ID: WST001
Technique name: Drip Irrigation
Sector: Agriculture
Description: A micro-irrigation system delivering water directly to plant roots, reducing evaporation.
Step-by-step guide: 1. Install pipes along plant rows. 2. Set up emitters at each plant base. 3. Connect to water source. 4. Monitor flow.
Resource required: Drip tubing, water source, pressure regulators
Benefits: Reduces water usage by 30-50%, increases yield by 20%.
Challenges: High initial cost, emitter maintenance
Suitable region: Arid/semi-arid regions
Water savings: 40% compared to traditional methods
Cost Estimate: 40,000 to 50,000 per acre
Implementation time: 1-2 days for a small farm
Case studies: https://ijcmas.com/6-2-2017/Y.V.%20Krishna%20Reddy,%20et%20al.pdf
References:
https://fyi.extension.wisc.edu/cropirrigation/files/2018/03/References-for-Drip-Irrigation-3-19-2018.pdf

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ID: WST002
Technique name: Subsurface Irrigation
Sector: Agriculture
Description: Delivers water beneath the soil surface, targeting root zones, limiting evaporation.
Step-by-step guide: 1. Install pipes 10-15 cm below ground. 2. Attach water source with pressure control. 3. Monitor system efficiency.
Resource required: PVC pipes, filters, water pump
Benefits: Saves 25-40% more water, prevents waterlogging.
Challenges: Difficult to monitor for clogs
Suitable region: Dry and moderate climates
Water savings: Saves 35% more water
Cost Estimate: 60,000 to 70,000 per acre
Implementation time: 2-3 days for setup
Case studies: nan
References: https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/surface-irrigation

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ID: WST003
Technique name: Sprinkler Irrigation
Sector: Agriculture
Description: Sprays water through nozzles over crops like rainfall, useful for large areas.
Step-by-step guide: 1. Set up sprinklers at field edges. 2. Attach to a water pump. 3. Adjust nozzle for uniform coverage.
Resource required: Sprinkler heads, pipes, water source
Benefits: Covers large areas quickly, easy to automate.
Challenges: Wind affects distribution, requires significant water pressure
Suitable region: Suitable for humid and dry regions
Water savings: 20-30% water saved
Cost Estimate: 25,000 to 30,000 per acre
Implementation time: 1-2 days for a small farm
Case studies: nan
References: nan

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ID: WST004
Technique name: Mulching
Sector: Agriculture
Description: Using organic materials to cover soil surface, reducing evaporation and improving soil health
Step-by-step guide: 1. Spread organic mulch (e.g., straw) across crop base. 2. Water soil before mulching. 3. Maintain mulch layer.
Resource required: Straw, compost, plastic sheeting
Benefits: Retains moisture, reduces weed growth
Challenges: Labor-intensive, can harbor pests
Suitable region: Tropical and temperate regions
Water savings: Saves 10-20% water
Cost Estimate: 8,000 to 10,000 per acre
Implementation time: 1 day for small farms
Case studies: nan
References: nan

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ID: WST005
Technique name: Rainwater Harvesting
Sector: Agriculture
Description: Collects and stores rainwater for irrigation during dry periods.
Step-by-step guide: 1. Install collection system on rooftops. 2. Direct water to underground tanks. 3. Use drip irrigation to distribute.
Resource required: Gutters, storage tanks, piping
Benefits: Reduces dependency on groundwater, low cost
Challenges: Requires initial investment
Suitable region: Semi-arid regions, seasonal rain areas
Water savings: Saves up to 60% of water
Cost Estimate: 20,000 per 1000 liters stored
Implementation time: 1-2 weeks
Case studies: nan
References: nan

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ID: WST006
Technique name: No-Till Farming
Sector: Agriculture
Description: Avoids disturbing the soil, reducing water loss and improving moisture retention.
Step-by-step guide: 1. Use seed drills to plant crops directly. 2. Avoid plowing or tilling. 3. Manage weeds with cover crops.
Resource required: Seed drills, herbicides, cover crops
Benefits: Retains soil moisture, improves soil health
Challenges: Difficult weed control, needs equipment
Suitable region: Dry regions, semi-arid climates
Water savings: 10-15% water retention improvement
Cost Estimate: Varies with scale
Implementation time: 1 week for medium-sized farms
Case studies: nan
References: nan

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ID: WST007

Technique name: Terracing
Sector: Agriculture
Description: Creates level steps on slopes to prevent water runoff and soil erosion.
Step-by-step guide: 1. Dig terraces along the slope. 2. Reinforce with stone or vegetation. 3. Plant crops on each level.
Resource required: Digging tools, stones, plants
Benefits: Reduces water runoff, prevents erosion
Challenges: Labor-intensive, costly
Suitable region: Mountainous and hilly regions
Water savings: Saves 20-25% water, reduces soil erosion
Cost Estimate: 45,000 to 85,000 per hectare
Implementation time: 2-3 weeks
Case studies: nan
References: nan

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ID: WST008
Technique name: Agroforestry
Sector: Agriculture
Description: Integrates trees and shrubs into farming systems to enhance water retention.
Step-by-step guide: 1. Plant trees alongside crops. 2. Use nitrogen-fixing species. 3. Harvest trees for additional income.
Resource required: Tree saplings, fertilizers
Benefits: Improves soil health, retains water, reduces runoff
Challenges: Competition between trees and crops
Suitable region: Semi-arid, tropical regions
Water savings: Increases soil moisture by 30%
Cost Estimate: 85,000 to 90,000 per hectare for saplings
Implementation time: 1-2 years for full implementation
Case studies: nan
References: nan

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ID: WST009
Technique name: Precision Farming
Sector: Agriculture
Description: Uses sensors and data to optimize water usage and fertilizer application.
Step-by-step guide: 1. Install soil moisture sensors. 2. Use weather data to adjust irrigation. 3. Apply water based on crop needs.
Resource required: Sensors, data systems, irrigation
Benefits: Maximizes water efficiency, reduces over-irrigation
Challenges: High cost, requires technical expertise
Suitable region: All regions
Water savings: Reduces water use by 20-30%
Cost Estimate: 1,70,000 to 1,80,000 per hectare
Implementation time: 2-3 months for setup
Case studies: nan
References: nan

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ID: WST010
Technique name: Cover Cropping

Sector: Agriculture
Description: Grows crops like legumes in off-seasons to improve soil moisture and reduce evaporation.
Step-by-step guide: 1. Plant cover crops after harvest. 2. Let them grow until the main season. 3. Till or mow before planting the main crop.
Resource required: Seeds, fertilizers
Benefits: Retains soil moisture, improves soil quality
Challenges: Requires additional management
Suitable region: Temperate, tropical regions
Water savings: Saves 15-20% water
Cost Estimate: 10,000 to 15,000 per hectare
Implementation time: 1 season for full benefits
Case studies: nan
References: nan

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ID: WST011
Technique name: Plastic Mulching
Sector: Agriculture
Description: Uses plastic sheets to cover soil, reducing evaporation and weed growth.
Step-by-step guide: 1. Spread plastic mulch on soil surface. 2. Cut holes for planting. 3. Replace plastic after each season.
Resource required: Plastic sheeting, cutters
Benefits: Reduces evaporation by 40%, improves plant growth
Challenges: Plastic waste disposal, high cost
Suitable region: Suitable for hot, arid climates
Water savings: 30-40% water savings
Cost Estimate: 17,000 to 20,000 per acre
Implementation time: 1-2 days for a small farm
Case studies: nan
References: nan

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ID: WST012
Technique name: Check dams
Sector: Agriculture
Description: Small, temporary barriers built across waterways to slow water flow and increase soil moisture.
Step-by-step guide: 1. Construct dams using local materials. 2. Dig retention basins. 3. Use water for irrigation.
Resource required: Stones, soil, digging tools
Benefits: Increases groundwater recharge, reduces erosion
Challenges: Requires regular maintenance
Suitable region: Arid and semi-arid regions
Water savings: Saves up to 50% of runoff
Cost Estimate: 40,000 to 45,000 per dam
Implementation time: 1-2 weeks
Case studies: nan
References: nan

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ID: WST013
Technique name: Laser Land Leveling

Sector: Agriculture
Description: Uses laser technology to ensure flat fields, improving water distribution and reducing waste.
Step-by-step guide: 1. Install laser leveling equipment. 2. Level fields to a uniform grade. 3. Set up irrigation.
Resource required: Laser leveling tools, tractors
Benefits: Reduces water runoff, improves yield by 15%
Challenges: High initial cost
Suitable region: All regions
Water savings: Saves 20-30% of water
Cost Estimate: 85,000 to 90,000 per hectare
Implementation time: 2-3 days for large farms
Case studies: nan
References: nan

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ID: WST014
Technique name: Vertical Farming
Sector: Agriculture
Description: Grows crops in vertically stacked layers to optimize space and minimize water use.
Step-by-step guide: 1. Set up vertical structures. 2. Install hydroponic or drip irrigation systems. 3. Plant crops in vertical layers.
Resource required: Hydroponic systems, shelves, lights
Benefits: Saves up to 95% of water, high yield per area
Challenges: High cost, energy usage
Suitable region: Urban, indoor settings
Water savings: 90-95% water savings
Cost Estimate: 17,70,000 to 18,00,000 per unit
Implementation time: 2-3 months for setup
Case studies: nan
References: nan

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ID: WST015
Technique name: Biochar Soil Amendment
Sector: Agriculture
Description: Adding biochar to soil enhances water retention and soil health.
Step-by-step guide: 1. Produce biochar from organic waste. 2. Mix biochar into soil. 3. Monitor moisture levels.
Resource required: Biochar, organic waste, soil
Benefits: Increases soil moisture retention, improves crop resilience
Challenges: Requires biochar production setup
Suitable region: All regions
Water savings: Increases soil water retention by 15-20%
Cost Estimate: 5,000 to 8,000 per hectare
Implementation time: 1-2 weeks
Case studies: nan
References: nan

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ID: WST016
Technique name: Hydrogel Soil Conditioners
Sector: Agriculture

Description: Hydrogels absorb and retain water in soil, releasing it slowly to crops.
Step-by-step guide: 1. Mix hydrogels into soil before planting. 2. Monitor soil moisture levels. 3. Reapply annually.
Resource required: Hydrogels, soil
Benefits: Reduces irrigation frequency by 50%, improves crop growth
Challenges: High cost of hydrogels, requires annual application
Suitable region: Arid and semi-arid regions
Water savings: Saves up to 50% of irrigation water
Cost Estimate: 25,000 to 30,000 per acre
Implementation time: 1 day for small farms
Case studies: nan
References: nan

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ID: WST017
Technique name: Irrigation Scheduling
Sector: Agriculture
Description: Uses climate and soil data to determine optimal watering times, minimizing overuse.
Step-by-step guide: 1. Install weather stations and soil sensors. 2. Monitor crop needs daily. 3. Adjust irrigation accordingly.
Resource required: Sensors, weather data, irrigation system
Benefits: Maximizes water use efficiency, reduces waste
Challenges: Requires ongoing data collection
Suitable region: All regions
Water savings: Reduces water use by 20-30%
Cost Estimate: 1,26,000 to 1,30,000 for sensors and setup
Implementation time: 1-2 weeks
Case studies: nan
References: nan

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ID: WST018
Technique name: Aquaponics
Sector: Agriculture
Description: Combines fish farming and hydroponics in a symbiotic system where fish waste nourishes crops.
Step-by-step guide: 1. Set up fish tanks and hydroponic beds. 2. Circulate water between systems. 3. Monitor fish and plant health.
Resource required: Fish tanks, hydroponic system
Benefits: Uses 90% less water than traditional farming, produces fish and crops
Challenges: High cost, requires expertise
Suitable region: Urban settings, controlled environments
Water savings: Saves up to 90% of water
Cost Estimate: 4,20,000 to 4,30,000 for small systems
Implementation time: 3-6 months for setup
Case studies: nan
References: nan

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ID: WST019
Technique name: Water Reuse Systems
Sector: Agriculture

Description: Recycles treated wastewater for irrigation and other agricultural uses.
Step-by-step guide: 1. Set up treatment systems for wastewater. 2. Direct treated water to irrigation systems. 3. Monitor water quality.
Resource required: Water treatment systems, pipes
Benefits: Reduces fresh water demand, lowers costs
Challenges: Requires treatment infrastructure
Suitable region: Urban and peri-urban areas
Water savings: Saves up to 70% of water
Cost Estimate: 4,20,000 to 4,30,000 for small systems
Implementation time: 1-2 months for setup
Case studies: nan
References: nan

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ID: WST020
Technique name: Deficit Irrigation
Sector: Agriculture
Description: Deliberately applying less water than crops need to improve water-use efficiency.
Step-by-step guide: 1. Monitor crop water needs. 2. Apply water during critical growth stages. 3. Reduce irrigation during less critical stages.
Resource required: Soil moisture sensors, irrigation system
Benefits: Improves water use efficiency, increases drought tolerance
Challenges: Can reduce yields if misapplied
Suitable region: Arid and semi-arid regions
Water savings: Saves 20-30% of water
Cost Estimate: 40,000 to 45,000 per hectare
Implementation time: 1 season for full implementation
Case studies: nan
References: nan

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