

Precision Agriculture And Its Scenario In India

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Abstract: Precision agriculture is becoming an acknowledged method of crop farming and has become an important method to acquire agricultural outcome in a sustainable and environmental friendly way. Additionally, increasing attention towards automated data, acquisition & knowledge processing is leading towards augmented agriculture management and increased capability in crop production. The advantage and effect of using precision agriculture technology is eminently abased on the abilities of integrated technology along with human efforts. The study related on the subject is centralized on the basis of survey and research on history, development, applications, and benefits of precision agriculture, especially for small scale farms. Consequently, work was analyzed and research data was reviewed in the paper. Precision agriculture imparts with an innovative approach using modern techniques to provide brand new solutions for present day farming problems, which basically includes balanced productivity with environmental protection.

Keywords: Automated data, Integrated technology, Augmented agriculture management

I. INTRODUCTION

By 2050, agricultural o/p will have to double to keep pace with population growth, changing diets & increasing demand. In 2040, agricultural o/p will need to increase by 100%.

The future scenario consisting of land use pattern with respect to agriculture, increasing population, depleting energy resources, fresh water supply, soil quality along with decreased rainfall, extreme weather patterns, climate change, achieving above facts using conventional agriculture is virtually impossible. Hence, to tackle the situation, agriculture must be integrated with modern methods in a sustainable way to assure sufficient nutritious food for all the people. This led to advent of an innovation called P.A in the agricultural scenario.

P.A or satellite farming is a farming management system based on information and technology to analyze, determine and administer lands within farms for optimum sustainability & protection to procedure better profits. The farm is divided into smaller parts, each part is firstly any analyzed preliminarily and then in a detailed manner for yield, moisture content, soil futility etc. Since, the data is obtained from GIS database, move precise control on the treatment such as fertilizer, herbicides & pesticides applications are applied timely to a particular part of land for a specific crop with suitable amount, preventing their excess use.

II. HISTORY

Considering all the major technology shifts, the technologies & the tools changed to get better & improved outcomes. Likewise, precision agriculture presents major shift in the innovation of modern day agriculture. In yesteryears, owing to the small sizes of farms, surveying, collecting data and decision making on that data was practically possible. However, it is not so presently, with larger farms. A crude method is to stake out the field to show areas that require different treatment, but it is not practical on large fields. The advent of GIS in 1960s & 70s allowed for low cost, reliable tool for surveying.

In 1980s & 1990s, a number of different intelligent devices & Implement components were developed. However, these were only data collectors without spatial recognition of data. The major breakthrough occurred with the advent of GPS with enough satellites available in the 90s, civilian operators had better spatial analysis with detailed data collection of the fields and field characteristics to approach appropriate sustainable decision, which is now called as precision agriculture.

III. DEVELOPMENT

Various stages involved in the development process are as follows

1. Abstract stage: Means a mass of signals of numerical values, which have no practical value in themselves.
2. Reconnaissance stage: Provides some meaning from a set of data (e.g. levels of excessive, appropriate or deficient fertilizer use).
3. Decision stage: Implies that information is individualized in some logical way, enabling to make decisions & farming guidelines.
- 4 Implementation stage: Proper analysis of collected data, [decision making, farming & subsequently following guidelines] then proper & specific implementation for optimum results.

The first three stages are mainly related to virtual part or I.T and the last stage calls for human reasoning and application. For proper development it is necessary that all the stages are closely interrelated with each other. Therefore, with positive intervention of technology along with close collaboration with human efforts, the concept of precision agriculture was developed.

Site specific farming or precision agriculture has opened up colossal avenue for awareness of variability in the farm, precise implementations to get higher yield. The major applications being yield.

- Increasing yield content: Having obtained the precise information of each zone of the farm, proper analysis is done for crop production. Zones having poor soil quality can be specifically treated with soil additive/nutrients to get uniform soil quality. Hence, maximum production is achieved with minimal intervention of substitutes.
- Increasing yield quality: Along with knowledge of specific soil characteristics obtained by satellite survey, and perception of crop specific nutrient requirements, the most suitable crop is planted in the most suitable zone to achieve better yield with excellent quality.
- Risk management: Every aspect concerned with precision agriculture is precise & calculated. Moreover, due to greater machine intervention than human intervention, the whole process of farming has become more precise & specific rather than a matter of trial and error.

IV. SCENARIO IN INDIA

Although India being characterized as an agricultural state, the actual scenario is quite bleak. With more than 75% of total farm assets in the country are less than approximately 4.8 acres. Most crops being mainly fed by seasonal rainfall, moreover, the rate of irrigation being almost 50%, resulting in lower levels of productivity. With almost 60% of population engaged in farming and farming related activities, the situation is extremely grave.

Due to poor mechanization, farming has become a back-breaking venture, resulting in most farmers' children opting for other streams for livelihood. Moreover, farmers find it more feasible selling their lands to builders,

industries, malls etc. than farming. All of which would eventually lead to shrinking of farmlands that can feed the billions plus of our country.

Successful implementation in India.

1. TATA KISAN KENDRA(TKK)

TKK was an initiative of the Tata group under the Tata Chemicals (TCL) to harness this particular technologies. TCL's services, brought to farmers through the TKK, use of remote sensing technology to analyse soil, crop health, pest attacks and coverage of various crops predicting the final outcome.

Outcome summary

- Healthier crops
- Higher yields
- Enhanced income for farmers
- Financial support
- Insurance against natural calamities
- Buyback facilities

2. Tamil nadu Precision Farming Project

Govt. Of Tamil Nadu assigned this task to Tamilnadu agricultural University. Which financial grant for installation of drip irrigation and crop production. Drip irrigation providing precise and regulated application of irrigation water and plant nutrients at low pressure and frequent intervals through pipes directly into root zone of the plant.

Outcome summary

- Reduced water and fertiliser requirement
- Less weed infestation
- Proper moisture maintenance and soil aeration
- Increase in productivity
- Water savings
- Elimination of soil erosion

V. BENEFITS AND IMPACTS

- 1) Precise examination of soil, information acquisition and data interpretation allows alteration of chemicals additives to match particular areas of the farm.
- 2) Authentic farm navigation reduces extra applications and skipped areas and allows maximal farm space utilization in the minimum amount of time.
- 3) It allows chance to work when conditions are not appropriate like heavy rain, fog, dust, dim lighting which in turn booms productivity.
- 4) Precisely monitored yield information allows site specific farm anticipation.

By imparting precision farming technology, the quantity of additives and nutrient fertilizers have been reduced while the yield production raised. Consequently, farmers investment had good returns on their input due to their savings in pesticides and nutrient additives amount. Precision agriculture is environmentally viable and a continuous supply of food over the year is guaranteed. With the help of precision farming 'seasonal' system is eradicated and yearly availability of fruits and vegetables is made possible.

VI. CONCLUSION

The real potential of precision agriculture mainly depends on the gap between the technological capabilities and scientific understanding between information technology and human reasoning. The main objective of Precision agriculture is to obtain maximum yield with minimum input along with reduced environmental harm. Various scenarios involving success of this technology in India have been discussed. Moreover, site specific farming is paving way to the further scope of adopting modern methods of farming leaving the conventional one using right resources at the right time with proper management, eventually resulting in a sustainable method of farming along with environmental protection.

VII. REFERENCES

- 1) S.A Shearer, "Big Data: The Future Of Precision Agriculture", The InfoAg Conference Union Station, St. Louis, MO June 29, 2014.
- 2) Subrata Kr. Mandal and Atanu Maitly, "Precision Farming for Small Agricultural Farm: Indian Scenario", American Journal of Experimental Agriculture.
- 3) Ms. Shannon Norwood and Dr. John Fulton, "GPS/GIS Applications for Farming Systems", Alabama Cooperative Extension System/Auburn University.
- 4) Resource Guide, "Precision Farming And Variable Rate technology", ARECA