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Study of Drip Irrigation Systems in Agricultural Settings

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Abstract

In recent years, drip irrigation systems have gained popularity as a viable option for farmers looking to maximize crop yields while simultaneously reducing water use. The process of watering crops in order to stimulate their development is known as irrigation. In addition to protecting crops and improving yields, it also minimizes soil compaction and weed growth.

Keyword: Irrigation systems, different, varieties, Dripper.

INTRODUCTION

There are several types of irrigation systems. Nowadays, only a tiny fraction of farmers really employs drip irrigation systems. Just 12% of farmers are using pivot irrigation, despite the fact that it is another technology that is relatively efficient. Still, 84% of farmers use flood irrigation. Problems with waterlogging and salinity, which affect surface irrigation systems, do not exist when using a drip irrigation system. Drip irrigation systems help farmers conserve water, increase water consumption efficiency, minimise tillage equipment needs, boost crop yields, enhance product quality, and make better use of fertilizer.

As the global population continues to grow, the need of water saving measures like drip irrigation cannot be overstated. Installing one is essential for preventing future water shortages. Flooding is wasteful because it contributes to increasing emissions of greenhouse gases, wastes a lot of water, and releases methane and pollutes aquifers. It is more difficult for children and women to complete schoolwork or other errands in countries where poverty is widespread because they frequently have to spend additional time carrying water in buckets by hand.

Drip irrigation affects all field crops, although it has a disproportionate effect on vegetables, strawberries, bananas and tomatoes. After weighing the benefits of two pressurized irrigation systems for pistachio trees, researchers in the Kerman area determined that drip irrigation would be the most cost-effective choice. In the region of Khorasan, I looked at the economic viability of drip irrigation systems. These strategies have the potential to be very lucrative if executed properly, according to the findings. Drip irrigation is an essential and great method to utilises water in many countries where it is limited, and it is now being employed in many wealthy nations as well. The great bulk of our nation's water use is due to agriculture; thus, we must be more deliberate in our use of this precious resource.

The EU's political leaders have long supported and encouraged such drills. Previous CAP funding has given preference to water-intensive crops; this study evaluated several methods of pressurized irrigation.

LITERATURE REVIEW

Henning Bjornlund et.al (2016) Irrigation development in Sub-Saharan Africa falls far behind that of other developing countries. Economic development and food security are both impacted by this. Among all developing areas, Sub-Saharan Africa has the most to benefit from

the recent uptick in interest in irrigation investments, which began in the middle of the 2000s. If future irrigation investments are to be successful and not repeat the mistakes of the past, a commercial model for small-scale irrigation systems has to be devised. This article will examine the obstacles that this model has to overcome in addition to the possible benefits for irrigators' bottom lines.

David Lozano et.al (2020) Creating a suitable irrigation plan is crucial for water conservation and maintaining good crop yields. Conventional methods of field evaluation based on distribution uniformity do not account for the effects of the filling and emptying stages of the irrigation system. According to our idea, it is crucial to measure the total water supplied from the beginning of irrigation until the irrigation system is empty, especially when utilising brief drip irrigation pulses on sloping sandy soils. We set out to describe the typical strawberry irrigation system's filling, steady-pressure, and emptying phases so that we could ascertain distribution uniformity. Our research shows that distribution uniformity and the possibility of application efficiency or zero deficit are negatively affected by the duration of the irrigation pulse. The decrease in value of irrigation performance indicators during the filling and emptying phases is the root cause of this problem. Drip irrigation systems are not consistent throughout the filling and emptying stages, which makes them difficult to handle on sandy soils that slope.

Ali Montazar et.al (2019) Investigating the viability of growing organic spinach using drip irrigation as a means of controlling spinach downy mildew disease in California was the main objective of this study. The experiment took place at the UC Desert Research and Extension Centre in the low desert of California and spanned two growing seasons. In order to test and compare various combinations of dripline spacings and installation depths, a sprinkler irrigation control technique was used. We collected a tonne of data to look at the differences between the irrigation treatments. A large body of statistical research suggests that irrigation system has an effect on fresh spinach yields generally. However, there was a strong relationship between the total number of driplines and shoot biomass output. Based on the developed canopy crop curves, drip irrigation treatments had somewhat lower leaf densities than sprinkler irrigation treatments. It was shown that irrigation treatment has a general influence on downy mildew by showing that drip watering during emergence resulted in a lower incidence compared to spray irrigation. Drip irrigation has the potential to improve the yield of organic spinach while simultaneously decreasing water use and the likelihood of downy mildew, as shown in the study. However, further research is needed to find the most cost-effective drip irrigation systems for spinach, as well as the best ways to optimise the system, hydrate it, and regulate the nitrogen.

M. Moyo et.al (2016) Case studies were conducted on the Silalatshani and Mkoba irrigation systems in Zimbabwe to identify the potential and limits impacting the long-term sustainability of smallholder irrigation. Infertile soil, inadequate infrastructure, and a lack of access to agricultural knowledge, resources, and markets were the main causes of bad harvests, food insecurity, and negative agricultural income. Most of the irrigated land sits unused because of disjointed marketing campaigns. There are new possibilities for the dissemination of market data made possible by mobile technology. If institutions regularly encourage dialogue amongst all stakeholders in the agricultural value chain, irrigation companies may be better equipped to adjust their operations to suit market demands and increase the financial viability of irrigation systems.

Carlos Dionisio Pérez Blanco et.al (2020) Despite being the least valuable use of freshwater, farming accounts for 70% of the world's total use. The "water conservation technologies" (WCTs) that are promoted in water-limited regions claim to reduce agricultural water use and release it into the environment via piped and drip distribution systems. Whether WCTs save water in theory and in practice is examined in this article. Our extensive review of over 230 theoretical and empirical studies supports our thesis that WCTs should not be used for water conservation purposes, but rather to sustain and improve agricultural water output and farmers' income in

areas with water scarcity. The purpose of water conservation strategies should be to reallocate resources using governance instruments.

AGRICULTURE IN INDIA

The agriculture industry contributes significantly to India's gross domestic product. A little over half of India's landmass is used for farming. Covering nearly 47% of India's total geographical area, the industry is vast. The majority of rural households (more than 70%) make their living in agriculture. The agricultural industry of India is vital to the nutritional demands of the 1.2 billion people that live there.

If you're looking for rice, wheat, spices, groundnuts, sugarcane, cotton, jute, milk, fruits, or vegetables, India is either the one or second largest producer in the world. In rural India, where 263 million people are engaged in farming or agricultural employment, each family tends to an average of 1.15 hectares (ha). Women make up slightly more than one-third (34.9%) of the working-age population in rural regions, according to the 2011 census. But there were fewer female cultivators (23.4%) than female agricultural labourers (43.1%).

Climate Variation

So far, India's agricultural industry has been able to meet the needs of its quickly growing population, but it faces several obstacles that reflect the country's socioeconomic reality as well as the unique environmental and climatic conditions in South Asia.

A number of factors, such as shifting weather patterns, depleting natural resources, and dispersed populations, are posing challenges to India's agricultural industry. An important component in determining the future of human food security on Earth will be the impact of climate change on farming. Understanding weather changes over time and adjusting management procedures to produce a higher output are two of the many issues that the agriculture business encounters. There is no way to generalize about how climate change would affect agriculture because of the wide range of regional differences in things like temperature, rainfall, soil type and composition, crop varieties and cropping methods, and management approaches.

Small and Marginal Farmers Holding Less Land

Small parcels of land are owned by the majority of Indian farmers, which negatively impacts their production and earnings. It would seem that a farmer's income declines in direct proportion to the amount of land they own. India has an area of arable land of 141 million hectares.

A total of 11.55 crore acres were under cultivation in 1996, up from 6.99 crore in 1951. Valued at 11.88 crore in 2011, according to the appraisal. The typical lot size in 1996 was 1.41 hectares. But in 2011, the average value fell to 1.15 hectare. A whopping 86% of all land holdings were in the hands of small and marginal farmers.

Table 1: New patterns in the relationship between farmland revenue per month and holding size

Size of Land Holding (in Hectares)	Monthly Income of farm Household in Rs.
2	7,348
4	10,730
10	19,637
Above 10	41,388

The persistent problem of low output is due, in large part, to the ever-increasing proportion of small and marginal farmers (86%). The agricultural earnings per hectare of land in the US and China are above 50% and 40%, respectively, whereas in India they are less than 40%.

Table 2: Forecasts for 2020 global trends in grain yields per hectare

Country	Productivity per Hectare in KG
USA	7,638
China	5,886
Brazil	4,640
India	2.984
Russia	2,444

Water Management Problem

When it comes to irrigation, water is more valuable than land in India. If the rain doesn't show up, farming will stop. Modern thought holds that the true issue is in insufficient water management, which encompasses usage, growth, and storage, rather than a lack of water itself. With 183 million hectares of arable land, 115.6 million agricultural families, and 400 million metric tonnes of yearly precipitation, the country has a perfect agro-climate for producing a broad variety of crops. More than one billion people rely on agriculture for their daily nutrition, and about two-thirds of the nation's workforce is employed in this sector. For India's farmers, the monsoons are still an absolute must. Precipitation is essential for almost 70% of the entire cultivated area.

There are three perspectives from which water issues could emerge: supply, demand, and quality. By 2030, India will need to significantly reduce its resource use while increasing its rice output by 60%. Irrigation accounts for over 56% of India's agricultural production and 60% of the country's food grains, although using just 46% of India's arable land. No matter the method, water—rainfall or irrigation—is crucial to the agricultural sector.

Effect of Economic Reforms Policies

Though it was intended to aid those who depend on agriculture and the country in becoming food independent, large-scale farmers have been the primary beneficiaries of the Green Revolution. Higher agricultural costs, low-quality fertilizer, decreased crop yields, stagnating crop production, and almost no advantages from agricultural goods were all issues brought about by the Green Revolution.

The government of India implemented sweeping economic reforms in 1991 to tackle poverty, unemployment, and income inequality. The State Industrial Policy, which was adopted in 1998, was an economic growth plan that put an emphasis on industrial and agricultural development. The State Government of Uttar Pradesh primarily implemented economic reforms to lower unemployment and poverty levels.

With these strategies for the future of the economy. Agricultural GEOGRAPHY was not seen as a top priority, but rather as something that might indirectly support agricultural expansion. Economic reform measures failed to address the concerns of small farmers and had a detrimental impact on agricultural growth since they prioritized the service sector. Regardless, on a smaller scale, these changes did influence agricultural growth.

Factors Affecting Crop Productivity

Overharvesting of fertilizer, mistimed arrival of seasons or the monsoon, and soil degradation have all reduced the acreage, yield, and productivity of staple crops and food staples.

As a direct consequence of urbanites looking for economic prospects in the countryside, farmland is being turned into development land. The younger generation has little interest in farming, despite the fact that males have historically owned farms. There won't be enough competent people with relevant work experience because of this. Farmers

are only seeing infrequent benefits from the agricultural programmes and projects in which they are engaged.

Commercial and cooperative banks in India do not lend enough money to farmers for agricultural purposes. Krishi Vigyana Kendra, commercial companies, and the media have all been involved in awareness and extension campaigns, yet they have made very little headway.

Degradation of Resources

Most Indian farmers work plots of land that are smaller than one hectare in size, so the majority of farming in the country is small-scale. More than 80% of the farming households in India are on the smaller scale. Overall, the size of farms has been declining. More food may be produced with less land and water, as their usage has declined over the previous few decades by most agricultural enterprises.

Rural infrastructure was inadequate, natural resources were in a precarious state, and there were obvious indications of technological fatigue. Financial, extension, and marketing service delivery systems were also failing, and there was a dearth of agricultural planning at the district and subnational levels. More trade liberalization means more competition for Indian farmers' goods in domestic and international markets, which means they have to compete on price and quality for a broader variety of products. Collaborative efforts to meet demand cycles and quality standards are typically not extended to small and marginal farmers since only large farmers are able to pool their product.

Knowledge Gaps

Services and high-quality inputs are critical for increasing productivity. Nevertheless, it is crucial to know how to use them efficiently. Farmers also need data on market trends and prices, post-harvest processing, variables impacting food quality, and safety regulations. Some farmers get their hands dirty with independent research.

The "resource-poor" population of India produces most of the country's food, and they might benefit from extension projects grounded in science to supplement their existing knowledge.

KINDS OF DRIP IRRIGATION SYSTEM

System drip irrigation products may be categorised into five different types. For whatever reason, you're free to combine any of these five options; just keep in mind that various approaches may need distinct watering systems. Both a multi-station setup and a sequential pattern are preferable for arranging the different techniques on separate parts and controls.

Growth stage

1. The main source of drip irrigation:

The best way to water plants is using a drip emitter since it hydrates the soil just where the roots are. A watering system with drip emitters is ideal for plants such as trees, shrubs, and baskets. Low water flow rates usually cause the watering cycle to be longer.

2. Bubbler:

Bubbler irrigation systems are well-liked for watering plants and trees due to their high discharge rates and long watering intervals. Because of its ability to regulate high pressure, bubblers irrigation systems are perfect for decreasing the flow of water from large-volume sprinkler systems.

3. Micro-spray irrigation system:

For large-area watering needs, plants that demand a little more moisture, or situations where just a small amount of overhead irrigation is needed (like ferns), a micro-spray irrigation system is the way to go.

4. Dripper line irrigation system:

One of the simplest and most used drip irrigation systems is the drip line. Gardens, vegetable plots and other places with closely spaced plants are best watered using a drip line system. Additionally, there are drip irrigation systems that surround trees and containers, as well as rings that fit into large planter boxes and pots.

5. The Mister irrigation system:

If you want to water plants in hanging baskets at the ideal humidity, turn the mister’s upside down and spray the water downwards. More and more people are opting to cool themselves outside using

misters since the water evaporates quickly, which may drastically reduce the surrounding temperature.

6. Enter drip irrigation:

It was brought about by this kind of irrigation. At the precise moment when plants want it most, this ideal irrigation system will water them deeply into their roots instead of just watering the soil surface. Plastic "drip lines" are either buried or laid on top of the soil to facilitate this kind of watering. When the valve is opened, a tiny quantity of water is consistently delivered to the soil around the plant. The amount of water is controlled at the source, which might be a tank or reservoir.

You have two options when it comes to installing a drip irrigation system: above or below ground.

Injecting a drip line 1" to 6" below the soil's surface allows for a surface drip irrigation system to be employed with modest emitter spacing (10"-16") and high wall thickness (9-12 mil). People often call these kinds of irrigation systems "temporary" since the drip line is taken down and reused every year. There are two types of submains: permanent and temporary. Due to the significant labour and material expenses linked with yearly reinstallation, these systems are often saved for crops with high monetary value.

The ability to precisely hydrate plant roots using a drip irrigation system makes it preferable to other approaches. It has the potential to be more efficient with water use than other irrigation methods if it is designed, managed, and built appropriately, since it may decrease water loss due to evaporation and deep drainage. Furthermore, by avoiding contact between water and leaves, a drip irrigation system aids in the prevention of several diseases. Beyond simplifying network operations, this technology has several real-world uses. It has improved the regulation and monitoring of water distribution and shed light on how farmers handle irrigation, especially with the capacity to access and evaluate past data sets. In regions with limited water resources, this approach fails to consider utilized water and just boosts production without modifying water use. Gentle soaking is the way to go when watering crops in very dry regions or on sandy soils. Sadly, not even WP has managed to establish a personal connection with farmers. For them, "irrigation efficiency" usually means maximization of profits at the cost of water conservation efforts.

HISTORY OF MICRO-IRRIGATION IN INDIA

The National Committee on the Use of Plastics in Agriculture (NCPA) was established in 1981 by the DCPC. With an emphasis on micro-irrigation devices, the NCPA led many campaigns to expand plastic use in farming. In the eyes of many, this was the first daring step by the Indian government to encourage drip irrigation. Given that India's agricultural sector is the country's biggest plastic consumer, the NCPA was transferred to the Ministry of Agriculture in 1993. In 2001–2002, the group formally became known as the National Committee on Plasticulture Applications in Horticulture (NCPAH). Promotion of plasticulture as a horticultural tool is one of the NCPAH's mandated duties. It monitors the progress of the micro-irrigation region and specifies its settings. In various agro-economic zones, seventeen PDCs were established to study and advance plasticulture and precision farming for high-tech horticulture. Precision Farming Development Centres received their formal name in 2003. They provide a helping hand with research and technical issues so that micro-irrigation may progress.

Since 1985, NABARD has provided financing for micro-irrigation systems. There was a set aside of 385 crore rupees in 1985–86. Between 1989 and 1990, this increased to 499.76 crore Indian rupees. Right up to 1988–89, the actual payout—Rs. 686.50 lakhs for sprinklers and Rs. 49.85 lakhs for drip irrigation—was far lower than the targets, mainly because farmers lacked expertise and technical help. According to [IPCL, 1992],

In an effort to promote and ease the widespread use of micro-irrigation, particularly drip irrigation, the government has launched a number of subsidy schemes in each of the last three five-year plans (World Bank, 1998: 116-118). All farmers were eligible for subsidies under a coordinated plan that ran from 1982 to 1983. Under the 7th Five Year Plan, which allocated Rs 10 crore, small-scale farmers were proposed to get 25% subsidies and SC/ST farmers 50%. The 8th Five Year Plan

increased subsidies for small-scale farmers by 50% (IPCL, 1992).

MODERN TECHNOLOGY AND AGRICULTURE

"If agriculture fails, nothing else in the country has a chance to succeed." Agrarian production has long been a primary economic driver. It is the primary means of subsistence for those who are economically and technologically disadvantaged.

Urbanization and Agriculture

As the population continued to rise, people were fleeing from rural areas to urban centers. This will simply make overcrowded cities even more difficult to navigate. Government policy favoring urban development will have repercussions for rural areas and agricultural production.

This will reduce the land's fertility, which in turn reduces agricultural production and food security. Due to urbanization, farmers and agriculture are always under danger.

What is Digital Transformation?

"Digital transformation" is adapting business processes, culture, customer experiences, and agriculture to the changing demands of markets and organisations via the use of digital technology. Essentially, develop new items or improve old ones by using digital innovation and technology.

Important of Agriculture & Technology

There are several ways in which agricultural technology helps farmers. For example, it increases crop output per acre while decreasing the amount of water, fertiliser, and pesticide needed. This, in turn, leads to cheaper food. Additionally, it reduces pollution of rivers and groundwater. Farmers also report safer working conditions and less harm to natural ecosystems. Farmers' contributions to agricultural technology led to reduced environmental and ecological impact via better food quality, safer crop growing conditions, more efficiency, and cheaper pricing.

Technology Makes Smart and Sustainable Farming

By streamlining and simplifying some processes, the integration of technology and the Internet of Things (IoT) into our everyday lives and workplaces aims to enhance our quality of life. Sustainability, not only efficiency and effectiveness, should be the guiding principles of technology progress, according to the US Farmers and Ranchers Alliance (USFRA). This affects farmers and ranchers in ways that are relevant to food production and agricultural technologies.

Technology Revolution in India

India had a remarkable increase in food production during the Green Revolution, when contemporary farming methods and technology were brought to the nation.

Tractors, irrigation systems, fertilizers, insecticides, and HYV seeds and crops were the main components that sparked the green revolution. Increased agricultural output in developing countries around the world was a direct result of the Green Revolution, which was initiated by M.S. Swami Nathan at the behest of Normanbarlaug. The primary objective of the green revolution is to enhance food production, with a focus on cereal grains such as rice and wheat.

This trend is anticipated to bring about a slew of high-tech advances, the first of which is the integration of AI and big data into agricultural systems. One integrated system will replace all of the current ones, including those for irrigation, soil planting, farm management, and production forecasts.

on the agricultural sector, the 4IR will have an effect on three key areas. To start, precise optimisation has the potential to fix a lot of the issues plaguing the agricultural industry right now. Second, reestablishing rural production components, such human resources, will have a significant impact on agriculture. Forth, 4IR technology will have a major impact on weather-related issues.

Intelligent Robots

'Bigger is better' has long been the prevailing agricultural mindset, as farmers have increasingly turned to technology to boost yields, making small-scale businesses unsustainable. However, advancements in sensing and robotics technology have put the current paradigm in agriculture at risk.

"Intelligent robots have the potential to revolutionize the economic paradigm of farming, making it possible to be a small producer again," according to the author.

Robots and sensors of today can tackle issues that have persisted since the dawn of agriculture. Potentially more efficient and environmentally friendly crop production may result from using a robotic farming system. Research into automated greenhouse technology with the goal of increasing output while minimizing input costs is mostly focused on the production of fruits and vegetables.

Autonomous System Architectures

Increased crop output and better quality with less time and money spent on labour is what's pushing people to use agricultural robots. Developing countries' inability to keep up with food production is exacerbated by a lack of skilled agricultural labour, which has contributed to the growth of robotic agriculture. Several farming tasks, like as planting, harvesting, weeding, keeping tabs on groves, and spraying pesticides, have been effectively taken over by bots. Therefore, if farmers are given the tools they need to succeed with the help of robots, the country's agricultural output will rise significantly.

An automated guiding system allows for more precise spraying, which in turn reduces the likelihood of fertilizer overapplication in certain locations. Agricultural chores take less time to complete and produce less pollution as a result. Since the tractor is the one doing the tracking, this sort of automation might also make farming more pleasant for the farmer.

Irrigation System and Agriculture Automation

Agricultural process and irrigation system automation is rapidly becoming a hot topic and a major concern for all countries. Problems with water channelization and irrigation systems, pesticide control, weed management, insufficient storage management, and an upsurge in crop diseases are just a few of the issues plaguing the agricultural sector. Government officials in developing countries like India are attempting to promote more irrigation and farming automation due to the severe water shortage that affects agricultural laborers. In light of the problem of excessive water consumption among Indian farmers, a smart irrigation system is created that also results in the most efficient use of available water resources.

Automated Monitoring Integrated System in Agriculture

It is imperative that the agriculture sector follows the general trend of society in embracing new technologies and techniques. Keeping an eye on the weather isn't enough to boost agricultural production. In terms of actual output, there are many other considerations that take precedence. Automation in agriculture is therefore necessary to address these issues. The only way to overcome these obstacles is to implement a comprehensive system that considers all aspects influencing productivity at every level.

Impact of Technology on Agriculture Sector

Agricultural growth really alleviates hunger and poverty more rapidly than growth in other industries. The impact of emerging countries' use of modern agricultural technologies on production risk and unpredictability in output. By investing more time and energy into developing and implementing farm technology, we might potentially boost agricultural output while decreasing yield variability.

Technology has the ability to revolutionise several aspects of agriculture, such as irrigation systems. Crop irrigation is the most water-intensive business globally, accounting for about 70% of freshwater withdrawals.

Irrigation sites are increasing, especially in industrialised countries, because to the rising need for food, feed, fiber, and biofuels. Farmers and field workers are essential to any transformation process; thus, it is important to encourage and support them in conserving water via the use of appropriate technology and practices.

Water scarcity and water plenty can have negative impacts on agricultural production. Our nation receives an average of around 115 centimeters of precipitation each year, but the yield from farms in rainfed areas is modest and difficult to forecast. Effective rainwater management is essential in both low- and high-rainfall regions because it

allows for the reduction of rain-induced damage and the increase of on-site and off-site agricultural production. Adopting efficient and cost-effective water management techniques and technologies requires a significant amount of work.

Engineers, technologists, biologists, and physicists are essential to modern farming. Mechanization has raised production to the point where physical labour is no longer necessary on farms. For instance, whereas the northeastern states have a very low level of mechanization, Haryana and Punjab have a relatively high one.

ICT (Information Communication Technology)

Using information and communication technologies (ICT) at the village level is emphasized in the National Policy for Farmers as a means to reach out to farmers with pertinent recommendations and information. Without knowledge, no industry can advance. This is also true in the agriculture industry. The agriculture industry may benefit greatly from precise and reliable data. You may use it to foresee changes in the market, be ready for the next season or year, move quickly, and avoid problems. The speed and precision with which information reaches customers may, therefore, influence agricultural development. Spreading information to customers may be accomplished in more traditional ways. They mostly communicate via vaccination and do not adhere to a strict routine. It will take a lot of time to gather data and hear out consumer comments.

While it is still in its early stages, there is considerable potential for improving agricultural productivity and increasing farmer income in India via the use of farm technology in combination with a strong ICT framework. There have been many instances when technical progress has helped Indian farmers overcome production plateaus, connect with new markets, and improve farm management.

Impact of Precision Farming/Automated Agriculture

More effective use of water and fertilizer, together with a rise in agricultural productivity (yield), is necessary if we are to feed a growing global population without harming the earth. This environment is ideal for irrigation-based agriculture, which helps keep yields high in semi-arid and dry regions while also improving crop quality in temperate and humid regions via the use of supplementary irrigation.

Farmers are beginning to assess the effects of irrigation non-uniformity on resource consumption, productivity, and crop yields in light of rising production (input) costs and consumer demand for premium food.

Cities have seen a massive influx of people from low- and medium-income countries, such as China, India, and Brazil. China and India were ranked first and second, respectively, among the countries with the 100 fastest-growing cities.

The impact on economic development, urbanization, and energy consumption is substantial due to these massive shifts. Modern technology must be adopted and used by Indian agriculture if it is to satisfy the massive food grain demand of 480 million tonnes (Mt) by 2050, especially considering the increasing issue of biotic and abiotic stressors that crops encounter.

A knowledge-intensive, fiercely competitive, and market-driven future is ahead for the agricultural sector. Indian farmers will have a hard time competing on a global scale owing to low productivity and high production costs, even if the country is a big producer of food grain. Improving the productivity of small-scale farms in developing nations is a crucial step towards addressing the problem of food insecurity.

CONCLUSIONS

It was decided that drip irrigation, with all its advantages and adaptability, was the ideal technology to utilises in this particular irrigation system. In other words, you don't need much training to do it. Furthermore, in a handful of states, the federal government provided financial assistance for the acquisition of the same.

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