The Era of Challenges in Agriculture
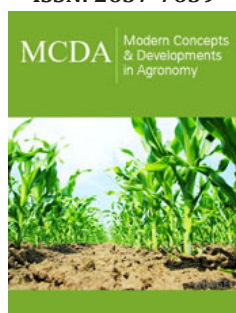
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Abstract

Our current era is characterized by many different technologies in the agricultural sector Agro-informatics, artificial intelligence and nanotechnology. All of these technologies aim to improve production in quantity and quality, tolerate various biotic and abiotic stresses, and try to find agricultural practices that guarantee sustainable production that meets the needs of the expected population increase in the year 2050. Therefore, researchers must combine efforts to use these technologies in an integrated manner to ensure the development of sustainable agriculture.

Keywords: Agriculture; Technologies; Agro-informatics; Artificial intelligence; Nanotechnology; Sustainable

Introduction

We are currently living in a time of challenges in various sectors, whether scientific, industrial, environmental, health, etc. We have performed many achievements, innovations and creations in different sectors, but nature has another opinion. Climate and environmental changes, increasing pollution, increasing population, the pattern of population distribution, wars, economic changes and various activities all have repercussions, whether positive or negative, on daily life. However, we find development and scientific progress, industrial, health and other sectors that seek to find appropriate solutions to various challenges. Really, we live in a contradictory time between rapid developments and various changes.

Technologies in the Agricultural Sector

The agricultural sector is one of the important sectors that give safety and stability to any country, and it is the sector most affected by climate and environmental changes. The plant is exposed to many biotic and abiotic stresses during its growth and development. Therefore, it is necessary to find plants that are able to grow tolerate different stresses and give appropriate productivity, both quantitative and qualitative. Therefore, this requires us to pay attention to the following:

1. Finding flexible varieties that are able to adapt to the changing conditions that the plant may be exposed to during its growth and development period by paying attention to the natural biodiversity that exists within the natural local environment and using them in genetic improvement processes.

2. increasing the deterioration of the existing varieties, in addition to the high rates of genetic mixing in the existing grains, which led to many changes and fluctuations that the plant is exposed to from year to year.

3. A major change in agricultural practices as a result of the tremendous development of various technologies in the agricultural sector. We mention, for example, Agro-informatics [1], Artificial Intelligence [2] (AI) and nanotechnology [3].

Agro-informatics provides data on different biological mechanisms and their impact on genes and other omics data. Thus, understanding the biological processes within the plant

by using agro-informatics can be completed. Also, it reflects the significant impact on agricultural productivity, climate change resilience and determining plant types that suit different changes in multiple environments [1].

AI is a set of programs that has inputs and outputs and also exists in an environment. AI was used in agriculture science research for many purposes such as in breeding programs, genes identification for different stresses resistance and predicting. Furthermore, applying AI has various benefits to the farmers, saving resources and applying sustainable agriculture practices [2].

Nanotechnology is a great and promising future science that uses nanomaterials (NM) in various fields. The nanoparticles were used with all kinds, shapes, sizes, and different manufacturing methods, and studied their impact on many different plant species via productive, biochemical and molecular indicators [3]. By reviewing the scientific literatures and scientific researchers recently, we find that most of the scientific research and studies use different technologies for various purposes such as increasing the quantitative and qualitative production or tolerant various biotic and abiotic stresses. Conversely, there were few studies that studied the continuing effects that occurred within the plant or seeds after using these modern techniques. Therefore, we need to employ technology and not just use it, especially in developing countries.

The Future Prospects and Conclusion

The future prospects of these applications are in diverse circumstances as well as in different countries. One of the challenges faced by these advanced technologies is the availability of software and algorithms that process a wide range of different morphological, biochemical, molecular, environmental and other data related to plant growth and development. Another challenge is the uneven distribution of these technologies in different countries, which vary in their use of modern technology according to their circumstances. Also developing and improving agricultural robots that target multiple aspects during plant development stages. Therefore, the efforts of researchers must be combined in collecting data resulting from the three technologies and analysis it's to the service of the agricultural sector for sustainable development. Finally, the fact that we live in an era of challenges requires us to determine priorities first in line with the existing local conditions, and then integrate these scientific developments in terms of technologies and techniques to achieve multiple goals from different applied perspectives during the stages of growth and development of multiple species, which achieves faster and sustainable development.

References

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