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Research Paper

Insitu Water Recycling Methods in Dryland- A Review

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Abstract
To improve the water holding capacity of the field it is important to go for some special techniques. By increasing the physical chemical and biological nature of the soil condition in the field we can improve the soil fertility and the texture of the soil. Either by storage of the rainwater or through infiltration of the rainwater we can recycle the rainwater. The stared water should be reused efficiently. These techniques can be followed in the dryland areas where there is the scarcity of the water. Proportionally by recycling the water we can increase the productivity of the crop simultaneously.
Keywords: *water harvesting, recycling, rainwater and soil fertility.*

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I. Introduction

Insitu water recycling in dryland farming involves the use of various technologies to treat and reuse water on site, reducing the demand for fresh water resources and increasing the sustainability of the agricultural production.

Insitu water recycling in field dryland can help to increase the resilience and sustainability of agricultural production, particularly in areas with water scarcity or high-water demand. By reducing the demand for freshwater resources and optimizing water use in situ water reusing can help to ensure that agricultural production is able to continue in the changing climate with growing water stress.

Water stress

For recycling of the water, first we have to store the water in the fields first. Insitu rainwater storage in the field involves collecting and storing rainwater on site directly where of falls, for later use in agricultural production . This approach can help to increase water availability for crops particularly in areas with irregular or unreliable patterns.

There are several methods for insitu rainwater storage in the field

Soil moisture conservation

The main objective of the soil moisture conservation is to minimize the of water lost from the spoils through evaporation and transpiration or combined, the evapotranspiration

- Soil moisture conservation techniques
- Spreading manure or compost over the soil
- Mulching Wilhoit*et al.* (1990) assembled a simple strip tillage implement to conduct a field experiment with summer cabbage and reported that the strip-tillage cabbage yield from a heavy mulch treatment was 56 per cent higher than that from a stubble mulch treatment, under very dry conditions.
- Conservation tillage
- Crop Rotation and
- Green manuring

Micro catchment systems

Micro catchment systems involve creating small. shallow depressions in the soil which act as mini reservoirs to collect and store rainwater. The stored water can be used for irrigation or other non-portable uses.

Percolation pond

Percolation ponds are shallow excavated areas designed into the soil, recharging groundwater and increasing soil moisture.

Contour bunds

As mentioned in the previous answer, contour bunds are low, broad ridges constructed along the contour lines of sloping land. They are designed to slow down and retain runoff water, allowing it infiltrate into the soil and recharge ground water

Swales

Swales are shallow ditches or depressions constructed ono contour lines to collect and hold water. The stored water can then infiltrate into the soil increasing soil moisture and groundwater recharge.

In situ rainwater storage in the fields can help to increase the resilience and sustainability of agricultural production. particularly in areas with water scarcity or irregular rainfall patterns. By capturing and storing rainfall on site, farmers can reduce their dependence on freshwater resources and improve water use efficiency.

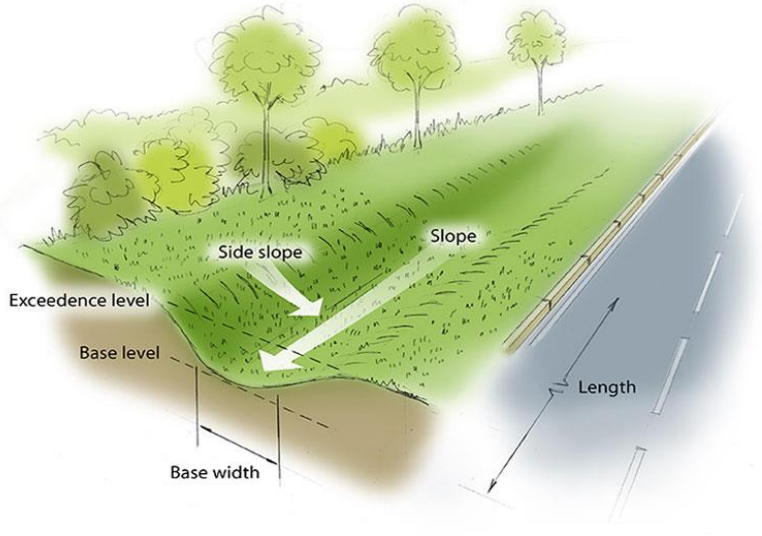

Fig 1

Some Common technologies used for in situ water recycling in field dryland include **Rainwater**

This involves collecting and storing rainwater for later use, either for irrigation or other non-potable uses. Rainwater can be collected from rooftops, roads or other surfaces using various collection methods, such as gutters tanks or cisterns.

Techniques of rainwater harvesting for small scale agriculture

Rain barrels

It is the easiest and affordable technique of rainwater harvesting, especially at home. It is where water tanks installed below the down spouts of the roof top guttering system, the water in funneled or directed into the tanks. The tank can be connected to give backup water to your current pumping system, or it can be attached to a pipe for drip irrigation.

Fig 2

Dry system

It is related to the barrels s system, but with the dry system, a large storage container is used, the container is generally a fie meters away from the property. The gutter is redesigned so that water is diverted to the huge storage tank. It is a quick and cheap method to implement but had significant rewards.

Wet system

It is a method that is entirely different from the dry system. Here the set pipes will always have in them. It is because they will be located undergoing. In the wet method, collection pipes are linked to the downspouts of the building diverted to the storage tank, which is also underground. The pipes need to be secure & well maintained to ensure there is not leakage intothe soil.

Green roof

This process of harvesting does not need the use of storage tank. Instead of storing the water in a reservoir, the waste is channeled directly to the garden. The procedure will require installing a drainage system on a building's rood straight to the backyard. It is a very maintenance process.

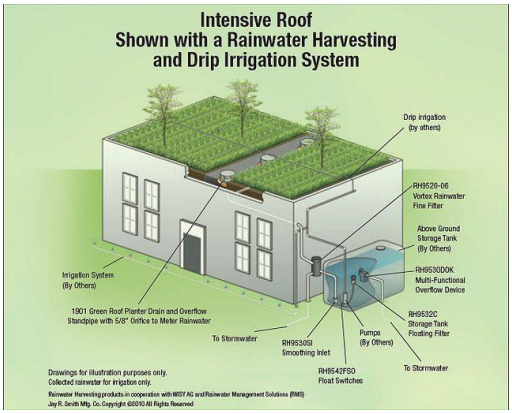

Fig 3

Conservation tillage

This involves reducing or eliminating tillage practices to conserve moisture in the soil and reduce soil erosion. Conservation tillage can help to retain moisture in the soil, increasing the amount of available water for crops.

These include a decrease in carbon dioxide and greenhouse gas emissions, less reliance on farm machinery and equipment, and an overall reduction is fuel and labor costs. In addition, conservation tillage methods have been shown to improve soil health, reduce runoff, and limit the extent of erosion. With a range of potential and properly integrated conservation tillage practice can contribute toward the sustainability toward the sustainability of an agriculture system.

Ridges and furrows

Surajbhan and Singh (1979) investigated the feasibility of moisture conservation practices under dryland conditions and concluded that ridging and furrowing increased the yield of maize and mustard and brought about an additional profit of Rs. 285.60 per hectare over the conventional method. Channappa and

Ashoka (1992) reported that there was 11.67 per cent increase in yield of ragi in the ridge and furrow system over the flat method of sowing

Drip irrigation

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Drip irrigation

Drip irrigation involves delivery water directly to the rootzone of the plan td reducing water loss through evaporation and improving water use efficiency.

Drip irrigation system can be designed to reduce and recycle water, reducing the demand for freshwater resources.

Waste water reuse

Waste water from various sources. Such as household, industrial, or agricultural activities, can be treated and reused for irrigation or other non-potable uses. Various treatment technologies such as constructed wetland or bioreactors, can be used to treat wastewater to a quality that is suitable for reuse.

Before one can endorse wastewater irrigation water supply for agriculture, a thorough analysis must be undertaken from an economic perspective as well. In this regard the comprehensive costs and benefits of such wastewater reuse should be evaluated.

Greywater recycling

Grey water is wastewater from household sources such as, showers and washing machines.

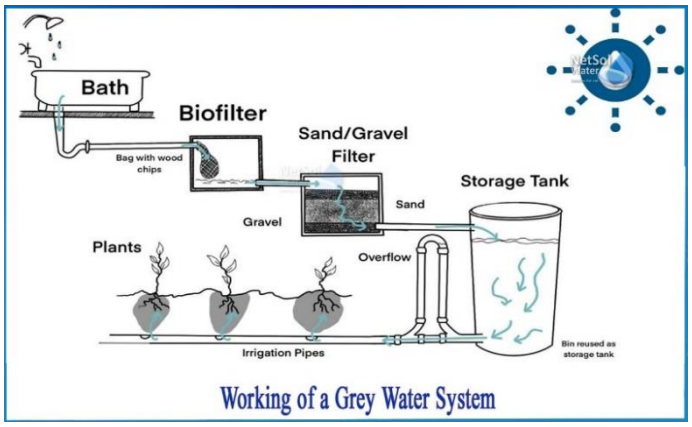

Fig 4

Blackwater treatment

Blackwater is wastewater from toilets and kitchen sinks. It contains high levels of organic matter and pathogens and requires more extensive treatment.

Constructed wetlands

Constructed wetlands are artificial wetlands designed to treat wastewater. The wetland plants and miracles remove pollutants and nutrients from the waste through a process called phytoremediation. Constructed wetlands can be used to treat both greywater and blackwater.

Fog harvesting

Fog harvesting involves collecting water droplets from fog that forms in dry areas using specially intended net or meshes. The collected water can remain used for irrigation, livestock, or even drinking after treatment.

Hydrological functions

Infiltration, rain water harvesting modify water flows in the landscape mainly by enhancing water infiltration.

The velocity of the runoff is reduced, and the water is collected behind the structures soil moisture increases significantly below semicircular bunds.

A negative effect might occur under poor drainage conditions that might lead to water logging.

Ground water recharge

Very few direct field measurements of groundwater recharge are available. The impact of in situ RWH on groundwater recharge, that in situ practices will enhance water availability.

Tips for recycling irrigation water

Consider all the options

Greenhouse irrigation water can easily be recycled because the water is collected afterward and can be chemically, physically or biologically treated.

Filtration is key

Build a largest reservoir possible to hold your water pre disinfection. This increases your water pre disinfectant. This increases the amount of natural filtration as sedimentation occurs and largest organic chunks sink to the bottom of the reservoir.

Recycled water can spread disease and must be properly disinfected

One crop loss could cost 10x more than the amount to install and operate a disinfection system. Water disinfectant ensures that plant pathogens are being recycled along with the irrigation water.

Consider the alternative

Recycling may not be for you if you are concerned about the biohazard risk of spreading disease.

II. Conclusion

68 % of the entire cultivated area in the India comes under the dryland cultivation. But the income generated or the productivity in these areas is not negligible. There improvement in the dryland technology is more important for the development of the agriculture. By using the described we can mitigate the loss of the rain water by efficient utilization of the rainwater. Simultaneously increase the production and the income of the farmers living in the dryland region.

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