

# Assessing Regional Risks and Policy Responses to Fall Armyworm (*Spodoptera frugiperda*) Invasion in Davao Region

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## ABSTRACT

The fall army worm (FAW), *Spodoptera frugiperda*, has emerged as a serious threat to rice and corn production in the Philippines, particularly in the Davao Region. Since its detection in 2019, the pest has rapidly spread due to its high mobility, polyphagous feeding behavior, and adaptability, causing significant crop damage and threatening regional food security and farmer livelihoods. Corn, being the pest's preferred host, has suffered yield losses of up to 80% in severe infestations, while recent reports also confirm its ability to attack rice seedlings. The region's diverse cropping systems, continuous cultivation, and favorable climate further increase FAW's establishment and spread. Current responses rely heavily on chemical control, raising concerns over resistance development, environmental harm, and health risks. This policy brief therefore advocates the urgent adoption of science-based, integrated pest management strategies, strengthening surveillance and monitoring systems, promoting resilient, diversified farming practices, and enhancing farmer education and extension support. It also recommends increased research funding, stakeholder collaboration, and participatory approaches to develop locally adapted solutions. Implementing these coordinated strategies will reduce FAW impacts, safeguard rice and corn production, and support the long-term resilience and sustainability of the agricultural sector in the Davao Region.

**Keywords:** *Economic impact, integrated pest management, invasive pest, farmers' livelihoods, local agroecosystem*

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## INTRODUCTION

Rice (*Oryza sativa*) and corn (*Zea mays*) are two of the most important staple food commodities in the Philippines, playing a central role in ensuring national food security and supporting government subsidy programs. As of March 2025, rice production reached 4.70 million metric tons harvested from 1.15 million ha of production area (PSA, 2025). Corn, the second-most-consumed staple after rice, recorded total production of 2.4 million metric tons during the same period (PSA, 2025). Beyond human consumption, more than half of the country's corn output is utilized by the livestock and poultry feed industry, highlighting its strategic economic importance. In the Davao Region, approximately 2,024 hectares are devoted to hybrid rice production, with about 85% of this area in Davao Oriental (Palicte, 2025), underscoring the region's vital contribution to the national grain supply.

However, the invasion of fall armyworm (FAW), scientifically known as *Spodoptera frugiperda*, an invasive lepidopteran pest endemic to the Americas, has emerged as a serious challenge to both rice and corn farming systems. FAW began spreading beyond its native range in 2016 and was first detected in the

Philippines in 2019, where it attacked corn fields in Piat, Cagayan (Navasero et al., 2019). Its rapid dispersal across the country within a year is attributed to its strong flight capacity, which can reach up to 100 km per night. Although FAW can feed on both rice and corn, it shows a stronger preference for corn. In the Davao region, various locations shown in Figure 1 have reported FAW infestation since 2019. Initial observations of infestation were recorded in Baguio District, Davao City and in the Municipality of Malalag, Davao del Sur (Colina, 2019). In Davao Oriental, reported infestations were in the City of Mati (Trozo, 2020) and in the Municipality of San Isidro (Tura et al., 2025). This is followed by confirmed sightings in Davao del Norte in 2023, based on larval morphological identification and damage characteristics (Sampiano, 2023).

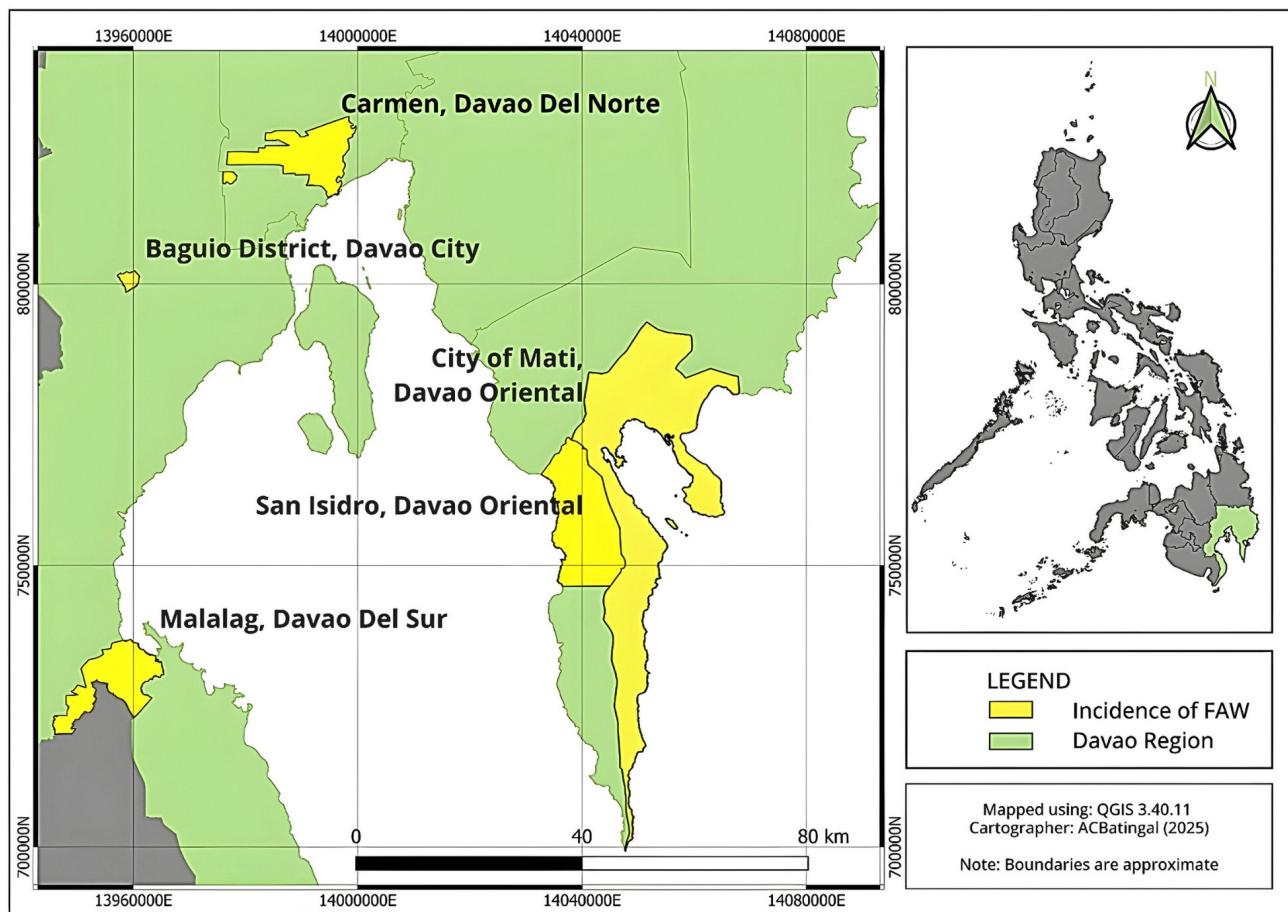
The current brief aims to highlight the urgent threat posed by the FAW invasion in the Davao Region and its impacts on corn and rice production, food security, farmer livelihoods, and the region's agricultural economy. Specifically, it seeks to inform policymakers, agricultural stakeholders, and local government units about the damage this pest causes, its potential to spread rapidly across various crop systems, and the risks of over-reliance on chemical-based control. This brief further aims to advocate

the adoption of sustainable management strategies, strengthened pest monitoring and surveillance systems, diversified cropping systems, sustained productivity, and long-term resilience of the region's rice and corn sectors. Considering these practices for policy recommendations is necessary because it highlights sustainability by reducing dependence on pesticides, slowing down pests' resistance build-up, and promoting long-term pest suppression, leading to improved livelihoods among farmers in the region.

#### METHODOLOGICAL NOTE

The current policy brief was developed through a rapid review and synthesis of various information from published international and local scientific papers, and documented field

observations on fall armyworm in the Philippines. A targeted literature search using the keywords "Fall armyworm," "FAW damage," "FAW invasion," "Davao Region," and "Philippines" was performed online. Reports of FAW attacks from regional news outlets were also included to capture real-time field conditions and farmer experiences. Only information published and available online are included in the brief. All collected information was organized, compared, and analyzed to identify patterns, emerging threats, and possible interventions relevant to regional cropping systems. This combined methodology ensured that the policy recommendations presented in this brief are scientifically grounded, context-specific, and responsive to the immediate needs of rice and corn farmers in the Davao Region.



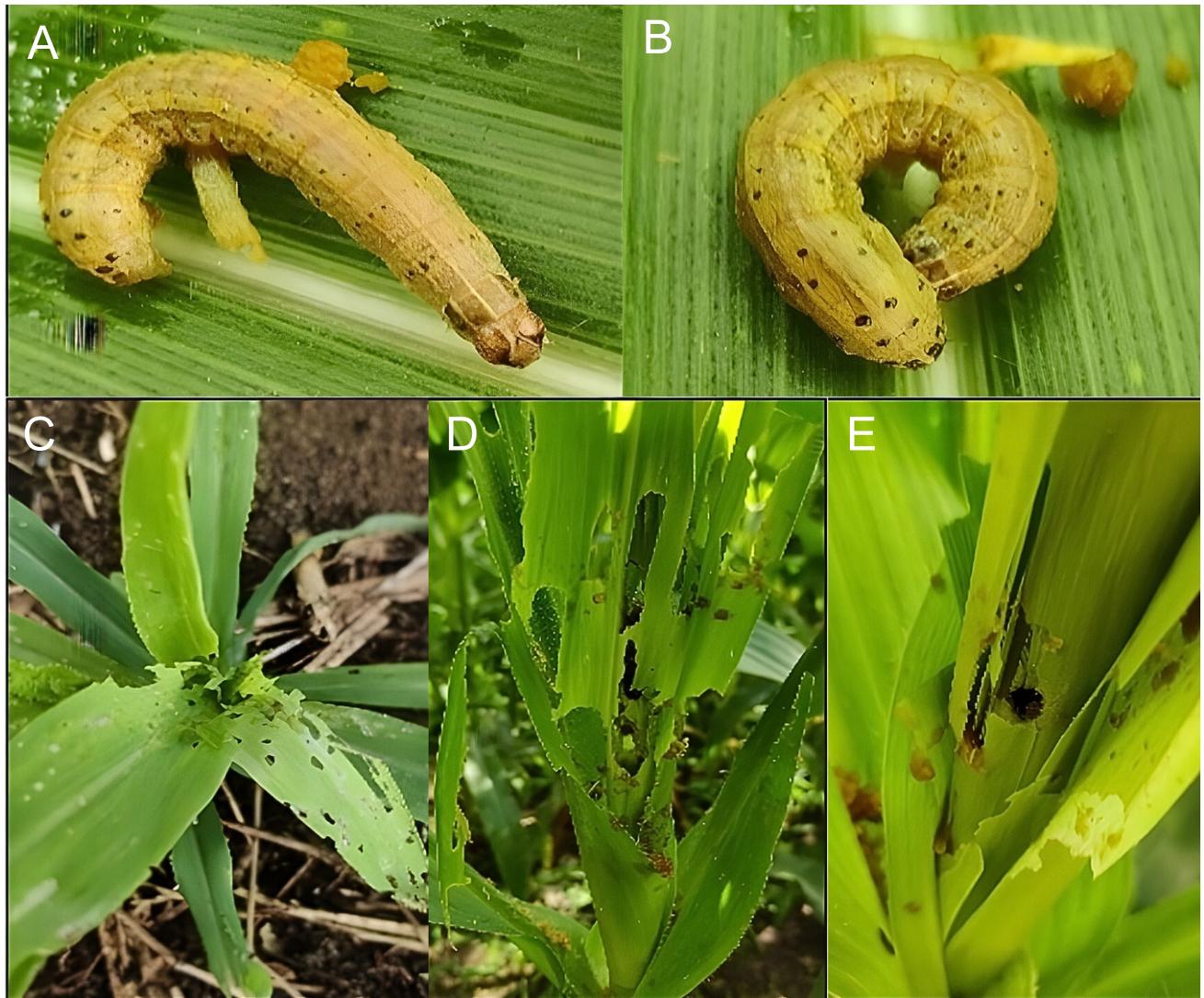
**Figure 1.** The sites where fall armyworm infestation was reported in Davao Region.

#### CHALLENGES DUE TO FALL ARMYWORM INVASION

##### Damage of the fall armyworm

The rapid spread of fall armyworm (FAW) across the Philippines and its invasion into the Davao Region pose a significant threat to regional food security and the agricultural economy. FAW has become a primary concern for both rice and corn production. In corn, FAW larvae (Figures 2A, 2B) feed aggressively on young leaves (Figure 2C), whorls, tassels, and ears, causing visible damage such as window-panning, ragged cuts (Figures 2D, 2E), and heavy defoliation that can lead to yield

losses of up to 80% if unmanaged (Navasero et al., 2019). A field survey in Davao del Norte, using direct visual inspection of reported damage, found infestation rates of 40% at the seedling stage and 66% at the vegetative stage of corn, with moderate to severe leaf and whorl damage (Sampiano, 2023). While corn remains the primary host, FAW has also been found attacking rice seedlings in Central Luzon (Valdez et al., 2023), further raising concerns, especially for the rice industry. Its polyphagous nature, rapid reproduction, and strong migratory ability heighten its damage potential, underscoring the urgent need for region-specific management strategies.



**Figure 2.** Morphological characteristics: FAW 5<sup>th</sup> (A) and 6<sup>th</sup> (B), instar larvae and their damage characteristics at seedling (C), and vegetative stages (D, E) of corn.

#### Economic impact of FAW invasion in national and regional contexts

The invasion of FAW in the Philippines has caused significant economic damage, particularly in the corn sector, which is considered the primary host of the pest. Corn is a significant input in livestock and poultry feed, and FAW-driven yield losses translate directly into higher production costs for the feed and meat industries. The last report from the Department of Agriculture states that 5,279 corn farmers and 3,273 ha of corn were affected by FAW nationwide, resulting in monetary losses of Php 57.03 million (Gomez, 2024). In the Davao region, FAW has caused 40-60% damage rates (Sampiano, 2023), threatening the corn industry. A reduction in corn production can increase feed prices, which in turn can raise the cost of basic commodities heavily consumed by households. Without coordinated and sustainable interventions, FAW will continue to impose significant economic strain on farmers, industries, and food systems at both the local and national levels.

#### Vulnerability of Davao Region's agricultural systems to FAW invasion

The current agricultural systems and farming practices in the Davao region make it highly vulnerable to potential severe FAW outbreaks. For instance, overlapping cropping schedules

and monocropping practices in the area, with a relatively warm climate, increase the exposure and risk of FAW attacks by providing a constant food source and a favorable environment. Additionally, dependence of the majority of farmers on susceptible crop varieties and limited access to sustainable pest management options further intensify the vulnerability of agricultural systems in the region (Bon et al., 2022). At the same time, socio-economic factors such as limited access to knowledge, inputs, and extension support reduce farmers' adaptive capacity, making them more dependent on reactive measures rather than preventive and sustainable strategies (Pagulayan et al., 2024). These interacting factors make agricultural systems in the region more vulnerable to severe FAW infestations. Addressing vulnerability, therefore, requires strengthening resilience through diversification, improved monitoring, capacity building, and integrated pest management strategies.

#### potential of spread across diverse cropping systems

The FAW's potential to spread across diverse cropping systems in the Davao Region poses a significant threat due to its polyphagous feeding behavior and strong migratory capacity. FAW is known to attack over 350 plant species globally, with a preference for cereals such as corn, rice, and sorghum, but it can also feed on sugarcane, soybean, and banana (Montezano et al., 2018; Prasanna et al., 2021). In the Philippines, infestations

have been reported in both corn and rice, including in Cagayan (Valdez et al., 2023), while the pest can also survive on weeds associated with these crops, increasing its potential for farm-to-farm spread (Agravante et al., 2023; Tura et al., 2025). In the Davao Region, where intercropping, mixed farming, and contiguous crop fields are common, FAW can easily move between crops. Favorable climatic conditions, continuous cultivation, and overlapping planting schedules further enable population build-up. Its adaptability and resistance complicate control, heightening risks to both smallholder and commercial farming systems.

#### Risks on over-reliant to chemical-based control

Over-reliance on chemical-based control poses serious agronomic, economic, environmental, and health risks. Farmers often resort to frequent and indiscriminate insecticide use, yet FAW populations can quickly develop resistance to common chemicals and even Bt toxins, compromising long-term control (Tavares et al., 2021; Zhang et al., 2021). For instance, misuse of pesticides, such as overdosing, using unregistered products, or spraying outside recommended schedules, is a widespread practice among farmers in Mindanao (Gonzaga et al., 2020), potentially accelerating the development of resistance. Economically, these practices increase production costs and reduce returns for resource-limited farmers. Environmentally, excessive pesticide use disrupts ecological balance by harming pollinators and natural enemies, while residues contaminate soil and water. Improper handling also endangers farmers' health, leading to poisoning and chronic illnesses (Anode et al., 2025). Given the proximity of farms to communities and water bodies in the Davao region, these risks are magnified. While this strategy provides immediate relief, it is unsustainable and counterproductive in the long term. To effectively manage FAW and mitigate these risks, there is a pressing need to implement integrated, science-based, and community-driven responses that combine surveillance, ecological approaches, and capacity building. The succeeding sections outline key strategies and possible responses toward sustainable FAW management in the Davao Region.

#### POSSIBLE RESPONSES TOWARDS FALL ARMYWORM INVASION

##### Adaptive governance for invasive species like FAW

Adaptive governance provides a flexible, collaborative, and learning-based framework for managing invasive species. It emphasizes continuous monitoring, timely information flow, and coordinated action across institutions and stakeholders (Chaffin et al., 2016). In the context of the FAW invasion in Davao Region, adaptive governance must be implemented by strengthening pest surveillance and monitoring systems to detect FAW movements across the region and by developing resilient farming systems to mitigate FAW attacks. Relevant stakeholders, including farmers, LGUs, research institutions, and national agencies, must also share data on sustainable pest management practices. It is also encouraged to incorporate scientific knowledge with local farmer experiences to refine management strategies against FAW. By promoting multi-sectoral engagement, collaborative decision-making, and policy flexibility, adaptive governance will surely enhance the region's ability to respond to uncertainties associated with FAW outbreaks and support more resilient and responsive agricultural systems.

#### Strengthen Surveillance and Monitoring

The first line of defence against the spread and damage caused by FAW and other pests is to have robust surveillance and monitoring systems (Shaurub, 2024). Early detection through systematic scouting, pheromone trapping, and farmer-led reporting helps identify infestations before they become outbreaks. Standardized monitoring protocols generate reliable data on pest incidence, severity, and spread, guiding timely interventions. Thus, engaging farmers, especially barangay agricultural workers, LGU technicians, and national agencies such as the Agricultural Training Institute (ATI) and Regional Crop Protection Center (RCPC), will surely build a community-based surveillance network. Digital tools like mobile apps, SMS alerts, and GIS mapping enhance real-time monitoring and decision-making. Regular surveillance tracks population trends, supports sustainable pest management, and provides valuable data for resource allocation and policy design. In the Davao Region, where diverse cropping systems and favorable climates allow FAW to thrive year-round, robust monitoring is crucial to minimize yield losses, prevent cross-crop infestations, and strengthen regional food security.

#### Establishing resilient and diversified farming systems

Establishing resilient and diversified farming systems is a key strategy to reduce crop vulnerability to FAW infestations (Harrison et al., 2019). Monocropping, widespread across many parts of the Davao region, creates favorable conditions for pest outbreaks by providing continuous, uniform food sources. Adopting agroecological practices such as legume-based intercropping, ecological engineering, minimum soil disturbance, and diverse field margins can disrupt FAW's life cycle, limit population build-up, and simultaneously improve soil fertility and ecosystem resilience. These diversified systems also enhance the presence of natural enemies, such as parasitoids and predators, which naturally regulate FAW populations. Practices such as synchronized planting and residue destruction further reduce breeding sites and interrupt pest carryover between seasons. Integrating indigenous knowledge with modern agroecological approaches strengthens smallholder farmers' capacity to manage invasive pests. Diversification also spreads production risks, ensuring food and income security even if one crop is attacked. Overall, resilient farming systems support long-term management, food security, and sustainable livelihoods.

#### Integrated pest management

Integration of multiple strategies forms the foundation of effective pest management, including FAW control. This integrated pest management (IPM) approach combines cultural, biological, mechanical, and chemical methods to suppress pest populations sustainably (Zhou et al., 2024). Cultural practices such as synchronized planting, crop rotation, proper land preparation, destruction of infested residues, and intercropping with legumes or trap crops disrupt the pest's life cycle and reduce breeding sites. Leguminous intercrops also improve soil health through nitrogen fixation, making plants more resilient to FAW damage. Biological control relies on natural enemies such as predators (e.g., ladybird beetles and earwigs), parasitoids (e.g., *Trichogramma* spp.), and entomopathogens (e.g., *Metarhizium* spp. and *Beauveria bassiana*). These organisms naturally limit FAW population build-up by increasing mortality in natural agroecosystems where FAW occurs. Mechanical methods, including hand-crushing egg masses and

larvae, and the use of light and pheromone traps, are beneficial for smallholder farms. This reduces initial pest densities, limits population build-up, and prevents subsequent generations from reaching outbreak levels. Planting resistant corn varieties can further enhance field protection by altering the agroecosystem at the plant level, reducing FAW's feeding success, growth rate, and reproductive capacity, thereby lowering its damage potential. When necessary, selective insecticides should be applied judiciously at the correct crop stage and dosage to prevent resistance. Given Davao Region's diverse cropping systems and favorable climate, adopting these IPM strategies can significantly reduce crop losses while building resilient rice and corn production systems.

These measures provide a critical stepping point for the successful management of the FAW and reducing its impacts in the regions' agroecosystems. To ensure their success and long-term sustainability, several policy interventions must now be prioritized, as outlined in the succeeding section.

### POLICY RECOMMENDATIONS

Considering the abovementioned challenges and risks and together with the analysis on the possible sustainable responses against FAW infestation in the region, the following policies outlined in Table 1 are recommended;

**Table 1.** Outline of the recommended policies and proposed actions against FAW invasion in Davao region.

Policy Recommendation	Proposed Actions
Provision of funds for research and development	<ul style="list-style-type: none"> <li>Allocate research funds to conduct studies related to FAW's biology, ecology, strain composition, and resistance.</li> <li>Invest on researches that aim to validate and test local corn varieties and identify those with potential resistance or tolerance to FAW.</li> <li>Provide funds for trials on habitat manipulation, including legume-corn intercropping systems and ecological engineering technologies in rice agroecosystems.</li> <li>Finance research projects related to the formulation and mass-production of locally sourced biological control agents, such as earwigs, <i>Trichogramma</i> spp., and entomopathogenic fungi, to provide sustainable and regionally adapted control options.</li> <li>Actively involve at least 80% of the farmers in Davao Region in participatory research to ensure that technologies and management strategies developed are practical, adoptable, and suited to local farming conditions.</li> </ul>
Strengthen surveillance and early warning systems	<ul style="list-style-type: none"> <li>Institutionalize a regional pest surveillance network involving LGUs, farmers, SUCs, and national agencies for timely detection and coordinated response.</li> <li>Invest in digital pest monitoring tools (e.g., mobile apps, GIS mapping, automated pheromone traps) to enhance data collection, reporting, and real-time decision-making, and try to achieve 90% farm level adoption of these technologies.</li> <li>Develop standardized monitoring protocols, early warning systems, and economic threshold levels (ETLs) specific to regional cropping systems.</li> </ul>
Establish strong collaboration among stakeholders	<ul style="list-style-type: none"> <li>Promote strong collaboration among national agencies, state universities and colleges, local government units, farmer's organizations, and private stakeholders especially in surveillance, research, and management of FAW in the region.</li> <li>Strengthen linkages between research institutions and extension service providers to ensure timely sharing and dissemination of new technologies and management practices against FAW.</li> <li>Collaborative efforts should focus on sharing of research results, synchronized pest control strategies, and streamlining collective expertise to address FAW challenges more effectively under regional conditions.</li> </ul>
Enhance capacity building and extension support	<ul style="list-style-type: none"> <li>Establish regular capacity-building programs for agricultural technicians and extension workers in Davao region to enhance their technical competence in FAW identification, monitoring, and management.</li> <li>Develop and implement at least one farmer field school, community-based training, or demonstration farm in each province of the region to build farmers' practical skills and decision-making capacity for sustainable FAW management appropriate under regional contexts.</li> <li>Conduct training on appropriate pesticide handling and product stewardships to farmers promoting judicious application of pesticides and delay the development of insecticide resistance.</li> <li>Produce localized IEC materials preferably in vernacular languages to improve accessibility and adoption of technologies for FAW management.</li> <li>Strengthen extension-research linkages to ensure that new knowledge and technologies are rapidly communicated to farming communities in the region.</li> </ul>

## CONCLUSION

The invasion of the fall armyworm definitely posed a substantial and evolving threat to crop production and farmer livelihoods in Davao Region. Its high reproductive rate, broad host range, rapid dispersal, and adaptability underscored the urgent need for coordinated, science-based, and forward-looking interventions. The region must prioritize establishing robust surveillance systems, institutionalizing integrated pest management, and promoting resilient, diversified farming systems as core strategies for long-term control. These must be coupled with sustained funding in both research and development, strengthened multi-sectoral collaboration, and enhanced capacity building for farmers and agricultural technicians. Implementing these policy directions will not only mitigate current FAW impacts but also set the foundation for an adaptive, well-coordinated, and climate-resilient agricultural landscape. In doing so, the Region will be better equipped to prevent future outbreaks, protect staple crop productivity, and secure the livelihoods of the farming communities.

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## DECLARATION

### Informed consent statement

This policy brief did not involve human participants, animals, or the collection of the primary data. The analysis is based solely on secondary data, publicly available information, and previously published sources. As such, no ethical clearance or information consent was obtained. This study adheres to the principles of academic integrity, proper citation, and responsible use of information.

### Conflict of interest

The author declares no conflict of interest associated with this report.

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