

## Chapter 2

# Precision Agriculture: A New Tool for Development

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### ABSTRACT

*Precision agriculture is a management system that aims to reduce inputs like seeds, water, and energy; protect the environment; and maximize profitability. Precision agriculture uses advanced technology like positioning technology, geographical information systems, satellite navigation, and remote sensing. There are different factors affect the adoption of precision agriculture like farm size, legal affairs, and social interaction. Under climate change and increases in world population, adoption of precision agriculture could assist farmers to face various challenges to achieve ideal production and maximizing profitability. Information, technology, and management are considered the backbone of the precision agriculture system, and combining these elements reduces inputs and maximizes productivity. Different threats attacked precision agriculture including threats to confidentiality, threats to integrity, threats to availability, and crowding of the spectrum signal. This chapter explains the different roles of precision agriculture in developing agricultural production.*

### INTRODUCTION

The main purpose of precision agriculture (PA) is to support farmers by providing customized information and technology services that enhancing productivity, increase profitability and reduce environmentally pollutions, PA working on improving crop production and livestock, and contribution of different factors like soil fertility, water, and pest control in increasing farmer's profits, and protect the environment at the same time (Ess& Morgan, 2003) &(Rains & Thomas, 2009).

PA also called Precision Farming(PF) or Satellite Farming (SF) includes advanced management technologies like soil sensing and mapping, yield monitoring and mapping, satellite-based positioning, remote sensing, field and crop scouting, geographical information systems (GIS), variable rate application (VRA), and automatic steering (Balafoutiset al.,2017).

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Adoption of the PA system is affected by various elements like personality characters of farmers, farm size, features of the machines, characteristics of the technology, legal affairs, and social interaction, etc. (Tey&Brindal, 2012).

PA plays a direct role in developed country-specific intelligent platforms that provide farmers with context-relevant and personalized agricultural recommendations through their mobile phones, also, PA helps render these advisory services more customizable and intelligent with time, by evaluates and enhances the existing agricultural systems (Paustian&Theuvsen 2017). PA is becoming an interesting scope for managing natural resources like water, soil, and seeds and applying modern sustainable agricultural development, it is bringing agriculture into the digital information era,also, PA in the animal production sector use to improve meat and milk productivity (Kutter, Tiemann, Siebert, &Fountas, 2011).

This chapter addressees the role of the PA system to increase agricultural production, increasing farmers' profitability, sustain natural resources and protect the environment,exploring different technologies used in PA and the threats which attacked the PA system.

The work was arranged by focusing on the objective of the importance of precision agriculture, exploring the various technologies used, explaining the advantages of precision agriculture, adopting to the PA system in developing countries and the challenges for the P A system, ending with the potential threats to P A.

Searching for the literature published from 2000 to 2019 was conducted, through Egyptian knowledge Bank(<https://www.ekb.eg/>), Academia (<https://www.academia.edu/>), Researchgate (<https://www.researchgate.net>), Google scholar (<https://scholar.google.com/>), Springer- (<https://www.springer.com/>), Elsevier-(<https://www.elsevier.com/>), IEEE (<https://ieeexplore.ieee.org/>) and The Egyptian Journal of Remote Sensing and Space Science<https://www.sciencedirect.com/science/journal/11109823>using “precision agriculture”, “soil mapping”, “variable rate application”, “threats to precision agriculture ” as key terms. 87 papers out of a total database of 252 papers were shortlisted after a thorough reading, all selected papers were analyzed, discussed, and classified into a specific category. The literature was distributed on the basis of related to the subject of the work, whereas (Table 1) highlights various e-resources accessed for acquiring in-depth knowledge of the subject.

*Table 1. Summary of data of papers selected on the basis of search string “Precision Agriculture, soil mapping, variable rate application, and threats to precision agriculture”*

No	E-resource	Content
1	<a href="https://www.ekb.eg/">https://www.ekb.eg/</a>	Journals, Proceedings, books
2	<a href="https://www.academia.edu/">https://www.academia.edu/</a>	Conference, Journals, Proceedings
3	<a href="https://www.researchgate.net">https://www.researchgate.net</a>	Journals, Proceedings, books
4	<a href="https://scholar.google.com/">https://scholar.google.com/</a>	Conference, Journals, Proceedings
5	<a href="https://link.springer.com">https://link.springer.com</a>	Conference,Journals, Proceedings, books
6	<a href="https://www.elsevier.com/">https://www.elsevier.com/</a>	Journals, Proceedings, books
7	<a href="https://www.sciencedirect.com/">https://www.sciencedirect.com/</a>	Journals, Proceedings, books
8	<a href="https://ieeexplore.ieee.org/">https://ieeexplore.ieee.org/</a>	Conference, Journals, Proceedings

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