

Low Corn Production as Affected by Insufficient Farm Input and Economic Problems: Coping Strategies Adopted by the Municipalities in Camotes Group of Islands, Cebu Province

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ABSTRACT

Corn farming is a vital source of livelihood for many Filipinos, particularly in Camotes Islands Philippines. This study investigated the challenges faced and coping strategies employed by corn farmers in the area to enhance agricultural productivity and sustainability. Through structured interviews with 232 farmers across four municipalities, socio-demographic and socio-economic profiles were established, revealing the predominance of middle-aged male farmers with low educational attainment and small land holdings. Despite facing financial constraints and being categorized as poor, these farmers demonstrated resilience and determination in continuing their agricultural practices. The study identified key challenges, including shortages of essential inputs, lack of capital, pest and disease infestations, poor access to extension services, and adverse weather conditions. The study recommended intercropping, accessing microfinance institutions, enhancing market connections, and empowering farmers through digital literacy programs to partly solve the problems faced by farmers. Furthermore, policy should be reviewed on subsidizing costly inputs, installing public tube wells for irrigation, and promoting integrated pest management practices.

Keywords: corn production, constraints, coping strategies, Camotes islands

INTRODUCTION

Corn is the Philippines' second most important crop and the most widely produced grain in the country. For almost 14 million Filipinos (DA08.da.gov.ph), corn is the primary food source and it is made up of several strategic value chains in the food, feed, and multi-industries sectors that involve farmers and industrial participants at various scales (PSA 2020). As of March 1, 2024, the estimated corn production based on standing crop for the January to March 2024 period may increase to 2.64 million metric tons, or by 4.8 percent, from its actual estimate of 2.52 million metric tons in the same period of 2023, according to the Philippines Statistics Authority (2024). A decline of 1.8 percent was noted in the updated estimate of maize production based on standing crop as of March 1, 2024, compared to the record of 2.69 million metric tons as of January 1, 2024. In

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connection, corn production has seen significant growth over the years, with advancements in agricultural practices, improved hybrid varieties, and government support programs. The crop's versatility has expanded its application from a mere subsistence crop to a potential cash crop, contributing to the rural economy and livelihoods of many farming communities. Corn stands as the nation's secondary vital staple and played a crucial role within the food system. Despite its significance, there was an evident need for further development, especially as the current level of self-sufficiency, particularly in yellow corn that was at a mere 59%. This underscored the imperative for the Department of Agriculture to focus on enhancing corn production. To address this concern, collaborative efforts were being undertaken in conjunction with farmers' cooperatives and associations (FCAs), local government units (LGUs), and essential industry stakeholders.

Moreover, Cebu Province was one of the few Philippine provinces that relied heavily on corn as a food source. This could be because of the province's unfavorable weather conditions for growing rice or because agricultural areas were not adequately irrigated. In fact, Cebu produced more corn than rice, and it leads Central Visayas in corn production. Data from the Philippine Statistics Authority (2023) showed that in Central Visayas, Cebu has one of the biggest areas planted to corn (10,144 hectares out of the total 23,653 hectares planted to corn in the entire region for the 1st semester of 2023). In terms of corn production, Cebu also leads (at 8,280 metric tons out of the total production of 18,614.43 metric tons in Region VII for the 1st semester of 2023). Consequently, white corn cultivation predominantly catered to human consumption. Local farmers primarily cultivated traditional varieties, with the most favored being Tinigib, (a visayan white corn variety of Philippine corn that was commonly found in the Cebu region. It has a low glycemic index, which means it digests slowly and releases glucose more gradually in the body) alongside enhanced Open Pollinated Varieties (OPVs). In addition, farmers decided to plant enhanced and local OPVs that were suitable for marginal soils, have excellent milling recovery and good grain production, and were resistant to diseases and pests. Furthermore, Amper et al (2018) stressed that corn was grown primarily as a subsistence crop to provide food security for the household for the full year rather than as a commodity to be sold for profit. Because native corn varieties relied upon to provide a consistent supply of grain for family consumption, they were chosen over high-yielding varieties that have been introduced more recently. However, rather than being a means of making money, planting corn was a method for these rural Cebu peasant households to fulfil their basic food needs.

Additionally, farmers relied solely on their cultivated fields for subsistence, addressing their daily needs. Nonetheless, corn farmers grappled with various challenges, notably the scarcity of capital, exorbitant farm input costs, labor expenses, and unproductive land. Other identified constraints encompass inadequate storage facilities, pest and disease infestations, adverse weather conditions, limited access to extension services, and equipment inadequacies. In Vietnam, the decline in farmers' input prices resulted in production costs per cropping averaging around P10,000-P15,000 (32.4%) per hectare, with some as low as below P10,000 (32.4%) (Coelli et al 2005). Farmers encountered challenges related to disrupted input material supplies and inconveniences in timing and

Low Corn Production as Affected by Insufficient Farm Input ..

quantity of supply. These constraints significantly contributed to the observed low productivity (Osuji et al 2012). Farmers cited financial constraints leading to the inability to acquire essential supplies and equipment, thereby resulting in income loss due to crop failure and family health issues, which emerged as predominant concerns of the people.

Moreso, according to the consensus among a significant portion of corn farmers, there was a perceived deficiency in governmental engagement with agricultural issues. Following the destructive impact of typhoons, governmental focus was predominantly directed towards infrastructure initiatives and providing aid to affected households. Despite substantial calamities, the government failed to furnish essential agricultural assistance to farmers. Also, the Municipal Agriculture Offices expressed dissatisfaction with their relegation to local government units, which frequently overlooked agricultural development endeavors. Generally, the National agricultural initiatives exhibited constraints in both breadth and extent of coverage. Mitigating these constraints necessitates an efficient combination of inputs to achieve a reasonable output level and counteract the impediments hampering efficient corn production. Therefore, the first step in managing all of these restrictions was to combined all of the inputs effectively in order to provide a level of output that was reasonable and to address the issues that were impeding efficient corn production. Secondly, employed coping strategies to recover from losses, farming operations were temporarily stopped, capital requirements were reduced, and farming was integrated with other commodities. Supported by the study of Gilligan (2007) stated that receiving government assistance was another method of providing farmers with the finances they required in order to achieve high production.

Towards this end, numerous studies on coping strategies for corn production and management had been published in the Philippines, as well as in other countries like the US, China, Brazil, Vietnam, and India. However, Camotes Island has not yet seen any studies undertaken in this field. Thus, this study on coping strategies in the four municipalities, namely: Pilar, Poro, San Francisco and Tudela was conducted to provide utmost significance for compelling reasons. Firstly, understanding farmers' coping strategies identified gaps and areas for improvement in corn production techniques. These strategies helped farmers adapt to and effectively deal with adversities, ultimately contributing to the overall success and sustainability of corn production. Secondly, aside from the practical implications of the study's findings to corn production, this study helped LGU, Municipal Agriculture Office and farmers associations contributed in the development of agricultural policy and programs that give more attention to the needs of corn farmers which shall eventually enhanced their agricultural productivity and standard of living. Lastly, prepared viable ways to address the issues and concerns regarding the production of corn not only in Camotes Islands but also in the neighboring towns and cities. However, assisting corn farmers should not stop at increasing corn production; rather, we looked at the value chain and determine how farmers take part of it. So, the main purpose of this descriptive study was to investigate the problems and coping strategies employed by the farmers and recommend solutions on how to improve the corn productivity of the local farmers in the islands. Specifically, the study determined the socio-demographic and socio-economic profile and other related characteristics of the

respondents and identified the problems met by the corn farmers including the coping strategies they employed.

METHODOLOGY

The study was conducted in the islands of Camotes comprising the four municipalities namely: Poro, Tudela, San Francisco, and Pilar. This study area was selected because majority of the farmers were engaged into corn farming as their primary source of living and livelihood for several years. The corn farmers of four municipalities under Camotes Island were considered as the respondents of the study. Lists of corn farmers in their respective farmers association (FAs) of these municipalities were prepared with the help of Municipal Agriculture Officers (MAO) of that area. Additionally, descriptive research design was employed using a structured interview schedule. Given that the study covered four municipalities, Cochran's (1977) formula was employed in the getting the total sample size of the respondents. Among 4089 corn farmers from the four (4) municipalities mentioned-above, the sample size of 232 farmers were selected as the actual respondents of the study (Table 1). The respondents were selected proportionally from the list in each municipality as the sample by following proportional stratified sampling method. A structured interview schedule was prepared for collection of relevant data for the study. The structured interview schedule was subjected to a pre-testing process to assess its applicability and to verify that the questions were framed in a manner that is comprehensible to the farmers. The issuance of permit to conduct of the study was coordinated with the various municipalities in the respective area where farmers were situated, subsequent to the collecting of data. The Cebuano dialect was used during the interview to elicit responses. Moreso, gathering of data were took place from January to March 2024. The conversations were also captured using a variety of recording tools, including a mobile phone and notes written by hand. Statistical Package for Social Sciences, version 20 was used in coding and analyzing the data (SPSS v.20). Descriptive statistics such as frequency, percentages, means, and ranges were established and the data gathered were summarized and analyzed by the Statistician. Data gathered through interviews were presented in descriptive forms, tables and figures.

Low Corn Production as Affected by Insufficient Farm Input ..

Table 1. Distribution of the population and sample of the corn farmers in each municipality in Camotes Group of Islands

MUNICIPALITY	POPULATION	SAMPLE SIZE
PILAR	1309	74
PORO	1284	73
TUDELA	161	9
SAN FRANCISCO	1335	76
TOTAL	4089	232

RESULTS AND DISCUSSION

Socio-demographics characteristics

Table 2 shows that middle-aged farmers (48.71%) were highly involved in farming followed by old aged (40.95%) and young aged farmers (10.34%), respectively. On average, the age of the respondents was 54.76 years. The findings were consistent with those of Farah et al (2011), who found that 211 respondents, or 35.17 percent, were primarily in the 36–55 age range. The findings make it evident that respondents in their middle years were more involved in the field. Majority of the respondents were male (57.33%) and 42.67% were female. This implies that male farmers were responsible on doing farming tasks as compared to female farmers who were responsible in the household tasks. In terms of civil status, almost all respondents were married (85.34%) followed by widowed with 11.64%.

The results also revealed that less than one half (45.69%) of respondents were elementary undergraduate while 14.22% graduated their elementary level. On the other hand, 11.64% of the respondents were high school undergraduate, 24.14% had finished their secondary level of education and only 2.59% had earned their college degree, respectively. Higher percentage of lower-level education of respondents engaged to farming operation because they believed that farming does not require high considerable quality of knowledge.

Table 2. Socio-demographic characteristics of the respondents

VARIABLES	FREQUENCY (N=232)	PERCENTAGE (%)
Age		
Young (≤ 35)	24	10.34
Middle 36 -55	113	48.71
Old >55	95	40.95
TOTAL	232	100.00
MEAN	54.76	
RANGE	25-83	
Sex		
Female	99	42.67
Male	133	57.33
TOTAL	232	100.00

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Civil Status		
Single	6	2.59
Married	198	85.34
Widowed	27	11.64
Separated	1	0.43
TOTAL	232	100.00
Educational Attainment		
Elementary Undergraduate	106	45.69
Elementary Graduate	33	14.22
High School Undergraduate	27	11.64
High School Graduate	56	24.14
College Undergraduate	4	1.72
College Graduate	6	2.59
TOTAL	232	100.00

Socio-economic characteristics

Data revealed that corn farming (96.12%) was the major source of income of the respondents as shown in Table 3. However, apart from corn farming the respondents also earned money through raising of poultry and livestock (1.73%) animals, they also served as government employees (1.29%) and other sources of their income such as in food business and lending collector (0.86%). Furthermore, promoting and aiding in income diversification can help with efforts to reduce poverty and promote sustainable development. Thus, the data also revealed that fishing (35.78%) topped as the other sources of income of the respondents. It also included livestock raising (23.71%), vending (14.66%), sari-sari store (13.36%) and construction worker (4.74%). This result indicates that whatever income they derived from other non-farming work, they still determined to continue corn farming, which was their main source of income. Data were also provided that one-fourth of the respondents (25%) had high years in farming that ranges to 38-48 years and fewer portions of farmers (8.19%) had low years in farming ranging to 49-58 years. This suggests that a longer farming career may be associated with a better degree of expertise and knowledge, which may have an impact on the adoption of agricultural methods and decision-making, particularly to corn. Moreover, in the research area, the average number of years spent farming was 28.54. Our findings roughly agreed with Chuks' (2014) observation that the respondents' mean farming experience exceeded 20 years. Moreover, majority (97.41%) of the respondents were having a monthly income of Php 10, 000 below and low (2.59%) number of respondents were having Php 10, 000 above monthly income. The data demonstrated that mostly of the respondents were poor. This result proved accordingly to the Philippine Institute of Development Studies (2022) in the Philippine Income Classes Categorization that the income less than Php 10, 957 were categorized as poor. Additionally, data showed that in the study area 93.97% of the farmers were having one hectare and below of land and 6.03% of the respondents were having 1.1-5.0 hectares of land. From the result it was concluded that majority of the farmers had small land holdings. Our findings were consistent with those of Ali et al (2016), who found that 72% of farmers owned less

Low Corn Production as Affected by Insufficient Farm Input ..

than 5 hectares of land and that small farmers made up the bulk of respondents. Farmers' tenurial position affects their exposure to and inclination to use new agricultural technologies (Idress 2003). Three categories were used to group the respondents: owners, tenants, and both (owner and tenant). Lastly, data of the respondents regarding tenurial status were revealed that out of total 232 respondents, majority (65.09%) of them were tenant cultivators, followed by owner (27.59%) and 7.33% of the respondents were both tenant and owner. These findings were consistent with those of Aziz et al (2018), who reported that tenant cultivators made up the majority of respondents (71%) in their study.

Table 3. Socio-economic characteristics of the respondents

VARIABLES	FREQUENCY (N=232)	PERCENTAGE (%)
Main source of income		
Corn farming	223	96.12
Poultry and livestock raising	4	1.72
Government employed	3	1.29
Others (<i>Food business, lending collector</i>)	2	0.86
TOTAL	232	100.00
Other sources of income		
Fishing	83	35.74
Livestock raising	55	23.71
Vending	34	14.66
Sari-sari store	31	13.36
Construction worker	11	4.74
Copra making	9	3.88
Government worker	6	2.59
Furniture making	3	1.29
TOTAL	232	100.00
Years in farming		
5-15	54	23.28
16-26	49	21.12
27-37	52	22.41
38-48	58	25.00
49-58	19	8.19
TOTAL	232	100.00
MEAN	28.54	
RANGE	5-58	
Monthly income		
Php 10, 000 above	6	2.59
Php 10, 000 below	226	97.41
TOTAL	232	100.00
Farm size		
1 hectare and below	218	93.97
1.1 to 5.0 hectares	14	6.03
5.1 hectares and above	0	0
TOTAL	232	100.00
Tenurial Status		
Tenant	151	65.09
Owner	64	27.58
Both	17	7.33
TOTAL	232	100.00

Problems met and coping strategies employed

Results on the problems and coping strategies of the respondents were shown in Table 4. It was arranged according to its rank and the shortage of essential inputs such as seeds and fertilizers (17.29%) emerged as the foremost problem of corn farmers. Farmers faced multiple obstacles that hinder their ability to sustainably cultivate crops and generate income. The absence of a reliable supply of fertilizers and seeds severely limits farmers' ability to prepare and plant their fields effectively. Without adequate fertilizers, soil nutrient levels may decline, leading to reduce crop yields and overall productivity. Thus, farmers were need to explore intercropping or mixed cropping to reduce input demand, foster collaboration among farmers for resource-sharing and advocate for government support to address input shortages through subsidies and incentives.

Shortage supply would just be a one problem, farmers were also suffered from lack of capital (15.73%) to operate their farms. Corn farmers were grappling with a lack of income, primarily due to factors like unpredictable weather patterns and rising production costs. Many of them were struggling to make ends meet, unable to cover basic expenses such as equipment maintenance, seeds, and labor costs. However, urgent strategies can help them through access to microfinance institutions or rural development programs offering tailored financial products can provide affordable credit and insurance. Also, diversifying income sources through activities like livestock rearing alongside corn farming can offer stability. Thus, strengthening market connections through farmer cooperatives and associations can improved access to better prices and opportunities. Another problem faced by the respondents was on the infestation of pests and diseases (14.48%). The outbreaks were threatening their farms and livelihoods, leading to reduce yields and financial losses. Farmers were struggling to effectively manage the infestation, lacking access to proper knowledge, resources, and support systems. However, immediate interventions such as providing training on pest and disease management techniques, facilitating access to pest-resistant seed varieties, and establishing local monitoring and control programs were crucial to mitigate the impact and safeguard the agricultural productivity of the island's corn farmers.

In addition, respondents were also faced poor access to extension services (13.23%). Extension services, which provided vital information, resources, and support to farmers, were crucial for enhancing agricultural practices and addressing emerging issues. However, many corn farmers in the island were unable to access these services due to factors such as limited infrastructure and inadequate funding for extension programs. As a result, farmers struggled to obtain essential knowledge on modern farming techniques, pest and disease management, market trends, and climate-smart practices. This lack of access to extension services exacerbated existing vulnerabilities and hampered the farmers' ability to adapt to changing conditions and improved their yields. Coping this problems, immediate measures such as empower corn farmers through digital literacy programs, enabling access to extension services, market insights, and weather forecasts were required to be tackled including the measures of implementing community-based extension initiatives, utilizing local expertise to deliver grassroots support. Then, fostered farmer participation through inclusive methods like on-farm trials and discussions and enhanced adoption of best

Low Corn Production as Affected by Insufficient Farm Input ..

practices and technologies.

Lastly, farmers were challenged when it comes to weather condition (12.50%). Unpredictable weather patterns, including irregular rainfall, droughts, and extreme temperatures, posed a considerable threat to corn production. These adverse weather events lead to crop failure, reduced yields, and financial losses for farmers, exacerbating food insecurity and economic vulnerability. Moreover, poor weather conditions disrupted planting and harvesting schedules, resulting in logistical challenges and increased labor costs. Farmers often struggled to adapt to changing climate conditions, lacking access to resources, technologies, and knowledge for climate-resilient farming practices. Since corn production was largely dependent on rainfall patterns, changes in climate drastically affected cropping seasons as well as harvests. Natural hazards such as typhoons, floods as well as drought and dry spells periodically affect their corn crops. Ultimately, addressing the challenges posed to choose weather-resistant corn hybrids suitable for the region's climate, like drought-tolerant varieties for dry areas or flood-resistant ones for waterlogged regions, installed irrigation systems like drip or pivot systems to supplement rainfall during dry spells and maintained soil moisture for crop growth and obtain crop insurance covering weather-related risks such as drought or excessive rainfall to safeguard against potential losses. In line with this, the notion of food security surfaced upon asking regarding farmers' reasons and motivations for corn farming. The common response on why they continued to grow corn despite environmental changes and low productivity was because it ensured that they had food on their table for the succeeding months after harvest, even if sometimes it could not suffice until the next harvest. Thus, farmers emphasized that having food from their corn harvest was better than having money from cash crops that would just disappear in a few days.

Table 4. Problems encountered and coping strategies

RANK	PROBLEMS (n=960)	FREQUENCY OF MENTION	PERCENT (%)	COPING STRATEGIES EMPLOYED BY THE FARMERS	SUGGESTED STRATEGIES
1	Shortage of input supply (seed, fertilizer)	166	17.29	1. Most of the farmers explored intercropping or mixed cropping systems.	1. Farmers should foster collaboration and resource sharing among farmers within the community or through cooperative networks. 2. Farmer should seek government assistance and intervention to address input shortages through subsidies, incentives for production.
2	Lack of capital	151	15.73	1. Some farmers accessed to microfinance and agricultural credit schemes, that offered affordable credit, savings, or insurance products tailored to the needs of smallholder farmers groups, or agricultural associations.	1. Farmers should explore diversification opportunities by engaging in alternative income generating activities alongside corn farming that includes livestock rearing and poultry farming. 2. Strengthen market linkages and access by participating in farmer cooperatives and producer
3	Pest and disease infestation	139	14.48	1. Some farmers utilized chemical control measures judiciously and responsibly, opting for targeted and selective pesticides when necessary, and adhering to recommended application rates to minimize environmental problems.	1. Farmers should select corn varieties with genetic resistance or tolerance to prevalent pests and diseases in the region. 2. Farmers need to practice field hygiene by removing crop residues, weeds, and volunteer plants that may harbor pests and diseases between growing seasons.
4	High cost of labor	131	13.65	1. Some of the farmers invested in farm machinery, equipment, and technologies to automate labor intensive tasks such as planting, harvesting, and weed control.	1. Farmers need to attend training and skill development programs for farmers to improve labor efficiency, reduce labor time per task, and enhance overall productivity. 2. Farmers need to investigate government sponsored labor assistance programs, tax incentives, or subsidies.
5	Poor access to extension services	127	13.23	1. Some farmers were provided a training and capacity building initiatives to empower farmers to effectively accessed extension information about corn farming.	1. Corn farmers should establish community based extension programs that leverage local knowledge, resources, and networks to deliver extension services to corn farmers at the grassroots level. 2. Farmers should incorporate participatory approaches such as farmer led discussions, on farm trials, and experiential learning activities to foster farmer engagement, ownership, and adoption of recommended practices and technologies.
6	Unproductive farm land	126	13.13	1. Most of the farmers practiced crop rotation by alternating corn cultivation with other crops such as root crops and legumes to mitigate soil depletion, and improve overall soil health.	1. Farmers should apply organic amendments such as compost, manure, or green manure to replenish soil organic matter, improve nutrient cycling, and enhance soil microbial activity. 2. Farmers should invest in site specific management practices such as precision irrigation, nutrient management zones, and soil moisture monitoring to maximize yield potential and minimize input wastage on unproductive land areas.
7	Poor weather condition	120	12.50	1. Farmers selected corn hybrids that were resilient to specific weather extremes prevalent in the island, such as drought tolerant varieties for arid areas or flood tolerant varieties for areas prone to waterlogging.	1. Farmers should invest in irrigation infrastructure such as drip irrigation systems, pivot systems, or furrow irrigation to supplement rainfall during dry spells and ensure adequate soil moisture for optimal crop growth. 2. Farmers should engage in crop insurance policies tailored to protect against weather related risks such as drought and excessive rainfall.

*Multiple responses

Low Corn Production as Affected by Insufficient Farm Input ..

CONCLUSION AND RECOMMENDATIONS

In conclusion, the socio-demographic and socio-economic characteristics of corn farmers in the study area revealed that majority of farmers were middle-aged males, primarily engaged in corn farming as their main source of income, despite having low educational attainment and small land holdings. Additionally, the long years of farming experience among respondents underscored the importance of traditional knowledge and practices in agricultural decision-making. Despite facing financial challenges and being categorized as poor, these farmers demonstrated resilience and determination to continue farming, highlighting the integral role of agriculture in their livelihoods. Moreover, the predominance of tenant cultivators reflected the complex dynamics of land tenure in rural agricultural communities. These findings also provided the challenges faced by corn farmers in Camotes Island, such as shortages of essential inputs, lack of capital, pest and disease infestations, poor access to extension services, and adverse weather conditions, significantly impacted their livelihoods and agricultural productivity. Immediate measures were required to address these challenges, including exploring intercropping or mixed cropping, accessing microfinance institutions, enhancing market connections, and empowering farmers through digital literacy programs. Moreover, prioritizing food security and enhancing agricultural productivity remained at the forefront of policy-making and development initiatives to ensure the well-being and resilience of corn farming communities in Camotes Island and beyond. Moreso, government needs to subsidize costly inputs like pesticides, herbicides, fertilizers and other modern agricultural machinery for the farming community. It was further recommended that public tube wells need to be installed to overcome deficiency of irrigation water. Extension staff also needed to make frequent visits to ensure the dissemination of latest farming practices to the farming community. Thus, chemical control measures against diseases and weeds were replaced with IPM practices to avoid the environmental and human health hazardous effects of these pesticides.

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