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FARMERS INFORMATION NEEDS AND PREFERRED FEATURES FOR ENHANCING THE INTEGRATED PEST MANAGEMENT (IPM) FARMERS GUIDE MOBILE APPLICATION IN GENERAL SANTOS CITY

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ABSTRACT

This study assessed farmers' information needs on integrated pest management (IPM) and their preferred features for an IPM Farmers' Guide mobile application in General Santos City. Data from 30 farmers were summarized using frequency counts and weighted means. Farmers reported very high information needs, particularly for knowing which crops are affected by common pests (WM = 4.85), distinguishing harmful pests from beneficial insects (WM = 4.80), and learning physical or mechanical control methods (WM = 4.72). Preferred application features also received very high ratings. The strongest preferences included videos demonstrating biological, physical, or mechanical control methods (WM = 4.81), Filipino/Tagalog content (WM = 4.80), Cebuano/Bisaya content and offline access to saved guides (WM = 4.79 each), and side-by-side images of healthy and affected crops (WM = 4.78). Although 73% of respondents owned smartphones, 18% of smartphone owners reported having no internet access. The findings suggest that the application should provide crop-specific, locally relevant IPM information through multilingual content, clear images, instructional videos, simple navigation, and offline access.

Keyword: Farmers' information needs, integrated pest management, mobile application, farmers' guide, General Santos City

1. INTRODUCTION

Integrated pest management (IPM) is an approach to crop protection that combines biological, cultural, physical, and chemical measures suited to the crop and its environment. The Food and Agriculture Organization of the United Nations (FAO, 2012) explains that IPM aims to maintain healthy crops, manage pest populations, and minimize pesticide use and its risks to human health and the environment. Effective IPM also relies on accurate pest identification and regular field monitoring (Guiam et al., 2021). In Southern Philippines, farmers who completed IPM training or learned about IPM-based pesticide use showed higher levels of technology adoption. Lack of time and capital were among the constraints reported by farmers (Josue-Canacan, 2022). These findings highlight the value of practical, accessible information that can support farmers' decisions in the field.

Digital tools are one way to provide crop protection information. Guiam et al. (2021) described SPIDTECH, a Philippine mobile application with camera-based pest and disease identification and a digital library containing images, identifying signs, life stages, and management practices for major crops. Its content was available in English and Filipino. Another Philippine initiative, GIYA, established a communication channel between farmers and crop protection experts. Its authors noted that the tool assumed users could identify pests, that its recommendations were brief, and that insecticide resistance management needed further attention (Mercene & Herrera, 2023). These examples show how digital guides can support access to pest management information while underscoring the need for clear, sufficiently detailed content suited to farmers' knowledge and needs.

Research on agricultural applications also emphasizes the importance of learning what farmers need and how they prefer to receive information. Seenuankaew et al. (2018), drawing on interviews and observations with 48 Thai

farmers, identified information priorities that informed the development of a mobile application for farming and marketing. In a choice experiment with farmers in Mexico, Molina-Maturano et al. (2022) found that preferences for an agricultural advice application were affected by features such as support during first use, training, and data-use costs. Kumar (2023) also reported language barriers and mobile network problems among farmers using phones to access agricultural information in Haryana. Although these studies were conducted in different settings, they demonstrate why local content, usability, language, and access conditions should be considered when designing digital agricultural services.

For the IPM Farmers' Guide mobile application to serve farmers in General Santos City, its content and features should reflect the information they need and prefer. This study therefore assesses farmers' information needs concerning crop pests, pest identification, prevention, control methods, and safe pesticide use. It also examines their preferences for application features, including language options, offline access, images, videos, navigation, and crop-specific information. The findings are intended to provide local evidence that can guide the enhancement of the IPM Farmers' Guide mobile application.

2. STATEMENT OF THE PROBLEM

The study's main objective was to determine the farmers information needs and preferred features for enhancing the integrated pest management (IPM) farmers guide mobile application in General Santos City.

Specifically, the study sought to answer the following questions:

1. What are the farmers profile in General Santos City in terms of age, highest educational attainment, years engaged in farming, primary crops cultivated, and access to and use of smartphones and the internet?
2. What integrated pest management (IPM) information does the farmer need most, particularly regarding pest and disease identification, prevention, control methods, and safe pesticide use?
3. What features and content formats farmers prefer for the IPM farmers guide mobile application in terms of language, offline access, images or videos, navigation, and crop-specific information?

3. METHODOLOGY

The study used a quantitative descriptive survey approach to assess farmers' information needs on integrated pest management (IPM) and their preferred features for the IPM Farmers' Guide mobile application in General Santos City. Data were gathered from 30 farmers using a questionnaire covering their characteristics and access to smartphones and the internet, their IPM information needs, and their preferred application features. Respondents rated each item on a five-point scale, from 1 (Very Low) to 5 (Very High). Frequencies and percentages summarized respondent characteristics and digital access, while weighted means described the ratings. Mean scores were interpreted as Very Low (1.00–1.80), Low (1.81–2.60), Moderate (2.61–3.40), High (3.41–4.20), and Very High (4.21–5.00).

4. RESEARCH DESIGN

The study employed a quantitative descriptive survey design to describe farmers' information needs on integrated pest management (IPM) farmers guide mobile application and their preferred features for the IPM Farmers' Guide mobile application in General Santos City. This design enabled the researchers to collect numerical responses from 30 farmers and summarize them using frequencies, percentages, and weighted means. It was suitable for identifying the IPM topics and application features that respondents rated as important. The study describes the farmers' reported needs and preferences.

5. SAMPLING METHOD

The study employed purposive sampling to select 30 farmers from General Santos City who could provide information relevant to the study's objectives. Participants were selected based on their involvement in farming in the study area and their ability to answer questions about IPM information needs and preferred features of the Farmers' Guide mobile application. Smartphone and internet ownership were not required for participation, allowing the study to include farmers with different levels of digital access. The responses of the selected participants were used to describe their IPM information needs, application feature preferences, and access to

digital devices. Since the participants were purposively selected, the findings describe the respondents who took part in the study and may not represent all farmers in General Santos City.

6. DATA COLLECTION

The research was conducted by observing research ethics. Permission to conduct the study was sought from the Municipal Mayor and concerned Barangay Captains of General City. the researcher explained to the farmers the nature and purpose of the study and assured them of the anonymity of their identity. They were asked to participate but made aware of their rights to refrain from answering questions they believed were offensive or discriminatory or to forego their participation should they feel uncomfortable during the interview. The farmer was interviewed in their respective houses or their most convenient place. The survey questionnaire was answered by every participant for 5-7 minutes.

The data was grouped, categorized, and analyzed according to the study's objectives. Descriptive statistics such as mean, rank, percentage, scaling, and frequency counts were used in analyzing the farmers profile, integrated pest management information, features and content formats.

7. ANALYSIS, AND INTERPRETATION OF DATA

AGE	FREQUENCY	PERCENTAGE
30 below	7	23
31-40	5	17
41-50	14	47
51-60	3	10
71-80	1	3
TOTAL	30	100

Table 1. Distribution of the farmers according to age

Table 1 presents the distribution of the farmers according to age. Data revealed that nearly one-half (47%) of the farmers age was 41-50 years old. The oldest is 78 years old, while the youngest is 30 years old, with a mean age of 39 years old. The data indicates that the majority of the farmers were middle-aged. The findings was consistent with the report of the Philippine Statistics Authority ([PSA], 2017), that agricultural farmers middle age is between 30-50 years old and has insatiable desires to achieve things. This means that nearly half of the agricultural farmers were above 40 years old. The median age among male agricultural farmers was 45-year-old while among female agricultural farmers was 56 years old. This means that male agricultural farmers were generally older than female counterpart.

EDUCATIONAL ATTAINMENT	FREQUENCY	PERCENTAGE
Elementary Level	3	10
Elementary Graduate	5	17
High School Level	7	23
High School Graduate	6	20
College Level	9	30
TOTAL	30	100

Table 2. Distribution of the farmers according to educational attainment

Table 2 presents the distribution of the farmers according to educational attainment. Data reveals that the largest group of farmers reached College Level with a frequency of 9 (30%), followed by those at the High School Level with 7 (23%), and High School Graduates with 6 (20%). Additionally, 5 farmers are Elementary Graduates (17%), while 3 are at the Elementary Level (10%), and none (0%) are College Graduates.

These findings indicate that a significant portion of the farmers possess foundational to intermediate formal education. According to Bautista (2021), a farmer's educational background plays a vital role in enhancing their capacity to absorb technical agricultural training, analyze complex information, and effectively adopt modern farming technologies. Furthermore, Quisumbing and Pandolfelli (2015) emphasize that individuals with higher educational attainment are better positioned to navigate innovative agricultural extension programs, such as Integrated Pest Management (IPM) mobile applications, leading to improved farm productivity and decision-making.

FARMING EXPERIENCE	FREQUENCY	PERCENTAGE
Below 5 years	2	7

6-10 years	**5**	**16**
11-15 years	**8**	**27**
16-20 years	**9**	**30**
21 years and above	**6**	**20**
TOTAL	**30**	**100**

Table 3. Distribution of the farmers according to farming experience

Table 3 presents the distribution of the farmers according to their farming experience. Data reveals that the majority of the farmers have extensive experience in agricultural production, with the largest group falling under the 16 to 20 years bracket, comprising 9 farmers or 30% of the total respondents. This is followed by those with 11 to 15 years of experience at 27% (8 farmers), and those with 21 years and above at 20% (6 farmers). Meanwhile, fewer farmers have relatively shorter experience, with 16% (5 farmers) having 6 to 10 years and only 7% (2 farmers) having below 5 years of farming experience.

These findings indicate that the respondents possess mature, practical knowledge and long-term engagement in rice farming. According to Bautista (2021), extensive farming experience equips agricultural workers with localized resilience, traditional problem-solving skills, and a deep understanding of seasonal crop cycles. Furthermore, as noted by Quisumbing and Pandolfelli (2015), highly experienced farmers are often adept at traditional crop management, though targeted extension programs and digital tools (such as Integrated Pest Management mobile guides) remain crucial in bridging traditional practices with modern technological innovations.

PRIMARY CROPS GROWN	FREQUENCY	PERCENTAGE
RICE	**9**	**30**
CORN	**6**	**20**
SUGARCANE	**4**	**14**
COCONUT	**3**	**10**
BANANA	**3**	**10**
CASSAVA	**2**	**7**
COFFEE	**1**	**3**
CACAO	**1**	**3**
MANGO	**1**	**3**
TOTAL	**30**	**100**

Table 4. Distribution of the farmers according to Crops grown

Table 4 presents the distribution of the farmers according to their primary crops grown. Data reveals that the majority of the farmers are engaged in staple food production, with Rice recording the highest frequency of 9 (30%), followed by Corn with 6 (20%). Furthermore, farmers are also distributed across commercial and high-value crops, including Sugarcane at 4 (14%), Coconut and Banana both at 3 (10%), and Cassava at 2 (7%). Meanwhile, specialized permanent and high-value crops such as Coffee, Cacao, and Mango each account for 1 (3%) of the respondents.

These findings reflect the diverse agricultural landscape and cropping systems managed by the farming community. According to the Philippine Statistics Authority (PSA, 2017) and the Department of Agriculture (DA, 2020), multi-crop diversification and staple cereal farming heavily influence local rural livelihoods, requiring farmers to adapt specific crop management strategies. Quisumbing and Pandolfelli (2015) emphasize that understanding the specific primary crops grown by farmers is crucial when introducing targeted technological interventions—such as Integrated Pest Management (IPM) guides—since pest control needs, input requirements, and agronomic practices vary significantly across crops like rice, corn, sugarcane, and perennial tree crops.

SMARTPHONE OWNERSHIP	FREQUENCY	PERCENTAGE
Yes	**22**	**73**
No	**8**	**27**
TOTAL	**30**	**100**

Table 5. Distribution of the farmers according to Smartphone Ownership

Table 5 presents the distribution of the farmers according to smartphone ownership. Data reveals that the majority of the farmers own a

smartphone, with a frequency of 22 or 73% of the respondents, while 8 farmers or 27% do not own one.

These findings indicate a high level of digital connectivity and mobile device accessibility among rural agricultural workers. According to Bautista (2021), the widespread adoption of smartphones in agricultural communities presents a viable platform for delivering digital extension services, such as mobile-based agricultural applications and real-time advisory tools. Furthermore, Quisumbing and Pandolfelli (2015) emphasize that high mobile phone ownership significantly bridges the information gap, enabling farmers to easily access market prices, weather updates, and Integrated Pest Management (IPM) mobile guides to enhance their farm management decisions.

INTERNET ACCESS (AMONG SMARTPHONE OWNERS)	FREQUENCY	PERCENTAGE
Yes	18	82
No	4	18
TOTAL	22	100

Table 6. Distribution of the farmers according to Internet Access

Table 6 presents the distribution of the smartphone-owning farmers according to their access to the internet. Data reveals that among the 22 farmers who own a smartphone, the majority have active internet connectivity, with a frequency of 18 or 82% (representing 60% of the total 30 respondents), while 4 farmers or 18% (13% of the total respondents) reported having no internet access.

These findings indicate that while mobile device ownership is high, online connectivity remains variable within the farming community. According to Bautista (2021), regular internet access is a critical determinant in successfully deploying digital agricultural interventions, such as real-time updates and online agricultural mobile guides. Furthermore, Quisumbing and Pandolfelli (2015) emphasize that bridging the digital divide and improving rural internet infrastructure are essential to ensuring that all farmers—especially those with limited connectivity—can fully utilize web-based Integrated Pest Management (IPM) applications and agricultural extension services.

INDICATORS	WEIGHTED MEAN	DESCRIPTIVE RATING
1. I need to know which crops are affected by each common pest.	**4.85**	**Very High**
2. I need information about the life cycle and behavior of common crop pests.	**4.70**	**Very High**
3. I need information about the common pests that affect the crops I grow in General Santos City.	**4.64**	**Very High**
4. I need information about the type and extent of crop damage caused by common pests.	**4.62**	**Very High**
5. I need to know when common crop pests are most likely to appear during the growing season.	**4.62**	**Very High**
TOTAL	**4.68**	**Very High**

Table 7. Farmers information needs and preferred features for enhancing the integrated pest management in terms of pest management

Table 7 reveals the farmers' information needs on crop pests. Farmers rated their needs as very high with an overall mean of 4.68. In particular, they

believed that they need to know which crops are affected by each common pest (4.85), they believed that they need information about the life cycle and behavior of common crop pests (4.70), and they believed that they need information about the common pests that affect the crops they grow in General Santos City (4.64). This indicates that the farmers have a strong and urgent demand for pest management knowledge. This pattern indicates that farmers want pest information linked to the crops they grow. Guiam et al. (2021) describe SPIDTECH, a Philippine app whose crop-organized library presents host ranges, pest life stages, damage symptoms, and management practices. This design approach aligns with the respondents' strongest need: knowing which crops are affected by common pests.

INDICATORS	WEIGHTED MEAN	DESCRIPTIVE RATING
1. I need guidance on distinguishing harmful pests from beneficial insects found in my fields.	**4.80**	**Very High**
2. I need clear pictures of common pests at different stages of their life cycle.	**4.65**	**Very High**
3. I need guidance on identifying pests from their appearance and the signs of damage they cause.	**4.63**	**Very High**
4. I need guidance on distinguishing pest damage from symptoms of crop diseases or nutrient problems.	**4.61**	**Very High**
5. I need step-by-step guidance for identifying a crop problem based on the affected plant part and observed symptoms.	**4.60**	**Very High**
TOTAL	**4.65**	**Very High**

Table 8. Farmers information needs and preferred features for enhancing the integrated pest management in terms of pest identification

Table 8 reveals the farmers' information needs on pest identification and diagnostics. Farmers rated their needs as very high with an overall mean of 4.65. In particular, they believed that they need guidance on distinguishing harmful pests from beneficial insects found in their fields (4.80), they believed that they need clear pictures of common pests at different stages of their life cycle (4.65), and they believed that they need guidance on identifying pests from their appearance and the signs of damage they cause (4.63). This indicates that the farmers have a strong and urgent demand for pest management knowledge. The highest rating was for distinguishing harmful pests from beneficial insects (WM = 4.80), while requests for life-stage pictures (4.65) and symptom-based identification (4.63) were also very high. Guiam et al. (2021) identify accurate pest and disease identification as central to management and describe a Philippine app that pairs crop-specific identification with image-supported reference material. These results support prioritizing clear diagnostic steps and images in the guide.

INDICATORS	WEIGHTED MEAN	DESCRIPTIVE RATING
1. I need information on field sanitation practices that help prevent pest and disease problems.	**4.78**	**Very High**

2. I need information on using crop rotation to reduce pest and disease problems.	**4.71**	**Very High**
3. I need guidance on choosing resistant crop varieties or healthy planting materials to prevent pest and disease problems.	**4.68**	**Very High**
4. I need information on practices that protect beneficial organisms that help control pests.	**4.63**	**Very High**
5. I need guidance on regularly checking my crops to detect pests or diseases before they spread.	**4.60**	**Very High**
TOTAL	**4.68**	**Very High**

Table 9. Farmers information needs and preferred features for enhancing the integrated pest management in terms of pest prevention

Table 9 reveals the farmers' information needs on pest prevention. Farmers rated their needs as very high with an overall mean of 4.68. In particular, they **need information on field sanitation practices that help prevent pest and disease problems** (4.78), they believed that they **need information on using crop rotation to reduce pest and disease** (4.71), and they believed that they **need guidance on choosing resistant crop varieties or healthy planting materials to prevent pest and disease problems** (4.68). Field sanitation (WM = 4.78), crop rotation (4.71), and resistant varieties or healthy planting materials (4.68) were the highest-rated prevention topics. These are preventive and cultural tactics in IPM; Flint (2012) discusses sanitation, rotation, and crop and field management among practices used to reduce pest problems. The results support presenting these practical prevention steps as core guide content.

INDICATORS	WEIGHTED MEAN	DESCRIPTIVE RATING
1. I need information on physical or mechanical methods, such as traps, barriers, or removing pests by hand.	**4.72**	**Very High**
2. I need information on using natural enemies or biological control products to manage pests.	**4.65**	**Very High**
3. I need guidance on deciding when a pest or disease problem requires control measures.	**4.62**	**Very High**
4. I need guidance on combining suitable IPM control methods to manage a pest or disease problem.	**4.61**	**Very High**
5. I need information on cultural practices that can reduce an existing pest	**4.59**	**Very High**

or disease problem.		
TOTAL	**4.63**	**Very High**

Table 10. Farmers information needs and preferred features for enhancing the integrated pest management in terms of control method

Table 10 reveals the farmers' information needs on control methods. Farmers rated their needs as very high with an overall mean of 4.63. In particular, they believed that they need information on physical or mechanical methods, such as traps, barriers, or removing pests by hand (4.72), they believed that they need information on using natural enemies or biological control products to manage pests (4.65), and they believed that they need guidance on deciding when a pest or disease problem requires control measures (4.62). Physical or mechanical control had the highest item mean (4.72), followed by biological control (4.65); all five topics were rated very high. This pattern supports practical explanations of traps, barriers, hand removal, and natural enemies, alongside guidance on when and how to combine tactics. Flint (2012) explains that IPM selects and integrates appropriate methods according to crop and pest conditions.

INDICATORS	WEIGHTED MEAN	DESCRIPTIVE RATING
1. I need guidance on selecting a pesticide registered or recommended for my crop and the pest or disease being managed.	**4.75**	**Very High**
2. I need information on protective clothing and safe practices for handling, mixing, and applying pesticides.	**4.71**	**Very High**
3. I need guidance on the proper timing and frequency of pesticide application.	**4.70**	**Very High**
4. I need clear instructions on reading pesticide labels and following the correct dosage and mixing directions.	**4.68**	**Very High**
5. I need information on pesticide storage and the safe disposal of leftover mixtures and empty containers.	**4.62**	**Very High**
TOTAL	**4.69**	**Very High**

Table 11. Farmers information needs and preferred features for enhancing the integrated pest management in terms of safe pesticide use

Table 11 reveals the farmers' information needs on safe pesticide use. Farmers rated their needs as very high with an overall mean of 4.69. In particular, they believed that they need guidance on selecting a pesticide registered or recommended for their crop and the pest or disease being managed (4.75), they believed that they need information on protective clothing and safe practices for handling, mixing, and applying pesticides (4.71), and they believed that they need guidance on the proper timing and frequency of pesticide application (4.70). This indicates that the farmers have a strong and urgent demand for pest management knowledge. The top-rated need was selecting a pesticide registered or recommended for the crop and target pest (WM = 4.75), followed by protective clothing and safe handling (4.71). High ratings for timing, label instructions, storage, and disposal also point to demand for safe-use guidance across the pesticide-use cycle. The Food and Agriculture Organization of the United Nations and the World Health Organization (2014) set out pesticide-management guidance from production through disposal, supporting

clear, label-based advice on selection, protection, application, and disposal.

INDICATORS	WEIGHTED MEAN	DESCRIPTIVE RATING
1. I prefer the app's written information to be available in Filipino/ Tagalog	4.80	Very High
2. I prefer the app's written information to be available in Cebuano/ Bisaya	4.79	Very High
3. I prefer an option to switch between available languages in the app.	4.75	Very High
4. I prefer audio narration in the language I select for the app.	4.69	Very High
5. I prefer the app's written information to be available in English.	4.64	Very High
TOTAL	4.73	Very High

Table 12. Farmers information needs and preferred features for enhancing the integrated pest management in terms of language

Table 12 reveals the farmers' preferred features regarding language. Farmers rated their preferences as very high with an overall mean of 4.73. In particular, they believed that they prefer the app's written information to be available in Filipino/Tagalog (4.80), they believed that they prefer the app's written information to be available in Cebuano/Bisaya (4.79), and they believed that they prefer an option to switch between available languages in the app (4.75). This indicates that the farmers have a strong and positive attitude towards language accessibility features. Tagalog (WM = 4.80) and Cebuano/Bisaya (4.79) received the highest language ratings, and the option to switch languages also rated very highly (4.75). In a study involving 135 rice farmers in Benin, Bede et al. (2021) found that videos in the local language improved assimilation and understanding. This provides a relevant parallel for offering farmers language choices in the proposed guide, while recognizing that the earlier study examined videos in a different setting.

INDICATORS	WEIGHTED MEAN	DESCRIPTIVE RATING
1. I prefer to access saved crop and pest guides without an internet connection.	4.79	Very High
2. I prefer to save useful pest and disease information on my phone for later use in the field.	4.76	Very High
3. I prefer to search downloaded app content while offline	4.73	Very High
4. I prefer app content to update when my phone reconnects to the internet.	4.68	Very High
5. I prefer an app that uses little mobile data when an internet connection is available.	4.63	Very High
TOTAL	4.71	Very High

Table 13. Farmers information needs and preferred features for enhancing the integrated pest management in terms of offline access

Table 13 reveals the farmers' preferred features regarding offline access. Farmers rated their preferences as very high with an overall mean of 4.71. In particular, they believed that they prefer to access saved crop and pest guides without an

internet connection (4.79), they believed that they prefer to save useful pest and disease information on their phone for later use in the field (4.76), and they believed that they prefer to search downloaded app content while offline (4.73). This indicates that the farmers have a strong and positive attitude towards offline accessibility features. Offline access received a very high overall rating (WM = 4.71). Accessing saved guides without internet had the highest item mean (4.79), followed by saving information for field use (4.76) and searching downloaded content offline (4.73). This preference is relevant to the four smartphone owners who reported no internet access in Table 6. Guiam et al. (2021) report that SPIDTECH's mobile features continue to work offline and temporarily store data on the device, providing a Philippine example for downloadable IPM guidance.

INDICATORS	WEIGHTED MEAN	DESCRIPTIVE RATING
1. I prefer side-by-side images comparing healthy crops with crops affected by pests or diseases.	**4.78**	**Very High**
2. I prefer images with labels or arrows pointing out important identifying features.	**4.77**	**Very High**
3. I prefer clear photographs showing common crop pests and diseases.	**4.71**	**Very High**
4. I prefer images showing pests at different life stages.	**4.70**	**Very High**
5. I prefer close-up images showing pest or disease damage on affected plant parts.	**4.60**	**Very High**
TOTAL	**4.71**	**Very High**

Table 14. Farmers information needs and preferred features for enhancing the integrated pest management in terms of images

Table 14 reveals the farmers' preferred features regarding images. Farmers rated their preferences as very high with an overall mean of 4.71. In particular, they believed that they prefer side-by-side images comparing healthy crops with crops affected by pests or diseases (4.78), they believed that they prefer images with labels or arrows pointing out important identifying features (4.77), and they believed that they prefer clear photographs showing common crop pests and diseases (4.71). This indicates that the farmers have a strong and positive attitude towards image accessibility features. Side-by-side comparisons (WM = 4.78) and labeled visual cues (4.77) were the most preferred image features. This emphasis matches SPIDTECH's use of crop and pest or disease images alongside identification results (Guiam et al., 2021). Bede et al. (2021) also found that farmers learned from images in training videos, including when the spoken language differed, supporting clear visual cues as a complement to written descriptions.

INDICATORS	WEIGHTED MEAN	DESCRIPTIVE RATING
1. I prefer videos demonstrating how to use biological, physical, or mechanical control methods.	**4.81**	**Very High**
2. I prefer videos demonstrating pest and disease prevention practices.	**4.79**	**Very High**
3. I prefer short videos showing what common crop pests and	**4.76**	**Very High**

diseases look like.		
4. I prefer videos narrated in the language I select for the app.	**4.70**	**Very High**
5. I prefer videos demonstrating how to inspect or scout crops for pests and diseases.	**4.60**	**Very High**
TOTAL	**4.73**	**Very High**

Table 15. Farmers information needs and preferred features for enhancing the integrated pest management in terms of videos

Table 15 reveals the farmers' preferred features regarding video content. Farmers rated their preferences as very high with an overall mean of 4.73. In particular, they believed that they prefer videos demonstrating how to use biological, physical, or mechanical control methods (4.81), they believed that they prefer videos demonstrating pest and disease prevention practices (4.79), and they believed that they prefer short videos showing what common crop pests and diseases look like (4.76). This indicates that the farmers have a strong and positive attitude towards video content accessibility features. Videos demonstrating physical, biological, or mechanical control methods had the highest item mean (WM = 4.81), followed by prevention demonstrations (4.79) and short pest or disease identification videos (4.76). Zoundji et al. (2018) assessed farmer-learning videos on sustainable vegetable production in Benin and reported that viewers adapted lessons to their local conditions and used more sustainable practices. Their study supports video as a practical learning format, while the present results identify the topics farmers in General Santos City most want demonstrated. Furthermore, this supports the findings of Van Campenhout et al. (2017), who demonstrated that video-mediated agricultural instruction on portable devices significantly enhances knowledge uptake and technological adoption among smallholder farmers.

INDICATORS	WEIGHTED MEAN	DESCRIPTIVE RATING
1. I prefer a simple home screen with clearly labelled buttons.	**4.76**	**Very High**
2. I prefer app information to be organized into clear sections.	**4.73**	**Very High**
3. I prefer to browse information by pest, disease, or visible symptom.	**4.70**	**Very High**
4. I prefer to browse information by crop.	**4.68**	**Very High**
5. I prefer a search feature that lets me find information by entering a crop, pest, disease, or symptom.	**4.65**	**Very High**
TOTAL	**4.70**	**Very High**

Table 16. Farmers information needs and preferred features for enhancing the integrated pest management in terms of navigation

Table 16 reveals the farmers' preferred features regarding navigation. Farmers rated their preferences as very high with an overall mean of 4.70. In particular, they believed that they prefer a simple home screen with clearly labeled buttons (4.76), they believed that they prefer app information to be organized into clear sections (4.73), and they believed that they prefer to browse information by pest, disease, or visible symptom (4.70). This indicates that the farmers have a strong and positive attitude towards navigation features. The strongest navigation preference was a simple home screen with clearly labeled buttons (WM = 4.76), followed by clear sections (4.73) and browsing by pest, disease, or symptom (4.70). SPIDTECH organizes its library by crop and category and provides search (Guiam et al., 2021), offering a relevant example of the

content organization and retrieval options requested by respondents. These ratings describe preferred features; they do not measure the usability of an existing interface. Furthermore, this supports the findings of Van Campenhout et al. (2017), who demonstrated that intuitive user interface designs and simplified navigation paths significantly improve usability and digital application adoption among rural users.

INDICATORS	WEIGHTED MEAN	DESCRIPTIVE RATING
1. I prefer the app to include guides for the crops I grow in General Santos City.	**4.77**	**Very High**
2. I prefer pest and disease information to be linked to the specific crop affected.	**4.75**	**Very High**
3. I prefer each crop to have its own section in the app.	**4.70**	**Very High**
4. I prefer reco-mmendations to match the to match the growth stage of the crop.	**4.67**	**Very High**
5. I prefer crop guides to include pest and disease problems common in my local area.	**4.63**	**Very High**
TOTAL	**4.70**	**Very High**

Table 17. Farmers information needs and preferred features for enhancing the integrated pest management in terms of crop-specific information

Table 17 reveals the farmers' preferred features regarding crop-specific information. Farmers rated their preferences as very high with an overall mean of 4.70. In particular, they believed that they prefer the app to include guides for the crops they grow in General Santos City (4.77), they believed that they prefer pest and disease information to be linked to the specific crop affected (4.75), and they believed that they prefer each crop to have its own section in the app (4.70). This indicates that the farmers have a strong and positive attitude towards crop-specific information features. A guide for crops grown in General Santos City was the highest-rated crop-specific feature (WM = 4.77), followed by linking pest and disease information to the affected crop (4.75) and giving each crop its own section (4.70). This priority aligns with SPIDTECH's Philippines-focused content for major crops and its crop-organized library (Guiam et al., 2021). The findings support organizing the proposed guide around local crops and linking each crop to relevant pest and disease information.Furthermore, this supports the findings of Van Campenhout et al. (2017), who demonstrated that localized, crop-tailored content significantly enhances user engagement and practical adoption among agricultural workers.

8. CONCLUSION

Based on the findings, the 30 farmers surveyed in General Santos City reported very high information needs across the assessed IPM topics. Their strongest needs were information about which crops are affected by common pests (WM = 4.85), how to distinguish harmful pests from beneficial insects (WM = 4.80), and physical or mechanical pest-control methods (WM = 4.72). They also rated the proposed application features very highly. Video demonstrations received the highest overall feature rating (WM = 4.73), followed by language options (WM = 4.73), offline access and images (WM = 4.71 each), and navigation and crop-specific information (WM = 4.70 each). Although 22 of the 30 respondents owned smartphones, four smartphone owners reported having no internet access. The findings indicate that an enhanced IPM Farmers' Guide should provide practical, crop-specific information in Filipino/Tagalog and Cebuano/Bisaya, supported by clear images, instructional videos, simple navigation, and offline access. These features reflect the needs and preferences reported by the participating farmers and can guide the application's enhancement.

9. RECOMMENDATION

Based on the findings, the following recommendations were forwarded:

Prioritize offline and low-data access. The application should allow farmers to save and access crop and pest guides without an internet connection. Its content should use minimal mobile data when the device is online.

Provide localized, crop-specific IPM information. The guide should cover crops grown in General Santos City and include clear information on common pests, signs of damage, pest life stages, prevention, physical and biological control methods, and safe pesticide use. Pest management content should be reviewed by qualified crop protection specialists.

Use accessible language and learning materials. Include Filipino/Tagalog and Cebuano/Bisaya options, with audio narration where possible. Add labeled images and short instructional videos to help farmers identify pests and understand recommended management practices.

Keep the application easy to navigate. Organize content by crop, pest, disease, and visible symptoms. Use clearly labeled buttons and a search feature to help farmers find information quickly.

Provide support through local agricultural extension services. The General Santos City agriculture office and extension workers should help introduce the application, gather farmer feedback, and share IPM information with farmers who do not own smartphones or have reliable internet access.

Conduct further testing and research. Future studies should test the application's usability and content accuracy with farmers and evaluate whether using it improves IPM knowledge or practices. A larger and more diverse sample would also help assess whether the findings apply to farmers across General Santos City.

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