



RESEARCH PAPER

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## Challenges and impact of the farmer-scientists training program on community development in Bohol, Philippines

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### ABSTRACT

Agricultural extension programs play a crucial role in enhancing farm productivity, technology adoption, and rural livelihoods. In the Philippines, the Farmer-Scientists Training Program (FSTP) represents a participatory and capacity-building approach that empowers farmers as active innovators. Despite its widespread implementation and reported high satisfaction rates, limited empirical studies have comprehensively assessed its long-term economic and social impacts at the local level. In Bohol, existing evaluations largely focus on implementation rather than outcomes, creating a gap in understanding how the program influences productivity, income, and community development. This study addresses this gap by evaluating the challenges and impact of the FSTP among corn farmers in Bohol. A mixed-methods cross-sectional design was employed, involving structured surveys, key informant interviews, and field observations among program graduates. Descriptive and inferential statistics, including Analysis of Variance (ANOVA), were used to analyze relationships between socio-demographic and farm characteristics, challenges encountered, and program impacts. Findings reveal that participants are predominantly smallholder, low-income farmers who received strong support in terms of training and farm inputs. However, gaps persist in access to credit, mechanization, and market linkages. Farmers experienced moderate challenges, particularly related to environmental factors, program participation demands, and operational inefficiencies such as delayed input distribution. Despite these constraints, the program contributed positively to knowledge enhancement, adoption of improved practices, and moderate productivity gains. The study highlights that the effectiveness of the FSTP is shaped by institutional support, resource accessibility, and local governance conditions. It implies that strengthening integrated support systems, particularly in financing, market access, and extension services, is essential to sustain program benefits and enhance community development outcomes.

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## INTRODUCTION

Agricultural extension and training programs are vital for improving farm productivity, advancing technological innovation, and supporting community development. In the Philippines, these initiatives bridge the gap between research institutions and farming communities. One notable example is the Farmer-Scientist Training Program (FSTP) of the Agricultural Training Institute (ATI), which adopts a participatory and capacity-building approach that positions farmers as “farmer-scientists.” By promoting on-farm experimentation, collaborative learning, and farmer-led innovation, the FSTP reflects global shifts toward inclusive agricultural research frameworks (Ingram, 2014; Lacoste *et al.*, 2022). Such models emphasize farmers as co-creators of solutions rather than passive recipients, thereby enhancing both productivity and social empowerment.

Despite these strengths, agricultural extension programs in the Philippines continue to face challenges that limit their overall effectiveness. Farmers often lack sufficient production inputs, market access, and infrastructure support (Cayabyab *et al.*, 2024; Juan *et al.*, 2025). Even with high participant satisfaction, 88.4% found the FSTP useful and 76.7% applied their learning (Cayabyab *et al.*, 2024), systemic barriers persist. These issues highlight the need for stronger institutional coordination, better resource allocation, and context-specific training. Similar global experiences show that technology alone cannot generate sustained improvements without supportive markets and institutions (Kristjanson and Thornton, 2004; Raza, 2025).

The Corn Program, a major government initiative, aims to increase corn productivity, strengthen food security, and improve farmer livelihoods through technology dissemination, training, and infrastructure support. Corn remains a key crop for both household consumption and the livestock industry. In Bohol, daily consumption reaches 342 sacks of corn grits, or about 124,830 sacks annually, indicating substantial and growing demand driven by the province’s expanding livestock sector. While existing studies provide insights

into technology adoption, they often overlook institutional and community-level factors influencing program outcomes.

This gap is notable in Bohol, where substantial participation in corn programs has not been matched by comprehensive empirical evaluations. Current assessments typically focus on implementation activities rather than long-term impacts on income, productivity, or social empowerment. Without integrated evaluations, policymakers and development agencies face limitations in measuring effectiveness, identifying gaps, and designing more inclusive strategies.

Addressing this gap is essential to understanding how national agricultural initiatives translate into meaningful local outcomes. By examining the Farmer-Scientist Training Program in Bohol, this study situates itself within agricultural extension, community development, and impact evaluation. A systematic, evidence-based assessment of FSTP outcomes will provide insights necessary for enhancing the design, implementation, and sustainability of agricultural training programs in the Philippines.

## MATERIALS AND METHODS

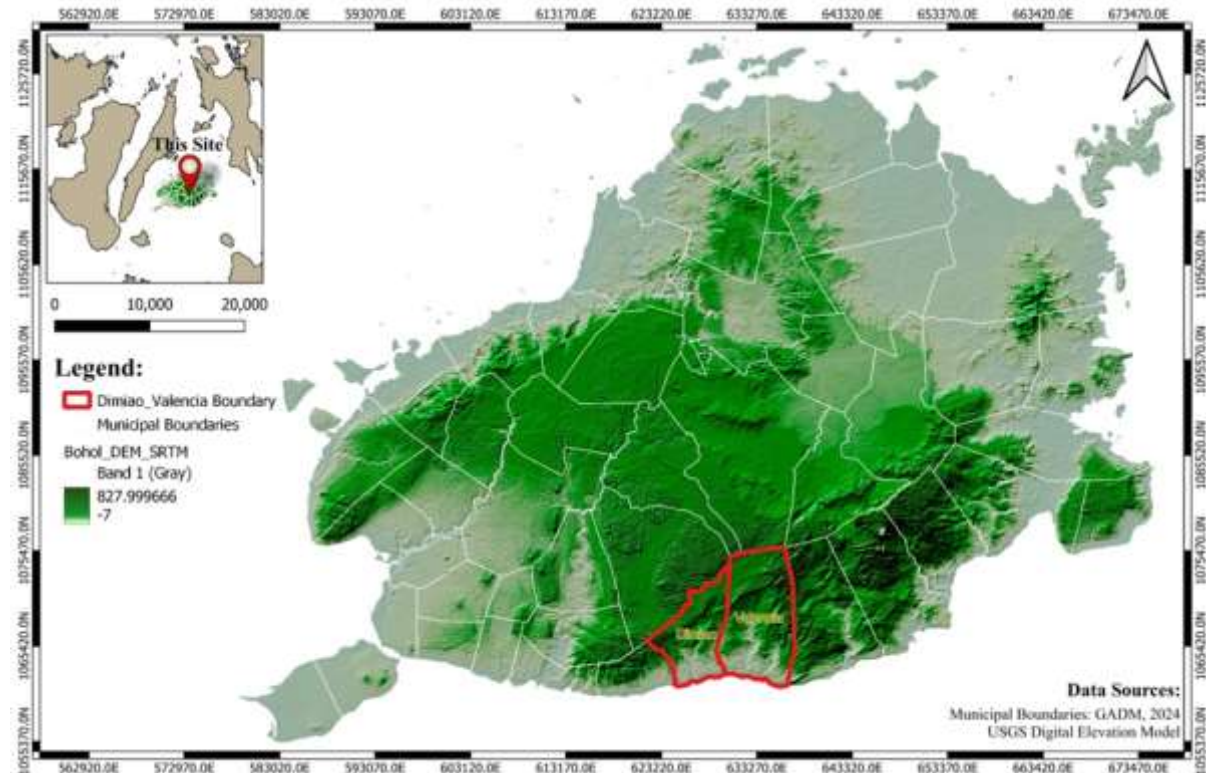
### Study site

The study was conducted in the Province of Bohol, located in Central Visayas, Philippines. Bohol is predominantly an agricultural province characterized by vast tracts of rice fields, coconut plantations, livestock production areas, and expanding corn farms. Agriculture remains one of the province’s major economic drivers, providing livelihood and income to a significant portion of its population. The province’s agro-ecological landscape includes both irrigated and rainfed areas, supporting diverse cropping systems and varying levels of farm productivity (Fig. 1).

Several institutions play vital roles in advancing agricultural development in Bohol. The Office of the Provincial Agriculturist (OPA) oversees agricultural policies, programs, and coordination among local government units (LGUs). The Municipal Agriculture

Offices (MAOs) implement and monitor agricultural initiatives at the local level, serving as the direct link between farmers and government services. The Department of Agriculture – Regional Field Office 7 (DA–RFO 7) provides technical and logistical

support, while the Agricultural Training Institute – Regional Training Center VII (ATI–RTC VII) facilitates capacity building, extension activities, and the implementation of specialized commodity programs such as the Corn Program.



**Fig. 1.** Location map of the study

The FSTP under Corn Program is among the key initiatives aimed at improving farmers' productivity and income by providing access to quality seeds, fertilizers, training, machinery, and market linkages. In Bohol, the program operates through partnerships among national and local agencies, farmers' cooperatives, and agricultural extension workers (AEWs). The province's strategic location, institutional support system, and diverse agricultural landscape make it an ideal setting for assessing the impact and effectiveness of the Farmer-Scientists Training Program on farming communities.

### Respondents

Participants were purposively selected according to the following criteria: they must be graduates of the Farmer-Scientists Training Program (Phase I to Phase III), known as farmer-scientists, and must have received support in the form of training, seeds, fertilizer, technical

assistance, or other interventions provided through the program.

### Design

This study employed a mixed-methods cross-sectional design, combining quantitative and qualitative approaches, to evaluate the economic and social impacts of the Farmer-Scientists Training Program (FSTP) in Bohol. The qualitative and quantitative strand consists of a structured household/farm survey of participating corn farmers (the questionnaire provided), key informant interviews (KIIs), and interviewers' field notes to capture perceptions, contextual factors, and implementation processes.

### Instrument

A modified questionnaire was used in the study to assess the challenges and impact of FSTP in Bohol

Province. This research employed a pilot test before the study was conducted and used Cronbach's Alpha to test the questionnaire's reliability. Part I of the questionnaire focused on the socio-demographic characteristics of the respondents. These variables, including age, gender, educational attainment, household size, income, and source of livelihood, were analyzed using descriptive statistics such as frequency counts, percentages, and means. This analysis aimed to provide a demographic profile of the corn farmers participating in the Farmer-Scientists Training Program.

Part II covered the farm characteristics of the respondents, including farm size, ownership or tenure, type of corn planted, cropping pattern, frequency, yield, and access to agricultural services. Descriptive statistics was used to summarize and interpret this information, offering a comprehensive understanding of the respondents' farming conditions and production contexts.

Part III measured the level of challenges encountered by corn farmers in participating in the Farmer-Scientists Training Program (FSTP). Respondents rated each challenge using a 5-point Likert Scale, where: 5 = Very Challenging, 4= Challenging, 3= Moderately Challenging, 2= Less Challenging and 1= Not Challenging at all. This section aimed to identify the most significant barriers that affect farmers' participation and engagement in the program.

Part IV assessed the level of impact of the FSTP in achieving its objectives, including increasing corn yields, improving farmers' income, and promoting sustainable farming practices.

Respondents evaluated the program using a 5-point Likert Scale, where: 5= Very High, 4= High, 3= Neither, 2= Low, and 1= Very Low. This section determined the extent to which the FSTP has positively influenced farmers productivity, knowledge, and livelihoods. Part V presented the respondents' recommendations for improvement of the FSTP. Responses were analyzed using qualitative

content analysis. Suggestions were categorized and summarized to identify common themes, recurring issues, and actionable insights that can guide policymakers, program implementers, and agricultural institutions in enhancing the delivery, sustainability, and overall effectiveness of the Farmer-Scientists Training Program.

### **Procedure**

The researcher sought permission from the respondents' respective LGUs, through a formal letter addressed to the municipal mayor and the municipal agriculturist, to allow their inclusion in this study.

### **Prior informed consent and ethical considerations**

The study included 42 respondents, all graduates of the FSTP Phases I to III, comprising 21 farmer-scientists from the municipality of Dimiao (2017–2025) and 21 farmer-scientists from the municipality of Valencia (2019–2024). Demographic information (e.g., age, sex, marital status, occupation) were collected solely to provide context and promote inclusivity. The study adhered to established ethical standards for research involving human participants, ensuring respect for autonomy, confidentiality, and non-maleficence. In compliance with Republic Act No. 10173, also known as the Data Privacy Act of 2012, all personal data were handled with the utmost confidentiality. Respondents' identities were anonymized, and access to raw data was restricted exclusively for academic and analytical purposes.

### **Statistical treatment**

Data gathered from the questionnaire was systematically analyzed using descriptive and inferential statistical tools to assess the economic and social impact of the Farmer-Scientists Training Program on farming communities in Bohol. The analysis was structured according to the research questions outlined in the study. To explore potential relationships between selected socio-demographic or farm variables and the observed program impacts, Analysis of Variance (ANOVA) was employed. This determined whether significant associations exist

between respondents' profiles and their levels of productivity, income improvement, or program satisfaction. All quantitative data were processed and analyzed using the Statistical Package for the Social Sciences (SPSS) version 20.0, ensuring accuracy and reliability in statistical computation. Results were presented through tables and textual interpretations to provide a clear, comprehensive understanding of the Farmer-Scientists Training Program's impact across Bohol's farming communities.

## RESULTS AND DISCUSSION

### Socio-demographic characteristics of FSTP-trained farmers

Table 1 presents the demographic profile of the FSTP-trained farmers (n=42). In terms of age distribution, the largest proportion of respondents belonged to the 50–59 age group (38.1%), followed by those aged 40–49 (21.4%) and 70–79 (16.7%). Smaller proportions were observed among respondents aged 60–69 (11.9%), 30–39 (9.5%), and 80–89 (2.4%). This distribution indicates that the respondent population is predominantly composed of middle-aged to older individuals, suggesting a relatively mature group with potentially extensive life and work experiences that may influence their perspectives and decision-making processes. This result was supported by the findings of Oñal *et al.* (2025) indicating that a combination of age and experience enhances farming outcomes.

With respect to sex, the respondents were equally distributed between males and females (50.0% each), indicating gender balance within the sample. This equal representation minimizes gender bias and allows for more balanced interpretation of results across sexes which contrasts with the findings of Aritree *et al.* (2022), who reported that women often remain underrepresented in agricultural policy and administration, thereby limiting their influence in broader decision-making processes.

In terms of civil status, the majority of respondents were married (73.8%), followed by widowed individuals (19.0%), while only a small proportion were single (7.1%). This suggests that most

respondents are embedded within family structures, which may have implications for economic responsibilities, resource allocation, and participation in socio-economic activities. Married farmers tend to have stronger social networks and greater opportunities for innovation, with spousal collaboration further enhancing farm productivity (Badstue *et al.*, 2020; Deere and Twyman, 2014).

Regarding educational attainment, the data reveal that a considerable proportion of respondents had completed elementary education (23.8%) or reached high school level (21.4%), while 16.7% were high school graduates and 19.0% were college graduates. A smaller percentage had only elementary-level education (14.3%) or had reached college level without completing a degree (4.8%). This indicates that while some respondents have attained higher education, the majority possess basic to secondary educational backgrounds, which may influence their access to information, technical knowledge, and capacity to adopt innovations. Education plays a crucial role in technology adoption by enhancing farmers' ability to access information and actively engage with extension services (Matovelo *et al.*, 2006; Wakoli *et al.*, 2025).

In terms of income, the majority of respondents (71.4%) reported annual earnings of less than ₱50,000, followed by those earning ₱50,001–₱100,000 (21.4%). Only a minimal proportion reported higher income brackets, with 4.8% earning ₱100,001–₱200,000 and 2.4% earning ₱200,000 and above. This distribution reflects a generally low-income population, suggesting potential economic constraints that may affect livelihood opportunities, access to resources, and overall well-being as access to capital remains critical for improving productivity and income, although challenges such as loan repayment difficulties and limited financial literacy persist (Ahmad, 2025).

The demographic characteristics indicate that the respondents are predominantly middle-aged, married individuals with balanced gender representation,

moderate levels of educational attainment, and relatively low income. These socio-demographic factors are critical variables that may shape respondents' behavior, decision-making, and engagement in development interventions. Consistent with existing literature, demographic attributes such as age, education, and income are key determinants of participation and adoption of programs, as they influence both capacity and access to resources necessary for socio-economic advancement (Wosene *et al.*, 2025; Mala and Mala, 2025; Yusuf *et al.*, 2024).

**Table 1.** Profile of the FSTP-trained farmers

Profile	f	%
<b>Age</b>		
30-39	4	9.5
40-49	9	21.4
50-59	16	38.1
60-69	5	11.9
70-79	7	16.7
80-89	1	2.4
<b>Sex</b>		
Male	21	50.0
Female	21	50.0
<b>Civil status</b>		
Single	3	7.1
Married	31	73.8
Widowed	8	19.0
<b>Educational attainment</b>		
Elementary level	6	14.3
Elementary graduate	10	23.8
High school level	9	21.4
High school graduate	7	16.7
College level	2	4.8
College graduate	8	19.0
<b>Income</b>		
Less than ₱50,000	30	71.4
₱50,001- ₱100,000	9	21.4
₱100,001-₱200,000	2	4.8
₱200,000 and above	1	2.4

### Farm characteristics of FSTP-trained farmers

Table 2 presents the farm characteristics of the respondents (n= 42). In terms of farm size, the majority of respondents operated small landholdings, with 47.6% cultivating less than 0.50 hectares and 42.9% managing farms between 0.51 and 1.00 hectare. Only a small proportion had larger farms, with 7.1% owning 1.01–2.00 hectares and 2.4% exceeding 2.00 hectares. This indicates that most respondents are smallholder farmers, which may limit economies of scale and production capacity, as small-scale operations often restrict access to resources such as capital and modern inputs, thereby

constraining productivity and overall farm performance (Kamara *et al.*, 2019).

With respect to farm ownership or tenure, a considerable proportion of respondents rented their farms (31.0%), followed by those who owned their land (26.2%). Others reported different tenure arrangements (21.4%) and shared ownership (19.0%), while only 2.4% had CLOA/titled land. This suggests a diverse tenure system, with many farmers lacking full ownership, which may influence long-term investment decisions and farm management practices, as secure land tenure is known to encourage investments in land improvements and sustainable practices, thereby enhancing agricultural productivity and development (Ayamga *et al.*, 2016; Place and Otsuka, 2002).

In terms of the type of corn planted, the majority of respondents (73.8%) used hybrid varieties, while smaller proportions utilized open-pollinated varieties (14.3%) and traditional varieties (11.9%). This indicates a strong adoption of improved seed technologies aimed at increasing productivity, as hybrid corn varieties are widely recognized for their significantly higher yields and better performance compared to traditional and open-pollinated varieties (Abera *et al.*, 2024).

Regarding cropping pattern, more than half of the respondents practiced monocropping (52.4%), followed by intercropping (28.6%) and crop rotation (19.0%), with monocropping, although easier to manage, potentially leading to soil nutrient depletion and increased pest pressures (Belete and Yadete, 2023). In terms of cropping frequency, a slight majority planted corn once per year (54.8%), while 45.2% cultivated twice annually, reflecting moderate land use intensity, however, higher cropping frequency may boost yields but requires sustainable management to prevent soil degradation (Quais *et al.*, 2018).

In relation to input utilization, the majority of respondents sourced their seeds from government

agencies such as the DA or LGU (90.5%), while only a few relied on their own seeds (4.8%) or other sources (4.8%), highlighting the important role of government institutions in providing high-quality seeds, consistent with findings that public agencies are primary sources of improved genetic materials in the Philippines and across Southeast Asia (Leyte *et al.*, 2021). Similarly, most respondents applied both organic and inorganic fertilizers (61.9%), followed by those using inorganic fertilizers alone (31.0%). Only a small percentage used purely organic fertilizers (4.8%) or no fertilizer at all (2.4%). This indicates a preference for integrated nutrient management, as the combined use of organic and inorganic fertilizers enhances soil quality and nutrient availability, leading to improved crop growth and yield (Lina *et al.*, 2014; Marlina *et al.*, 2017; Sofyan *et al.*, 2019). Furthermore, the primary source of fertilizers was government subsidy (85.7%), with fewer respondents purchasing inputs (11.9%) or obtaining them from other sources (2.4%). These findings highlight the significant role of institutional support in farm input provision, as government subsidies are essential in improving farmers' access to inputs, enabling the adoption of improved technologies and enhancing agricultural productivity and income (Dorward *et al.*, 2024).

With respect to labor utilization, the majority of respondents relied on hired labor (85.7%), while a smaller proportion used family labor (11.9%) or a combination of both (2.4%). This suggests a dependence on external labor resources, which may have implications for production costs. The use of hired labor is influenced by socio-economic factors such as education and farm size, with more educated farmers and those managing larger landholdings being more likely to employ hired workers; while smaller farms often rely on family labor, the strategic use of hired labor can improve efficiency and productivity, potentially offsetting its higher costs (Abdi *et al.*, 2014; Das, 2024; Langemeier, 2015).

In terms of productivity, most respondents achieved moderate yield levels, with 47.6% producing 1,001–

2,000 kg/ha and 26.2% producing less than 1,000 kg/ha. Meanwhile, 16.7% attained yields of 2,001–3,000 kg/ha, and only 9.5% exceeded 3,000 kg/ha. This distribution indicates that while some farmers achieve higher productivity, the majority remain within low to moderate yield ranges, suggesting the presence of productivity constraints. Crop productivity is influenced by a combination of climatic conditions, land management practices, and socio-economic factors, where unfavorable climates and limited access to inputs can widen yield gaps, while small farm sizes and constrained access to markets and credit further limit the adoption of productivity-enhancing technologies, highlighting the need for sustainable practices that balance yield improvement with environmental and social considerations (Licker *et al.*, 2010; Ateka *et al.*, 2018; Gerber *et al.*, 2024).

Regarding market outlets, the largest proportion of respondents sold their produce to direct buyers (40.5%), followed by other outlets (31.0%) and traders (26.2%), while only a few sold in formal markets (2.4%). This suggests a reliance on informal or localized marketing channels. Farmers' choice of market outlets is influenced by demographic factors such as age, gender, and farming experience, as well as access to market information and extension services, which shape their ability to make informed decisions; moreover, shorter and more direct marketing channels have been shown to improve efficiency by reducing costs and increasing returns for both farmers and consumers (Ngeno *et al.*, 2024; Nxumalo *et al.*, 2019; Council, 2025; Gurning *et al.*, 2024).

In terms of extension services, all respondents (100.0%) reported having access to extension support, although the frequency varied, with 57.1% receiving services occasionally and 42.9% regularly. This indicates widespread access but varying levels of engagement with extension programs. Extension services play a vital role in promoting the adoption of improved agricultural practices and technologies, as regular access enhances farmers' productivity and

decision-making; however, the frequency and availability of these services vary across regions, highlighting gaps in service delivery and the need for more consistent and accessible extension support (Mburu *et al.*, 2023; Umunna and Adeeko, 2012; Mulbah and Flomo, 2024; Mala and Mala, 2025).

Furthermore, a large majority of respondents (88.1%) were members of organizations, while only 11.9% were not affiliated. This high level of membership suggests strong social participation, which may facilitate information sharing and collective action. Demographic factors such as age, education, and gender influence membership and participation in organizations, with more educated individuals often showing higher engagement; such membership provides access to networks and resources that enhance social and economic participation, although levels of involvement may vary depending on the type of organization (Dathe *et al.*, 2010; Aggeborn *et al.*, 2021).

Finally, in terms of farming experience, the largest proportion of respondents had 21–30 years of experience (31.0%), followed by those with less than 10 years (23.8%). Meanwhile, 16.7% had 31–40 years of experience, and equal proportions (14.3%) had 11–20 years and more than 40 years of experience. This indicates a relatively experienced farming population with substantial practical knowledge in corn production. Farming experience plays a crucial role in decision-making and farm management, as more experienced and often older farmers possess greater knowledge and adaptive capacity, enabling them to make informed decisions and remain productive despite age-related limitations, although the increasing proportion of aging farmers also highlights emerging challenges in the agricultural workforce (Dinar *et al.*, 2023; Oliyah, 2024; Cole and Donovan, 2008; Geong, 2025).

The farm characteristics suggest that respondents are predominantly smallholder farmers operating under diverse tenure arrangements, with strong reliance on government support for inputs, moderate adoption of

improved technologies, and varying levels of productivity. These characteristics highlight the importance of sustained institutional support, access to resources and capacity-building interventions to enhance farm efficiency and productivity.

**Table 2.** Farm characteristics of FSTP-trained Farmers

Farm characteristics	f	%
Farm size (ha)		
Less than 0.50	20	47.6
0.51-1.00	18	42.9
1.01-2.00	3	7.1
More than 2.00	1	2.4
Farm ownership/Tenure		
Owned	11	26.2
Rented	13	31.0
Shared	8	19.0
CLOA/Titled	1	2.4
Other	9	21.4
Type of corn planted		
Traditional	5	11.9
Hybrid	31	73.8
OPV	6	14.3
Cropping pattern		
Monocrop	22	52.4
Intercrop	12	28.6
Rotation	8	19.0
Cropping frequency		
Once	23	54.8
Twice	19	45.2
Source of seeds		
Own seed	2	4.8
DA or LGU	38	90.5
Others	2	4.8
Type of fertilizer		
Organic	2	4.8
Inorganic	13	31.0
Both	26	61.9
None	1	2.4
Source of fertilizer		
Purchased	5	11.9
DA or LGU subsidy	36	85.7
Others	1	2.4
Farm labor		
Family labor	5	11.9
Hired labor	36	85.7
Both family and hired labor	1	2.4
Yield (kg/ha)		
Less than 1000	11	26.2
1001-2000	20	47.6
2001-3000	7	16.7
More than 3000	4	9.5
Market outlet		
Traders	11	26.2
Market	1	2.4
Direct buyers	17	40.5
Others	13	31.0
Access to extension service		
Yes	42	100.0
Extension frequency		
Regularly	18	42.9
Occasionally	24	57.1
Organization membership		
Yes	37	88.1

No	5	11.9
Years in corn farming		
Less than 10	10	23.8
11-20	6	14.3
21-30	13	31.0
31-40	7	16.7
More than 40	6	14.3

### Institutional support and service provision among FSTP-trained farmers

Table 3 presents the types of support received by the respondents. The results indicate that all respondents (100.0%) received support in the form of seeds and training, highlighting the strong emphasis of support programs on enhancing production capacity and farmer knowledge. A similarly high proportion (95.2%) received fertilizer assistance, suggesting substantial institutional involvement in providing essential farm inputs. This highlights the critical role of institutional support in providing essential inputs and capacity-building interventions; such comprehensive support systems are widely recognized for enhancing agricultural productivity and reflect coordinated efforts observed in similar agricultural programs (Tumba *et al.*, 2025; Doggima *et al.*, 2023; Ruslan *et al.*, 2023).

In terms of technical support, 64.3% of respondents reported receiving technical assistance, indicating that a majority benefited from advisory services, although a notable proportion still lacked access to such support. Meanwhile, only 31.0% of respondents reported receiving market-related support, and 28.6% received machinery assistance, reflecting relatively limited access to post-production and mechanization support services. While advisory and input support are widely provided, access to market-related services and mechanization remains limited, highlighting gaps in agricultural support systems; such disparities, often influenced by socioeconomic factors, can constrain farmers' ability to fully benefit from productivity-enhancing technologies and improve their market competitiveness (Rocha *et al.*, 2019).

Notably, none of the respondents reported receiving cash or credit assistance (0%), suggesting a gap in financial support mechanisms. This lack of financial access may constrain farmers' ability to invest in farm

improvements, adopt new technologies, or expand production. Access to agricultural credit is essential for enabling farmers to invest in inputs and adopt modern technologies, thereby improving productivity and income; however, barriers such as strict eligibility requirements, high interest rates, limited information, and infrastructural constraints continue to restrict farmers' access to formal financial systems, particularly in rural areas (Hssoune, 2025; Storozhenko, 2025; Meher and Agrawal, 2023; Selvam, 2025).

The findings suggest that while respondents benefit significantly from input-based and training support, there remains limited provision of financial, mechanization, and market assistance. This imbalance highlights the need for a more comprehensive support system that integrates financial services, market linkages, and access to farm machinery to enhance productivity, efficiency, and overall farm sustainability.

**Table 3.** Support received FSTP-trained farmers

Support received	f	%
Seeds	42	100.0
Fertilizer	40	95.2
Cash	0	0
Training	42	100.0
Machinery	12	28.6
Technical	27	64.3
Market	13	31.0
Credit	0	0

### Challenges encountered in FSTP implementation

Table 4 presents the level of challenges encountered by the respondents in relation to program implementation. The overall weighted mean of 3.05 indicates that the respondents generally perceived the challenges as moderately challenging.

Among the indicators, participation in the FSTP activities, experimentation processes, and program requirements was rated as challenging (WM = 4.21), suggesting that respondents experienced notable difficulty in fully engaging with the program's demands. Similarly, weather disturbances or pest problems significantly affecting corn production was also perceived as challenging (WM = 4.02),

highlighting the substantial impact of environmental factors on farming activities. Farmers may face challenges in fully engaging with FSTP activities due to the program’s technical and financial demands, which can limit the adoption of improved practices, especially among smallholders; these constraints are

further intensified by climate-related risks such as extreme weather and shifting pest dynamics, highlighting the need for resilient maize varieties and adaptive strategies to sustain productivity (Morante *et al.*, 2023; Khan *et al.*, 2024; Ramadan *et al.*, 2024; Marenya *et al.*, 2024).

**Table 4.** Challenges faced by FSTP-trained farmers

Challenges	WMS DI
1. Participation in the FSTP activities, experimentation processes, and program requirements has been challenging.	4.21 Challenging
2. The late distribution of inputs (seeds, fertilizers, etc.) has been a challenge to the program schedule.	3.31 Moderately challenging
3. The quality of inputs received (seeds, fertilizer) has been poor or inconsistent.	3.05 Moderately challenging
4. There has been a lack of adequate training sessions or follow-up support during implementation.	2.88 Less challenging
5. Weather disturbances or pest problems have significantly affected my corn production.	4.02 Challenging
6. Political favoritism or unequal distribution of program benefits has been a challenge.	3.02 Moderately challenging
7. The long duration and phases of the FSTP training have affected my schedule or ability to participate.	2.71 Less challenging
8. The distance or accessibility of the training venue makes participation challenging.	2.64 Less challenging
9. The cost of transportation or attending training sessions creates additional burdens.	2.50 Less challenging
10. Limited availability of farming equipment or machinery has hindered my productivity.	3.21 Moderately challenging
11. Conflicts with personal responsibilities (family, off-farm work) have made FSTP participation challenging.	2.57 Less challenging
12. Lack of coordination among implementing agencies (DA-ATI, UPLB, LGU, etc.) has affected program delivery.	2.62 Less challenging
13. The facilitators and resource speakers' ability to effectively facilitate and discuss FSTP activities/topics has been a challenge.	2.93 Less challenging
14. Understanding technical concepts or scientific farm practices presented in the training has been difficult.	2.95 Less challenging
Average WM	3.05 Moderately challenging

Several indicators were assessed as moderately challenging, including the late distribution of inputs such as seeds and fertilizers (WM= 3.31), limited availability of farming equipment or machinery hindering productivity (WM= 3.21), poor or inconsistent quality of inputs received (WM= 3.05), and political favoritism or unequal distribution of program benefits (WM= 3.02).

These findings indicate that operational inefficiencies, resource limitations, and governance-related concerns moderately affected program implementation and farmer productivity. Challenges in agricultural support programs include delayed input distribution, logistical inefficiencies, limited availability of machinery, and inconsistent input quality, all of which can negatively affect productivity; these issues are often compounded by budget constraints and, in some cases, political interference

and favoritism, which undermine the effective and equitable delivery of program benefits (Tembo, 2024; Arodha, 2024; Tabaro and Katusimeh, 2018; Rioba, 2025).

On the other hand, a number of factors were perceived as less challenging, including lack of adequate training sessions or follow-up support during implementation (WM = 2.88), difficulty in understanding technical concepts or scientific farm practices (WM = 2.95), and the facilitators’ ability to effectively discuss FSTP activities and topics (WM = 2.93). Additionally, logistical and personal constraints such as the long duration and phases of the training (WM= 2.71), distance or accessibility of the training venue (WM= 2.64), cost of transportation (WM= 2.50), and conflicts with personal responsibilities (WM= 2.57) were also rated as less challenging. Furthermore, lack of coordination

among implementing agencies (WM= 2.62) was perceived to have minimal impact on program delivery. The perceived difficulty of technical concepts and logistical constraints is reduced when facilitators are well-trained and provide adequate support, as effective facilitation, localized solutions, and flexible arrangements enhance understanding, coordination, and participation in agricultural programs (Lizarondo *et al.*, 2023; Gumban and Baladjay, 2025; Mwamakimbula, 2014).

The results suggest that while respondents encountered moderate challenges in program implementation, the most critical concerns were related to participation demands and external environmental factors such as weather and pests. Meanwhile, institutional, logistical, and technical aspects were generally perceived as less problematic. These findings imply that improving program scheduling, strengthening climate-resilient interventions, and ensuring timely and equitable distribution of inputs may help reduce the challenges experienced by participants and enhance program effectiveness.

### **Impacts of the FSTP on productivity, technology adoption, and sustainable agricultural practices**

Table 5 presents the perceived impact of the program on the respondents. The overall weighted mean of 4.36 indicates that the respondents rated the impact as high, suggesting that the program has substantially contributed to improving various aspects of their farming practices and livelihoods.

Among the indicators, respondents strongly agreed that the training sessions have greatly improved their knowledge and skills in corn production (WM = 4.48) and that the program has significantly contributed to increasing their corn yield (WM= 4.45). This implies that capacity-building interventions and technical knowledge transfer were highly effective in enhancing farmers' competencies and productivity. Farmer Scientist Training Program (FSTP) and similar training programs have been shown to significantly

enhance farmers' knowledge, skills, and productivity, with evidence indicating substantial improvements in technical understanding, farm management, and crop yields following participation in such capacity-building initiatives (Hamad, 2024; Risna *et al.*, 2020; Popescu, 2019; Montolalu *et al.*, 2025; Astiko *et al.*, 2025; Sudiana and Martiningsih, 2012).

Similarly, respondents perceived that the program has increased their confidence to experiment with and adopt new technologies (WM = 4.41) and that their overall productivity and efficiency in corn production have improved because of the program (WM = 4.41). These findings were consistent with Hawkins *et al.* (2025), who found that training increases the use of research-based information in decision-making, and Dubey and Srivastava (2016), who reported higher knowledge and adoption among trained farmers. Its positive impact on productivity and efficiency aligns with the findings of Maula (2025) and Ndombi and Kisimbii (2015), who showed that training enhances farm performance. Moreover, the program has improved their ability to make informed decisions in farming operations (WM= 4.38) and encouraged the continued application of learned technologies and practices (WM= 4.38). This supports the findings of Oliyah (2024) and Dinar *et al.* (2023), who emphasized the role of knowledge and experience, as well as Abubakar and Mahatmayana (2025), who highlighted the influence of both internal and external factors on farmers' decision-making processes. These findings highlight the program's strong influence on farmers' behavioral change and decision-making processes.

In terms of economic and institutional impact, respondents agreed that the program has positively impacted their household income (WM = 4.31) and that it is effectively implemented in their area and meets the needs of farmers (WM = 4.31). Additionally, the inputs provided through the program were sufficient and delivered in a timely manner (WM= 4.21), indicating satisfactory program delivery and resource provision. Participants in the

FSTP expressed satisfaction with the program's implementation and its responsiveness to their needs, as reflected in the high weighted mean scores, consistent with Ahmad *et al.* (2012), who reported that KVK training programs were largely aligned with farmers' needs. The importance of timely and

sufficient input delivery is supported by Gordo *et al.* (2019), who found that adequate inputs and facilities contributed to program success, while Dubany *et al.* (2025) emphasized that participatory approaches and efficient resource use enhance productivity and household incomes.

**Table 5.** Impacts of FSTP according to the farmers

Impact	WMS	DI
1. The FSTP has significantly contributed to increasing my corn yield.	4.45	High
2. The program has positively impacted my household income.	4.31	High
3. The training sessions have greatly improved my knowledge and skills in corn production.	4.48	High
4. The inputs provided through the program were sufficient and delivered in a timely manner.	4.21	High
5. The program has strongly encouraged my adoption of sustainable farming practices.	4.36	High
6. The FSTP is effectively implemented in my area and meets the needs of farmers.	4.31	High
7. The FSTP has improved my ability to make informed decisions in my farming operations.	4.38	High
8. The program has increased my confidence to experiment with and adopt new technologies.	4.41	High
9. My overall productivity and efficiency in corn production have improved because of the FSTP.	4.41	High
10. The program has strengthened collaboration and knowledge-sharing between farmers in my community.	4.29	High
11. The FSTP has contributed to improving the overall development of my community.	4.29	High
12. I intend to continue applying the technologies and practices learned from the FSTP.	4.38	High
Average WM	4.36	High

Furthermore, respondents acknowledged that the program has strongly encouraged the adoption of sustainable farming practices (WM= 4.36), reflecting its contribution to environmentally sound agricultural practices. They also agreed that the program has strengthened collaboration and knowledge-sharing among farmers (WM= 4.29) and contributed to the overall development of their community (WM= 4.29), demonstrating its broader social impact. The FSTP has been instrumental in promoting the adoption of sustainable farming practices among participants, as reflected in high satisfaction levels, consistent with Cayabyab *et al.* (2024), who reported strong program relevance and benefits for sustainable implementation. This is further supported by Astiari *et al.* (2025), who demonstrated successful adoption of organic fertilizer technologies, and Singh *et al.* (2023), who highlighted the role of training in advancing climate-resilient practices, while Kausar (2023) emphasized the importance of farmer group formation in fostering collaboration and environmentally sustainable agriculture.

The findings indicate that the program has generated significant positive outcomes in terms of productivity, knowledge enhancement, technology adoption, and

community development. The consistently high ratings across all indicators suggest that the program is effective in addressing farmers' needs and promoting sustainable agricultural development.

## CONCLUSION

The study concludes that the Farmer Scientist Training Program (FSTP) implemented by ATI Region VII has significantly enhanced farmers' knowledge, skills, and productivity in corn production, leading to improved decision-making, increased confidence in adopting new technologies, and gains in yield and income. The program's strong focus on training, input provision, and extension support has facilitated the adoption of improved practices such as hybrid seed use and integrated nutrient management. However, productivity levels remain moderate, indicating the presence of persistent constraints, including environmental risks, delayed input distribution, limited access to machinery, and the absence of financial and credit support. These challenges underscore gaps in both program implementation and the broader agricultural support system. To address these limitations, it is recommended that government agencies and stakeholders adopt a more integrated

and systems-based approach by providing accessible credit and financial assistance, strengthening market linkages and value chain support, and expanding access to shared or subsidized farm machinery. Furthermore, improving the efficiency and equity of input distribution, incorporating climate-smart agriculture and pest management strategies into training and ensuring regular, responsive extension services are essential to sustain program gains. Continuous monitoring and evaluation should also be conducted to refine program delivery, while maintaining inclusive participation to ensure equitable access to resources and opportunities. Collectively, these measures will enhance the long-term effectiveness, sustainability, and impact of the FSTP on rural livelihoods and agricultural development.

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