

Why agrobiodiversity is important environmental sciences essay



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Agrobiodiversity mostly consist of all the components of biological diversity that is strongly related to food and agriculture. The components of biological diversity that found in the agrobiodiversity consist of the variety and variability of animals, plants and microorganisms at the genetic, species, populations and ecosystem levels that are required to provide sustainable agro-ecosystem and agricultural production. Agrobiodiversity contribute to sustainable livelihood securities at the local, national and global levels. There are four main good services that are provided by agrobiodiversity which is provisioning, regulating, supporting and cultural. It also responsible for provisioning food and nutrients, materials for industry, medicines, genetic materials for improved yields and crops and pest resistance. Agrobiodiversity is responsible for regulating agricultural pests, climate, and natural disasters such as drought, fire and floods. Besides, the other services provided by agrobiodiversity like help to increase the diversity of pollinator in pollination and soil biodiversity, maintain the natural enemy populations for sustainable food chain in agrobiodiversity, and climate mitigation and adaptation. Some of the cultural services provided by agrobiodiversity consist of pollinator sanctuaries, genetic materials reservoirs, and agricultural lifestyles varieties. In order to achieve the objectives of agricultural environmental sustainability, food safety and security and improved livelihoods, the agricultural production systems need to be focused more on the effective conservation and management of biodiversity and ecosystem services.

Introduction

Malaysia is one among the top dozen countries in the world for wealth of biodiversity. About 145 years ago, Alfred Russel Wallace confirmed this

wealth of biodiversity (Wallace, 1869). Agrobiodiversity is one of the important elements of biodiversity which is related to agriculture.

Agrobiodiversity also refers as agricultural biodiversity or the genetic resources for foods and agriculture. Agrobiodiversity can be defined as the interaction between the environment, genetic resources and management systems and practices used by culturally diverse peoples. (FAO, 1999).

According to The Convention on Biological Diversity (CBD), agrobiodiversity have been defined as all of the constituents of biodiversity that is related to food, and agricultural ecosystems. Hence, it comprises the variety and variability of animals, plants and microorganisms at the genetic, species, populations and ecosystem levels that are required to provide sustainable agro-ecosystem and agricultural production. The CBD also identified four dimensions of agrobiodiversity. First of all, agrobiodiversity provides the genetic resources for food and agriculture, including plants, animals and microbes. These also include cultivated and domesticated species, managed wild plants and animals, and their wild relatives. Besides, it is also one of the components of biodiversity that support the ecosystem services of agricultural systems. These include a wide range of organisms that contribute to water and nutrient cycling, pest and disease regulation, pollination, climate regulation and other processes. Abiotic factors like local climate change or chemical factors also can affect agrobiodiversity. Socio-economic and cultural dimensions, including traditional and local knowledge of agrobiodiversity, cultural factors and participatory processes, as well as tourism associated with agricultural landscapes. (CBD, 2011)

Why agrobiodiversity is important?

We need to know before we can embark on supporting agrobiodiversity because it allows us to differentiate between good and bad of the services provided by agrobiodiversity and the important role of agrobiodiversity in agricultures. We as the future agriculturists must understand the concept of biodiversity in order to use it effectively. We cannot foretell the future, but with knowledge of biodiversity in our tool kit, we are better equipped respond to new challenges. Biodiversity itself needs to be protected; otherwise our range of options will be progressively restricted. (Ng & Ooi, 2012)Agrobiodiversity play a very important role in enabling agriculture to achieve gains in productivity, improve sustainability, support improved livelihoods for the rural poor and due with the challenge of changing production conditions such as those resulting from climate change, population growth, urbanization and an increasingly degraded environment. Changes will be needed in both the nature and the amounts of agrobiodiversity used. Agrobiodiversity plays an important role in sustainable development such as provides many environmental services to animals, plants, humans and other species. These include pollination, watershed functions, nutrient cycling, regulation of the atmosphere composition and many more. For instance, pollinators are crucial for crop and fruit production and their number and diversity can greatly affect crop production levels. Besides that, it also enables the diverse species and ecosystems continue to evolve and adapt to the new changes including climate changes. The diverse species and the variety of agro-ecosystem in the biosphere offer various biological products and raw materials that play important roles in our country economy. For instance, it provides us the food, spices, rubber, <https://assignbuster.com/why-agrobiodiversity-is-important-environmental-sciences-essay/>

medicines, fuel and other useful products which in turn increase productivity, income opportunities, food security and economic return. Agrobiodiversity contribute in various ways to human health and nutrition by providing food and access to traditional medicines. Agrobiodiversity also help to reduce the pressure of agriculture on fragile areas, forests and endangered species and this result in conservation of ecosystem structure and stability of species diversity. (Thrupp, 1997). The diversity of plants and animals also refers as diversity of the genetic pool in which different populations of plants and animals has different genetic variations. In order to create the genetic variation among the different populations of plants and animals, agrobiodiversity is vital for supplying the raw genetic materials for breeding new species of plants and animals. Agrobiodiversity also can help the farmers to make the farming systems more stable, resilient, and sustainable by conserving soil and increase natural soil fertility and health.

Do we need to use chemical pesticides?

One of the mainstays of current modern agricultural practice is the use of chemical pesticides. It cannot be denied that the usage of chemical pesticides becomes the important part of farming in modern agriculture today. As we know, most of the farmers use chemical pesticides to control or eliminate various types of agricultural pests that can bring damage to crops and livestock. In other words, chemical pesticides help to protect plants and crops from diseases, weeds, and pests and prevent spoilage on the crops. This in turn will increase the farmers' crops and livestock productivity. Therefore, farmers prefer to use chemical pesticides because they act fast, quickly eliminate those agricultural pests before they can cause any

destruction much of the crop. In addition, many chemical pesticides are extensive range as they protect crops and livestock against more than one pest, which saves time and money. Although chemical pesticides did bring many advantages to the farmers, it also causes environmental deterioration. We can use chemical pesticides in farming but we should try reduces the usage of the chemical pesticides as excessive use of chemical pesticides can cause serious consequences for the humans and environment, our Mother Nature. For example, these pesticides penetrate into the soil by the action of rain water and get mixed with the ground water which in turn contaminates the soil. The draining of pesticides into the nearby river or lake by rainwater can also contaminate the water resources and also causes loss of living organisms that feeds the contaminated water. Other alternative that we can use to control the agricultural pests instead of chemical pesticides is to use integrated pest management (IPM). Integrated pest management uses the pest's natural predators to protect our crops which use the principle of prey-predators relationship. It is an environmentally friendly approach that will help us to alleviate those problems caused by agricultural pests and create a sustainable environment for both humans and wildlife. For instance, natural nocturnal predators like Barn Owls have been used as pest control agents of rodents in oil palm plantations to eliminate the rodents that cause damage to the oil palm. The IPM approach would not only help to reduce the many chemical pesticides related problems currently encountered by the farmers but would also better ensure a more productive and sustainable crop output in an environment that is both cleaner and less hazardous. (Lim, 1990)

How can we sustain the fertility of our soil?

One of the methods to sustain the fertility of soil is by watering the soil. This can help to conserve and maintain the fertility of soil. Moreover, we should reduce the usage of any chemical pesticides as they can cause unwanted side effect on the fertility of soil by inhibit the storage of Nitrogen and other vital minerals in soil. In addition, manures such as animal wastes and human wastes can also be used to sustain the fertility of soil. For instance, animal wastes are like dung, dried blood and bone, duck or chicken feathers and other crop residues. Livestock manure is a natural fertilizer that usually has been used to fertilize soil as it contains certain nutrient or element that is needed by the soil. Such manure can be applied to the field in either raw or composted form and it is useful in providing nutrients and organic matter to the soil. Besides, crop rotation also can be used to endorse fertility of the soil and help to improve soil structure. Crop rotation is a method that requires a farmer to plant crops at different times and in different sites in the same agricultural field.

The bad effects that challenges agrobiodiversity in malaysian agriculture

We are in an era of rapid ecological, social, and economic change, and the pace of this change will accelerate during the next several decades. The world's population of 6.3 billion people is projected to grow to 7.5 billion by the year 2020 and to 9 billion by 2050. By 2050, food consumption must double to meet human needs. To meet this increasing demand for food, production systems are expected to become increasingly dependent on inputs of fertilizers, pesticides, and water. Irrigated lands will likely increase

by 1. 3-fold by 2020, and 1. 9-fold by 2050. Pasture lands are also increasing, with an expected doubling in area by 2050. In 50 years, global agricultural land area is projected to increase by 18%, with a loss of 10 hectares of natural, wildland ecosystems (Jackson, Bawa, Pascual & Perrings 2005). According to some experts, they agree that climate change could be one of the major threats for agrobiodiversity. The global climate changes that is caused by the green house effects normally includes the increase in global temperature, changes in the rainfall pattern, and the increase of extreme weather conditions such as flooding, drought and heavy rains. will have direct effects on the agrobiodiversity. As most of country agricultural land is rain-fed, changing rainfall patterns and water depletion could have demoralizing consequences on our agriculture. Furthermore, climate changes may also disruptions in the natural distribution range of species and ecosystem in agrobiodiversity. Thus, when agro-ecosystem structures and functions as well as growth and reproduction rates are influenced, this can cause the entire ecological network of habitats and landscapes to be changed. This is because the climate change will make the animals and plants species difficult to adapt to the new environment. Many crops and plants destroy by the extreme heat from drought and increase weed growth and disease outbreak. The other bad effect that can challenge agrobiodiversity is the rapid expansion of industrial and Green Revolution agriculture. This includes demanding livestock production, industrial fisheries and aquaculture which also include genetically modified varieties and breeds. Moreover, relatively few crop varieties are cultivated in monocultures and a limited number of domestic animal breeds, or fish, are reared or few aquatic species cultivated (Thrupp, 1997)One of the ways to <https://assignbuster.com/why-agrobiodiversity-is-important-environmental-sciences-essay/>

minimize the bad effects that challenges agrobiodiversity is mitigation of the climate changes. For example, agrobiodiversity can alleviate climate change by increase the soil biodiversity to build organic matter through crop rotation, animal and plant manures and cover crops to enrich the soil for better yields production, drought-resistance crops and absorption of excess rainfall. Besides, we can use diverse leguminous crops to fix nitrogen in the soil and planting temporary vegetative cover between successive crops to reduce nitrous oxide emissions by extracting unused nitrogen. In addition, the management of agriculture and food security is ultimately the management of risk and the ideal preparation for the management of risk is to train people with the knowledge and skills to respond quickly and effectively. Malaysian agriculture has been shaped by researchers who were able to use biodiversity successfully at critical times. (Ng & Ooi, 2012)

Area of modern science that can promote agrobiodiversity in our country

Area of modern science that can promote agrobiodiversity in our country are like biotechnology, molecular science, taxonomic science, ecology and conservation biology, botany and some other science fields that are related to agrobiodiversity. Biotechnology is strongly inter-related to agrobiodiversity. It plays an important role in contributing to sustainable agriculture. Biotechnology can enhance the utilization and conservation of agrobiodiversity. Besides, Biotechnology primarily provides implements for variation of crops and livestock production in agriculture, and genetic improvement and management. For example, techniques in biotechnology such as cloning and tissue culture can be applied in agriculture. Through

these techniques, many crops and plants can be produced in a larger amount within a shorter time. Transgenic crops like soya bean and wheat which are resistant to agricultural pests, herbicides and diseases have been introduced by the biotechnologist. Taxonomic science is the science of discovering, naming, classifying and describing organisms which help us to understand biodiversity and ecology. Taxonomy is a basic knowledge for conserving and sharing the benefits of biodiversity. By knowing our biodiversity we are able to conserve it and sustain healthy ecosystems in our developing countries. As we know, biodiversity and agrobiodiversity are related to each other. Hence, we not only conserve biodiversity at the same time we also conserve agrobiodiversity which in turn leads to sustainable agriculture. Besides, taxonomy enables farmers the correct identification ways of their plants and crops species. This is useful when dealing with the agricultural pests. The farmers have to identify the pests and their predators to allow for the application of biological control like Integrated Pest Management (IPM). Moreover, Taxonomic collections also can provide us with a everlasting record of the historical distribution of variety of species of animals and plants which allow us with the prediction of extinction of species, pest and disease occurrence and supporting ecosystem adaption measures. Botany a science that study plants life; how the plants live, grow, evolve, function and related to each other. Botany also includes the study of fungi, algae, viruses and bacteria. Botany plays an essential part in sustaining agriculture. For example, the study of botany can help us on how to improve different strains of crop varieties, appearance and quality of our crops like rice and vegetables. It also includes the research on how a specific crop can grow in a specific climate and different soil conditions.

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