



Review Article

Biodiversity and its Impact on Plant Productivity

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ABSTRACT

The reports of biodiversity state for food and agriculture in the world, providing mounting and alarming evidence that the biodiversity that supports our food systems is disappearing, posing a major threat to the future of our food, livelihoods, health and environment, and as a result of the increase in the numbers of the world's population. Agriculture is one of the human activities most dependent on the environment factors. Therefore, interest in the sustainability of agriculture must have a high priority not only because of its connection to the goals of production, development and food security only, but also because of its necessity to maintain a more balanced and stable environment. The biological diversity of agricultural fields is necessary to ensure increased and stable food production, as green areas are characterized by the richness and diversity of their components. crop biodiversity maintains the sustainability of our food systems and makes them able to withstand these real and dangerous threats and a large proportion of indigenous and local communities in the world are trying to conserve agricultural biodiversity. This study showed the importance for biological diversity in the abundance of crop productivity.

Keywords: Crop biodiversity, modern agriculture, preserve biodiversity, ecosystem.

INTRODUCTION

Despite expectations that the world population will be to 9.7 billion people in 2050; the challenges for the agricultural sector in terms of providing human food needs increase as a result of the worsening repercussions resulting from climate change, the decline in arable land areas and the deterioration of the environment and natural resources including is the loss of many elements of biodiversity which plays an important role in achieving sustainable agricultural production by providing enhanced productivity of agricultural crops.

Literature review

Agriculture is one of the human activities most dependent on the environment factors. Therefore, interest in the sustainability of agriculture must have a high priority not only because of its connection to the goals of production, development and food security only but also because of its necessity to maintain a more balanced and stable environment (Forrest *et al.*, 2015) and despite the fact that traditional agricultural policies have created a major boom in productivity and a large surplus in food production was achieved in large areas of the world. This was done at the expense of the environment and agricultural lands. The soil lost its nutritional components, which led to the intensification of the use of fertilizers and pesticides, leading to soil pollution, loss of biodiversity, and desertification of agricultural lands (Hartung and Schliemann, 2019), sustainable agricultural development in its quest to achieve food security and increase returns from agricultural resources, we must preserve those resources and protect them from pollution, degradation and loss. Preserving biological diversity can ensure that ecosystems continue their ability to provide service to the requirements of humans and other living organisms, and to maintain balance in order to be sufficient to meet those requirements, (Fennill *et al.*, 2023). Recent scientific studies conducted by him have shown that a number of scientific researchers from different parts of the world, to the diversity biological diversity is important for the continued survival of humans on planet earth, given that this diversity plays an important role in achieving food security and stability (Clilverd *et al.*, 2016).

The reports of biodiversity state for food and agriculture in the world, providing mounting and alarming evidence that the biodiversity that supports our food systems is disappearing, posing a major threat to the future of our food, livelihoods, health and environment to measure the agriculture (Hartung and Schliemann, 2019) agricultural productivity rates of those fields (Bänziger, 2013), based on two ecological components provided by nature, represented by the pollination process carried out by wild insects, and the biological control of harmful agricultural pests (Clilverd *et al.*, 2016). Through different techniques start with selection individuals around the world such as farmers, gardeners, and specialist plant breeders working in organizations, such as government institutions; universities; crop industry associations; and research plant centers (Bänziger, 2013). The international development agencies have agreed that the selection of new crop varieties is necessary important to ensure the security food through the development of new types that are highly productive resistant for diseases and drought; or adapted for different environmental and growth conditions.

Crop quality after harvest

Some of the techniques that breeders are trying to apply to crop plants:

1. Improving quality, such as nutritional content, taste and morphological characteristics of the plant.
2. Increase crop productivity.
3. Increased resistance to environmental stresses (salinity, extreme heat, and drought).
4. Increased tolerance to insect pests.
5. Resistance to viral and fungal diseases.
6. Crop quality after harvest.

A recent scientific study conducted by a large number of researchers from different parts of the world confirmed that biological diversity is important for the continuation of human life on planet Earth, given that this diversity plays an essential controlled in achieving the security food and stability. (Bänziger, 2013; Du, 2016). Our findings are also very important. It shows that biodiversity is very important for providing ecosystem services and maintaining high and more stable agricultural production (Hartung and Schliemann, 2019).

The role of agricultural diversity in plant productivity

Modern agriculture has encouraged a large number of farmers to adopt high-yielding and productive types of plants or animals, but when producers move away from diversity, the original and local varieties and breeds disappear, and with them their special characteristics (Wassan *et al.*, 2023). The possession of plants and animals with a wide range of unique characteristics allows these plants and animals to face difficult conditions. The changing environment, this provides scientists with the basic materials they need environmental threats, such as land resources, groundwater, running water, other environmental components, and other living organisms, including humans. These threats that lead to the loss of agricultural biodiversity can also be summarized as represented by wrong agricultural practices, such as excessive use of pesticides and chemical fertilizers. Urban sprawl on agricultural lands, building on them, reducing their area, industrial and sewage drainage into waterways and rivers, polluting them and affecting their natural properties. Strange customs that have been introduced, whether intentionally or unintentionally, into the local environment, vegetation, and trees to serve humans, overgrazing, soil salinity and decreased fertility as a result of the absence of agricultural cycles, incorrect irrigation, climate change, air erosion, desertification, soil erosion, and encroachment of sand dunes (Du, 2016).

Scientists emphasized the importance of the study by saying that farmers can significantly reduce the use of chemical pesticides to get rid of harmful pests and insects, if there are natural biological control, by increasing agricultural biodiversity (Amjad *et al.*, 2020). Researchers also stressed the need to protect ecosystems whose health depends on biodiversity, and increase crop diversity, in addition to increasing the agricultural area as much as possible.

This study showed the importance for biological diversity in completing pollination processes. In areas of heterogeneous surfaces in which plants and trees are diverse and dominated by the nature of open meadows, wild pollinators (such as insects) are the most abundant and diverse, and therefore the most useful, not only for completing pollination processes or biological control, but also in the abundance of crop productivity (Yang, 2019). Regarding the importance of biological diversity in increasing the productivity of agricultural crops, some scientists say that increasing the biological diversity of agricultural fields is necessary to ensure increased and stable food production, as green areas are characterized by the richness and diversity of their components (Geris *et al.*, 2015).

How to preserve biodiversity

There are several strategies and methods that can be adopted to preserve biological diversity and not lose it (Gardarin *et al.*, 2022), as preserving it contributes to keeping the planet earth free from dangers that threaten human life, and among the most prominent of these methods is:

- Identify economically important organisms and follow a specific plan to preserve them.
- Reducing the level of pollution and strictly prohibiting deforestation.
- Full compliance with environmental laws and awareness of the importance of preserving biodiversity.
- Preserving endangered species of plants and animals. Effective use of environmental resources, and prohibition of hunting wild animals.
- Prioritize the protection of rare ecosystems.
- Preserving all types of food, livestock, agricultural animals and microbes.
- Use economical and energy-saving lamps, and recycle all products made of plastic and glass.

- Buy products that have nutritional labels for reference, so you can determine what products are made and the percentage of all ingredients for any particular ingredient.

Why is biological diversity necessary from agriculture? In many studies; crop genetic diversity, has a critical controlling for play in increasing and preservation production levels in plant and nutritional diversity in the level for the different agro ecological conditions (Gardarin *et al.*, 2022).

Numerous essential processes that maintain the soil ecosystem are carried out by the diverse organisms that contribute to soil biodiversity (Genis *et al.*, 2015). These processes include breaking down litter and cycling nutrients, converting atmospheric nitrogen into an organic form and then back again into gaseous nitrogen, and changing the structure of the soil. Variability in intentional farming plantings: Crop combinations, crop rotations.

Permanent soil cover crops employed in conservation agriculture or agroforestry are oft used techniques to increase yield stability, and increase soil fertility. Grassland and pasture/crop systems that diversify and integrate ruminant livestock and crops tend to be more sustainable because they provide opportunities for rotation diversity, perennial cultivation, and greater energy efficiency. The introduction of grazing animals at certain.

Agroforestry and conservation agriculture frequently use permanent soil cover crops as a means of improving soil fertility and yield stability. Grassland and pasture/crop systems (Hawes *et al.*, 2003) that incorporate and diversify crops with ruminant animals are typically more sustainable due to the opportunity they present for perennial production, varied rotation, and increased energy efficiency. Grazing animals being introduced at certain points in farming cycles may help to break down plant material and increase nutrient availability. Predators and parasites which attack pest insects or pathogens on crops, or plant-feeding insects which attack crop weeds.

Contribute to Pest regulation (Geris *et al.*, 2015). Beyond these direct trophic relationships, a web-like pattern of interactions amongst diverse life-forms on-farm can deliver additional benefits. For instance, crop production may benefit from benign micro-organisms which colonize crops and their habitats such that pathogens do not establish, or from non-crop plants which are attractive to specific times of farming cycles may aid in the breakdown of plant matter and improve the availability of nutrients. Insects that eat on plants and fight crop weeds, or predators and parasites that target pest insects or diseases on crops (Amjad *et al.*, 2020). Participate in the control of pests. A web-like network of connections between various living forms on a farm can provide benefits beyond the direct trophic ties. For example, beneficial microorganisms that colonize crops and their environments so that pathogens cannot establish themselves or non-crop plants that are appealing to pests and thereby lower their population on crops. When combined, these biodiversity-related direct and indirect effects could provide "pest suppressive" environments. Increased plant diversity on the farm, closer spacing between crop plants, which covers more barren ground, and more perennial culture could all help control weeds and increase the farming system's resistance to noxious species invasion (Wasan *et al.*, 2023). Pollinators are necessary for orchards.

Output of horticulture and fodder, as well as help raise the caliber of fruit and fiber crops. The greatest way to guarantee healthy pollination services is to have a wide variety and number of pollinators, which are mostly found in wild biodiversity.

What makes biological variety crucial to agriculture? Here are a few instances: In order to maintain and increase production levels and nutritional diversity over the entire range of various agronomic ecological circumstances, crop genetic variety is crucial. Numerous critical processes that maintain the soil ecosystem are carried out by diverse species that contribute to soil biodiversity. These include the breakdown of trash and the cycling of nutrients, the conversion of atmospheric nitrogen into an organic form and this nitrogen then turns into nitrogen gas and changing the composition of the soil. Diverse intentional planting practices on farms, such as crop rotations, crop species combinations, and permanent soil cover crops used in agroforestry or conservation agriculture, are often adopted strategies to improve soil fertility and yield stability.

Systems of pasture and grassland/crops that incorporate and diversify ruminant livestock and crops are typically more resilient.

Therefore, they offer chances for perennial farming, varied rotation, and increased energy efficiency. At specific stages of farming cycles, the addition of grazing animals may aid in the breakdown of plant matter and improve nutrient availability (Yang, 2019). Pest regulation is aided by predators and parasites that prey on pest insects or diseases that affect crops, as well as by plant-feeding insects that target weeds in crops.

Insects that target weeds in crops help control pests. Besides these explicit trophic connections. Interactions between various living forms on a farm can result in a web-like pattern that offers extra advantages. For instance, beneficial microorganisms that colonize crops may enhance crop productivity and their habitats (Gardarin *et al.*, 2022), which prevent the establishment of diseases, or from non-crop plants that draw pests and hence lower their population on crops. When combined, these biodiversity-related direct and indirect effects could provide pest-suppressive environments. Increased plant diversity, increased proximity between agricultural plants, and hence increased coverage of barren ground on farms and more perennial cultivation could be strategies to help control weeds and provide farming systems more resilience against noxious species invasion. In addition to being necessary for orchard, horticultural, and feed production, pollinators also help to raise the caliber of fiber-producing plants. The greatest way to guarantee healthy pollination services is to have a wide variety and number of pollinators, which are mostly supplied by wild biodiversity (Fennill *et al.*, 2023).

Humans depend on plants to obtain most of their calories. In the fact; of the thousands of the fruits and vegetables grown for food, fewer than 200 species made from a significant portion of the food produced worldwide and climate variation and gases type and disturbances, urban sprawl or excessive land use have also played a role in weakening these species and reducing their capacity to generate or to create in the times ahead (Forrest *et al.*, 2015). Many of types and species of plants that our predecessors fed on have been lost, and the number of losses is rising. of them daily. The diversity of the key to securing our food, crop biodiversity maintains the sustainability of our food systems and makes them able to withstand these real and dangerous threats and a large proportion of indigenous and local communities in the world are trying to conserve agricultural biodiversity. These communities deep have need for different crop types and the way they are grown, these communities are often dangerous, living in these areas vulnerable from the change of climate and vulnerable for the degradation of agricultural sources (Gardarin *et al.*, 2022). The benefit-sharing fund, established through the international treaty of plant genetic resources from food and agriculture (Forrest *et al.*, 2015); help the farmer in developing countries. Working to protect and use plant genetic diversity for food security to help the community adapt to the changement of climate. And the cooperation is an important way of In order to preserve the knowledge of indigenous peoples and promote access to and replacing for tolerant crops; and help to their necessary (Hawes *et al.*, 2003).

The convention on biological diversity (CBD):

The convention of the biological diversity; was signed at the earth summit in Rio de Janeiro, Argentina, in 1992 and entered into force a year later. As of 2020, 196 countries have ratified it; and it aims to preserve the sustainability of diversity and ensure the sustainable using for and its components, as well as its benefit.

The agreements as it led emphasizes the importance of biological diversity for a healthy life on planet earth and on the basis of this principle, the united nations environment programmer: Which was established in 1972 in the Kenyan capital, Nairobi and its partners in various countries assist develop programs and plans to work on a special national strategy to serve biological diversity; in addition to the program supports knowledge platforms on ecosystems and biodiversity like the global forest monitoring and the global peatlands initiative, formed in 2016; for temperate coal-forming charred plants. In addition to the interfaith rainforest initiative in 2017.

CONCLUSIONS

The biodiversity needs breeding or plant improvement it is the science of coordinating and altering genetic genes in plants, in order to produce traits suitable for plant improvement components that the nature of the environment provides for each place. The process of pollination of wild insects and the biological control of agricultural pests. The biological diversity is important for the continuation of human life on planet earth, given that this diversity plays an essential controlled in achieving the security food and stability. This mean that the biodiversity is very important for providing ecosystem services and maintaining high and more stable agricultural production.

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التنوع البيولوجي وتأثيره على إنتاجية النبات

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الملخص

زودت تقارير حالة التنوع البيولوجي للطعام والزراعة عن العالم أدلة متزايدة ومثيرة للقلق على أن التنوع البيولوجي الذي يدعم أنظمتنا الغذائية يختفي، مما يشكل تهديدًا كبيرًا لمستقبل طعامنا وسبل عيشنا والصحة والبيئة، ونتيجة للزيادة الحاصلة في أعداد سكان العالم، تعتبر الزراعة هي واحدة من الأنشطة البشرية الأكثر اعتمادًا على عوامل البيئة. لذلك، يجب أن يكون الاهتمام باستدامة الزراعة أولوية عالية ليس فقط بسبب علاقتها بأهداف الإنتاج والتنمية والأمن الغذائي فقط، ولكن أيضًا بسبب ضرورة الحفاظ على بيئة أكثر توازنًا واستقرارًا. إن التنوع البيولوجي للحقول الزراعية ضرورية لضمان زيادة إنتاج الغذاء المستقر، حيث تتميز المناطق الخضراء ببراء وتنوع مكوناتها. يحافظ التنوع البيولوجي للمحاصيل على استدامة أنظمتنا الغذائية ويجعلهم قادرين على تحمل التهديدات الحقيقية والخطيرة ونسبة كبيرة من المجتمعات المحلية والمحلية في العالم تحاول الحفاظ على التنوع البيولوجي الزراعي. أظهرت هذه الدراسة أهمية التنوع البيولوجي في وفرة إنتاجية المحاصيل.

الكلمات الدالة: التنوع البيولوجي للمحاصيل، الزراعة الحديثة، الحفاظ على التنوع البيولوجي النظام البيئي.