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A Study on the application of Remote Sensing, GIS and GPS Tools in Precision Business

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Abstract: From long time there are many technologies was developed by researchers, scientists and engineers to increase the market and production if the agriculture. Just because of this research work the cost and work of production is decreased but sometime there is some opposite effect on environment and geology. To improve the agriculture practice accurate agriculture pacts with the study of the application of technology as compare to old agricultural method and lower unpleasant impact on environment and geology. Remote sensing, GIS and GPS technology play an important role in accurate agriculture which increases the agriculture practices. It is easy to keep field data like slope, aspect, yield, wet and nutrients with the help of GPS (Global Positioning System) with geographically latitude and longitude. GIS (Geographic Information System) store and handle these data for further analysis. This review paper include topics remote sensing technology, GIS and

Keywords: GIS and GPS, Precision agriculture, environment, Remote Sensing.

I. INTRODUCTION

The populations of all countries are increased over the 10 billion in the decade of 2050 [1]. So showing continues increasing population, it is necessary to develop such technology which improves the production of the agricultural. These all are available in cost effective manners. To achieve this goal it should be goal of all farmers from large scale to small scale farming. A farmer use feasible strategy of farming and also have knowledge about precision farming. At the starting point of precision farming, the farmers need to face many problems to use to this system but later they can furnish health of his crop, stress damage, or likely yield and soil conditions. Commodity brokers can easily find out the quantity and quality using such tools so they easily estimate all the products price and worldwide trading. Precision agriculture compacts with the study of the application of technology to produce agricultural product, which accomplish food requirement of world. This can not be satisfied with conventional agricultural method and because of this we decrease the adverse impact on environment and other problems. Precision agricultural is combined agriculture with management and technology, remote sensing, GPS (global positioning system) and GIS (geographical information system). It is developed to improve the farmer efficiency at low cost and award more productions. If it is done in organic method then it also helps to reduce the redundant effects of chemical to the environment.

Some time it creates myth that precision farming is only for larger scale but it is beneficial for small area and different condition of soil and crops.

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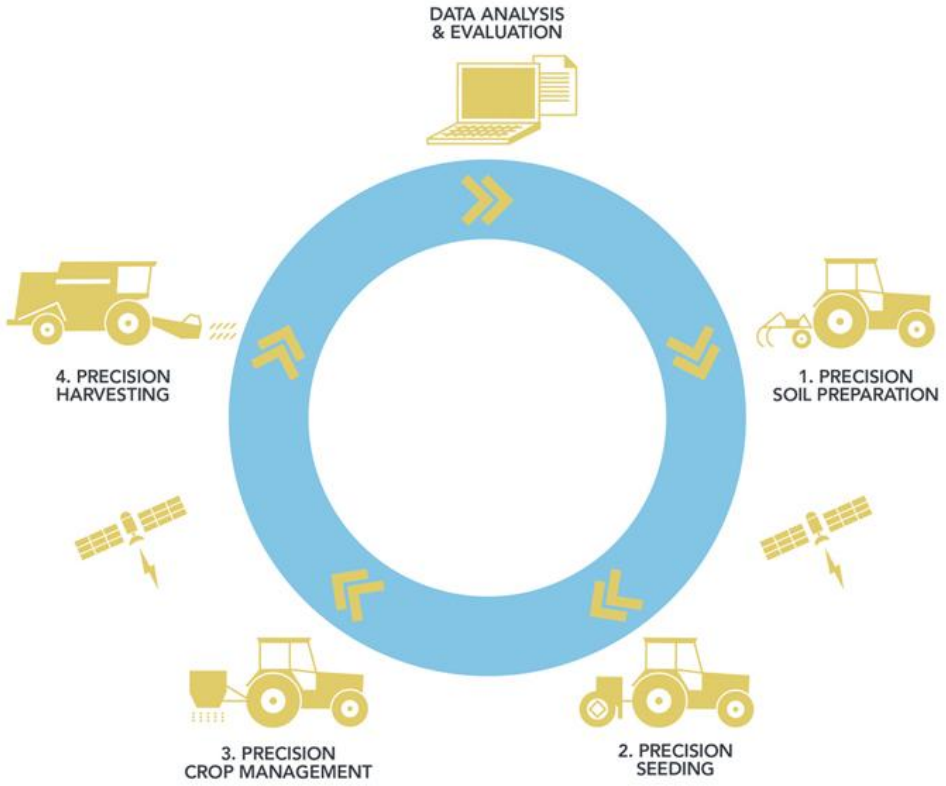

Figure 1: - Precision farming cycle

There are many developing countries it is very difficult crop management, so precision farming is good to seize in soil and crop condition frequently in time span. Now the precision agriculture change the way of working farmers and agribusiness person. It gives knowledge to collect their profits in critical condition as well. Precision agriculture is about collecting information about soil, whether, requirements of animals and mechanical hardware. It wlaso help timely specific treatment of site and help green environments.

II. Remote Sensing in Agriculture.

The remote sensing is widely used in precision agriculture and agronomy. It plays an important role to gain significant growth and profits day by day by farmers. It is used for monitoring the agricultural activities faces the problem. It exercises space sensors which is a tool for obtaining repetitive and local to regional coverage information. Those are used to observe behavior of crops and their growing environment. We can store all this information in database to use them in applications such as crop inventory, crop production forecasts, drought and flood damage assessment, range and irrigated land monitoring and management. The productivity of agriculture monitoring systems is monitored timely. It is more important to point out by the Food and Agriculture Organization (FAO) (2011) [5]. This review aims to provide an overview of recent remote sensing developments in terms of regional and global applications for agriculture. A brief mention of conventional procedures of crop acreage per estimation in India and the rationale of use of RS for crop inventory is made before reviewing the Indian experience. Salam et al. (1998) worked on crop inequality condition and estate estimation using IRS III digital data to prepare winter crop inventory of parts of Haridwar and Saharanpur districts, Uttar Pradesh, India. Bairagi and Hassan (2002) has used remote sensing and agrometeorological data for the 1998-99 Rabi season for defer and production forecasting of wheat crop. This study aims to provide overview of remote sensing development at local and remote area Foley *et al.* (2011) [7], Tilman *et al.* (2011) [8] and Mueller *et al.* (2012) [9]. Johnathan Foley mentioned why we require investing more in agriculture sector [6].

Working of remote sensing: -

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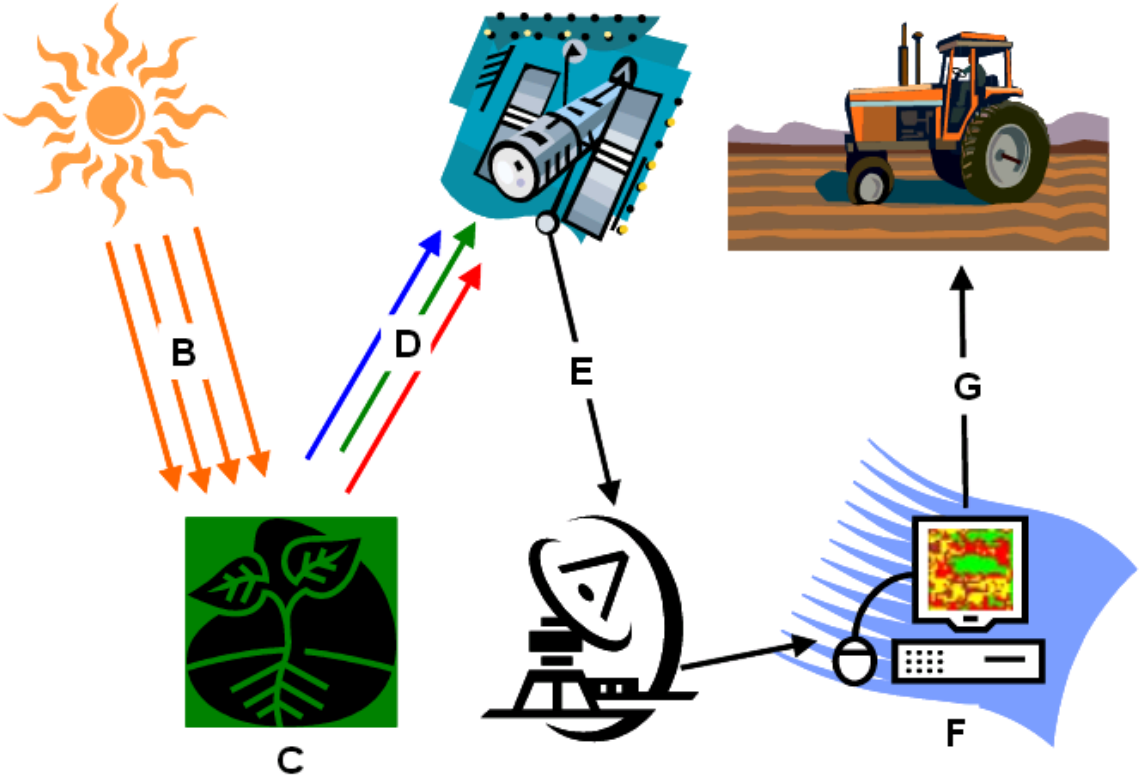

Figure 2: - Remote Sensing Process

From the above figure we can say that remote sensing process is applied to geospatial agricultural processes to observe. The sun produces electromagnetic energy over plants. Then this electromagnetic energy is transmitted from plants to sensors. The sensor on the satellite detects the reflected energy which is coming from the plants. The data is then transmitted to the ground receiver station which works as base station to transmit that data to data store in computer. These data is examined by computer and displayed on field or farms to gain information about precision agriculture.

III. GIS in agriculture

GIS (Geographic Information Systems) are extremely accommodating in project current and future variations in rainfall, temperature, crop condition, and soil management. It is a dominant tool for collecting, storing, retrieving, observing, transforming and displaying spatial information from the actual world for a particular purposes [4]. Now there are many organization who implement GIS like USDA and it is very revolutionizing application for planning and management of precision agriculture. It can study soil data integrated with past farming done to determine what the best crops to plant are, and how to maintain soil nutrition levels which give best reimbursement to plants. The agriculture perform main role to improve economics of developing countries because till most developing countries are not aware of technology in precision agriculture and agronomy. In developing country like India it is very difficult to forecast the weather. So in such countries satellite can help to get data of earth and analyze to calculate crop inventory. So the uncertainty is condensed in grain industries with accurate and reliable crop estimation per year. Still the tool like GIS is not used or could not be used in agri-oriented countries but even it has strategic advantages for future agriculture growing and planning to role in economics. Just like every business, agriculture also requires some inputs to get best output. GIS can simulate complex weather system to analyze spatial data. GIS technology combines satellite information and natural information to create one understanding model. The farmers collect all the scientific evaluated information by using receivable mobile GIS system in the ground.

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Figure 3: - information stored online by GIS Solution

Benefits of GIS in agriculture [10]:

- Normally in agriculture planning is largely work on guess system. So GIS helpful for precision farming and improve the ground quality.
- The soil quality is never same at all fields it has un-ubiquitous nature. So we can get information about slop, drainage and water access which are changes timely by GIS.
- It also gives some basic information about sunlight, shade and area of road.
- GIS gives connection between archeological and agricultural

IV. GPS in agriculture

The combination of GPS and GIS make possible to implement precision agriculture. GPS allocates farmers to work during low visible ground conditions such as rain, dust, fog, and darkness [11]. In the past it was difficult for farmers to associate production techniques and crop ground with land inconsistency. The global positioning system (GPS) makes possible to record the in-field variability as geographically encoded data. It is possible to determine and record the correct position continuously. This technology gives important details about fields and agriculture area for that big database is available 24 x 7 for farmers. The farmer or farm manager can get accurate details where GPS positions pointed. GPS receivers are coupled with field monitors provide spatial coordinates to monitor data. This can be mapped of each field. GPS itself combine the information which is collected by satellite receivers from the different fields for chemical

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application, harvesting and cultivation [10]. The GPS gives accurate position information which are used for collecting and observing data.

How GPS work:

- Steering module of GPS can control real steering of tractor. This is work on hydraulic or electronically
- GPS system can reference the position of tractors in defined field.
- PC which equipped with software to examine data and transmit data for direction.

V. Conclusion

Precision farming allows the precise tracking and tuning of production of agriculture. Precision farming makes farm planning easier and more profitable. Sometime it may happen that the farm manager think it is very complex to adopt but when they use to do then surely they can get wanted results. The farmer or farm manager can forecast or plan information for cropping, erosion controls, salinity controls and assessment of tillage systems. But as the amount of data grows, more work is needed to interpret the data and this increases the risk of misconception but now there are many database and data mining software available which give interpreted information. If we want fast result from precision farming then it is necessary to get work from several professionals in agriculture or give some training to local people. Hence, the base technologies in precision agriculture are GIS, GPS and remote sensing to improve agronomy economics.

VI. Reference

[1]. Lutz, W., Sanderson, W. and Scherbov, S., 1997, Doubling of world population unlikely. Nature 387, pp 803–805.

[2]. Salam, M.A., and Saha S.K., 1998, Crop Inventory using remote sensing and Geographical Information System (GIS) Techniques. Journal of Remote Sensing and Environment 2:

[3]. Bairagi, G.D., Hassan, Z., 2002, Wheat Crop Production Estimation Using Satellite Data. Journal of the Indian Society of Remote Sensing, 30(4), pp 213–219.

[4]. Burrough, P.A., McDonnell, R.A., 1998, Principles of geographic information systems. Oxford University Press, Oxford, UK, pp 10–16.

[5]. Food and Agriculture Organization of the United Nations (FAO). *Global Strategy to Improve Agricultural and Rural Statistics*; Report No. 56719-GB; FAO: Rome, Italy, 2011.

[6]. Jonathan Foley. *How to Feed Nine Million and Keep the Planet too*. Available online: http://www.newsecuritybeat.org/2011/10/jon-foley-how-to-feed-nine-billion-and-keep-theplanet-too/#.USI9VKV303k (accessed on 18 February 2013).

[7]. Foley, J.A.; Ramankutty, N.; Brauman, K.A.; Cassidy, E.S.; Gerber, J.S.; Johnston, M.; Mueller, N.D.; O'Connell C.; Ray, D.K.; West, P.C.; *et al.* Solutions of a cultivated planet. *Nature* 2011, *478*, 337–342.

[8]. Tilman, D.; Balzer, C.; Hill, J.; Befort, B.L. Global food demand and the sustainable intensification of agriculture. *Proc. Natl. Acad. Sci. USA* 2011, *108*, 20260–20264.

[9]. Mueller, N.D.; Gerber, J.S.; Johnston, M.; Ray, D.K.; Ramankutty, N.; Foley, J.A. Closing yield gaps through nutrient and water management. *Nature* 2012, doi:10.1038/nature11420.

[10]. http://www.environmentalscience.org/agriculture-science-gis

[11]. http://www.gps.gov/applications/agriculture/ last modified on November 25, 2014.

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