

Precision Farming: Indian Perspective

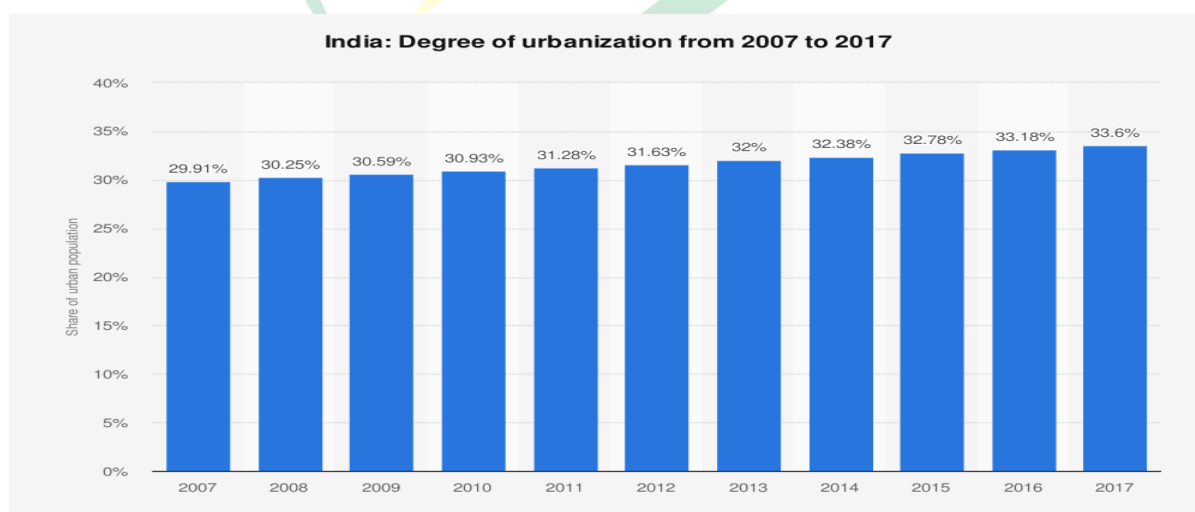
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Introduction

India cover 2.4 % of the world's total area, 329 Mha Land (47 % cultivated) 7th largest, 17.5 % of world's population, 68.86 % Rural Population, 4 % of water resources, 11.6 % of world livestock population, Worth \$ 2.73 trillion, world's third largest economy. Agriculture sector cover 15.87% of GDP, Employed 47% of the total workforce, 82 % of farmers being small and marginal, 1st in Milk, Pulses and Jute production, 2nd in rice, wheat, sugarcane groundnut vegetable, fruit and cotton, Total food grain production 283.37 MT(2018-19). Increasing production in all spheres is imperative to meet the growing demand of the population in India in terms of food, fodder, fiber, fuel, timber and industrial raw materials. The need is increasing to produce more and more from less and less of land and water both in quantity and quality; and time. In order to meet ever growing demand for agricultural products, it has resulted in indiscriminate utilization of resources which in turn resulted in neglecting the critical linkage between agriculture and the environment and has posed a threat to future of Indian agriculture on sustainable basis. Precision Farming (PF) helps in dealing with this challenge by proper and effective management of soil and crop variability with the use of information technology.



Precision Farming is defined as information and technology based farm management system to identify, analyze and manage variability within fields for optimum profitability, sustainability and

protection of the land resource. Precision Agriculture (PA) generally defined as the application of technologies and principles to manage spatial and temporal variability associated with all aspects of agricultural production for improving production and environmental quality

Definition of Precision farming may include-Improve margins, Minimize input cost, Re-organize the total system of agriculture , Timely application , Decreasing operating costs, New information technologies , high-efficiency, Only required amount of input , Save time and money , Better decisions , Sustainable agriculture , Minimized impact on environment. Basic concept of precision farming is- Right amount, Right source, Right site, Right time. Precision farming and farm mechanization have similar target like -Increase Productivity, Time saving, high-efficiency, Optimize profitability

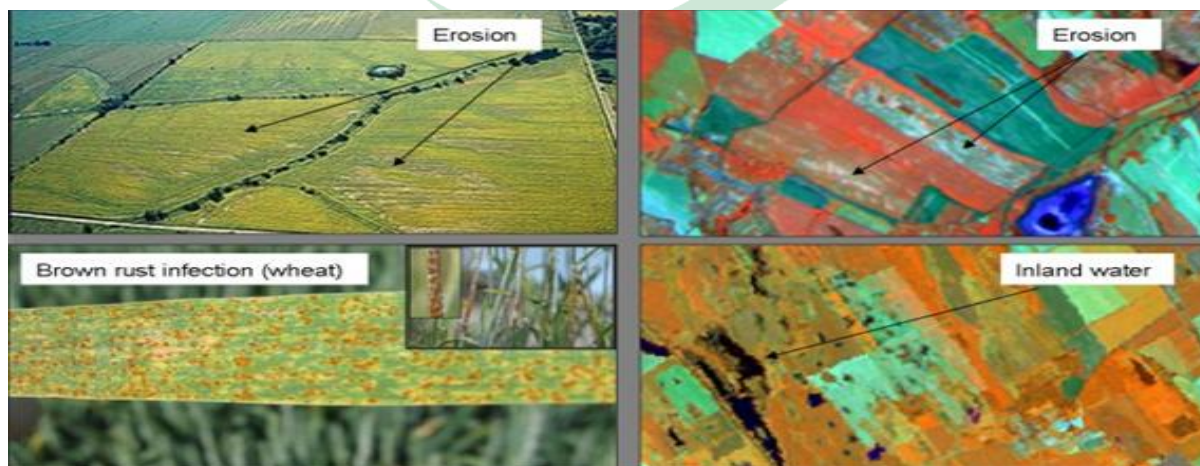
Steps in precision farming-

- ✚ Assessing variability (AV) - Inputs are to be applied in accordance with the existing variability.
- ✚ Managing variability -By applying and making farm inputs available only in require quantities at particular time and specific location.

Components of Precision Farming

- ✚ **Global Positioning System (GPS)** - GPS provides continuous position information in real time, while in motion. Having precise location information at any time allows soil and crop measurements to be mapped.
- ✚ **Geographic Information Systems (GIS)** - GIS are computer hardware and software that use feature attributes and location data to produce maps. An important function of an agricultural GIS is to store layers of information, such as yields, yield maps, soil survey maps, remotely sensed data, crop scouting reports and soil nutrient levels.

Maps prepared by GIS





Remote Sensing - Remotely sensed data, obtained either by aircraft or satellite, containing electromagnetic remittance and reflectance data of crop can provide information useful for soil condition, plant growth, weed infestation etc.

- ✚ **Variable Rate Technology** - Technology that focuses on the automated application of materials to a given landscape. The way in which the materials like fertilizers, chemicals, and seeds are applied is based on data that is collected by sensors, maps and GPS.
- ✚ **Wireless Sensors Network and IOT** - WSNs for environmental condition monitoring with information of soil nutrients is applied for predicting crop health and production quality over time. IOT connect this different sensor with internet and can access by mobiles. Various applications of WSN and IOT are irrigation management, pest and disease control, Ground water quality monitoring, asset tracking etc.

Application of GPS in agriculture-Precision farming helps in Mapping yields (GPS + combine yield monitor), Variable rate planting (GPS + variable rate planting system), Variable rate fertilizer application (GPS + variable rate controller), Field mapping for records and insurance purposes (GPS + mapping software), Parallel swathing (GPS + navigation tool). Farm inputs could be used more efficiently especially chemical fertilizers and PPCs which indicated potentially lower environmental damages under precision farming practices. Thus it promises the soil health and sustainability in production. Adoption of precision farming needs awareness through political support and human development programs. There is lack of knowledge of infield variability among farming community and there is misconception of getting higher yields by applying high doses of fertilizers and application of higher quantity of PPC. Thus, precision farming can be chosen as an appropriate option for sustainable agriculture in India. The precision practices may be different from one place to another place. There are huge scope to adopt a part of precision farming technologies in Indian agriculture through collaborative efforts by space technology organizations, agricultural institutions, private sector and NGOs.