

# The Sustainability Of Agricultural Activities Meets The Welfare Indicators Of Sustainable Development Goals 13 (Sdg 13): Systematic Literature Review

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## Abstract

Agriculture is a crucial economic sector for food production. Uncontrolled and poorly planned agricultural activities can contribute to significant climate change. Therefore, this study aims to identify sustainable farming practices that align with the Sustainable Development Goal (SDG) 13, which focuses on reducing the impact of climate change and greenhouse gas emissions. The research findings indicate that sustainable agricultural practices such as the use of organic fertilizers, recycling materials, and renewable energy can mitigate climate change. Additionally, research and development efforts related to seeds, irrigation systems, and soil can enhance crop resilience to climate change. The National Transformation Program (2013-2025) has recognized the importance of sustainable development and has incorporated it into its policies and strategies. Hence, further research on how to incorporate sustainable development goals into educational curricula is essential.

**Keywords:** Agriculture, Sustainable agriculture, Sustainable Development Goals, SDG 13 Malaysian Education Development Plan

## Introduction

Sustainability in agricultural activities is a very important factor for the preservation of the environment. The preservation and conservation of the environment for the sector can be done by being guided by the goals of sustainable development. This sustainable agriculture refers to agricultural practices that are carried out without destroying the environment by reducing its negative effects (Myszograj & Płuciennik-Koropczuk, 2022). According to Shelef et al. (2018), sustainable agriculture refers to agricultural activities that require good management of land and natural resources. In addition, this sustainable agricultural activity also requires cooperation between the local community and the farmers in ensuring that the agricultural activities are carried out without polluting the environment. Meanwhile, Sustainable Development Goal 13 (SDG 13) refers to Actions taken to mitigate the effects of climate change leading to reducing greenhouse gas emissions (Filho et al., 2023; McNeill, 2019). Thus, this systematic literature review was conducted to see the sustainability of

agricultural activities that can meet the requirements of SDG 13. In addition, this study was also conducted to look at the factors that cause climate change from the agricultural sector and the steps that can be taken to meet the goals of SDG 13. Climate change in recent times had a significant impact on agricultural activities. The SDG 13 goal introduced in The 2023 Agenda for Sustainable Development serves as a guide in helping the economic sector (Arora-Jonsson, 2023; Mortimer et al., 2023). According to Arora-Jonsson (2023) the goal of SDG 13 was created to reduce the current effects of climate change. However, to what extent can this agricultural activity achieve the sustainable development goals.

### **Issues Of Agricultural Activities**

The agricultural sector is one of the most important economic activities for economic development and human life. Nevertheless, the effects of climate change such as rising temperatures, lack of water supply and other natural disasters greatly affect agricultural activities (McNeill, 2019). In the study of Rama Rao et al. (2022), the climate change that occurred had a significant impact on the production of agricultural products and food supply. Therefore, in order to meet these sustainable development goals, farmers must adapt their agricultural activities to the climate change. The adaptation of agricultural activities to climate change requires farmers to take into account several factors in order to help them find suitable methods or measures to carry out their agricultural activities (Praveen & Sharma, 2020).

Nazu et al. (2021) said that there are several factors that influence the sustainability of agricultural activities in achieving the goals of the SDG 13. Among them are environmental factors such as weather and soil conditions that greatly affect agricultural yields (Thomson et al., 2017). In addition, social factors that look at the ability of the community and farmers to understand the facts regarding sustainable agriculture. Next, economic factors are also taken into account such as the cost of production and the selling price of agricultural products in helping farmers to increase their production and income from the economic activities (Ramanauskas et al., 2021; Sulewski et al., 2018; Thomson et al., 2017).

### **Strategic And Intensive Issues In Agriculture**

Appropriate strategies and initiatives in agricultural activities should be taken into account. These planned strategies and initiatives are necessary to ensure that the SDG 13 development goals are achieved. The ability of farmers in adapting their agricultural activities to climate change can be carried out through training and technical assistance. In addition, stakeholders also need to carry out their responsibilities to help promote sustainable agriculture and the use of green technology such as increasing the use of organic fertilizers. Farmers should also be provided with assistance in improving their access to markets and sales of sustainable agricultural products (Ramanauskas et al., 2021).

Farooq & Pisante (2019) say that agriculture is one of the most important economic activities. Innovations have been made in this economic activity. Reyes Yanes et al. (2022) and (Nazu et al., 2021) say that technology in agriculture is one of the keys that ensure the activity continues to grow. However, technology is one of the innovations that need to be taken into account in helping to make sustainable agriculture a success. The study (Yue et al., 2021) says that green technology is a technology that can help reduce greenhouse gas emissions into the air. Green technologies such as the use of organic fertilizers and efficient irrigation systems help to increase agricultural yields (Kwon et al., 2021). In addition, the exposure of digital technology skills to farmers can also assist farmers in more efficient management of

agricultural systems. The exposure of this technology should be expanded to increase the awareness and understanding of farmers on the importance of sustainable agriculture. The community needs to understand that this sustainable agriculture can help reduce the negative effects of climate change and increase agricultural yields (Rama Rao et al., 2022b). Such awareness can be increased through educational programmes as well as environmental awareness campaigns.

Although there is a lot of research that has been done on sustainable agriculture and sustainable development goals, there are still deficiencies that need to be met in identifying agricultural activities that can meet the sustainable development goals of SDG 13. The previous studies were still focusing on the new technologies and environmentally friendly agricultural practices but less focus on agricultural activities that can help a country in achieving the development goals. Therefore, this study was conducted to provide additional information on sustainable agricultural activities that can be practiced to help farmers understand its importance as well as enabling the goals of SDG 13 to be achieved. In addition, the information obtained is expected to assist in planning future programs and additional initiatives that are more effective in promoting sustainable agriculture and the goals of SDG 13.

In conducting this literature review, the discrepancy that can be seen in implementing traditional literature is that traditional methods are likely to have incomplete and up-to-date resources. This traditional literature review cannot provide details on the strategy, selection and also the reasons for the exclusion of a selected article. In addition, this literature review also does not provide complete information regarding the quality and method of searching for selected articles more systematically (Snyder, 2019). This traditional literature mostly uses different languages and is not easy to understand. The use of systematic literature is a more systematic and comprehensive research method involving the process of collecting, evaluating and synthesizing the research material obtained (Xiao & Watson, 2019). The systematic literature also provides an opportunity for researchers to assess the quality of the studies and synthesize the results more systematically, especially with regard to sustainable agriculture and sustainable development goals (Kitchenham & Charters, 2007).

The difference between these systematic literature reviews and others is that this study is more focused on researching agricultural practices that can help achieve the goals of SDG 13. This focused agricultural practice can help reduce the problem of greenhouse gas emissions, reduce the use of chemical fertilizers and use green technology (Kwon et al., 2021). In addition, these agricultural practices need to preserve biodiversity, reduce pollution problems and increase the use of renewable resources in addition to looking at the effectiveness of agriculture in achieving the goals of SDG 2, SDG 3 and SDG 15 (Hamidov et al., 2018). This study was conducted by focusing on agricultural activities carried out in Malaysia based on agricultural activities that have been carried out in other countries.

### **Research Objective**

Agricultural activities are among the economic activities that can support the sustainable development goals of SDG 13 (Action on climate change). More sustainable agricultural practices are seen to be able to reduce greenhouse gas emissions. Therefore, this study has listed the objectives of this study to see how far this agricultural activity can meet the sustainable development goals of SDG 13. The following are the research objectives:

1. Researching sustainable agricultural practices that help achieve the goals of SDG.
2. Exploring approaches and methods that can be used to support sustainable

agricultural practices and the goals of SDG 13

- Identifying challenges in integrating sustainable agricultural practices in the educational curriculum.

### Research Question

The following is the research questions that have been formed based on the systematic literature review on the sustainability of agricultural activities in meeting the well-being indicators of sustainable development goals 13 (SDG 13)

- What are the sustainable agricultural practices that contribute to the achievement of sustainable development goals SDB13?
- What are the approaches and methods that can be used to support sustainable agricultural practices and the goals of SDG 13?
- What are the challenges in integrating sustainable agricultural practices in the educational curriculum?

### Research Method

The purpose of this systematic literature review can be achieved using the PRISMA protocol. This PRISMA protocol is used for the purpose of assisting in the selection of high quality articles that are relevant to the topic and research question that have been proposed. In addition, this protocol also facilitates the analysis process by looking at various research results from different perspectives of researchers. This study has selected 43 articles as shown in the PRISMA 1 flowchart. The 43 articles will be selected to be analyzed for this systematic literature review.

### Identifying articles

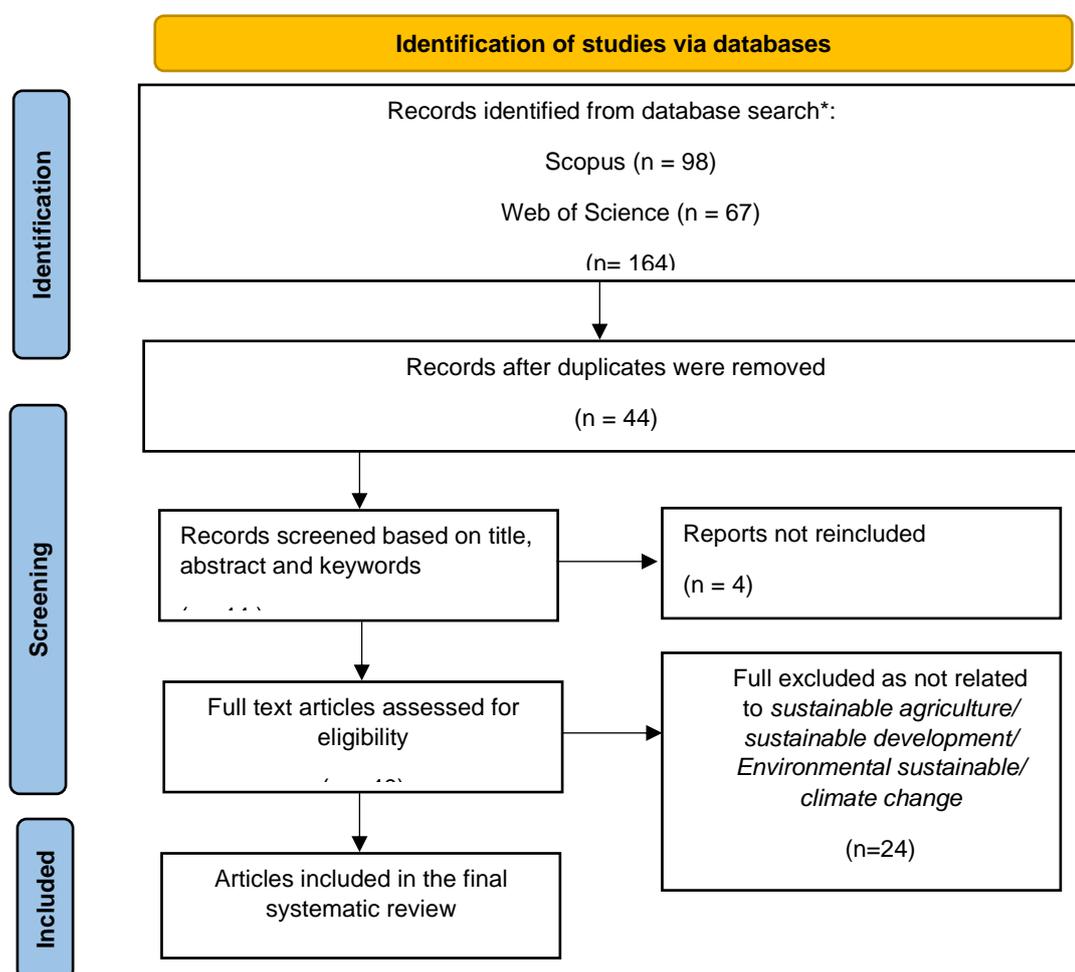
Searching and identifying articles is the first step in PRISMA guidelines. WoS and Scopus databases have been selected to perform article searches. The search for this article is identified by using search keywords, namely Sustainable agriculture and Sustainable development. In addition, words that are synonymous with keywords are also used to expand searches. Among these keywords are Environmental Sustainability and Climate Change. The article search steps have been presented in the form of a table as in Table 1 below.

Table 1.0:

#### Search String

Database	Search String
Scopus	<p>1: TITLE-ABS-KEY((((<i>"sustainable agriculture"</i> OR <i>"Agriculture practices"</i>) AND (<i>"sustainable development goals"</i> OR <i>"SDG13"</i>) AND (<i>"Environmental sustainability"</i> OR <i>"climate change"</i>))))</p> <p>2: TITLE-ABS-KEY((((<i>"sustainable agriculture"</i> OR <i>"Agriculture practices"</i>) AND (<i>"sustainable development goals"</i> OR <i>"SDG13"</i>) AND (<i>"Environmental sustainability"</i> OR <i>"climate change"</i>)))) AND (LIMIT TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018)) AND (LIMIT-TO (DOCTYPE, <i>"ar"</i>)) AND (LIMIT-TO (SUBJAREA, <i>"ENVI"</i>) OR LIMIT-TO (SUBJAREA, <i>"AGRI"</i>) OR LIMIT-TO (SUBJAREA, <i>"SOCI"</i>))</p>
Web of Science (Wos)	1: (( <i>"sustainable agriculture"</i> OR <i>"Agriculture practices"</i> ) AND ( <i>"sustainable development goals"</i> OR <i>"SDG13"</i> ) AND ( <i>"Environmental sustainability"</i> OR <i>"climate change"</i> ))

Figure 1.0: PRISMA Flow Chart



This study has searched and selected articles using Scopus and Web of Science (WoS) databases. The search through the database is believed to contain quality articles and has gone through several evaluation processes. The articles obtained through the search will go through several screening processes based on the research question that have been proposed. The selected article will be used as an analysis material in this study.

The PRISMA protocol requires three phased of article search, namely identifying articles, article filtering processes and the process of determining whether the article is eligible to be accepted or not.

### Filtering Phase

The search continues by placing the title using the selected keyword. A total of 164 articles was obtained from the search through the two databases. The number of articles has been reduced by focusing on the study years between 2018 and 2022. As a result of the search, 121 articles have been released, bringing the total number of articles to 43. Articles filtering have been continued again by focusing on keywords that are synonymous with the previous keywords. In addition, this filter also focuses on the title and abstract of each article. Only articles related to Sustainable Agriculture and Sustainable development were selected as the

next study material. As a result of the search, 43 articles have been selected (121 articles have been excluded from the search). The 43 articles have been re-screened based on the criteria and guidelines contained in the PRISMA protocol found in Table 2.0.

Table 2.0:  
Inclusion and exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Articles from 2018 to 2022	Articles that are not within the desired year
Articles that have a large number of readings	Books, reports and proceedings books
Articles that have been written in English related to the topic of sustainable agriculture and sustainable development	Articles that use languages other than English and are not related to the topic of sustainable agriculture and sustainable development

After that, the 43 articles were re-filtered based on the criteria that had been set based on the title and abstract. As a result of the screening, 15 articles were selected as research materials and 24 articles were removed.

### Selection Phase

As a result of the screening, 15 articles were selected from the Scopus and WoS databases. The screening was made focusing on Sustainable Agriculture and Sustainable development. In addition, the search is also carried out by searching based on synonymous words such as environmental sustainability and Climate change. The selected article was carefully read to see the results of the study and analysis done by the researchers. The results and findings of the researchers of each article have been summarized for the purpose of analysis in relation to the title and research question as in Table 3.

Table 3.0:  
Summary table of articles

Author	Databases	Research focus	Methodology	Research findings
Mamabolo et al., 2020	Scopus	The importance of conservation of soil biodiversity functions and sustainable agriculture.	Survey research	Studies show a reduction in the use of insecticides and chemical fertilizers to prevent contamination and loss of soil biological diversity.
Streimikis & Baležentis, 2020	Scopus	Analyse the implementation of a sustainable development approach used in agricultural activities.	Survey research	The results of this study state that indicators of sustainable agriculture across EU Member States are considering policies related to climate change and rural development.
Mottet et al., 2020	Scopus	Form a tool used to gather information to	Action research	Research results show that this tool is used as an

		understand agricultural ecology.		R&D program in sustainable agriculture.
Kwon et al., 2021	Scopus	Analyse the main factors of greenhouse gas emissions from agriculture.	Action research	The results of the study show that the use of Nitrogen fertilizer contributes to the emission of nitrous oxide, which is a greenhouse gas.
Qian et al., 2022	Scopus	Evaluate the efforts of the Pepsi Company to reduce carbon emissions.	Case studies	The results of the study found that the Pepsi Company increased training and R&D in reducing carbon emissions.
Setsoafia et al., 2022	Scopus	Factors influencing agricultural practices in Ghana.	Survey research	The study found that Sustainable Agricultural Practices are influenced by social demographics, site characteristics, expansion services, and location.
Rama Rao et al., 2022	Scopus	Analyse the effects of climate change using climate projects.	Case studies	The results of the study show that agricultural technology plays an important role in the effects of climate change.
Hamidov et al., 2018	Scopus	Study the effects of soil pollution in agriculture in line with SDGs.	Case studies	The study shows that there is potential to improve the Sustainable Development Goals SDG 2 and SDG 3.
Sarkar et al., 2020	Scopus	Assess the role of Low input sustainable agriculture (LISA).	Survey research	Studies show that LISA helps reduce the use of chemical fertilizers.
Begum et al., 2022	Scopus	Review usage Estimate Carbon in Organic Soils-Sequestration and Emissions (ECOSSE).	Survey research	The use of the ECOSSE model can look at carbon changes in land management.
Sethuraman et al., 2021	WoS	Examine the	Case studies	Studies show

		agroecological approaches to achieving the SDGs.		agroecology can help increase sustainable food production.
Amadu et al., 2021	Scopus	Examine the role of the Climate Resilient Agriculture (CRA).	Case studies	The study results show that CRA can increase crop yields and soil fertility in South Malawi in line with SDG 13.
Bijarniya et al., 2020	Scopus	Examine the effect of use Climate Smart Agriculture (CSA).	Case studies	Studies show that the CSA can improve productivity, water supply and energy.
Batalini de Macedo et al., 2022	Wos	Research the potential of Low Impact Development (LID) practice.	Survey research	The results of the study show that LID can reduce initial runoff and improve water quality.
Jahan et al., 2022	Scopus	Examine factors affecting agroforestry.	Survey research	Studies show support from the government and skills training are main factors.
Rosegrant et al., 2022	Scopus	A study of agricultural R&D expenditure.	Survey research	Studies show that technological innovation records high expenses.

### Research Findings

Sustainable agriculture is essential for the supply of quality food and environmental preservation. Agricultural activities should consider various factors to achieve the goal of sustainable agriculture in the context of the agricultural economy (Qian et al., 2022). Sustainable development goals and SDG 13 emphasize the importance of reducing the impacts of climate change and increasing resilience to disasters caused by climate change (Filho et al., 2023). Based on careful reading and analysis, 16 articles were selected to understand the author's point of view, research results, and survey analysis. Most of the articles provide information on sustainable agricultural practices (Mamabolo et al., 2020; Qian et al., 2022; Setsoafia et al., 2022; Streimikis & Baležentis, 2020) and the approaches and technologies used in implementing sustainable agriculture (Amadu et al., 2021; Begum et al., 2022; Bijarniya et al., 2020; Kwon et al., 2021b; Mottet et al., 2020; Rama Rao et al., 2022c; Sarkar et al., 2020; Sethuraman et al., 2021). In addition, the article also discusses factors and challenges in the integration of sustainable agricultural practices in achieving the sustainable development goals of SDG 13 (Amadu et al., 2021; Mottet et al., 2020; Nazu et al., 2021; Setsoafia et al., 2022).

Studies demonstrate increasing concern for health care and biodiversity in the agricultural landscape. The United Nations (UN) have prioritized the preservation of

biodiversity in agriculture as part of its sustainable development goals. This is aimed at creating a more comfortable and environmentally friendly environment. The UN also handed over the responsibility for biological conservation to the Food and Agriculture Organization (FAO) in each economic sector. Research is done to design appropriate environmental conservation methods (Mamabolo et al., 2020). ECOSSE, on the other hand, can provide data on the carbon content in the soil increased from 16% to 32% with the help of the ECOSSE system, demonstrating the potential to increase soil fertility and reduce the effects of climate change in addition to improving productivity and maintaining environmental sustainability (Begum et al., 2022).

However, the impact of climate change can be reduced through agroecological farming approaches that supports the approach of achieving SDG 13 and SDG 15 by emphasizing more environmentally friendly agriculture (Sethuraman et al., 2021). In addition, Sarkar et al. (2020) added that Low input Sustainable Agriculture (LISA) can reduce the use of chemical fertilizers, increase crop yields, protect the environment and produce quality and healthy food. The use of artificial rain technology is also certain to reduce the impact of rising temperatures such as in India which has reduced the total agricultural area by 50% (Rama Rao et al., 2022c). Amadu et al. (2021) also said Climate Resilient Agriculture (CRA) is a project that can be used to increase the resistance of plants to climate change by increasing nitrogen content (41%), potassium (31%), organic matter (57%), and organic carbon (44%). It could further help restore grain farming in dry regions such as Malawi and around the Sahara. Climate Smart Agriculture Practice (CSAP) which has been studied by Bijarniya et al. (2020) can be used to increase crop productivity with increasing the water supply to agriculture by 18.3% and energy productivity by 48.9% as in India in addition to maintaining environmental sustainability.

Articles	Years	Approaches	Goals of Sustainable Agriculture	Challenges of Sustainable Agriculture	Technology Assisted	Government and Organizational Support	Water and Food securities
1. Begum et al.,	2022	/	/	/	/		/
2. Seturaman et al	2021	/	/	/	/		/
3. Sarkar et al	2020	/	/	/	/		/
4. Rama Rao et al	2022	/	/	/	/		/
5. Amadu et al	2021	/	/	/	/		/
6. Bijamiya et al	2020	/	/	/	/	/	/
7. Mamabolo et al	2020	/	/	/	/	/	/
8. Streimickis & Baležantis	2020	/	/	/	/	/	/
9. Mottet et al	2020	/	/	/	/	/	/
10. Kwon et al	2021	/	/	/	/	/	/
11. Qian et al	2022	/	/	/	/	/	/
12. Setsoafia et al	2022	/	/	/	/	/	/
13. Hamidov et al	2018	/	/	/	/	/	/
14. Batilini de Macedo et al	2022	/	/	/	/	/	/
15. Jahjan et al	2022	/	/	/	/	/	/
16. Rosegrant et al	2022	/	/	/	/	/	/

Jadual 4.0: Approaches in Sustainable Farming Practices

**Discussion**

The Malaysian Education Development Plan (PPPM) (2013-2025) is a framework of actions launched aimed at transforming the education system in Malaysia to meet the needs of the 21st century. Among the objectives of PPPM (2013-2025) is to increase access to education for all Malaysians. This objective is achieved by providing opportunities for higher education including vocational and technical. In addition, this plan is used as a guide to improve the quality of education in rural areas and further develop the use of technology in education.

Sustainable development has become an important aspect of the modern education system, and Malaysia is no exception. PPPM (2013-2025) has recognized the importance of sustainable development and has incorporated it into its policies and strategies. Sustainable development is defined as a development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The plan recognizes that education is a key driver of sustainable development and is essential to develop a sustainable education system that prepares students for future challenges.

One of the main strategies of the plan is to promote environmental education. The plan recognizes that environmental education is essential for developing a sustainable society. The plan aims to integrate environmental education into the curriculum at all levels of education. These include primary, secondary and higher education. The plan also aims to develop environmental education programs that are relevant to the local context. Another strategy of the Malaysian Education Development Plan is to promote sustainable practices in schools. The plan recognizes that schools can play an important role in promoting sustainable development. This plan aims to develop sustainable school practices that reduce energy consumption, promote waste reduction, and promote sustainable transportation (MOE, 2013).

The Education Development Plan also aims to integrate SDG 13 into the education system. This initiative is in line with the objectives of SDG 13, which focuses on taking immediate action to combat climate change and its impacts. The core of the Education Development Plan is the recognition of the importance of environmental education. This plan emphasizes the need to integrate the concept of sustainable development into the curriculum. By combining environmental education across a range of subjects, students are exposed to a range of environmental issues, fostering a deeper understanding and appreciation of the natural world. Through this approach, the plan aims to raise awareness among students and promote responsible environmental behaviour from an early age. Transforming schools into environmentally friendly and sustainable institutions is another key initiative outlined in the plan. The concept of a green school requires adopting environmentally friendly practices such as waste reduction, energy saving, water management, and the use of renewable energy sources. By implementing this practice, schools not only reduce their ecological footprint but also become role models to students and the wider community. Green schools show that sustainable practices are not only beneficial for the environment but also practical and can be implemented in everyday life.

PPPM (2013-2025) recognizes the importance of aligning subjects and fields of study with the Sustainable Development Goals, specifically SDG 13 (Climate Action). By incorporating various subjects into the curriculum, students can gain a comprehensive understanding of climate change, its effects and the actions needed to combat it. In the Science curriculum, Malaysian students delve into topics directly linked to climate change and

global warming. They learn about the scientific principles underlying the climate system, such as the greenhouse effect and the carbon cycle (BPK, 2015). Geography also plays an important role in helping students understand climate change. Through the geography curriculum, students gain knowledge of the climate system, the science of climate change, and the causes and consequences of climate change (BPK, 2018). Civic education plays an important role in empowering students to become responsible citizens and active participants in climate action. By emphasizing the importance of civic engagement, activism and advocacy, students learn how individuals, communities and governments can contribute to mitigating climate change and adapting to its effects (MOE, 2018). Moreover, extra-curricular activities provide students with a practical opportunity to actively participate in climate action. Environmental clubs, sustainability initiatives and eco-awareness campaigns allow students to engage in hands-on activities related to climate change. Students participate in tree planting, waste reduction campaigns, energy conservation projects, and raise awareness of climate change (MOE, 2013).

### Conclusion

The Sustainable Development Goals (SDG 13) which focus on combating climate change and its impacts through measures such as reducing greenhouse gas emissions and integrating climate change measures into policy and planning. The study of the sustainability of agricultural activities in the context of SDG 13 is significant because it addresses climate change, food security, poverty reduction, biodiversity conservation and many other key elements of human welfare. It provides insights into how sustainable agricultural practices can contribute to the achievement of SDG 13 and other related goals to make it an important area of research with far-reaching implications for global development. In the context of the Malaysian Education Development Plan, sustainable agriculture plays an important role in achieving SDG 13 by promoting environmentally friendly, socially responsible, and economically viable agricultural practices. Plans include initiatives such as integrating the concept of sustainable agriculture into the curriculum by providing training to teachers and educators, offering hands-on learning opportunities, and collaborating with relevant stakeholders. By aligning the plans with SDG 13 and emphasizing sustainable agriculture, Malaysia can contribute to tackling climate change and building a sustainable future for the agricultural sector and its overall development. Therefore, further research regarding the method of delivery of sustainable development goals in the educational curriculum should be carried out so that the target of this development goal can be mastered and understood from the educational level in the school.

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