. W. (2025). Soil-Texture-Unlocking-Fertility-and-Productivity-for-Better-Crops. AATCC Review, 396–408. https://doi.org/10.21276/AATCCReview.2025.13.03.396
6. Boltana, S. M., Ukumo, T. Y., Lohani, T. K., Mena N. B., Muluneh, L. E., Matusal, A. A., Alaro, M. A., Doliso, B. D. (2024). Comparative analysis in selecting best irrigation method to maximize tomato yield from various irrigation approaches in water scarce regions. Heliyon. https://pmc.ncbi.nlm.nih.gov/articles/PMC11002582/
7. Cañete, S. D., Collado, W. B., Badayos, R. B., Sanchez, P. B., & Sta. Cruz, P. C. (2023). Suitability assessment of Bantog soil series for potential enhancement of rice-based cropping systems. https://philjournalsci.dost.gov.ph/suitability-assessment-of-bantog-soil-series-for-potential-enhancement-of-rice-based-cropping-systems/
8. Corsiga, C. A. V., Badayos, R. B., Sanchez, P. B., Paterno, E. S., & Sta. Cruz, P. C. (2018). Soil classification, suitability assessment, and constraints analyses of major soil series grown to sugarcane in Negros Occidental, Philippines. Annals of Tropical Research, 40(1), 53–70. https://atr.vsu.edu.ph/article/view/138
9. Haider, W., Durrani, M. N., Rehman, A. ur, & Rehman, S. ur. (2019). Knowledge based soil classification towards relevant crop production. International Journal of Advanced Computer Science and Applications, 10(12), 1–6. https://doi.org/10.14569/IJACSA.2019.0101266
10. Le, T. H., Kristiansen, P., Vo, B., Moss, J., & Welch, M. (2023). Understanding factors influencing farmers' crop choice and agricultural transformation in the Upper Vietnamese Mekong Delta. https://www.sciencedirect.com/science/article/pii/S0308521X24000490#:~:text=Farmer%20decision%2Dmaking%20influenced%20by,perception%2C%20knowledge%20and%20market%20access
11. Magahud, J. C., Badayos, R. B., & Sanchez, P. B. (2016). Soil properties of major irrigated rice areas in the Philippines. Asia Life Sciences, 25(1), 291–309. https://www.ukdr.uplb.edu.ph/journalarticles/5634/
12. Mamiit, R. J., Yanagida, J., & Miura, T. (2021). Productivity Hot spots and cold spots: Setting geographic priorities for achieving food production targets. Frontiers in Sustainable Food Systems, 5. https://doi.org/10.3389/fsufs.2021.727484
13. Martin, H., & Santos, E. (2016). Comparison of indigenous and scientific knowledge on soil classification among farmers in Imugan, Nueva Vizcaya, Philippines. Journal of Environmental Science and Management, 71. https://doi.org/10.47125/jesam/2016_sp2/07
14. Onunwa, A. O., Okoli, N., Uko, I., Ndukwe, O. O., & Imo, C. M. (2023). Soil-Crop production relationship. CADVENTURES Nigeria. https://www.researchgate.net/publication/373256196_Soil-Crop_Production_Relationship
15. Poliquit, D. E., Tangaran, L. F., & Labrador, M. G. (2019). Soil fertility evaluation and crop suitability assessment of agricultural soil condition in Samar Province, Philippines. Research Gate, 15(03), ISSN: 18158129 E-ISSN: 18151027. https://www.sagepublisher.com/volume/JASAE/15/03/soil-fertility-evaluation-and-crop-suitability-assessment-of-agricultural-soil-condition-in-samar-province-philippines-5e0740a7cd164.pdf
16. Shwerif, N., Elghammudi, A., Abosnena, S., & Alfaid, A. (2020). Effect of Different Types of Soil on the Growth & Productivity of Tomato Solanum lycopersicum var. Rio Grande in Libya. International Journal of Plant & Soil Science, 26–32. https://doi.org/10.9734/ijpss/2020/v32i1630377
17. Singh, J., Pandey, P., & Pandey, P. (2021). Decision-making system for crop selection based on soil. In Elsevier eBooks (pp. 449–475). https://doi.org/10.1016/b978-0-12-823694-9.00032-3
18. Suruliandi, A., Mariammal, G., & Raja, S. (2021). Crop prediction based on soil and environmental characteristics using feature selection techniques. Mathematical and Computer Modelling of Dynamical Systems, 27(1), 117–140. https://doi.org/10.1080/13873954.2021.1882505
19. Watson, C. J. P. (2025). Soil morphology and suitability assessment of selected soil series for purple yam production in La Union, the Philippines. Philippine Journal of Science, 154(6B), 1821–1834. https://philjournalsci.dost.gov.ph/soil-morphology-and-suitability-assessment-of-selected-soil-series-for-purple-yam-production-in-la-union/
20. Watson, C. J. P., Badayos, R. B., Sanchez, P. B., & Sta. Cruz, P. C. (2023). Characterization, classification, and crop suitability assessment of selected soil series in Ilocos Norte, Philippines. https://mjst.ustp.edu.ph/index.php/mjst/article/view/2386
21. Xing, Y., Wang, X., & Mustafa, A. (2025). Exploring the link between soil health and crop productivity. Ecotoxicology and Environmental Safety, 289, 117703. https://www.sciencedirect.com/science/article/pii/S0147651325000399