International Journal of Sustainable Development and Planning
Vol. 20, No. 7, July, 2025, pp. 3037-3043
Journal homepage: http://iieta.org/journals/ijsdp

Pest Eradication and Environmental Sustainability Dilemma of Malaysia's Palm Oil

Haniff Ahamat*, Yuki Wong

Faculty of Law, National University of Malaysia (UKM), Bangi 43600, Malaysia

Corresponding Author Email: haniff@ukm.edu.my

https://doi.org/10.18280/ijsdp.200728

Received: 17 April 2025
Revised: 30 June 2025
Accepted: 2 July 2025
Available online: 31 July 2025

Keywords:
integrated pest management (IPM), palm oil law, sustainable development, pesticide law

ABSTRACT

This paper explores the complex regulatory landscape surrounding pest eradication in the Malaysian oil palm industry within the environmental context. While oil palm is a significant economic driver, its environmental impacts—deforestation, biodiversity loss, and greenhouse gas emissions—pose sustainability challenges. Pest control, particularly the use of chemical pesticides, further exacerbates these concerns by threatening biodiversity and human health. The paper seeks to (i) identify Malaysian palm oil regulatory framework promoting environment protection, (ii) examine the inclusion of environment issues within pest eradication regime in Malaysia, and (iii) investigate how linking pest eradication with oil palm environment concerns, reduce biasness towards palm oil. It critically assesses Malaysia's regulatory frameworks, including the Environmental Quality Act (EQA) 1974 and the Pesticides Act 1974, in alignment with international commitments which still require fair and unbiased comparison between palm oil and other oil crops. Recommendations are made for strengthening regulatory coordination between environmental laws and agricultural policies to balance economic growth with ecological protection. This study employs a doctrinal legal analysis and limited empirical analysis based on secondary statistical data to review national and international laws, highlighting the need for improved governance and enforcement mechanisms to balance economic interests with environmental sustainability.

1. INTRODUCTION

The oil palm sector in Malaysia serves as a critical driver of the country's GDP, contributing significantly to its economic growth and employment [1]. Palm oil is widely used in various food products, cosmetics, and even chemical products due to its high production efficiency and oil content. In recent decades, the sector has experienced significant growth and transformation, driven by cutting-edge technology and innovation.

But despite its rising stature globally, it has been contended that this advancement has created serious obstacles to environmental sustainability and upset regional ecosystems. The expansion of oil palm plantations has profound environmental impacts, including deforestation, loss of biodiversity, and greenhouse gas emissions, which exacerbate climate change [2, 3]. Oil palm, a vital commodity crop for Malaysia's economy, has been both praised for its contribution to economic growth and criticised for its environmental and social impacts [4]. The oil palm sector in Malaysia has been affected by the reputational threats faced by oil palm on various issues that it has contributed to environmental degradation. The expansion of oil palm plantations in Malaysia has led to significant deforestation, loss of biodiversity, and increased greenhouse gas emissions [5]. Similarly, the monoculture nature of oil palm plantations has resulted in soil degradation and water pollution, further exacerbating environmental concerns [6].

In the World Trade Organization (WTO) dispute between Malaysia and the European Union (EU) concerning the oil palm sector, Malaysia contested the EU's Renewable Energy Directive (RED II). This directive, which aimed to phase out oil palm-based biofuels by 2030, was challenged by Malaysia on the grounds that oil palm production's alleged contributions to deforestation and greenhouse gas emissions through indirect land use change (ILUC) were not adequately supported. Malaysia argued that these regulations were discriminatory and violated international trade agreements [7, 8].

The WTO dispute panel, after deliberation, acknowledged certain procedural deficiencies in the EU's measures, including reliance on outdated data and an arbitrary 10-year limit for ILUC-risk certification. However, the panel largely upheld the EU's measures, deeming them justified under the objective of reducing greenhouse gas emissions. Notably, the panel recognized that the 10-year limit disproportionately affected oil palm compared to other crops like rapeseed and sunflower oil [9]. In response to the ruling, the WTO emphasised the necessity for the EU to adjust its Delegated Act to ensure compliance with international trade standards.

Malaysia interpreted this ruling as a validation of its stance, with Malaysian Minister of Plantation and Commodities, Johari Abdul Ghani, underscoring its significance in safeguarding Malaysia's oil palm industry against

discriminatory trade barriers [8]. The minister highlighted that while Malaysia remains committed to sustainable oil palm production, it also seeks to protect its economic interests and ensure fair treatment in global trade [8]. This ruling has prompted Malaysia to strengthen its advocacy for sustainable practices and seek collaborative solutions to address environmental concerns while promoting the economic benefits of its oil palm industry.

As regards climate change, the issues are not only about the impact of oil palm production on sustainability in general, but a more specific concern of pest eradication in such a context. Banishing pests such as bagworm requires the application of pesticides, commonly herbicides, fungicides, and insecticides. However, these pesticides adversely affect biodiversity and human health, causing threats to sustainability and delayed symptoms in exposed people [10].

Against the backdrops of the above, this paper has the following objectives:

(i) To identify Malaysian palm oil regulatory framework promoting environment protection.
(ii) To examine the inclusion of environment within pest eradication regime in Malaysia.
(iii) To investigate how linking pest eradication with oil palm environment concerns, reduce biasness towards palm oil.

2. METHODOLOGY

This research adopts a mixed-method approach, combining doctrinal legal analysis and empirical data analysis to comprehensively examine the regulatory, environmental, and policy dimensions of pest management in Malaysia's palm oil sector. The methodology is tailored to fulfil the three core objectives above.

1. Doctrinal Legal Analysis

The first component involves a qualitative doctrinal analysis of Malaysian statutes, regulations, policies, and relevant international instruments. The research reviews primary legal sources such as the Malaysian Palm Oil Board (MPOB) Act, Pesticides Act 1974, Environmental Quality Act (EQA) 1974, Plant Quarantine Act 1976, and their subsidiary legislations. Certification schemes such as the Malaysian Sustainable Palm Oil (MSPO) standards and the Roundtable on Sustainable Palm Oil (RSPO) framework are also examined to understand how environmental considerations are operationalised in industry practices.

The documents are evaluated to assess institutional coordination and enforcement mechanisms. The doctrinal approach aims to identify both the strengths and limitations of Malaysia's current legal framework in integrating pest control with environmental sustainability.

2. Limited Empirical Data Analysis

The second component involves comparative empirical analysis using secondary data on "Comparative Scrutiny": The study compares international environmental scrutiny directed at palm oil against other major crops (e.g., soybean, sunflower, rapeseed). It focuses on indicators such as pesticide intensity, land-use change, deforestation impacts, and carbon emissions. Data are sourced from FAOSTAT, IPCC reports, WTO dispute records, and EU sustainability reports to assess whether regulatory or narrative bias exists against palm oil.

3. Integration and Interpretation

The findings from both legal and empirical analyses are synthesised to evaluate whether current pest management practices in Malaysia adequately balance environmental sustainability and agricultural productivity. The research aims to show how enhancing legal coherence and integrating environmental concerns into pest control regimes can help reframe the global narrative surrounding palm oil, reduce regulatory bias, and support SDGs.

3. RESULTS AND DISCUSSION

3.1 Pro-environment oil palm regulation and initiatives in Malaysia

Looking into the regulation of oil palm in Malaysia in general, the MPOB is the first to come to mind. The MPOB is the government agency that serves Malaysia's oil palm industry, aiming to promote and develop the oil palm industry in Malaysia. The authorised person under the MPOB Act 1998 has the power to issue licence, impose cess, governing all research and developing projects on oil palm in Malaysia etc. Among all the authorities granted to the board, the root of ensuring sustainability in oil palm plantation, will be the issuance of licences.

In issuing a licence to the oil palm farmers, different standards had been imposed. The consideration of environmental health is only taken when it refers to the estates that sell oil palm, and the oil palm mills that process oil palm fruit. To issue a licence to develop an estate, the environment aspect has been taken into consideration when a report on Environmental Impact Assessment (EIA) is required. On the other hand, to issue a licence for the commencement of construction of an oil palm mill, the approval from the Department of Environment (DOE) is mandated.

3.1.1 Protecting the environment through Malaysian Sustainable Palm (MSPO) initiatives

In 2013, the government of Malaysia established the Malaysian Palm Oil Certification Council (MPOCC) to independently operate the MSPO certification scheme, as part of its commitment to promoting sustainable practices within the oil palm industry [11]. This certification scheme aims to address environmental, social, and economic concerns associated with oil palm production. It aligns with global sustainability standards and reflects Malaysia's dedication to responsible oil palm production [12]. These standards include criteria for reducing environmental impact, respecting land rights, ensuring fair labor practices, and promoting community engagement [13].

However, it must be noted that the MSPO was introduced to address the issue that RSPO certification was not accessible to "mid-range cultivators" [14], and placed consumer country's interest above producer country's interest [15].

This is despite the fact that in terms governance, environmental and social strengths within the standards promoted by MSPO certification are not "far behind" those of RSPO certification [14]. MSPO, just like RSPO certification revolves around good agricultural practices, sustainable practices concerning environment and social issues [14]. One of the key aspects of MSPO is its coverage. The scheme aims to certify all oil palm operations in Malaysia by 2023 [13]. This ambitious goal underscores Malaysia's commitment to enhancing the sustainability of its oil palm industry. However, challenges persist in achieving widespread adoption and compliance among oil palm producers.

From the environmental aspect, the implementation of the MSPO certification had a profound impact on the oil palm industry in Malaysia. By establishing stringent guidelines and criteria for sustainable oil palm production, the MSPO certification has encouraged producers to adopt more responsible and eco-friendly practices [14].

For instance, one of the most notable effects of MSPO is the reduction in environmental degradation associated with oil palm cultivation. Producers are required to implement measures to protect biodiversity, prevent deforestation, and manage waste more effectively. This has led to a decrease in soil erosion, better water management, and the conservation of natural habitats. By promoting integrated pest management (IPM) and the judicious use of agrochemicals, MSPO helps to minimise the ecological footprint of oil palm plantations. In addition, the MSPO certification has influenced pest management practices in the oil palm industry.

Through Good Agriculture Practices (GAP), which is one of the criteria for MSPO certification, the GAP standard operating procedure shall include the use of IPM techniques [16], which involve using a combination of biological, cultural, physical, and chemical tools to control pest populations in an environmentally and economically sustainable manner.

This approach reduces the reliance on harmful pesticides, minimising their negative impact on the environment and human health. By implementing IPM, producers can manage pests more effectively and sustainably, thereby enhancing the overall health and productivity of oil palm plantations [17].

On the other hand, economically, MSPO certification has helped Malaysian oil palm producers gain access to international markets that demand sustainably produced oil palm. As global consumers become more environmentally conscious, the demand for certified sustainable oil palm has increased. MSPO certification serves as a mark of quality and sustainability, enhancing the competitiveness of Malaysian oil palm on the global stage. By encouraging efficient production practices and reducing costs through sustainable methods, MSPO helps to ensure the long-term viability of the industry [18].

3.1.2 Criticisms of the MSPO

Despite its objectives, MSPO has faced criticism. Critics argue that the standards may not be stringent enough to address all sustainability challenges associated with oil palm production. Issues such as land rights disputes, deforestation, and greenhouse gas emissions continue to challenge the effectiveness of MSPO in achieving comprehensive sustainability goals [19].

Moreover, the enforcement and verification mechanisms of MSPO have been questioned for their adequacy in ensuring compliance. Transparency and accountability in reporting practices remain areas requiring improvement to enhance the credibility and trustworthiness of MSPO-certified products in global markets [19].

While the MSPO certification scheme represents a significant step towards promoting sustainability within Malaysia's oil palm industry, its effectiveness hinges on overcoming implementation challenges and addressing criticisms. Strict enforcement and transparent monitoring mechanisms are essential to strengthen MSPO's role in achieving sustainable oil palm production that aligns with global sustainability goals.

There is a strong nexus between oil palm cultivation and environment issues, including climate change. Climate change, including climate warming, rainfall variations and unpredictability, and rising sea could have negative effect on oil palm cultivation [20]. Decline in rainfalls and hotter climate could further expand population growth of dangerous pests including bagworms [21]. Increase in temperature has significantly shortened the duration of bagworm eggs to hatch, which could multiply bagworm population [22]. The scope of the nexus should not be confined to the impact of climate change on oil palm cultivation but should extend to the contrary that is the impact of oil palm cultivation on the environment. For example, massive utilisations of pesticides in “large-scale crops” have environmental impact in terms of polluting water resources used by indigenous communities in Brazil [23].

Pollution caused by chemical pesticides in oil palm cultivation areas may affect rivers and other watercourses there, hence the need to switch to biological control. Biodiversity can also be an issue as the use of chemical pesticides has been shown to have suppressed beneficial insects such as spiders in Liberia [24]. Therefore, measures to eradicate oil palm pests are susceptible to the application of the laws protecting the environment in Malaysia and elsewhere.

3.2 The inclusion of environment within pest eradication regime in Malaysia

3.2.1 The Environmental Quality Act (EQA) 1974

The EQA 1974 in Malaysia serves as a foundational legislation aimed at safeguarding and improving environmental quality across various sectors, including the oil palm industry. The Act provides the legal framework for the regulation, management, and protection of the environment, encompassing air, water, and land pollution control, as well as EIAs and waste management.

In the context of the oil palm sector, the EQA 1974 plays a crucial role in regulating and mitigating the environmental impacts associated with oil palm production and processing activities [25]. Oil palm cultivation and processing can have significant environmental implications, including deforestation, biodiversity loss, soil erosion, water pollution, and greenhouse gas emissions.

Under the EQA 1974, various regulations, guidelines, and standards are established to address these environmental concerns. For example, the Act empowers the DOE, Malaysia to issue Environmental Quality Orders to regulate and monitor activities that may cause pollution or environmental degradation. These orders may include requirements for obtaining permits, conducting EIAs, and implementing pollution control measures [26].

Additionally, the EQA 1974 provides mechanisms for environmental monitoring, enforcement, and compliance. It authorizes the DOE to conduct inspections, investigations, and audits to ensure that oil palm operations comply with environmental regulations and standards. Non-compliance may result in penalties, fines, or other enforcement actions as stipulated by the Act [27].

Furthermore, the EQA 1974 encourages sustainable practices and pollution prevention through the promotion of cleaner production technologies, waste minimization, and resource efficiency. It also fosters public participation and stakeholder engagement in environmental decision-making processes, allowing for greater transparency and accountability in the management of environmental issues

related to the oil palm sector [27].

There is the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, 1977 which prescribe on how to deal with effluents from premises occupied or used for processing oil palm fruits or oil palm fresh fruit bunches into crude palm oil. Palm oil mills are required to apply for licence from the DOE annually [28]. Pollution needs to be reduced, and there are rules and regulations on the amount allowed with regards to pH, oil and grease, biological oxygen demand (BOD), COD, total solids, suspended solids and total nitrogen, in the effluent discharged as a result of crude palm oil milling [28].

3.2.2 Pest eradication and the EQA 1974

As regard pest eradication in farming communities, there is no specific regulation under the EQA 1974 that disciplines conduct that has adverse effect on the environment including pollution. The Environmental Quality (Clean Air) Regulations 2014 is there but its scope is limited to chemicals emitted to the air resulting from industrial activities, something which are different from oil palm cultivation. However, palm oil processing activities that come after oil palm fruits and bunches harvesting fits into the category of industrial activities. This is also although the main goal of the EQA 1974 is to regulate the release of industrial and chemical pollutants, including pesticides, into the environment in order to prevent harmful impacts on the environment and public health [29].

Furthermore, the word “pollution” is defined by the EQA 1974 as “any direct or indirect alteration of the physical, thermal, chemical, or biological properties of any part of the environment by discharging, emitting, or depositing environmentally hazardous substances, pollutants or wastes so as to affect any beneficial use adversely, to cause a condition which is hazardous or potentially hazardous to public health, safety, or welfare, or to animals, birds, wildlife, fish or aquatic life, or to plants or to cause a contravention of any condition, limitation or restriction to which a licence under this Act is subject”.

Environmental effects such as polluting water resources and the soil from agricultural activities alongside industrial and household activities have been studied. In fact, the hazardous impact of pesticides on the environment and humans has been studied by many [29]. This includes the existence of heavy metal in agro-pesticides that pose danger to both water and soil unless the chemicals can easily be degradable, hence the interest to introduce and use biopesticides in agriculture.

Agrochemicals are the most widely used chemicals in the world, and form the largest chunk of pollutants that contaminate the environment. Therefore, there has been a shift from chemical to biological mechanisms to combat dangerous pests in Malaysian oil palm cultivated as evidenced by the importance placed on IPM there.

Pesticide law, which is vital to IPM implementation in Malaysia, is also part of the legal framework to protect the environment and human arising from the use of pesticides by farmers that can contribute to pollution [29].

3.2.3 Consideration of the environment in Malaysian pesticide law

The Pesticides Act of 1974 in Malaysia holds significant sway over the operations and economics of the oil palm industry, dictating the parameters for pesticide usage within this vital sector. Enacted to regulate the sale, distribution, and application of pesticides nationwide, this legislation ensures that oil palm growers adhere to stringent safety and environmental standards in pest management practices [29].

Compliance with pesticide law mandates the utilization of approved pesticides that meet established criteria for efficacy and safety, safeguarding both human health and the delicate balance of biodiversity within oil palm plantations [30].

While ensuring compliance incurs costs associated with pesticide registration, licensing, and adherence to regulatory frameworks, the Pesticides Act 1974 serves as an indispensable investment in maintaining oil palm productivity and yield. Effective pest control is paramount for sustaining oil palm yields, which directly influences the economic stability and profitability of the industry. Moreover, adherence to pesticide regulations is essential for preserving access to international markets, where stringent pesticide residue standards govern trade and export revenues [31].

The question now is how far the Pesticides Act 1974 gives prominence to environmental protection. Regulation of pesticides at international and domestic levels draws from the need to classify, register and prescribe the manner in which pesticides are used, so as to address their hazards on human health and the environment.

The goal of pesticide registration which is provided by the Guidelines on Registration of Pesticides issued by Malaysia’s Pesticide Board in pursuant to the Pesticides Act 1974 clearly addresses the impact on environment alongside human. It states that such registration is to guarantee that pesticides that are sold in the nation are high-quality, suitable for the purposes for which they are designed, and won't have unacceptably negative impacts on man or the environment [29, 32].

As part of data requirements for proprietary and commodity pesticides according to general use pattern, a specific chapter prescribes specific parameters on the “fate and behaviour in the environment” [32].

The functioning of the Pesticides Board is impacted by environmental governance and regulation since one of the members of the Board has to be the Director General of Environmental Quality alongside the Director General of the Malaysian Palm Oil Board [33]. Apart from control via registration, there is also control via licensing where pesticide manufacturing, sale and storage requires licensing [33].

3.3 Oil palm pest management as a mechanism to reduce international biasness towards palm oil

In striving to align with the SDGs, Malaysia's oil palm sector faces a complex landscape of challenges and opportunities.

The environmental onslaughts on palm oil in the context of international trade do not very much revolve around measures to tackle pollution but on biodiversity conservation measures of slowing down changes of land use in forests. However regulatory focus concerning environmental issues such as climate change and biodiversity conservation should not antagonise palm oil without clear and holistic scientific proof.

The data in Table 1 below was obtained in 2023 but was reviewed in 2025 [34]. Palm oil often gets blamed, but the data show that it is actually the most efficient oil crop. It gives the highest yield using the least land, and needs less pesticide and fertiliser than soy, sunflower, or rapeseed. As land-hungry oil crops like soy and sunflower expand, a move away from palm oil may put further strain on delicate ecosystems in Latin America, sub-Saharan Africa, and Eastern Europe [34, 35]. Due to the lower yields of substitute crops, replacing palm oil

with them may increase greenhouse gas emissions and degrade the soil [36]. The net biodiversity loss could be greater if palm oil is replaced by other vegetable oils [37].

3.3.1 Oil palm pest management should also be part of sustainability measures

Table 1 shows the land use efficiency of oil palm, so much so that oil palm records lower contribution to GHG emissions although a study by the EU has shown the contrary if oil palm is cultivated on peatlands [38]. The WTO palm oil case brought by Malaysia against the EU gave a positive response to the EU biofuel measures against GHG emissions under the GATT and TBT agreements but that will be at the expense of transparency and scientific justification [39]. This is somewhat wanting in the context of this paper since not all oil palm trees in Malaysia are planted on peatlands. What is more telling is that palm oil demands much lower use of pesticides compared to other oil crops (oil palm - 10%, soybean - 36%, sunflower - 25%, rapeseed - 29%).

Oil palm is not among the top crops that push up demand for pesticides worldwide, instead the crops are oilseed crops like soybeans, cereals like wheat, corn, maize and rice, and cash crops like cotton [40]. In another writing, it is reported that approximately 66% of all pesticides used globally are used on the following crops, namely sugarcane, corn, soybeans, and citrus [40].

Developed countries were leaders in chemical pesticides production and in terms of revenue share, Europe held over 18.7% of the worldwide pesticide market in 2022 [40]. In terms of consumption, after Brazil, the US is the second-biggest user of crop protection chemicals. China used an average of 2.0 kg of pesticides per hectare of agricultural in 2020, which is less than the US average of 2.5 kg/hectare of cropland, according to FAO statistics [40]. Compared to the US, Brazil, and China, India uses a remarkably lower amount of pesticides per acre [40].

It is important that the IPM strategy backed by the plant quarantine measures inform the relevant domestic laws and the international legal order for the environment which should protect ecosystems, biodiversity, and natural resources while balancing economic, social, and environmental concerns.

The regulatory framework should address the impact of pesticides on the environment. As discussed above, in Malaysia, the function is performed by Malaysian pesticide law and regulation, and IPM. They are the main framework for crop protection including for oil palm plants, and part of the world-wide movement to reduce the use and risk of chemical pesticides. For example, the EC Farm to Fork Strategy requires the use and risk of chemical pesticides be reduced by 50% by 2030 [40], and 50% reduction in the use of more hazardous pesticides by the same year [41].

Malaysia has been a party to the International Plant Protection Convention (IPPC) since 17 May 1991 [42]. The IPPC is a global treaty aimed at safeguarding plant health and preventing the spread of pests and diseases that threaten agriculture. As a member country, Malaysia commits to implementing stringent phytosanitary measures to protect its agricultural crops, including the important oil palm sector. These measures include quarantine protocols, pest risk assessments, and surveillance systems designed to monitor and manage potential threats effectively [42].

In alignment with the IPPC, Malaysia has enacted several laws and regulations to support its phytosanitary efforts. The Plant Quarantine Act 1976 and the Plant Protection Act 1974 serve as the primary legislative frameworks governing plant health and biosecurity in Malaysia [43]. These laws empower authorities to enforce quarantine measures, conduct inspections, and impose sanctions on non-compliant entities to uphold international phytosanitary standards.

Table 1. Comparing environment-related scrutiny on palm oil and other oil crops [34]

Performance Factors	Palm Oil	Soybean Oil	Sunflower Oil	Rapeseed Oil
Metric Annual Oil Production (Mt)	90	68	21	27
Land Use Share (Mha)	29	130	26	37
Oil Yield (t/ha)	3–6 (potential up to 10)	0.5	0.8	0.7
Water Footprint (m^3/t oil)	5000	4200	6800	4300
GHG Emissions Index (LCA t CO_2-eq/t)	2.37 (on mineral soils)	1.2–47.5 (high variability)	~3.0	3.14
Agroforestry Potential	Moderate to High	Low	Low	Low
Pesticide Use (kg/ha)	~2.1	~7.5	~5.3	~6.2
Fertilizer Requirement	Medium (≈55 kg/t)	High (≈272 kg/t)	High (≈468 kg/t)	High (≈508 kg/t)
Climate Risk (Yield Impact)	Low	Low-Mid	High (−5–20% by 2030)	Moderate (−25–42%)

4. CONCLUSION

In conclusion, the oil palm industry's regulatory framework in Malaysia, particularly concerning pest eradication, reveals a significant role of addressing environmental sustainability alongside public health risks. The existing laws such as the EQA 1974 and the Pesticides Act 1974 provide some mechanisms for the consideration environmental protection, which requires coordination with the environment agency. This is to ensure the use of pesticides does not continue to pose serious threats to biodiversity and ecosystems. The paper highlights the need for stronger governance, emphasizing the adoption of IPM and biological control as sustainable alternatives.

Furthermore, the coordination between environmental and agricultural policies requires enhancement to ensure compliance with both national objectives and international commitments, including the Paris Agreement and the SDGs. The MSPO certification, while a step forward, needs more stringent enforcement and transparency to gain broader acceptance and address sustainability challenges comprehensively. Strengthening the legal and regulatory framework is essential to align Malaysia's economic interests with long-term environmental goals, ensuring that oil palm production contributes to both economic growth and ecological sustainability in the face of climate change.

Pest management can be connected to global environmental issues including climate change. To make such connections, both positive and negative effects of palm oil have to be compared with those of other oil crops such as soy, sunflower and rapeseed. This is to prevent environmental causes being used to mask protectionism. There has to be coordination between environmental laws and oil palm related agricultural policies on production and consumption, based on what is reasonable and practical. Only with this approach which has to be scientific and objective, the importance of regulatory reform and the role of governance in shaping sustainable agricultural practices, can balance economic prosperity with environmental stewardship.

ACKNOWLEDGMENT

This paper is supported by the Universiti Kebangsaan Malaysia (UKM) Research University Grant (Geran Universiti Penyelidikan (GUP)) Project titled `Legal Framework for Oil Palm Bagworm Eradication Regulation in Malaysia', Project Code: GUP-2022-062.

REFERENCES

[1] Basiron, Y. (2007). Palm oil production through sustainable plantations. European Journal of Lipid Science and Technology, 109(4): 289-295. https://doi.org/10.1002/ejlt.200600223

[2] Carlson, K.M., Curran, L.M., Asner, G.P., Pittman, A.M.D., Trigg, S.N., Marion Adeney, J. (2013). Carbon emissions from forest conversion by Kalimantan oil palm plantations. Nature Climate Change, 3(3): 283-287. https://doi.org/10.1038/nclimate1702

[3] Koh, L.P., Wilcove, D.S. (2008). Is oil palm agriculture really destroying tropical biodiversity? Conservation Letters, 1(2): 60-64. https://doi.org/10.1111/j.1755-263x.2008.00011.x

[4] Ahmad, M.J., Ismail, R., Ghani, F.A. (2023). Review on socioeconomic and sustainability of oil palm plantations among rural communities in Malaysia. IOP Conference Series: Earth and Environmental Science, 1208(1): 012054. https://doi.org/10.1088/1755-1315/1208/1/012054

[5] Tan, X.Y. (2019). Kok to propose expansion cap on Malaysian oil palm estates at 6.5 mil ha by 2023. The Edge Markets. https://www.theedgemarkets.com/article/kok-propose-expansion-cap-msianoil-palm-estates-65-mil-ha-2023.

[6] Saediman, H., Mboe, I.S., Zani, M., Daud, L., Padangaran, A.M. (2021). Perceived impact of oil palm plantation on agriculture and environment. IOP Conference Series: Earth and Environmental Science, 810(1): 012027. https://doi.org/10.1088/1755-1315/810/1/012027

[7] Jong, H.N. (2023). Indonesia, Malaysia cry 'discrimination' in lobbying against EU palm oil restrictions. 29 May. Eco-Business.

[8] The Star. (2024). Johari: WTO rules EU's delegated act discriminatory against Malaysia. TheStar. https://www.thestar.com.my/business/business-news/2024/03/07/johari-wto-rules-eus-delegated-act-discriminatory-against-malaysia.

[9] Reuters. (2024). WTO backs EU in deforestation case against Malaysia. Reuters, 6 March.

[10] Hillocks, R.J. (2012). Farming with fewer pesticides: EU pesticide review and resulting challenges for UK agriculture. Crop Protection, 31(1): 85-93. https://doi.org/10.1016/j.cropro.2011.08.008

[11] Kumaran, S. (2019). The dynamics for mandatory MSPO certification scheme to be successfully implemented. Journal of Oil Palm, Environment & Health, 10: 1-7. https://doi.org/10.5366/jope.2019.01

[12] MSPO. MS 2530: 2013. https://mspo.org.my/ms25302013, accessed on Oct. 17, 2024.

[13] MPOCC. (2023). MSPO Certification Scheme Document.

[14] Rahmat, S.R., Mat Yasin, S., Mad' Atari, M.F., Tayeb, A. (2021). Seeking for sustainability: Actor's perspective on the Malaysian Sustainable Palm Oil Certification Scheme (MSPO). Malaysian Journal of Society and Space, 17(2): 65-78. https://doi.org/10.17576/geo-2021-1702-06

[15] Labansing, S.A., Sulong, R.S., Idris, S. (2021). Sustainable certification in the Malaysian palm oil industry. Asian Journal of Research in Business and Management, 3(2): 119-131.

[16] Mansor, N.H., Che Jaafar, N., Johari, M.A., Kannan, P., Tan, S.P. (2021). Acceptance of Good Agricultural Practices (GAP) among independent oil palm smallholders in Malaysia. International Journal of Modern Trends in Social Sciences, 4(16): 1-12. https://doi.org/10.35631/ijmtss.416001

[17] Purnama, I., Syafrani, S., Mutamima, A., Saputra, R., Nasution, N., Amalia, A. (2024). Improving edible oilseed (oil palm) health and productivity: Integration of sustainable pest management, precision farming, and stakeholder collaboration. Food Science and Nutrition. https://doi.org/10.5772/intechopen.114936

[18] Lim, F.C.W., Sharifuddin, J., Sinden, A. (2023). Impact of MSPO certification on profit among palm oil growers in Malaysia. The Planter, 99(1173): 789-804. https://doi.org/10.56333/tp.2023.030

[19] Higgins, V., Richards, C. (2019). Framing sustainability: Alternative standards schemes for sustainable palm oil and South-South trade. Journal of Rural Studies, 65: 126-134. https://doi.org/10.1016/j.jrurstud.2018.11.001

[20] Abubakar, A., Ishak, M.Y., Makmom, A.A. (2022). Nexus between climate change and oil palm production in Malaysia: A review. Environmental Monitoring and Assessment, 194(4): 262. https://doi.org/10.1007/s10661-022-09915-8

[21] Napiah, N.R.A.M.A., Kamarudin, N., Bakeri, S.A., Zainuddin, N., Keni, M.F., Masri, M.M.M. (2023). Impact of environmental factors on the larval population of bagworm, metisa plana walker (lepidoptera: Psychidae) in oil palm smallholdings. Serangga, 28(2): 149-161.

[22] Enting, C.E., Latip, S.N.H.M. (2021). Life cycle of oil palm bagworm, Metisa plana walker (Lepidoptera: Psychidae) at different temperatures under controlled environment. Serangga, 26(2): 151-165.

[23] Damiani, S., Leite Montalvão, M.T., de Alcântara Mendes, R., Gomes da Costa, A.C., Sousa Passos, C.J. (2023). Water and sediment pesticide contamination on indigenous lands surrounded by oil palm plantations in

the Brazilian Amazon. Heliyon, 9(10): e19920. https://doi.org/10.1016/j.heliyon.2023.e19920
[24] Pashkevich, M.D., Pett, B.L., Marshall, C.A.M., Caliman, J.P., Freeman, B., Guahn, M.M., Hadfield, P.M., Hendren, M.T., Jah, M.T., Jones, T., Saputra, A., Widodo, R.H., Turner, E.C. (2024). Conversion of rainforest to both traditional and industrial oil palm systems changes the biodiversity, web-building, and prey capture of understory spiders (Liberia, West Africa). Agriculture, Ecosystems and Environment, 373: 109102. https://doi.org/10.1016/j.agee.2024.109102
[25] Shehu, S., Salleh, M.A. (2020). Contributing factors to Malaysian sustainability on palm oil. Asian People Journal (APJ), 3(1): 110-121. https://doi.org/10.37231/apj.2020.3.1.165
[26] Mustafa, M. (2011). The environmental quality act 1974: A significant legal instrument for implementing environmental policy directives of Malaysia. IIUM Law Journal, 19(1).
[27] Department of Environment, Ministry of Natural Resources and Environment Malaysia. 2016. The Role of Department of Environment in Mitigating Climate Change.
[28] Begum, H., Alam, A.S.A.F., Er, A.C., Ghani, A.B.A. (2019). Environmental sustainability practices among palm oil millers. Clean Technologies and Environmental Policy, 21(10): 1979-1991. https://doi.org/10.1007/s10098-019-01744-7
[29] Abdul Rahman, H. (2021). Application of pesticides act 1974 in protecting community and environment health in Malaysia from the exposure of pesticides. International Journal of Academic Research in Business and Social Sciences, 11(185): 144-153. https://doi.org/10.6007/ijarbss/v11-i15/10641
[30] Peprah, M.A. (2019). Analysis of occupational health, safety and environmental management practices at the Twifo Oil Palm Plantations. Doctoral Thesis, University of Cape Coast.
[31] Kubiak-Hardiman, P., Haughey, S.A., Meneely, J., Miller, S., Banerjee, K., Elliott, C.T. (2023). Identifying gaps and challenges in global pesticide legislation that impact the protection of consumer health: Rice as a case study. Exposure and Health, 15(3): 597-618. https://doi.org/10.1007/s12403-022-00508-x
[32] Guidelines on Registration of Pesticides. (2005). https://irp.cdn-website.com/18f14595/files/uploaded/MAFI_DOA_GP_ON_REGISTRATION_OF_PESTICIDES.pdf.
[33] Pesticides Act 1974. http://reg.upm.edu.my/eISO/portal/softcopy_rujukan_luar/Akta%20149%20Teks-PESTICIDES%20ACT%201974.pdf.
[34] Murphy, D.J. (2025). Agronomy and environmental sustainability of the four major global vegetable oil crops: Oil palm, soybean, rapeseed, and sunflower. Agronomy, 15(6): 1465. https://doi.org/10.3390/agronomy15061465
[35] Alcock, T.D., Salt, D.E., Wilson, P., Ramsden, S.J. (2022). More sustainable vegetable oil: Balancing productivity with carbon storage opportunities. Science of the Total Environment, 829: 154539. https://doi.org/10.1016/j.scitotenv.2022.154539
[36] Chiriacò, M.V., Galli, N., Santini, M., Rulli, M.C. (2024). Deforestation and greenhouse gas emissions could arise when replacing palm oil with other vegetable oils. Science of the Total Environment, 914: 169486. https://doi.org/10.1016/j.scitotenv.2023.169486
[37] Meijaard, E., Garcia-Ulloa, Sheil, J., Carlson, S.A., Juffe-Bignoli, D., Brooks, T.M. (2018). Oil palm and biodiversity: A situation analysis by the IUCN Oil Palm Task Force. In IUCN Oil Palm Task Force. International Union for Conservation of Nature and Natural Resources (IUCN). https://doi.org/10.2305/IUCN.CH.2018.11.en
[38] Bourguignon, D. (2015). EU biofuels policy: Dealing with impacts of indirect land use change. In European Parliament Briefing (February 2015). European Parliamentary Research Service.
[39] Lee, H. (2024). A Change in the WTO Position on the Relationship Between Trade and Environment-Recognition of General Exceptions in WTO Disputes. Seoul National University.
[40] Sharma, S. (2023). Global agrochemicals short-term growth opportunities—2027: Geopolitical Conditions and the growing adoption of sustainable farming practices will continue to pressurize growth. In Frost & Sullivan.
[41] Silva, V., Yang, X., Fleskens, L., Ritsema, C.J., Geissen, V. (2022). Environmental and human health at risk – Scenarios to achieve the farm to fork 50% pesticide reduction goals. Environment International, 165: 107296. https://doi.org/10.1016/j.envint.2022.107296
[42] FAO. (2019). International Plant Protection Convention. https://www.fao.org/fileadmin/user_upload/legal/docs/004s-e.pdf.
[43] Asna, B.O., Ho, H.L. (2005). Managing invasive species: The threat to oil-palm and rubber – the Malaysian plant quarantine regulatory perspective. In The Unwelcome Guests: Proceedings of the Asia-Pacific Forest Invasive Species Conference. Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Pacific, p. 160.