



# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## A Review on Precision Agriculture and Its Farming Methods.

M Monisha\*, TG Dhanalakshmi.

Embedded Systems, SASTRA University, Thanjavur, Tamil Nadu, India.

### ABSTRACT

In recent times, the major characteristics of wireless technology like communication and sensing are real time basis and it provides better response time and low power requirements. Both features have been established and totally determined with precision agriculture. Wireless sensor networks are considered as developing technology for proficient and economical Precision Agriculture (PA). Prior to precision agriculture the farmers depend on many technologies like satellite and aircraft imagery based systems to exactly focus their growing areas, but PA technology provide the real time feed-back on a spot variables, crop conditions. By using WSN, size of the crop area is analysed as well it gives report based on amount of fertilizer and water which are sufficient for the crop. Precision agriculture comprises of monitoring soil, crop climate condition, and takes various actions which are based on real time modification of fertilizer or pesticide application. Some of the important techniques such as digging the land and plotting the seeds in, watering the crops, harvesting and storage etc. In WSN several issues are included such as connectivity and coverage and also nodes deployment, control algorithm and architecture are the main challenges.

**Keywords:** WSN, Precision agriculture, Crop, Farmers, Fertilizers

*\*Corresponding author*



## INTRODUCTION

Wireless sensor network plays a prominent part in agricultural environment and also solves some technical problems related to this environment. Agricultural regions are spread throughout the field so that any information related to this environment will differ continuously. Some techniques which are used to collect & analyse the crop condition are also used to identify the suitable time to harvest and predict the disease. Sensors are integrated and deployed in the specified area in land. Sensors work together to sense and monitor both soil and weather information in real time [1]. Sensed data is processed with the help of embedded system and then transmit the processed information to the decision centre. This provides various services like remote monitoring, managing agricultural environment etc...[2]. Nowadays these types of networks are used in irrigation, cultivation, fertilizer and pesticides management and they are implemented in the field with the help of embedded technology.

For precision agriculture preparation various technologies and innovations are involved they are controls, remote sensing skills, sensors. Some of the control techniques used today is unmanned vehicle for seeding, spraying pesticides according to the land requirement, Automatic farm operations using mechanical vehicle, deployment of sensors for network operation to supervise the crops and rate of agricultural chemicals [3]. In remote monitoring technique the adequate amount of pesticides and fertilizers are estimated with the help of spatial image resolution. Real time implementations of sensors are needed since they are cheap, robust and preferable. By using sensors farmers can use mapping system for harvesters and detect the crop condition. GPS technology is affordable for farmers to identify the crop disease or any anomalies, soil condition, data which are collect from these sensors, analyse and provide standardized information [4]. The farmers can also alter their farming practices as information based modern agricultural and enhance their agricultural methods.

## TECHNOLOGIES IN AGRICULTURE MODERNIZATION

Current requirements of agriculture are tools and knowledge which is used to enhance the adeptness and peculiarity and it also decreases the environmental issues on the crop. Precision agriculture is a technique which is well-defined integrated information and its specify the process of utilize the adequate amount of resources such as water, pesticide, fertilizer at required place in the land and crop so it will improve the production and support for protecting the environment and resources [5]. For social modernization, the main applications that focus and related to agricultural background are frequently monitor the soil moisture, to verify the weather condition, and other inputs to provide the detail information about the field, by using GSM module to observe and manage the overall system [6]. In agricultural modernization, WSNs are utilize more numbers of sensor nodes which are less expensive and power, small in size, limited energy saving. Construction of WSN is based on their specific application they required; therefore various technologies, analyses and also several algorithms for sensor communications are implemented in that application to overcome the issues and challenges related to agricultural environment [7]. The deployment of wireless sensor network in outdoor environment which simultaneously check and trace the field information which can relegate the use of chemical products such as fertilizers, pesticide and other pollution products [8]. This type of technologies target to yield crops without toxic and it will protect crops.

### Crop Monitoring techniques:

A unique novelty and skills related to this background based on different application such as monitoring, remote sensing the crop, soil moisture and mineral content. In these technologies they used to evaluate the crop health, and also recognized the crop invasion, moisture deficits, fungal and weed infestations therefore this type of detection helpful to endow a chance for farmer to modification in the concern field [9]. Image compression images of crops are captured and sometimes image influenced by some peripherals the information of crop images is transmitted and it consumes large energy, the accurate image of the crop provides sufficient information sensor nodes which support for the reconstruction of image quality by using this compression technique [10]. The frequent Remote sensing data identify the stress related to the land and this information will transfer to the farmer within few days. Generally growth of crops is different from one place to other because of the nutrient deficiency and other type of scarcities. Using this methodology the farmer reduces the inputs expenses and some impacts allied to environment. In remote sensing consists of various attributes that afford themselves to checking the healthy crops, this sensing

imagery gives the spatial view about the land it is also denote as optical (VIR) sensing. The farmer observes the images and makes the timely decision about managing the crop. Optical sensing is that it can be used in much agricultural application by recording a data transmission of wavelength, highly sensitive wavelength to crop stress and crop damage. In monitoring techniques the complete components of decision based agriculture are GPS (global positioning system and mobile mapping GIS (geographic information system) which is used for the analysis of maps, photograph, field observation, climatic result and testing results [11].

#### **Irrigation techniques:**

Irrigation is systematic technique for supplying water to the field or soil that is being refined. In some dry areas there is no water and rainfall so they preserved the water in the canals, wells but this process having also some difficulties related to labours and workload get increase and some issues such as under-irrigation, over-irrigation, trickling the soil also happen. To overcome these problems, before supplying water to land there was testing provided for soil conditions to enhances crop production and growth. This type of techniques manual operation are not needed all are automatic which support for farmers and to take the decision in timely manner. In automated irrigation system the wireless sensor networks infrastructure to control the sensor nodes, the farmers receives real time data about the field information and make decision according to the received data, correct amount of water is applied to the crop [12][13]. The main intention of automated irrigation system is to preserve the water, energy, the system which support both manually and machine based, and also find the water level. GSM technology used for automatic farm irrigation by using the controller section in the system. GSM which helps to transmit the information related to field using some coded signals to farmer mobile device. The farmer controls the irrigation system indirectly, so the eminent irrigation to the field without wasting a resources. In the SMS based system the temperature, humidity, status of power and water supply all are transmit in the form of message to the farmers mobile and the Bluetooth based controller are provided to manage the operation automatically.[14] This technology contains fewer signals depreciation and easily available this build better for sending message and control the signals, updating also provided over long distance.

#### **Fertilizer and Pest Management:**

A proper maintenance is needed to protect the crops and their growth sometimes various diseases caused due to climatic issues, there may be differ in soil moisture level, temperature, humidity and pH level of the land so the farmers used pesticide to prevent the land but they not having a knowledge about amount of pesticide for the required area then crop areas are not covered in spraying so the some nano-sensors are used to detect the diseases and for spraying techniques robots and automated aerial vehicle technology are furnished [3]. In these technologies the spraying operation is fast and efficient, this vehicles received the details about the land from WSNs which deployed in the land depend upon the areas its drenching the chemicals [15][16]. The routing protocols and localization schemes also included and its self- adjustment vehicle if there is rapid differ in wind it not spray in the neighbouring land is also avoided [3]. This technique WSNs feedback is important, based on the feedback map is designed for the chemical concentration needed areas then the automated vehicle sprayed the specific field effectively. These Implementation techniques impacts which are depend on the message alteration between sensor node and vehicle.

#### **Farming Lifecycle process**

Farmer carries outs the farming lifecycle process in eight layer stages starting from selection of crops to irrigation.



**Fig 1: Life cycle diagram of farming process**

**Crop Selection layer:**

Farmers need to consider several factors before selecting a crop. They should make a correct selection in selecting a crop particularly in perennial types because it will finally translate into positive farming venture [1]. The major factors to be considered while selecting crops are discussed below.

**Prevalent farm conditions:**

Environmental scanning is the primary process for a farmer. Supervisory rule for farmer is they need to know about their farm field and then select the good crop. Biotic factors and Climatic factors are also to be considered. Biotic factors [2] define about the living organisms including both macro and micro organism that includes different ways in which they change the growth of plants and the advancement. Climatic factor includes prevalent type of climate, temperature, rainfall, relative humidity, light incidence and frequency will control the selection of crops. A steady amount of water inside the farm provides wide guarantee for farmers in selecting crops.

**Crop Flexibility:**

The crops and the categories to be grown up and should be choose based on their flexibility to the current conditions in their farm. Discussion with neighbour farmers will also give you some helpful information that leads to the possibility of success or failure.

**Endurance to pests and diseases:**

Heedlessly the aim of farming is important in choosing a crop and providing variety with large resistant to essential pests and diseases. The use of legally responsible farms may leads to high cost of production or else bad crop failure [1].

**Existing technology:**

The technology used for the growing of crops must well recognize or it should be very simple to study and employ in real time [3]. As well as particular crops are chosen since technical assistance is accessible nearby.



**Farming technique:**

Selection of crop is exaggerated by the arrangement of farming engaged that is if merely crop farming or combined with livestock animals. As well as certain crop species are also need to be developed. Farming will vary on the crop making practices like multiple cropping and planting patterns.

**Security:**

In the lack of security workforce or there is no barrier that will leave out prowlers. Selection of crop may be finished in present of those which are not vulnerable of theft [5]. This will clear such crops like vegetables and fruit crops which can be simply fielded for food and for cash.

**Preparation layer:**

Land preparation also known as tillage or cultivation. The steps involved in the land preparation approach are

- Tillage
- Levelling
- Fusion of organic manures

**Tillage**

Tillage includes like process of ploughing, harrowing and sub soiling. To carry out Tillage operations crops tractors [4] are being extensively used. Tillage operations done via Tractor drained effect are almost standard and speedy. Mould board ploughs or disc ploughs are used for initial ploughing process. Before going for further tillage operations the soil must be allowed to weather for a week. Tyne harrows, disc harrows or Rotavator is used for secondary tillage operations. Among three Rotavator is best one because it is a multipurpose implement which chops the crop residues, rags them and finally merges them into the soil in one pass.

**Field levelling:**

Tractor operated leveller is used for carrying levelling operations .A moderate level field is more important.

**Fusion of organic Manures:**

At the time of soil preparation organic manures are added. It is very useful in enhancing and preserving soil fertility and its efficiency [6]. Organic matter benefits in upgrading the soil structure in water plot capacity and microbial activity. Organic manures will also helps to liberate some plant nutrients like phosphorus and micronutrients.

**Seed Selection layer:**

**Methods of Planting:**

The real planting approach is dependent upon the specific harvest to be sown [7]. You will find six planting methods which often differ within their merits, demerits and adoption. There are

- Broad spreading
- Broad or Line planting
- Dibbling
- Transplanting
- Planting
- Laying seeds following your plough



**Broad spreading:**

Allocation related with seeds by human gives the sorted field followed by layering with wooden planks or harrow intended for make contact related with seed through soil. Crops like rice, paddy, Sesamum, methi, coriander, and many others are sown by this technique [7].

Advantages:

- Quick & most affordable method
- Skilled labour is not uniform.
- Adopted with all wet condition.

Drawbacks:

- Seed necessity is additional
- Harvest stand is not uniform.
- Lead to gappy germination & faulty in which the actual sufficient water is just not present in the actual land.
- Spacing is just not taken care of inside rows & wrinkles, for this reason interculturing is actually complicated.

**Broad or Line planting:**

It is the generous technique that associated with seed that plants into the land through lay actions like mogha, seed soccer drills, seed-cum-ferti driller or physical seed soccer drills speed. Actual seeds are usually covered by timber planks or harrow that acquires between seed & land. Crops just like Jowar, rice, bajara, and many others are usually sown by using this technique.

Merits:

- Seeds are lay at right & homogeneous depths
- Besides actual rows, interculturing may be accomplished
- Seed necessity is actually below broad spreading
- Planting is done at right water levels.

Drawbacks:

- Wapsa issue is really essential.
- Intra row spacing is not taken care
- Skilled particular person is necessary consideration for planting.

**Dibbling:**

The placing or dibbling associated with seeds at cross represents (+ stated) in the field through manufacturer depending on the element they harvest in the directions. It is done personally by dibbler. This method is adopted in herbs like Groundnut, Castor, and Cotton, and many others which are experiencing bold sizing and quality.

Merits:

- Spacing in between rows & vegetation should be taken care
- Seeds could be dibbled at required detail within the water area
- Implement is just not needed for planting,
- An intercrop could be consumed greater spaced herbs
- Cross sensible Intercultivation can be done.

Demerits:

- Mind-numbing & cumbersome approach,
- Require additional labour, for this reason improve the price tag on cultivation,
- Only quality & vibrant seed usually are sown
- Require strict direction.



### **Transplanting:**

It is the elevating and transplanting associated with new plants on nursery beds or within the organized industry. For this reason, new plants are permitted to mature on nursery beds around 3-5 days. Mattresses are usually watered one day ahead of the transplanting associated with nursery to avoid chic towards the root base. The real industry is actually irrigated just before transplanting to obtain the new plants that need to set up earlier which often reduce the fatality rate. In addition to the benefits & down sides of dibbling approach, price related with cultivation connected with harvest could be saved but requires more attention within the nursery. This method is actually adopted within herbs like paddy, berry, veg, herbs, cigarettes.

### **Growing:**

The planting associated with vegetative part of herbs which are considered as vegetative spread within the organized industry. At the Gram side, tubers are associated with Potato, mommy pieces are associated with ginger & turmeric, and cuttings are associated with sweet potato & grapes and pieces of sugarcane.

### **Laying seeds following your plough:**

Laying up of seeds that driving the plough within the channel through manual labour. This method is intended for crops like wal or gram in most areas for betterment purpose using soil moisture. The seeds are covered by successive furrow opened through the plough. This method is not normally followed for sowing from the crops.

### **Harvesting layer:**

The process of cutting and gathering of the ripe crop is named harvest. In India, most of the harvest is finished manually and reap hook is the solely tool that's used for this purpose. The sickles square measure of 2 sorts namely plain and saw-shaped (serrated). The saw-toothed sickles square measure used for cutting paddy and wheat crops. When cutting, the crop is gathered at one place and is allowed to dry in the sun for many days.

Harvested crop uses a threshed to separate the grain from its outer covering is referred as chaff. The process of whipping out the grain from the chaff is understood as separation. In ancient methodology, the separation of paddy is finished by beating the harvested crop with sticks, whereas in case of wheat and different crops separation is finished by treading the crop with a team of animals like bullocks and buffaloes. This methodology is currently restricted to terribly little farmers. Just in case of huge fields, separation is finished with the assistance of threshers. Separation with threshers isn't cheaper, however it is additionally faster and additional economical than treading with animals. Typically the separation of wheat is finished by trample the harvested crop beneath a tractor.

After separation, the chaff and fodder square measure separated from grain by golf stroke the threshed material before a decent natural breeze. Once the threshed material is allowed to fall from a height, the grain being heavier fall straight on the bottom, whereas chaff and fodder being lighter and blown away from a separate heap slightly off from the grain heap. The process of separating the grain from chaff and fodder with the assistance of natural breeze is named as sifting.

### **Use of machines in harvest:**

In the recent year's machines like reapers, threshers and an excellent mix harvests are introduced in Asian nation. However these machines have tried prominent features exclusively on massive farms. The harvest with the assistance of machines allows the farmers to finish the method inside a brief climatically in a favourable amount and therefore the loss of crop owing to untimely rains and storms will be saved to an outsized extent. This additionally provides farmers decent time to organize the sector for next sowing.

However, harvest with machines additionally has some disadvantages as given below:

1. Harvest machines lead to shattering of the grain. Just in case of harvest with sickles, shattering of the grain is negligible.
2. Harvest through machines like combined harvesters leads to loss of fodder and therefore yields less fodder.

#### **Fertilizing layer:**

Presently every agricultural process has been redefined in our scientific mind and also now every process has been lit up with all the effects regarding new equipments. Main inventions that attracted the facilitators regarding producing larger ones than in older age. Particular in older age regarding agriculture has been recently redefined by using latest developed equipment as well as by the effective fertilizers. The particular benefits regarding agricultural fertilizers have proclaimed the new agricultural trend and contains balanced in order to split almost all data and start a new one.

Nowadays a number of agricultural fertilizers happen to be launched within the mind regarding scientific developments so that any sector agricultural sector has benefited amazingly.

Exactly what fertilizer?

The particular material structure of several vital mineral deposits and also things designed for the standard will increase and also eating routine of plants is known as fertilizer. Because these fertilizers happen to be utilized predictably in promoting and also boost the productiveness regarding business oriented plant life therefore they're known as agricultural fertilizers.

Forms of Farm fertilizers:

Because it is often spelled out in which fertilizers are usually are structured as one or even a variety of chemical substances and therefore it is based on the major component chemical substances. The particular agricultural fertilizers happen to be labelled into using categories:

Organic and natural agricultural fertilizer:

Organic and natural fertilizers usually are considered as human fertilizers which are made up of natural and organic materials which are bio-degradable. These types of natural and organic materials usually are additional decomposed and also busted into smaller and also soluble particles by many microorganisms.

Currently it is soluble and also much easier chemical substance. These fertilizers are usually consumed from the origins. Manure, slurry, earth worm's casting, peat, seaweed, sewage, and also guano are obviously taking place. Green manure plant life is produced towards feature nutrients for the dirt. Normally in natural and organic fertilizers manure blood meal, bone tissue supper and also seaweed removes etc

Inorganic agricultural fertilizer:

These fertilizers are constituted by inorganic substances usually are called inorganic agricultural fertilizers. These types of fertilizers are usually non-biodegradable. In addition to these include additional broken down into a variety of categories determined by their own constituents and also methods of arrangements.

These types of fertilizers are known as manufactured or even synthesized fertilizers since they usually are manufactured in the industrial facilities making use of most recent systems. The particular manufactured making processes give these fertilizer a new difficult touch and also propel those to end up being stable and also highly performative.





#### Macronutrients fertilizers:

The particular focus of each fertilizer within the dried base can determine generally their energy and as well their own major component things. You can find six principal and the majority prominent things which in turn engage in an essential purpose within the increase with the plants.

Nitrogen, phosphorus, and also potassium usually are primary macro-nutrients. Calcium mineral, magnesium, and also sulphur come under the group of secondary macro-nutrients. Though all these nutrients are essential from the plants with pretty much equivalent quantities even so their own availability signifies the variation. Plus the previous fertilizers completely contain nitrogen, phosphorus, and also potassium though the pleasure regarding secondary macro-nutrients is commuted although liming and also manuring.

These types of macro-nutrients are incredibly important for the best and also anti-retarding increase regarding almost any plant and additionally these nutrients boost the brings by excellent variations.

#### Micronutrients fertilizers:

Crops also need to have specific nutrients with little yet vital quantities and also lack of these things may hamper the increase in an efficient method. The particular plant increase could be retarded and will indicate a new long-lasting effect on the brings too. However micro-nutrient fertilizers usually are used to assist the reduced yet required needs with the plants and therefore these fertilizers usually are geared towards supplying little portions regarding nutrients such as iron, manganese, boron, water piping, molybdenum, chlorine, and also zinc. The particular levels during which these things are needed vary vividly by 5-100 ppm. Farm fertilizers, granular three-way superphosphate, Potassium chloride, Urea Anhydrous ammonia, etc.

#### Benefits of Farm fertilizers:

Use of the increased and also modified fertilizers leads to a huge boost with agricultural productivity and also World Wide Web end result. This beefs up the dirt and also enhances their virility.

You'll find so many plant life and also plants which have various rising routines and also nutritious specifications. The fertilizers help people with comprehending the precise needs and also specifications with the plants rewarding which in turn optimum output could be arrived at.

The particular combined combos regarding calculated quantities with the nutrients helps the plants to obtain prospective nourishment and also help those to speed increase and also provide more than their own normal potential.

The particular fertilizers usually are highly soluble and don't take much time to obtain blended within the dirt and also accomplish the plant right away. But it surely happens solely regarding substance fertilizers and also natural and organic fertilizers remember to end up being blended.

Moreover, agricultural fertilizers usually are a combination of dangerous and also valuable fertilizers. Organic and natural fertilizers usually are not seeing that hazardous because inorganic types nevertheless the ex- requires more time compared to the latter best accomplish the origins with the worried plants.

Abnormal fertilization does encourage excellent brings even so also challenges atmosphere, normal water and also dirt air pollution. So it is incredibly necessary to employ fertilizers with constrained quantities of course, if achievable then natural and organic and also inorganic ought to be utilized simultaneously in order to counterattack the miscellaneous dirt danger.

#### Growing layer:

The actual Harvest Increase Overseeing Method would be the core with the MARS Harvest Deliver Forecast Method (MCYFS) at this time found in forecasting routines in European countries by AGRI4CAST activity. The actual role connected with CGMS offers trusted along with well-timed spatial information



regarding scalp position in European countries, which might be taken in a variety of statistical processes to generate a generate prevision.

CGMS is constituted connected with about three elements:

Climate checking specialized in you are collecting along with control connected with meteorological info. The item yields meteorological indications pertaining to first warn caution along with scalp modelling.

Harvest increase modelling, having the aim of making scalp position indications taking temperature info along with static info (crop parameters, land details, managing practices) in scalp modelling alternatives. Statistical procedures, for your evaluation connected with outcomes, interpretation your interactions in between scalp indications along with scalp generate along with supporting in generate forecasting.

Climate Overseeing:

Meteorological parameters such as regular average, lowest along with maximum temperature, rain, and so on. Can help from the comprehension of scalp development character along with generate down the time. Climate info originates from unique places: (1) direct observations via meteorological gas stops, (2) meteorological products resulting from temperature modeling –ECMWF– or (3) remote control realizing observations via meteorological platforms.

Climate info is then refined to generate spatial tiers (maps) of all the so-called products made up from the dataset. The actual control along with storage connected with meteorological can be as close as you can for the order time. The quantity of observations during the scalp time along with time wait in between these observations as well as the product availableness night out will be the principal parameters determining the flexibility with the system to make up to date scalp estimations. For that reason your places pertaining to meteorological info carry out two principal prerequisites:

Access close to real-time (NRT).

The actual observations ought to be offered (Level 0 information) maximum 1 day following your order time.

Short control time.

The actual control string via observations to help value-added products ought not meet or exceed two nights, thus permitting to help determine end result parameters via scalp modelling in the time wait connected with 3 nights following your observations.

Harvest Modelling:

A new scalp type is several grouped algorithms which simulates your operating of any given scalp. Those people groups of algorithms mirror the main physiological plant techniques –such since mild interception, taking in oxygen, carbon compression, grain production– as a result of a collection of assumptions along with calibration parameters. In essence, your input datasets connected with scalp models combine meteorological info (temperature, rain, photovoltaic radiation, and so on. ), land details (soil drinking water potential, land depth) along with managing procedures (e. gary the gadget guy. irrigation). The actual outputs are usually indications connected with scalp development including the biomass developed, your leaf location developed, your biomass allocated from the storage bodily organs (grain with regards to cereals), and so on.

Inside forecasting routines in country wide or regional machines scalp models play an essential role. They offer the cornerstone to help measure the have an effect on connected with temperature in scalp generate. Instead of producing a certain importance expounding on the actual farmed scalp generate, that they determine a collection of indications expounding on your inter-annual variability connected with scalp biophysical parameters that may be statistically in connection with established generate stats to make predictions.

The actual operational models at this time are usually bundled from the BioMA (Biophysical Designs Application) system, a whole new facilities pertaining to scalp modeling currently developed within the MARS Device adding the previous models (WOFOST, pertaining to cereals along with tubers; COMFY pertaining to rice; LINGRA pertaining to pastures) in the more cost-effective surroundings.

#### Statistical Methods

The actual scalp generate outlook process assesses generate predictions in heap. ha-1 clean weight utilizing unique statistical procedures along with computer software tools. Two unique solutions are usually developed using the try and estimate your generate.

(1) The 1st 1 is made up in the basic regression technique, in which the target is within the connection in between the based mostly adjustable: your generate: along with a number independent parameters in connection with climate/ temperature side effects

(2) Though the second reason is determined by analogies between the contingent ailments as well as the earlier, looking into a long time which acts also with respect to chosen activities along with cancelling their own assessed side effects within the real point out so that you can estimate remaining consequences.

The actual generate "predictors" are comprised from the products in the past made by scalp modelling alternatives: meteorological result evaluation (minimum or maximum heat range, water, radiation degree, and so on.), scalp position examination (e. Gary the gadget Guy. land humidity, development stage) along with scalp increase anticipation (e. Gary the gadget Guy. possible generate biomass, possible generate storage).

#### Irrigation layer:

The main element of an efficient irrigation system would be to preserving drinking water. Numerous methods are effective in carrying this out and as a consequence drinking water productivity prices are 90% or higher. A low strength accurate software heart pivot system is one example that has lower lines wrapping by significant hands in which spray drinking water from an amount that previously mentioned on plant's top. Trickle irrigation leaves drinking water through way of plumbing typically PVC which is uninterested in holes. Water drips out and in strategically-placed holes within field is essential and it will reduce evaporation.

If you want to start fertilizing using a sprinkler system, you can also find other ways which will help to increase the productivity as well as less usage of drinking water. For example, scattering throughout hours will increase productivity and lowers solar power substantially. In addition, it unwraps up the area intended for fun as well as utilize in the daytime hrs. Ensuring the system won't routinely first turn on throughout periods of adequate rain fall also can aid spend less drinking water.

No matter what irrigation system will be selected, you can find always solutions to cut costs as well as spend fewer resources. In certain places, specifically where by drinking water will be rare, this is simply not simply an option, however a new qualification for legal reasons. Eventually, finding effective solutions to irrigate is not just beneficial to environmental surroundings, but in addition for an individual's savings.

#### CONCLUSION

Wireless sensor network (WSN) implementation in agriculture have several nodes used for sensing and communication, sensor nodes are sprinkled over a massive region deployment to monitoring the specific events in the field. There are several challenges faced in the sensor deployment, important factors are coverage and connectivity these two issues have several sway on the great on the implementation of WSNs deployment. In coverage reducing the cost of deployment is main issue sometimes in monitoring region some nodes are unknown and risky, it is overcome by following technique which divided into constant coverage and vibrant coverage. From the constant coverage technique the sensors are deployed in predefined areas and at least one observer continuously monitored the sensors and vibrant coverage the sensors having moving capability at a particular time instance, this technique used in random deployment and also by tuning the transmission and sensing range of WSN nodes the power saving techniques are achieved. In connectivity often the path of sensors deployment having some problems during transmission, this issue can be overcome by efficient algorithm is to be implemented and also deliberate the energy efficiency of node.

## REFERENCES

- [1] Rong-biao Zhang, Jing-jingGuo., Lei Zhang, Ye-cheng Zhang, Li-hong Wang, Qi Wang. "A calibration method of detecting soil water content based on the information-sharing in wireless sensor network", Science direct Computers and Electronics in Agriculture 76, 2011 161–168,
- [2] Soledad Escolar Díaz\*, JesúsCarretero Pérez, Alejandro CalderónMateos, Maria-Cristina Marinescu, Borja BerguaGuerra "A novel methodology for the monitoring of the agricultural production process based on wireless sensor networks" ScienceDirect Computers and Electronics in Agriculture, 2011, 252–265.
- [3] Bruno S. Façal , Fausto G. Costa , Gustavo Pessin , JóUeyama , Heitor Freitas "The use of unmanned aerial vehicles and wireless sensor networks for spraying pesticides" ScienceDirect Journal of Systems Architecture, 2014, 394-404.
- [4] Carlos R. Cunha, Emanuel Peres, Raul Moraes, Ana A. Oliveira, Samuel G. Matos, "The use of mobile devices with multi-tag technologies for an overall contextualized vineyard management" ScienceDirect Computers and Electronics in Agriculture 2010, 154-164.
- [5] Naiqian Zhang , Maohua Wang , Ning Wang, "Precision agriculture a worldwide overview" ScienceDirect Computers and Electronics in Agriculture 36, 2002, 113-132
- [6] Chandrika Chanda, Surbhi Agarwal, Er. B. Persis Urbana Ivy, "A Survey of Automated GSM Based Irrigation Systems" International Journal of Emerging Technology and Advanced Engineering, October 2012, ISSN 2250-2459, Volume 2, Issue 10.
- [7] Manijeh Keshtgari, Amene Deljoo "A Wireless Sensor Network Solution for Precision Agriculture Based on ZigBee Technology" Scientific Research Journal, 2011.
- [8] Wang, N., Zhang, N. & Wang, M, " Wireless sensors in agriculture and food industry –Recent development and future perspective", Computers and Electronics in Agriculture Journal, 2006, Vol. 50, pp. 114-120.
- [9] Shining Li, Jin Cui, Zhigang Li "Wireless Sensor Network for Precise Agriculture Monitoring", Fourth International Conference on Intelligent Computation Technology and Automation, 2011.
- [10] Liankuan Zhang, Deqin Xiao, "Collaborative image compression with error bounds in wireless sensor networks for crop monitoring", ScienceDirect Computers and Electronics in Agriculture, 2002, pp 1-9.
- [11] G. V. Satyanarayana, SD. Mazaruddin "Wireless Sensor Based Remote Monitoring System for Agriculture Using ZigBee and GPS", Conference on Advances in Communication and Control Systems 2013.
- [12] Mr. Dnyaneshwar Natha Wavhal, Prof. Manish Giri, "Intelligent Drip Irrigation System", International Journal Of Engineering Sciences & Research Technology, 2014, pp 170-174.
- [13] Swapnita Jayesh, Komal Priyanka, "Irrigation and Fertilizer control for Precision Agriculture using WSN: Energy Efficient Approach", International Journal of Advances in Computing and Information Researches ISSN: 2277-4068, January 2012, Volume 1– No. 1.
- [14] Deepti Bansal, S.R.N Reddy, "WSN Based Closed Loop Automatic Irrigation System Department of Electronics and Communication", International Journal of Engineering Science and Innovative Technology (IJESIT), May 2013, Volume 2, Issue 3.
- [15] Dr. Ross McKenzie research scientist, "CROP NUTRIENTS AND FERTILIZER REQUIREMENTS", soil fertility/crop nutrition Alberta agriculture, food and rural development Lethbridge 1998.
- [16] Morgan, M.A. "The behaviour of soil and fertilizer phosphorous. In: Phosphorous loss from soil to water, Tunney, H, 1998, 137-151.
- [17] Kassam, A, Friedrich, T, Derpsch, R, Lahmar, R, Mrabet, R, Basch, G, Gonzalez Sanchez, E and Serraj, R, "Conservation agriculture in the dry Mediterranean climate", Field Crops Research", 2012, 132: 7-17.
- [18] Kerr, R, Snapp, S, Chirwa, M, Shumba, L And Msachi, R, "Participatory research on legume diversification with Malawian smallholder farmers for improved human nutrition and soil fertility", Experimental Agriculture, (2007), 43: 437–53.
- [19] Knowler, D and Bradshaw, B "Farmers adoption of conservation agriculture: A review and synthesis of recent research", Food Policy, (2007), 32(1): 25-48.
- [20] Lal, R "Soils and food sufficiency. A review", Agronomy for Sustainable Development, (2009), 29(1): 113-33.
- [21] Lal, R, Griffin, M, Apt, J, Lave, L and Morgan, M "Managing Soil Carbon", Science", (2004), 304(5669): 393.
- [22] Lobell, D, Burke, M, Tebaldi, C, Mastrandrea, M, Falcon, W and Naylor, R "Prioritizing climate change adaptation needs for food security in 2030, Science", (2008), 319: 607– 10.