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A REVIEW

Water management in crop cultivation

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Abstract : In mediterranean countries, water is considered as the most basic assets for economic sustainability growth. For cultivation, water is not only essential but also essential in different sectors such as in industries and economic growth. It is considered as also an important component of the environment with significant impact on natural conservation and health. Around 70% of fresh water withdrawals goes to agriculture. The use of water within the sectors are very diverse and included mainly for irrigation pesticides and fertilizers application and sustain livestock. In India, agriculture is an important sector for sustenance and growth of Indian economy. Today, in the whole world, India is one of the largest producers of agricultural products. Several agricultural commodities like tea, coffee, oil seeds, fresh fruits, fresh vegetables, rice, wheat, spices etc. are considered as the major supplier from India. For crop and yards water, irrigation management involves the monitoring of water applications. It is especially important to monitor soil moisture in order to promote optimise crop yields without runoff percolated loss.

Key Words : Agriculture, India, Water, Water irrigation management

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INTRODUCTION

On the earth surface, water is considered as the most main assets for the utilization of human beings and nature of water replies upon use for need geological climate human existence and so on (Wagh *et al.,* 2014). For the endurance of widely varied vegetation, water is perhaps the most significant. As per the examination, it has been tracked down that the aggregate sum of water present in the earth surface is about 97% in the sea and 3% as new water out of which 2% of fresh water are in the structure which is usable for human beings (Phadatare *et al.,* 2016). On earth, water is perhaps the most valuable which delay for the life. It also refers to the amount of water required for dissipation of a grassland that has been cut. It is determined by crop kind, development stage and disappearance request (Parwin, 2014). Indian agribusiness is variegated extending from ruined ranch house and towns to create ranches using current rural advancements. Water system in India alludes to the

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inventory of water from Indian streams, tanks, wells, water ways and other fake ventures with the end goals of development and rural exercises. In agricultural nation like India, 64% of the developed land is subject to storms (Google). Horticulture is a significant piece of Indian economy. 1.6 billion Number of people dwell in locals encountering monetary storage, where the absence of interest in water or deficient human limit makes it outlandish for specialist to fulfil the interest for water (CA, 2007). Agribusiness gives food, pay and occupations and thus can be a motor of development in farming based agricultural nations and a powerful apparatus to diminish neediness in changing nations (Aker, 2010). Truth be told, in India, the significant cultivating frameworks incorporate various cultivations, for example, (Google):

Subsistence cultivation :

This alludes to cultivating for own utilization. The whole yield and profitability are with the end goal of utilization, thus, there isn't sufficient to be sold in the business sectors. Drilled by larger part of cultivating populace in India. There is almost zero to no use of conventional methods and techniques, chemical fertilizers, insecticides and pesticides. A portion of the harvests which are developed are beats, vegetables, sugarcane and so forth.

Commercial cultivation :

The exact inverse to means cultivating. Cultivating is done to sell on the lookout. In this of cultivating, it includes utilization of current instruments, water system, substance manure, high return assortment of seeds, procedures of cultivating and so forth. Under business cultivating, the yields like cotton, sugarcane, jute and groundnuts are the significant harvest filled in India.

Intensive and extensive cultivation :

On huge patches of land, extensive cultivating is finished. The efficiency is greatest because of huge land, however, yield per unit of territory is less. This kind of cultivating is dominantly drilled in the calm districts like Canada and United States. In some northern states of India like Punjab, Haryana and Uttar Pradesh, this type of cultivation is practically missing.

Plantation cultivation :

The plantation in which a domain where single money crop is developed available to be purchased alludes to Plantation Cultivating. Models of Tea, coffee, Rubber, Banana, Spices. British introduced many crops in India.

Mixed cultivation :

The ranchers or the yield cultivators who are engaged with blended cultivating are monetarily in a decent state. It might cover. For instance, a rancher who develops wheat may save some piece of it for his own and his relatives utilization (called as resource cultivating) and surplus piece of it for selling on the lookout (known as business cultivating). Similarly, banana is a manor and furthermore a money crop.

Water assets overseeing exercises fundamentally includes building water control structure (like dams, polders, seepage ditches and so forth) to boost water availability and lower the danger of water based regular perils like floods (Golam *et al.*, 2010). Water the executives can be just characterized as the administration of water assets for the coming next ages. Water is one of the most significant and fundamental normal assets for the endurance and presence of the individuals. In India, out of the complete ground water assets are there, we utilize just 6% for the home-grown reason, 5% for modern reason and the rest 89% is utilized in Agricultural work (Google). Farming should give water from different utilization, regardless of non-food yields, urbanization or modern turn of events and this increment against the diminishing accessibility and rivalry for land (Google). The utilization of oxygen 18 (heavy oxygen), hydrogen 2 (Deuterium) and different isotopes is an indispensable and significant piece of agrarian water assets, the board, permitting the ID of water (and plant supplements) origin and the following of aqua development and tracks inside the rural field and scenes as represented by various development advances, editing techniques and cultivating rehearses.

Importance of water in crop cultivation :

As we all know, we rely on three essential elements for our survival on this planet: water, air and soil, with water serving as the most vital elements for the life on earth (Dwivedi, 2007). As a result, issues such as the ecosystem, conservation, and the earth's carrying capacity have become the major focus in policy making around the world (Gupta, 2001). Agriculture sector leads to fresh water consumption, providing for over 70% of the total withdrawals from water management (FAO, 2002; WRI 2005). Agronomic considers for 80% - 90%

of fresh water utilized by humans, in contrast to daily help and commercial withdrawals, where most of the water is strayed through vaporization and water loss (FAO, 2002; WRI, 2005 and Shiklomanov *et al.,* 2003). The crop yield can be boosted manifold with proper combination of water and soil nutrient under irrigated agriculture (Rijsberman, 2004; Google).

Sources of water :

The most common water sources which is taken to supply water in an irrigation scheme that includes:

Canal or surface water including liftsb :

Rainy season on India is known as the interval from June to September when rains fall on such a basis and that there no rains during the remaining year (Google). According to the data, millions of rupees have been invested, hundreds of dams have ben build, as well as several lakhs of acres of farmland have been irrigated, potable water for drinkable and industrial uses. Thus, these waters are stored from river after the construction of dam. This results in a water deficit for both drinking and irrigation. Large dams take many years to design, build and construction, thus, their benefits are only seen after a long period of time.

Ground water-dug wells and bore wells :

Ground water from wells, surface water, drainage ponds, rain and municipal water are the main sources for irrigation water (Google).

Drilled wells :

In any event, the water outputfrom drilled well is typically constrained below planet's crust, and groundwater is present in reservoirs.

Surface water :

Incorporates steams, waterways, lakes which are reliant upon overflow through contiguous farmland or from groundwater level. Surface water vary from year to year that are dependent on rainfall. Sediments, chemical and plant growth are subject to contamination as the surface water from sources.

Drainage ponds :

These are often made up of rain water and run-off. Agricultural chemicals and other such fertilisers are stored in sewage ponds. Ecological factors seem to be an issue due to the bulk and shortage of aeration.

Storm water :

Storm water is clan and can be collected from nurseries or apartment rooftops without reaching the pavement, then stored in a solid storage, fiberglass or polyethylene container, water warehouses or other storage container that is integrated into the framework. Well water is often used to grow fruits veggies, and ornamental plants. Cropping pattern s varies depending on whether the water comes from a canal or a well.

Different methods of irrigation used in water management in crop cultivation :

In the present scenario, water is considered as the essential element for survival. About 70% of human body consist of water while plant consist about 90% of water (Google). But still for the fulfilment of water requirements of our body we are depending on some of outside sources. Similarly, for the growth and the development of crop, water is very essential. So, irrigation is the method of supply of water for the crop cultivation. Here we discussing about methods of irrigation used as water management in crop production (Darouich *et al.,* 2014).

Methods of irrigation :

In all the irrigation methods where water is either allow to flow continuously over the soil surface ponded on the soil for the duration of irrigation. All those irrigation methods are considered as most common and old methods of irrigation. In India, all those methods are widely used for irrigation purposes. Such as:

Surface irrigation method :

About 85% of irrigated agriculture is provided by irrigation system technologies around the world. The water is either channelled into little channels or the field is inundated in this cultivation techniques. The productivity of this technique of irrigation is mostly determined by the kind of soil and crop, as well as the distance between the source of irrigation and the crop via canals, pipelines, and other means(Google). In surface irrigation, mainly, there are 3 types of method:

Furrow irrigation method :

Small water way move water in between the crop rows and down the valley with this manner. In this method of irrigation, only crops like maize, sugarcane, sunflower

and soybean can be irrigated but come crops like potato, tomato, beans, citrus and grapes can get damaged in furrow irrigation (22). In this irrigation system, water flow into furrows by opening up the bank of channels from field channel.

Basin irrigation method :

This methodology is commonly employed for rice production or in hillsides slopes that stand in water for more extended flat lands, periods. This type of cultivation is most suitable in citrus, banana etc. This can be established on a sloping land, planes. These methods cannot find in case of some plants like potato, carrot, radish etc (Google).

Border irrigation method :

This form of cultivation thought to be the earliest. The field is divided into parts and the edges are created with the help of soil. Water is pumped between rectangular strips in this manner, dividing a downhill land with free drainage at one end into rectangular strips. These techniques, as opposed to the basin method, is best suited to sloped fields (Google).

Drip irrigation method :

Such technique is also referred as micro-irrigation since it saves both soil and water nutrients (Google). Among all cultivation technologies, drip irrigation is the most water efficient and well organised. It is the most necessary and demanding form of irrigation in the world's dry regions.

Sprinkle irrigation method :

Water is sprayed all over the field using this system. This is almost same as rain fall. Water is pushed through pipes and then showered by sprinkler in this method of cultivation. Sprinkler irrigation can effectively cover all field areas, regardless of their size (Google).

Management of water in crop production :

Water ("Source of Life") resource management is the pursuit of organizing, emerging, fledging, flourishing alarming, handling and managing best utilization of aqua resource. In modern horticultural perspective, the interrelationship between complex physical, socio-economic and agricultural farming system, the utilisation of water drives must be completely overviewed to successfully deal with the water management supplies on extended period of timescale (Aiken 1980). Structured and systematic avail of resource and enactment of reduced water intensive crop generation and production system are the current necessities to attain sustainable food production (Kannan *et al.,* 2020).

Water management in crop production and farming system can be achieved primarily by opting any one or more practices and as such practices must be the point of focus in any agricultural system:

– Operation of smart machinery and cybernetics (Automation and Electrical gadgets, low-cost data sources, domestic technology) to control water to produce more crop per drop.

– Generation and production of agricultural products under diminishing soil and water resources.

– Accessibility of water to farming and agricultural manufacture under ancestral past and predicted future climate change (Abiotic changes like flood, drought, temperature, precipitation, etc.).

– Succouring agricultural production under inhabitants increase with the present water resources (Manzoor Qadir *et al.*, 2003).

In this current review paper, we contribute a study 60 on the operation of intensive and indigenous technologies and mechanics for the development of an acute concept in the regulation and monitoring of water usage in the agriculture domain. This automation also enables to minimise the wastage of water resource (Khan and Mu, 2009). Quick witted solutions execution for water ascertainment put forward the probability to intensify the agricultural proffering and expedite the management (Parwal, 2015). We talk through the urge to conserve water resources, ecosystem and develop the crops using developed science and technology.

Three challenges coupled with the management of water in crop production:

Challenges ONE: Reuse of water and Inspection of water pollution:

Both biotic (human activities) abiotic (industrial activities) source can inaugurate pollutants into the natural ecosystem resulting in the degradation and depletion of the aquatic ecosystem due to release of wastewater (Thatai *et al.*, 2019). Water from different water bodies form the basis for irrigation, for agriculture and when these water bodies get contaminated, they raise harmful impact on crops, as their mineral characteristics reduce on one side and rise in external polluted chemical

properties on the other side which leads to the deformation of farming crops in terms of quality (Sheikh *et al.*, 1990).

Surveillance of the pollutant is one of the major tasks and among the current crucial restriction to contaminant inspection, the most important is the real-period detection. Besides the real-time response, several commercial devices and online bacteriological detection technology are used for monitoring the water pollutant, however they are cost effective (Lopez-Roldan *et al.,* 2013). Contemplation should be provided to the chance of making use of recycling of sewage water in the farming system, to enable the 3 'R' principle *i.e.,* Reduce, Reuse and Recycle of wastewater security (Jaramillo and Restrepo, 2017).

Challenges TWO: Aquatic pipeline surveillance :

Aqua dispersal web must be contemplated carefully, especially the below ground system which maximises the solicitude for perpetual inspection of the criss-cross to conserve the ecological wealth and make sure the uniform dispersal of aqua to conquer a full seedlings pipe's period, usually implementation and natural disasters are the major factors that are responsible for leakage and damage in the pipeline distribution (Loucks and Van, 2017). The water leakage in the artificial water supply web can create a reduction in generation of products, due to inadequate quality of aqua for extension and development.

Instantaneous inspection and administering procedure can solve these problems, among which aqua network surveillance structure is the outstanding and prosperous solution (Sadeghioon *et al.,* 2014).

Challenges THREE: Water irrigation :

The main intension of this challenge refers to the supplement of water to operable places for farming utilisation on the basis of well-ordered and mathematical procedure, climatic condition, local geography and the condition of land (acidity, alkalify). In some areas, the farmers used to prefer saline water for watering the plants which may leads to reduction to crop production because of soil salinization (Bradai *et al.,* 2016).

Irrigation techniques vary from place to place depending upon the locality, agricultural products, soil status and availability of water. The agricultural field obtains water from different sources like ponds, lakes, rivers, wells, dams and ground water and rain water. So, instead of running after the traditional method of water, it will be wise to shift to the smart irrigation methods which will be very helpful for the farmers to prevent water wastage during its application.

Irrigation scenario:

Our country has irrigation capacity of 139.89 million hectares (mha) out of which about 108.3 million hectares (mha) has been already availed. The standard 12 months pre-head availability of water is found out to be about 1800 cubic meters (CUM) at the country plane. This anticipated to reduce to about 1341 CUM by the year 2025 and 1140 CUM by the year 2050, with respect to high extension in population. The pre-head storage potentiality in India is only about 207 CUM. Taking the total water supply, currently the irrigation shares about 80%, which is estimated to reduce to about 73% by 2026 (Basil Hans, 2018).

Future scope :

Since aquatic capitals are reducing, the urge of the present period is to use the nature's wealth available to us, in smart ways effectively and efficiently. Shifting from traditional method to conventional method, will help to generate increased nutrient from the available source of aqua (Upadhyaya, 2015). To accomplish the above aim, there is an urge to concentrate the scientific efforts on following points:

Table 1: Aquatic resource of country

Topographical region	326 m ha
Cultivable region	190 m ha
Condensation	4200 cubic km
Usable aqua resource	1130 cubic km
Irrigation potential	139.9 m ha

– Aquatics of irrigation structure.

– Implementation of artificial intelligence (AI) in crop production.

– Evaluation of settlement props up methodology for sensible implementation of different natural water resources like groundwater, surface water and rainwater.

– Replacement of traditional water storage procedure and their incorporation with the latest smart technologies.

– Biotic and abiotic condition affecting the productivity of water and their incorporation of intercession, which can bring up the water generation in different agricultural climatic zone (Abraham *et al.,*

2002).

– Reducing the space between supplement of water and water desire by creating correlation between aqua distributor and aqua end users.

– Competence construction as well as tutoring of aqua availers and aqua providers to design consciousness for the utilization of this valuable available wealth of nature (Chaudhury and Batta, 2004).

– Building on one side and on other side shift of socially allowable and economically feasible liveable water management cybernetic in agricultural land for efficient application and up scaling in participatory way (Zimmerman, 2010).

Conclusion :

Being so foundational and principal to the communal, economical as well as ecosystem and ecological feasibility of various localities, water is judicious asset especially for agriculture. There are several on-field methods that can be employed for water management in crop production, which includes:

– Cultural methods

– Least weeds or no weeds

– Mulching: covering the surface of the soil with a protective covering like straw, black plastic film etc. (Singh *et al.,* 2010).

Besides the on-field techniques, many thermonuclear and radio isotopic methods are being used in aquatic resource treatment experiments. The use of isotopes like oxygen- 18 and hydrogen- 2 (Deuterium) forms a vital portion of farming water regulation, promoting the recognition of aquatic resources and the trailing of aqua fluctuation and alleyways among the farming land areas as impacted by various irrigation methodologies cropping systems and farming actions.

Water is a crucial component in 2 ways: for the production of demanded economic outputs on one side and for the maintenance of a sustainable enlargement in agricultural sector on the other end. Appropriate monitoring, inspection and management of aqua resource is the urge of hour (Abhinaya *et al.*, 2020). Development or un-development in farming in farming is largely proportional to water either supply naturally or artificially. Creation of the proper infrastructure and adoption of the renewable management will carry us to supplement the present water resources and upgrade the productivity and generation of facilities (Abhinaya *et al.*, 2020). In our country, about 70% of the field crops sown are dependent on rain water for production *i.e.*, rain-fed, thus, it is so vital to harvest rain water which is one of the important inexhaustible sources of water. This is the right time, yet the right moment to develop several water management technologies to raise the productivity and should follow the idea of "more crop per drop".

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