台灣農業研究 (J. Taiwan Agric. Res.) 75(2):171–184 (2026)
https://doi.org/10.6156/JTAR.202606_75(2).0001

Feature Article

Current Status of Edible Insect Industry in Korea: Contemporary Issues, Challenges, and Path Ahead

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Abstract

Ghosh, S., S. Sun, and C. Jung. 2026. Current status of edible insect industry in Korea: Contemporary issues, challenges, and path ahead. J. Taiwan Agric. Res. 75(2):171–184.

The edible insect industry in South Korea has evolved from its deep-rooted tradition of using insects such as silkworm pupae for food and medicine to a modern sector integrating advanced technologies and sustainability. Recent years have seen significant expansion, with approximately 245 operational insect farms producing species such as mealworms, crickets, silkworm pupae, black soldier fly larvae, and honeybee drones. Supported by regulatory frameworks like the Insect Industry Promotion Act (2011) and Hazard Analysis and Critical Control Point (HACCP) certification, the industry aims to address food security, rural development, and environmental concerns. Large-scale production facilities and AI-driven automation have increased efficiency, while global collaborations and export strategies have positioned South Korea as a leader in the global edible insect market. Nevertheless, scaling up production raises sustainability challenges, especially regarding energy use and carbon footprints. To maintain environmental benefits, strategies including renewable energy adoption, circular economy practices, and innovative processing are essential. Consumer acceptance is fostered by integrating insects into familiar food products and animal feed. Overall, South Korea's edible insect sector represents a fusion of cultural heritage and cutting-edge technology, contributing to food security, sustainability, and health. The industry's continued growth will depend on balancing large-scale production with environmental impact and meeting evolving consumer preferences. South Korea is well-positioned to shape the global edible insect market, driving innovation in sustainable protein production and securing a resilient future for global food systems.

Key words: Automation, AI, Circular economy, Sustainability, Food security.

INTRODUCTION

Korea has a long tradition of using insects for both food and medicinal purposes, as reflected in *Dong Eui Bo Gam*, the 1613 medical compendium by Heo Jun that records various traditional medicinal materials, including insects (Pemberton 1999; Yoshida 2012; Jeong *et al*. 2020). Rice grasshopper, *Oxya chinensis* has long been a seasonal delicacy. Silkworms (*Bombyx mori*) pupae, locally known as *beondaegi* are another example. The practice of rearing silkworms for silk and food in Korea dates back over 2,000 years and reflects a deep-rooted cultural heritage that is still preserved today. Silkworm larvae, pupae, and silk-fibroin hydrolysates are registered as food raw materials, while silkworm feces and *Bombyx*

Received: October 16, 2025; Accepted: December 29, 2025.
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batryticatus (Baekgangjam) are recognized as traditional Korean medicines. Among sericulture products, health-functional ingredients include silk-protein acid hydrolysates for immunity; fibroin hydrolysates for memory improvement; freeze-dried 5^{th} instar silkworm powder for blood sugar control; HongJam, made by steaming and freeze-drying mature silkworms, has been reported to offer health benefits such as preventing Alzheimer's and Parkinson's diseases, improving gastrointestinal functions, skin whitening, hair growth, and promoting a longer healthy life (Kim & Koh 2022). Beyond silkworms, crickets have also gained attention in modern Korea. While cricket farming is a newer industry compared to silkworms, it has rapidly evolved due to growing consumer demand. Crickets, such as *Teleogryllus emma* and *Gryllus bimaculatus*, are cultivated not only for human consumption but also for animal feed. The rise of cricket farming highlights Korea's ability to blend tradition with innovation by commercializing insects for broader markets. What sets Korea apart is its ability to integrate traditional practices with modern technologies (Meyer-Rochow *et al*. 2018). For example, while crickets were not historically consumed on a large scale, the country has adapted to emerging trends in insect farming, making them commercially viable. This innovation is seen as part of Korea's broader push to explore sustainable food sources in the face of global food security challenges. The combination of a cultural history of entomophagy and contemporary technological advances positions Korea as a leader in the global edible insect market.

Korea has become a notable player in the global edible insect industry in recent years (Caparros Megido *et al*. 2024). This rise is driven by increasing consumer demand for sustainable protein sources, government support for innovative agriculture, and a growing awareness of the health and environmental benefits of insects as food. Edible insect farming has seen substantial growth in the country, focusing on a variety of species, enhanced production techniques, and expanding international markets.

CURRENT SITUATION OF EDIBLE INSECT FARMING

As of 2024, Korea's edible insect farming industry is evolving rapidly, with significant developments in the commercial production of insects for human consumption, animal feed, and functional food products. The government, through the Ministry of Agriculture, Food, and Rural Affairs (MAFRA), has been actively promoting the industry as part of its strategy to address food security, rural development, and environmental concerns. According to the Major Statistics of the Ministry of Agriculture, Food and Rural Affairs (MAFRA 2025), 2,949 insect farms were operating in Korea in 2024. Table 1 presents the distribution of these farms across the country's provinces. The facilities used for insect farming include panel houses (1,012), vinyl houses (620), sunlight greenhouses (486), steel-frame concrete structures (467), containers (205), and other types of facilities (236). These facilities engage in the cultivation of various insect species, with modern production techniques being developed to ensure the quality and safety of edible insect products.

Insect species currently being farmed

In Korea, several insect species are being commercially farmed for food and feed purposes. These species include:

Table 1. Number of insect farms across provinces in Korea (MAFRA 2025).

Province	No. of farms
Gyeonggi (Seoul/Incheon)	749
Gangwon	122
Chungbuk	293
Chungnam (Daejeon/Sejong)	387
Jeonbuk	293
Jeonnam (Gwangju)	202
Gyeongbuk (Daegu)	508
Gyeongnam (Busan/Ulsan)	345
Jeju	50

1. Mealworms (*Tenebrio molitor*)

One of the most popular insect species in Korea, mealworms are farmed for both human consumption and animal feed due to their high protein content, favorable fatty acid profile, and potential use in various food products such as protein powders, snacks, and baked goods (Ghosh *et al*. 2017).

2. Crickets (*Gryllus bimaculatus*)

Crickets are another widely farmed species, known for their protein density, ease of farming, and sustainable production (Ghosh *et al*. 2017; Meyer-Rochow *et al*. 2021). Cricket-based products, such as powders, snacks, and even supplements, are gaining popularity in both the domestic and international markets.

3. Silkworm pupae (*Bombyx mori*)

Traditionally consumed in Korea as a street food called “beondegi,” silkworm pupae are a rich source of protein and fiber. They are now being processed into modern food products, such as powders and functional ingredients. *Bombyx batryticatus* is registered as a Korean traditional medicine.

The production of silkworm by-products in Korea showed variable trends from 2018 to 2024, as illustrated in Fig. 1 (MAFRA 2025). Fresh silkworms recorded the highest production throughout the period, increasing from 110,256 kg in 2018 to a peak of 140,146 kg in 2020, and then slightly declining to 119,697 kg in 2024. In contrast, dried silkworm production decreased overall from 46,305 kg in 2018 to 27,194 kg in 2024, despite some fluctuations. The production of silkworm cocoons gradually declined from 15,179 kg in 2018 to 10,082 kg in 2024. Similarly, male pupae and *Cordyceps* showed a continuous reduction over the years, reaching 161 kg each in 2024. In contrast, HongJam (steamed and freeze-dried silkworm) production increased sharply from 196 kg in 2018 to 10,205 kg in 2020, before stabilizing at around 4,000 kg between 2021 and 2024. These trends indicate shifts in the production and utilization of different silkworm by-products over time.

4. Black soldier fly (*Hermetia illucens*)

Primarily farmed for animal feed, the black soldier fly larvae (BSFL) are also recognized for their role in waste recycling and as a protein source in aquaculture feed.

5. Rhinoceros beetle (*Allomyrina dichotoma*) and white-spotted flower chafer (*Protaetia brevitarsis*)

The larvae of these beetles are not only valued for their nutritional content but are also deeply rooted in traditional medicinal practices (Pemberton 1999; Ghosh *et al*. 2017).

6. Honey bee drone (*Apis mellifera*)

Honey bee drones were registered relatively recently, owing to their high nutritional value. With their rich protein content, essential amino acids, and abundant minerals, drone brood has the potential to serve as a valuable ingredient in both food and animal feed (Kim & Jung 2013; Ghosh *et al*. 2021).

These farms, however, tend to operate on a smaller-to-medium scale, focusing on specialized production for both food and therapeutic applications, showcasing the unique blend of cultural heritage and practical innovation in Korean insect farming.

The annual sales of insect products in Korea showed an overall increasing trend from 2020 to 2024, with species-wise sales distribution illustrated in Fig. 2 (MAFRA 2025). Total sales rose from 41,392 million KRW in 2020 to 52,818 million KRW in 2024. Among insect species, the white-spotted flower chafer recorded the highest sales, though it declined from 14,741 million KRW in 2020 to 11,282 million KRW in 2022, then recovered to 13,833 million KRW in 2024. Sales of mealworms increased steadily from 3,284 million KRW in 2020 to 6,822 million KRW in 2024, indicating growing market demand. Black soldier fly sales rose from 9,305 million KRW in 2020 to 11,589 million KRW in 2023, but slightly decreased to 10,140 million KRW in 2024. Meanwhile, rhinoceros beetle and stag beetle sales fluctuated moderately over the

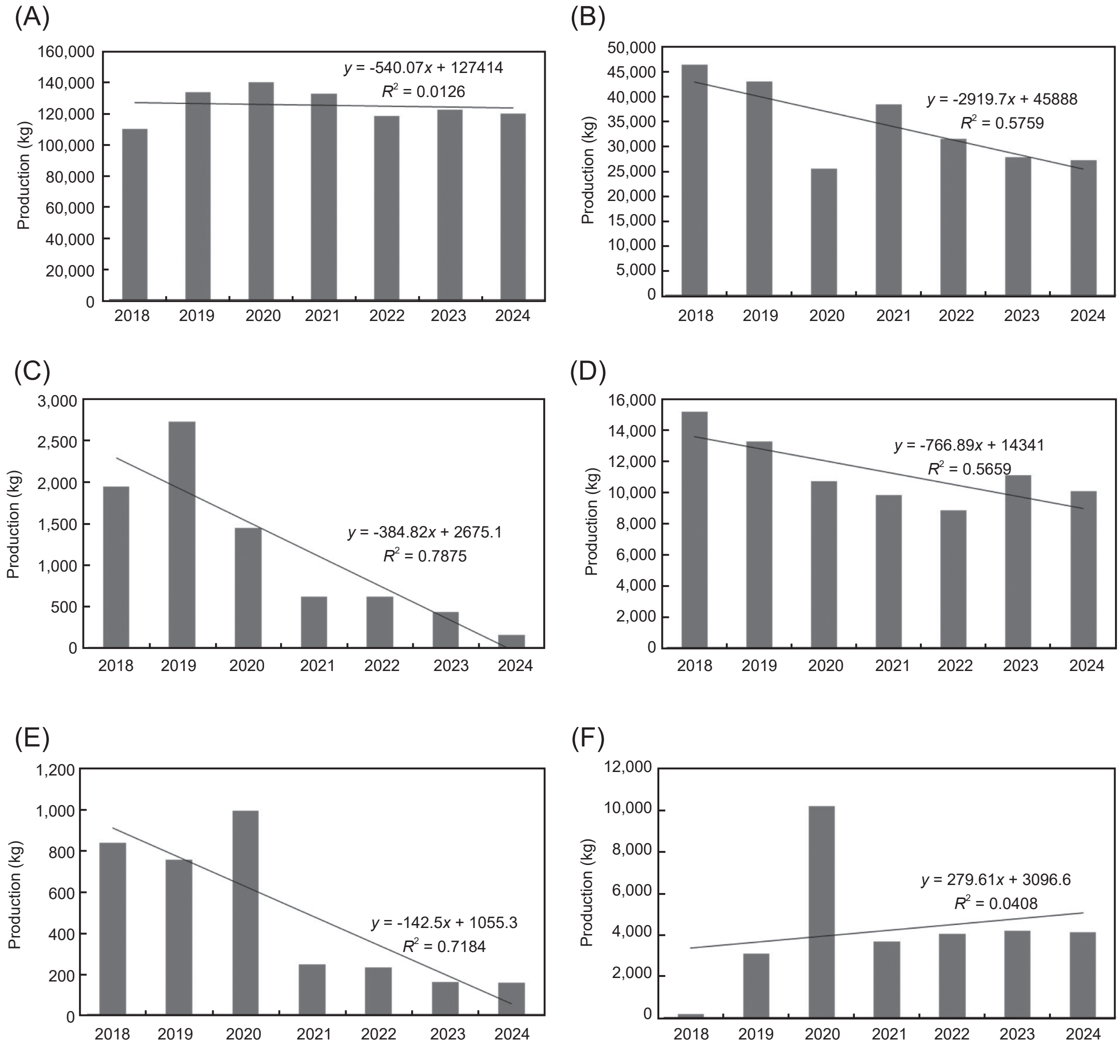

Fig. 1. Annual production trends of major silkworm by-products in Korea from 2018–2024 (kg). (A) Fresh silkworm; (B) dried silkworm; (C) male pupae; (D) silkworm cocoon; (E) *Cordyceps*; and (F) HongJam.

years. The cricket market also varied, peaking at 4,148 million KRW in 2023 before declining to 3,023 million KRW in 2024. In contrast, sales in the other insect category increased significantly from 6,492 million KRW in 2020 to 13,612 million KRW in 2024, reflecting diversification in the insect industry.

Large-scale production facilities

Several large-scale insect farming facilities have been established in Korea. These facilities are equipped with advanced technologies for mass breeding, processing, and packaging. Among the leading companies, Entomo Farms Korea and Bugs Korea are prominent examples, focusing on industrial-scale production. These large-scale facilities are integrated with automated systems for rearing, temperature control, feeding, and harvesting. This technological advancement not only ensures a higher yield but also meets stringent safety and quality standards that are crucial for both domestic and international markets. The farms can produce tons of insect biomass annually, which is further processed into

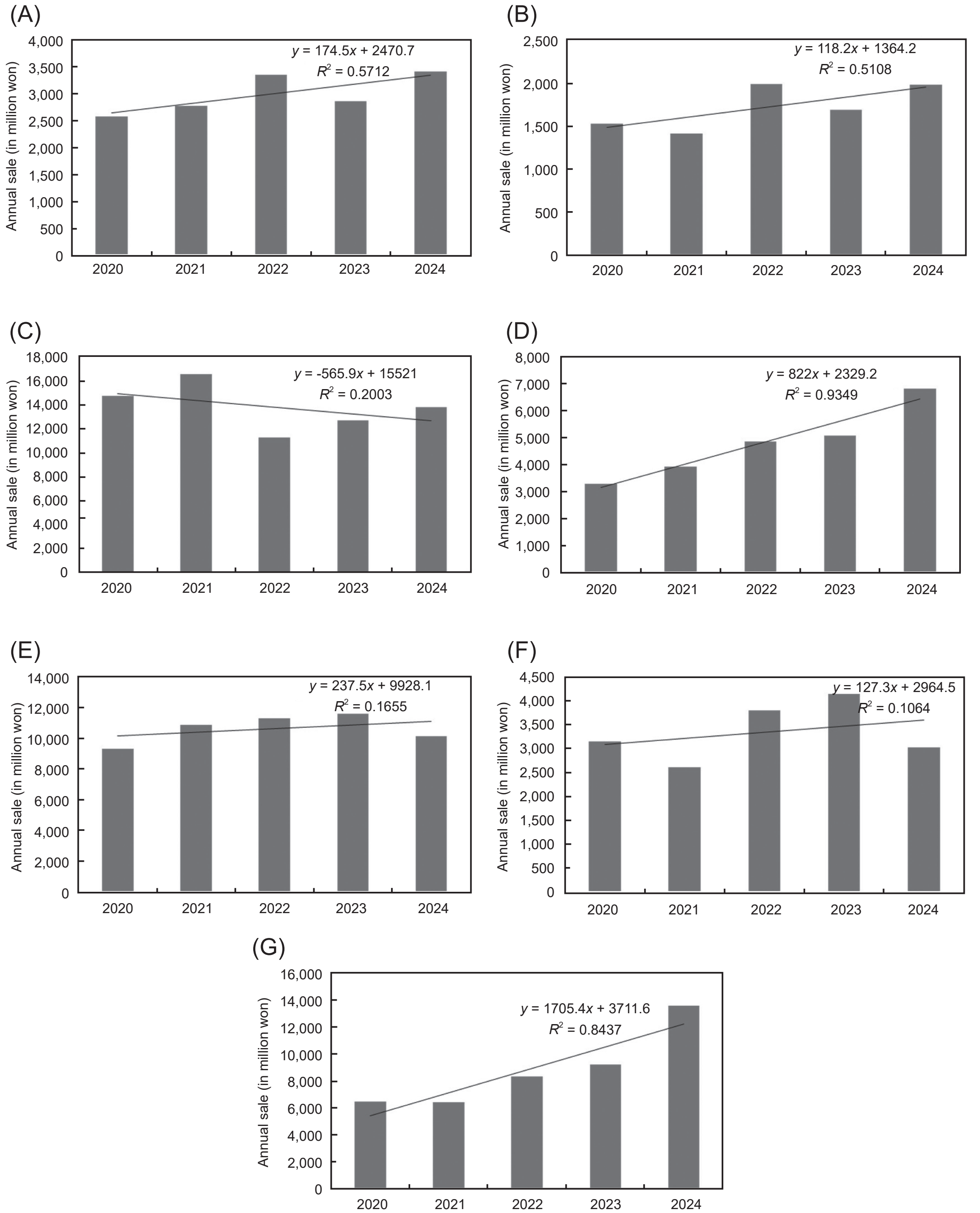

Fig. 2. Annual sales trends of major insect species in Korea from 2020–2024 (million KRW). (A) Rhinoceros beetle; (B) stag beetle; (C) white-spotted flower chafer; (D) mealworm; (E) black soldier fly; (F) cricket; and (G) others.

insect powders, protein bars, snacks, and other value-added products.

The Korean edible insect industry extends beyond insect production , encompassing various interconnected sectors designed to address specific industry requirements. Key categories include hardware, software, and services. Hardware refers to the physical devices and components essential for building edible insect production and product manufacturing facilities. Software solutions focus on applications that improve data management, automation, and analytics, enabling smarter decision-making and enhancing operational efficiency. The services segment provides consulting, implementation, and maintenance, ensuring the efficient deployment and utilization of edible insect feed technologies. Together, these components play a crucial role in driving market growth as businesses adopt integrated solutions that combine hardware, software, and services to meet their goals and remain competitive in a rapidly evolving landscape.

REGULATORY FRAMEWORK, GLOBAL PARTNERSHIPS, AND EXPANDING MARKET POTENTIAL FOR EDIBLE INSECTS IN SOUTH KOREA

Regulation and legislation

The Korean government is one of the earlier adapters of the global trend of the insect industry, making the registration of the act of Fosterage and Support of Insect Industry (2010, www.law.go.kr, hereafter, insect industry law). The act aims to promote the insect industry by providing a legal and institutional framework to support the breeding, production, processing, distribution, and utilization of insects. The law intends to enhance agricultural income, stimulate rural economies, and contribute to public well-being and environmental sustainability. Similarly, there are two more registrations regarding the traditional insect industry which are Functional Silviculture Promotion Act (2009), and Apiculture Promotion Act (2019). After establishing the Insect Industry Act, the Korean government has implemented several policies and regulatory frameworks to support the edible insect industry. In 2016, the Korean Food and Drug Administration (KFDA) approved the sale of certain edible insects for human consumption. This included species like mealworms and crickets, provided they meet safety standards for food hygiene (Table 2). The Insect Industry Promotion Act, established in 2011, serves as the primary legal framework governing insect farming in the country. It provides guidelines on the farming, processing, and distribution of insects for human consumption and animal feed. The act also outlines safety standards, labeling requirements, and permissible insect species for commercial use. In 2019, Korea further enhanced its regulatory infrastructure by introducing the Hazard Analysis and Critical Control Point (HACCP) certification for edible insect farms, ensuring that production facilities adhere to international food safety standards. Additionally, the government offers financial support to farmers venturing into the edible insect industry, including subsidies for research, facility upgrades, and market development.

International business collaborations

Korea is actively collaborating with international partners to expand its edible insect industry. Collaborations have been established with countries like the Netherlands, Thailand, and the United States to exchange expertise in insect farming technologies, research, and marketing strategies. Korean companies have been exploring partnerships to export their insect-based products to global markets, especially in Europe and North America, where demand for sustainable protein alternatives is increasing. The European Food Safety Authority (EFSA), through Regulation (EU) 2021/405, has approved certain insect species for consumption, thereby opening the door for Korean exporters to enter the European market (Spatola *et al*. 2024).

Research collaborations between Korean universities and international institutions are

Table 2. Edible insect species registered across different time periods in Korea.

Year	Registered insects for food: Common name	Scientific name[z]
2014	Grasshoppers	*Oxya chinensis*
	Silkworm pupae	*Bombyx mori*
	Dried larva of *Bombyx mori* (4–5 instars; Baekgangjam) infected by *Beauveria bassiana-Bombyx batryticatus*	*Bombyx batryticatus*
2016	Mealworm larvae	*Tenebrio molitor*
	White spotted flower chafer larvae	*Protaetia brevitarsis*
	Rhinoceros beetle larvae	*Allomyrina dichotoma*
	Two-spotted cricket	*Gryllus bimaculatus*
2020	Super mealworm larvae (non-fat powder)[y]	*Zophobas morio*
2020	Honeybee drone pupae	*Apis mellifera*

[z] Scientific names were assigned based on the common names listed in the policy book published by the Rural Development Administration, Korea.
[y] Temporary registration.

also on the rise. These partnerships focus on the nutritional analysis of edible insects, the development of new processing techniques, and the exploration of insects' potential to address global food security challenges.

Potential market size

The edible insect market in Korea is projected to grow significantly in the coming years. According to a market research report by Future Market Insight, insect feed sales in Korea are expected to grow at an impressive compound annual growth rate (CAGR) of 23.6% through 2033. The market is projected to rise from USD 18.4 million in 2023 to USD 152.9 million by 2033 (https://www.futuremarketinsights.com/reports/insect-feed-industry-analysis-in-korea). Key drivers of market expansion include:

1. Growing consumer awareness

Increasing awareness of the environmental benefits of insect farming (lower greenhouse gas emissions, reduced water usage) and the high nutritional value of insects (rich in protein, vitamins, and minerals) is driving consumer interest.

2. Government support

Financial and regulatory support from the Korean government is accelerating the growth of the industry, encouraging more farmers to enter the market and increasing production capacity.

3. Innovative products

Korean companies are developing a wide range of insect-based products, including protein bars, insect powders, snacks, and even insect-infused beverages. These products are being marketed as healthy, sustainable, and innovative food solutions for modern consumers.

4. Export opportunities

With international markets like Europe and North America showing interest in edible insect products, Korea has the potential to become a leading exporter of high-quality, safe, and innovative insect-based foods.

CONTEMPORARY ISSUES OF THE EDIBLE INSECT INDUSTRY

The role of automation and artificial intelligence (AI) in insect farming: Revolutionizing large-scale production

The rapid expansion of edible insect farming demands innovative solutions to address challenges in scalability, efficiency, and precision. Automation, integrated with AI, is playing a crucial role in transforming insect farms into highly efficient production facilities, as depicted in Fig. 3. The combination of AI and automation technologies enables faster, more accurate, and large-scale insect production, driving sustainability while ensuring profitability.

1. The potential role of automation in insect farming

Automation in insect farming uses advanced machinery, robotics, and sensors to handle various tasks such as insect breeding, feeding, harvesting, and monitoring environmental conditions. It significantly reduces human intervention, streamlines operations, and improves the overall quality and consistency of production.

Some of the critical areas where automation can revolutionize insect farming include:

1.1. Automated rearing systems: AI-driven machinery can be used to automate the process of rearing insects, from egg-laying to larval development. Machines equipped with precise temperature and humidity controls ensure optimal conditions for insect growth, reducing mortality and improving development speed.

1.2. Feeding automation: Ensuring that insects receive a balanced and consistent diet is critical to maximizing growth rates and nutritional content. Automated feeding systems use sensors to detect insects' feeding status and deliver precise amounts of food, reducing waste and optimizing resource use.

1.3. Harvesting automation: Harvesting insects at the correct time is crucial for achieving high yields and ensuring the desired nutritional content. Automated systems, guided by AI algorithms, can detect the optimal harvest time based on factors like the size and weight of the insects. These systems can efficiently collect, sort, and process large volumes of insects with minimal labor.

1.4. Environmental monitoring and control: AI-driven sensors monitor the insect farm's environmental parameters, such as temperature, humidity, and ventilation,

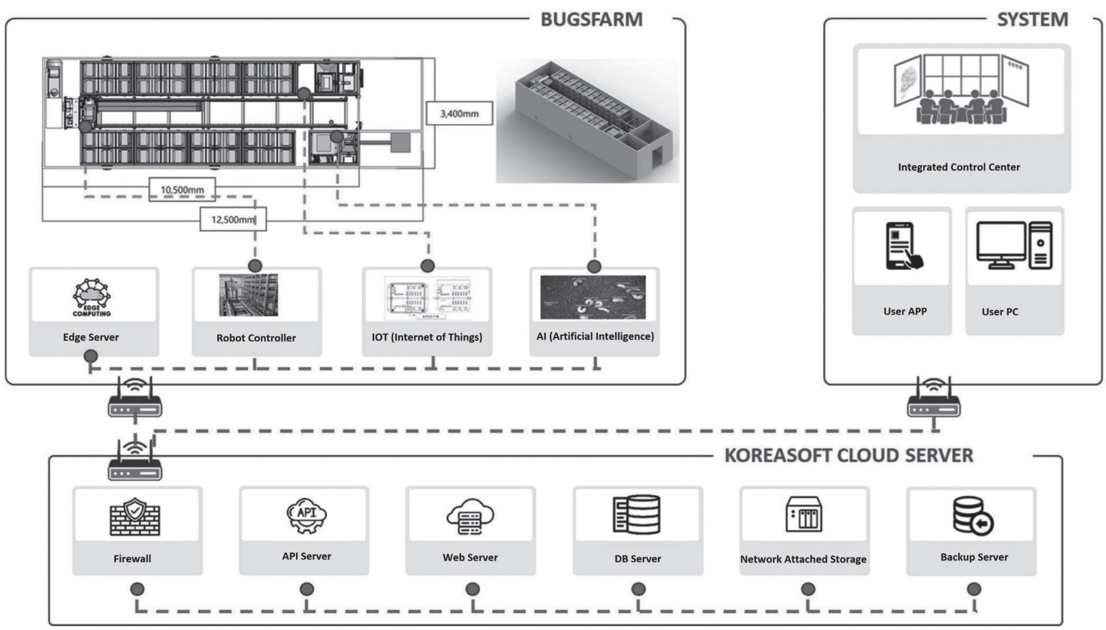

Fig. 3. Overview of an automated insect production facility (photo credit: Korea Soft).

ensuring optimal conditions for growth. Real-time data collection and analysis enable immediate adjustments in response to changes, helping to prevent disease outbreaks and improving overall insect health.

1.5. Waste management: Insect farms produce organic waste, and AI-powered automation can help manage and recycle waste materials. Black soldier fly larvae, for instance, are highly efficient at converting organic waste into protein, and automated waste processing systems can integrate this process, turning waste into a valuable resource.

2. The practical role of artificial intelligence in the improvement of insect farming

AI is increasingly being incorporated into farming operations to optimize production, improve decision-making, and reduce costs (Fig. 4). In insect farming, AI can enhance efficiency across various stages of the production process by leveraging machine learning, data analytics, and computer vision.

2.1. Data-driven insights and predictive analytics: AI algorithms analyze vast amounts of data collected from automated systems, providing valuable insights into insect growth patterns, feed efficiency, and environmental factors, as we discussed earlier. Predictive models can forecast growth cycles, allowing farmers to plan and optimize production schedules, anticipate challenges, and adjust strategies accordingly.

2.2. Computer vision for monitoring and quality control: Computer vision technologies powered by AI can visually monitor insect development and health. These systems can detect irregularities, such as diseases, malformations, or undernourished larvae, enabling early intervention. They can also assess the quality of harvested insects, ensuring that only those meeting specific criteria are processed for human consumption or animal feed.

2.3. AI-driven genetic optimization: AI can aid in selective breeding programs aimed at optimizing insect strains for faster growth, higher protein content, or disease resistance. By analyzing genetic data, AI algorithms can identify desirable traits and guide breeding decisions, leading to more efficient insect production over time.

2.4. Supply chain optimization: AI helps optimize the logistics of insect production by streamlining supply chain operations, from sourcing raw materials (like feed) to distributing final products. Algorithms can predict demand fluctuations, reducing overproduction or shortages and improving the overall profitability of insect farming operations.

Korea is at the forefront of agricultural

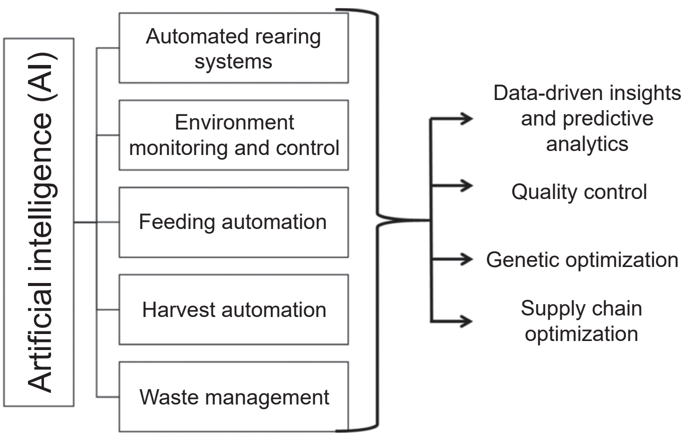

Fig. 4. Role of artificial intelligence (AI) in automated insect production facility.

technological innovation, including insect farming. The country has been investing heavily in smart farming technologies, including AI, to improve food production efficiency and address issues related to labor shortages, food security, and sustainability. Although the integration of AI in insect farming is still in its early stages, several promising developments are emerging in Korea and globally. Korea's insect farming industry is starting to adopt AI-driven technologies in a few large-scale operations. Companies like Bugs Korea and Entomo Farms Korea are exploring automated systems to manage temperature, humidity, and feeding schedules. Additionally, partnerships with tech firms and research institutions are being formed to develop AI applications tailored for insect farming. The Korean Rural Development Administration (RDA) has been actively promoting research into smart farming, and insect farms are included in these initiatives. The RDA is working with agricultural tech companies to develop automated insect farming systems that can be managed remotely via AI-powered apps, giving farmers real-time updates and control over their production.

Balancing sustainability and large-scale edible insect farming: A path forward

Edible insects have emerged as a promising solution to address the world's growing demand for sustainable food sources. Two primary pillars support the promotion of edible insect consumption and production: nutritional benefits and sustainability (van Huis *et al*. 2013). Insects are highly nutritious, boasting dense protein, essential minerals, and primarily unsaturated fats beneficial for cardiovascular health. In terms of sustainability, insects require minimal natural inputs, including land, water, and feed, while also emitting negligible amounts of greenhouse gases (GHGs) such as methane, unlike conventional livestock farming (e.g., cattle, swine, and poultry). However, as insect farming scales up to meet increasing global demand, a new challenge arises- the carbon footprint of large-scale automated or semi-automated insect production. Large production facilities, particularly those equipped with automated systems, require substantial energy for environmental control, such as heating, ventilation, air conditioning (HVAC), automated feeding, and processing machinery. As a result, this intensification could elevate the carbon footprint, potentially undermining the sustainability advantage of small-scale insect farms. To address this challenge, we must explore ways to ensure sustainability even with the growing shift toward large-scale insect production.

1. Small vs. large-scale insect farming: Carbon footprint comparison

1.1. Small and medium-scale producers: In regions like Southeast Asia, small and medium-scale insect farming is naturally supported by favorable climatic conditions (Hanboonsong *et al*. 2013; Ghosh *et al*. 2025). Many insect species, such as crickets, mealworms, and black soldier flies, thrive in warm, humid environments, which align closely with the natural conditions of tropical and subtropical areas. In these regions, insect farmers often rely on ambient environmental conditions to rear insects, without needing extensive energy inputs to regulate temperature or humidity. These small-scale farms typically have a minimal carbon footprint due to low energy consumption, limited reliance on artificial environmental controls, reduced transportation requirements, as production often occurs close to local markets (Barragán-Fonseca *et al*. 2025; Ghosh *et al*. 2025).

1.2. Large-scale, automated insect production: As the industry grows and large-scale production facilities are established, particularly in regions with less favorable climates, automation and mechanization introduce energy-intensive processes. This includes: Heating and cooling systems to maintain optimal temperatures for insect growth in colder climates; humidity control- essential for preventing desiccation or exces-sive moisture, both of which can affect insect health and growth; automated feeding and harvesting- robots and machines used for these tasks are energy-intensive, especially in facilities producing large volumes of insects. While automation brings the benefits of efficiency, scalability, and consistency, it also introduces higher energy demands, contributing to a greater carbon footprint, especially if the energy used comes from non-renewable sources.

2. Strategies to ensure sustainability in large-scale insect farming

To maintain the environmental benefits of insect farming while scaling up, it is crucial to adopt energy-efficient practices, renewable energy sources, and innovative technological solutions. One of the most effective ways to offset the energy demands of large-scale insect farming is to integrate renewable energy sources such as solar, wind, or geothermal power. Insect farming facilities can utilize renewable energy to power automated systems, environmental controls, and processing machinery. This not only reduces reliance on fossil fuels but also aligns with broader global efforts to mitigate climate change. As automation becomes more integral to large-scale insect production, it is important to develop energy-efficient technologies that minimize power consumption without sacrificing productivity.

Adoption of circular economy practices

The concept of a circular economy is particularly well-suited to insect farming. Insect farms can be designed to recycle waste products, both within the facility and from external sources. For instance:

1. Organic waste recycling

Insects like black soldier fly larvae are highly efficient at converting organic waste (e.g., food scraps, agricultural by-products) into valuable biomass (Bruno *et al*. 2025). By incorporating organic waste streams from other industries into their feed, insect farms can reduce the need for specially cultivated feedstock, thereby minimizing land use and water consumption associated with feed production.

2. Waste-to-energy systems

Facilities can use anaerobic digestion or composting to convert waste by-products (such as insect frass or exoskeletons) into biogas, which can then be used as an energy source within the farm (Odoi-Yorke *et al*. 2025).

Product development and value addition

Promoting edible insects in communities familiar with entomophagy can be achieved by establishing sustainable, scientifically sound rearing systems. Such systems ensure a consistent supply of nutritious products while enhancing food safety. In contrast, harvesting edible insects from the wild poses significant risks to biodiversity and raises safety concerns about consuming wild-caught species. For communities unfamiliar with edible insects, characterized by negative perceptions towards entomophagy, it is essential to shift the focus from whole insects to their incorporation as ingredients in food products. For example, insect flour can be blended with wheat flour to produce bakery items, while insect protein hydrolysate can serve as a valuable ingredient in protein supplements. This approach can facilitate greater consumer acceptance by integrating insects into familiar food forms. Furthermore, diversifying insect-based products offers an effective strategy for promoting their benefits. Using insects as animal feed can reduce demand for traditional feed sources, which often have significant environmental impacts. Insect protein sources for poultry and fish feed can be more sustainable alternatives to current animal feed practices.

The diversification of insect products not only enhances the nutritional profile of diets but also contributes to environmental sustainability. By presenting insects as a functional component of food rather than as standalone items, we can bridge the gap between the nutritional and ecological advantages of edible insects and human consumption, ultimately benefiting both health and the environment.

CONCLUSIONS

The edible insect farming industry in Korea is on a promising trajectory, supported by government initiatives, innovative product development, and growing domestic and international demand. With a strong regulatory framework, increasing investment in large-scale production facilities, and a focus on sustainability, Korea is poised to become a global leader in edible insect farming. As consumer acceptance grows and technological advancements continue, the industry holds significant potential for contributing to both food security and environmental sustainability in the coming decades.

ACKNOWLEDGEMENTS

The authors sincerely acknowledge Korea Soft for kindly providing the flowchart illustrating the overview of an automated insect production facility, and National Research Foundation of Korea (NRF-2018R1A6A1A03024862).

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韓國食用昆蟲產業之現況分析：現今議題、面臨挑戰與未來發展方向

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摘要

Ghosh, S., S. Sun, and C. Jung. 2026. Current status of edible insect industry in Korea: Contemporary issues, challenges, and path ahead. J. Taiwan Agric. Res. 75(2):171–184.

韓國食用昆蟲產業已從原先僅利用蠶蛹等昆蟲作為食品與藥物的根深蒂固的傳統，發展成為一個融合先進技術與永續發展的現代化產業。近年來，此產業得到顯著發展，約有 245 個運作中的昆蟲養殖場，養殖著麵包蟲、蟋蟀、蠶蛹、黑水虻幼蟲以及蜜蜂雄蜂等昆蟲。在 2011 年的《昆蟲產業促進法》與 Hazard Analysis and Critical Control Point (HACCP) 認證等監管架構的支持下，該產業旨在解決糧食安全、農村發展及環境問題。大規模生產設施與人工智慧驅動的自動化提高了生產效率，而全球合作與出口策略使韓國在全球食用昆蟲市場中居於領先地位。然而，為了擴大生產規模卻也帶來是否足以永續發展的挑戰，尤其是在能源使用與碳足跡方面。為維持環境效益，採用包括再生能源、實施循環經濟以及創新加工等策略至關重要。透過將昆蟲融入常見的食品與動物飼料中，可提高消費者的接受度。總體而言，韓國食用昆蟲產業融合了文化遺產與尖端科技，為糧食安全、永續發展及健康作出了具體貢獻。該行業的持續成長取決於如何在規模化生產與環境影響之間取得平衡，並滿足不斷變化的消費者偏好。韓國擁有塑造全球食用昆蟲市場的有利條件，能夠推動永續蛋白質生產的創新，並確保全球糧食體系擁有韌性的未來。

關鍵詞：自動化、人工智慧、循環經濟、永續性、糧食安全。

投稿日期：2025 年 10 月 16 日；接受日期：2025 年 12 月 29 日。

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