THE VALUE OF ADHERING TO THE FUNDAMENTAL IRRIGATION GUIDELINES

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Abstract: *Irrigation plays a pivotal role in sustaining agricultural productivity by ensuring that crops receive an adequate and timely supply of water. Understanding the basic rules of irrigation is crucial for farmers to optimize water usage, minimize wastage, and enhance overall crop yield. This analysis will delve into the fundamental principles of irrigation, providing insights into key concepts, annotated examples, and concluding with the significance of practical implementation.*

Key words: *timing, frequency, crop-specific, soil type, weather conditions. water quality and source:*

Watering, or irrigation, is a kind of melioration in which the soil is artificially moistened using water drawn from sources. In the area of the soil where plant roots are dispersed, irrigation produces the most ideal water regime. This makes it easier for plants to take in nutrients from the soil, including agricultural and mineral and organic fertilizers. assures a high crop production. When compared to non-irrigated settings, irrigation boosts land productivity by 8–10 times and enables the introduction of intensive farming. This guarantees that capital funds for land reclamation and water management construction be expended quickly—within three to five years.

All of the farmed land in China, India, Pakistan, Iran, Russia, Japan, and Egypt is irrigated. Large irrigation systems were constructed as irrigated land in the USA, Mexico, Italy, Bulgaria, France, and other nations expanded particularly quickly in the 20th century. The world's irrigated land area increased from 121 million hectares in the 1950s to over 230 million hectares in the 1980s and 271.4 million hectares by the end of the 20th century. Asia has 191.2, North America has 30.4, Europe has 24.6, Africa has 12.5, and Australia has 2.4 million people. Fields under cultivation are irrigated (1999).

Since ancient times, irrigation has been used in hot climates where it is necessary for crops to flourish, and later in areas with irregular rainfall that gave rise to agriculture. It has grown in places where there isn't a consistent crop yield. People learnt to cultivate food plants in floodplains in the arid climates of Egypt, Mesopotamia, Central Asia, Mexico, and Iran. Eventually, mazes are built around these areas, allowing for the long-term storage of water and the practice of agriculture. Harvesting crops on a regular basis was feasible.

Regular archaeological digs are carried out in Central Asia in the Surkhandarya oasis, the eastern portion of the Fergana valley, the Amudarya delta, and the Zarafshan river basin. It suggests that it began 2,000 years ago, miles downriver from the Amudarya in the eighth and seventh centuries. Up to the third century, irrigation was extremely sophisticated. Long-distance water transportation became necessary as irrigated areas expanded and irrigation technology advanced. Between mil. and av., the first canals with a basic primary structure were built. That would be around the middle of the first millennium. The first water lifter, chighir, was discovered during the Middle Ages, marking a significant advancement in irrigated agriculture. This made it feasible to irrigate smaller land areas that were above ditches or other natural water sources.

Since the end of the 19th century, Central Asia has seen a sharp increase in the area under irrigation. However, the creation of massive irrigation systems that allow for the irrigation of vast areas, as well as the planned development of new lands and the restoration of irrigated lands that were no longer suitable for agriculture, were only completed in the 20th century. The amount of irrigated land in Central Asia and Kazakhstan expanded from 5.8 million in 1965 to 8.8 million in the 1990s. Uzbekistan farmed 4.3 million hectares of irrigated land in 2001 (compared to 1.8 million hectares in 1914).

Water use in agriculture has increased as a result of the growth of irrigated land. Consequently, the need to regulate river flows over a longer period of time by constructing a reservoir became crucial during the following years. The development of powerful pumps made it possible for agriculture to irrigate crops on the machine's land by gradually raising the water level to between 250 and 300 m^3/s. There are about 105 billion gallons of water in the Aral Sea basin annually, 95 billion m^3 of the total flow of m^3 of water are being used. This necessitates replenishing water reserves and conserving water across the entire irrigation system. Redistributing water between basins (Amu Bukhara, Amu Qarakol, Karakum, and other canals), reusing sewage, and using saline drainage water are the primary methods used to replenish water resources. A series of technical, agro technical, and organizational procedures based on hydro technical principles make up irrigation, which guarantees that the soil receives a given (defined) quantity of water. It is separated into two categories: periodic and regular watering schedules. Irrigation can be classified as protective (using water), saline, vegetative, feeding (using juice), or other purposes. Sometimes, one kind of irrigation can serve multiple functions.

The practical implementation of basic rules of irrigation is essential for sustainable agriculture, as it directly influences crop productivity, resource conservation, and environmental health. This analysis will delve into the scientific underpinnings of the practical importance of fundamental irrigation rules, exploring their impact on soil health, plant physiology, and overall agricultural sustainability.

Maintaining optimal soil moisture levels is crucial for nutrient absorption, root development, and overall plant health. Irrigation rules guide farmers in preventing both waterlogging, which hampers root respiration, and drought stress, which adversely affects nutrient uptake.

Practical Importance: By adhering to irrigation rules that consider soil moisture dynamics, farmers can optimize nutrient availability, fostering robust root systems and healthier plants.

Over-irrigation can lead to soil compaction and erosion, negatively impacting soil structure. Conversely, under-irrigation may result in increased susceptibility to erosion. Adhering to proper irrigation rules mitigates these risks and promotes soil health.

Practical Importance: Following irrigation guidelines helps maintain soil structure, reducing erosion risks and preserving the long-term fertility and productivity of agricultural land.

Water stress during critical growth stages can significantly impact crop development and yield. Understanding the water requirements of specific crops and adhering to irrigation schedules prevents water stress, optimizing photosynthesis, and maximizing yields.

Proper irrigation practices, informed by scientific principles, contribute to enhanced crop development, minimizing the risk of yield losses due to water-related stress factors.

Water quality affects nutrient availability in the soil. Adhering to irrigation rules that consider water quality parameters ensures that essential nutrients are not compromised, promoting optimal plant nutrition and growth.

Farmers can enhance nutrient management by applying irrigation rules that account for water quality, resulting in healthier crops and improved agricultural sustainability.

Efficient water use is critical for sustainable agriculture, as excessive water application can lead to wastage and environmental degradation. Proper irrigation rules promote water use efficiency, aligning water inputs with crop requirements.

By adhering to irrigation guidelines, farmers contribute to water conservation, reduce the environmental impact of agriculture, and ensure the sustainable use of this precious resource.

Certain irrigation techniques may have varying energy requirements. Selecting energy-efficient methods, as guided by irrigation rules, reduces the carbon footprint of agriculture.

The practical application of irrigation rules aids in minimizing energy consumption, fostering a more environmentally friendly and sustainable agricultural ecosystem.

The practical importance of the basic rules of irrigation, grounded in scientific principles, extends beyond immediate crop management. By fostering soil health, optimizing plant physiology, and promoting environmental sustainability, these rules play a crucial role in ensuring the long-term viability and productivity of agricultural systems. Adopting and refining irrigation practices based on scientific insights is imperative for farmers to navigate the complexities of water management and contribute to a sustainable and resilient agricultural future.

Understanding and implementing these basic rules of irrigation are imperative for farmers to achieve optimal agricultural outcomes. By adopting a comprehensive approach that considers timing, water quality, soil moisture, irrigation techniques, water uniformity, and conservation practices, farmers can enhance crop yield, minimize resource wastage, and contribute to sustainable agriculture.

Theoretical knowledge alone is insufficient in the realm of irrigation. Practical implementation is paramount to mastering these rules. Farmers need to continuously assess and adapt their irrigation practices based on real-world conditions, crop responses, and technological advancements. The hands-on experience gained through practice refines farmers' skills, enabling them to make informed decisions that positively impact both their yields and the environment. Therefore, the importance of practice cannot be overstated in the context of irrigation, as it bridges the gap between theory and successful application on the field.

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