

# Methodology and Verification Protocol for DLI #4: Adoption of practices for efficient water use

## Background

DLI# 4 incentivizes the demand side activities implemented for sustainable groundwater management as included in the WSPs. This DLI incentivizes demand side measures that reduce water consumption in agriculture which includes the introduction of efficient micro-irrigation systems, a shift in cropping patterns away from water-intensive crops, innovative water saving agriculture methods and electricity feeder separation. The disbursement will be based on the increase in area (in hectares) at Gram Panchayat (GP) Level or the increase in number of blocks (in case of feeder separation) benefiting from these demand side activities.

## Data entry for DLI#4 incentive claim

To capture the year on year increase in area adopting efficient water utilization practices, a standard MIS template (**Annexure I**) has been devised for DLI#4 by NPMU comprising various indicators & sub –indicators. The claim can be entered in MIS module of DLI#4 available in Atal Jal Website by logging in the ‘Monitoring & Evaluation Modules’ of MIS. The achievement under DLI#4 will be based on the sum of these indicators as given below:

- a) **Year-on-year increase in area (in hectares) with efficient irrigation systems:** Under this indicator, States need to provide GP wise data of increase in area covered through the following water-efficient irrigation techniques:
  - Sprinkler Irrigation
  - Drip Irrigation and
  - Irrigation through pipelines
  
- b) **Year-on-year increase in area (in hectares) with a shift in cropping patterns:** GP-wise area with a shift from existing high water consuming crops to low water consuming crops will be considered for determining the annual increase in area with a shift in cropping pattern. The following information needs to be submitted by the States to estimate increase in area coverage :
  - Name of existing High water-consuming Crop
  - Name of replacing low water-consuming crop
  - Area with crop shifting (in Ha)
  - Name of Dept/CSR/NGO/ self-financing
  - Name of Scheme

Based on discussion with Agriculture experts from various institution, scientists of ICAR, literature review and cultivation & irrigation practices, crops with average water requirement more than 1000mm have been kept under high water consuming crops for assessing increase in area with significant reduction in water consumption through crop shift. A document on the scope of crop shifting under Atal Bhujal Yojana is also prepared and enclosed as **Annexure II**

- c) **Year-on-year increase in area (in hectares) under other water-saving methods:** Under this indicator, States need to provide GP-wise data on the increase in area covered under other water-saving agriculture methods as given below:
  - Super seeder /happy seeder/zero tillage
  - Polyhouse /net house
  - Mulching
  - Hydrogel
  - DSR
  - Other water-saving agricultural practices

A brief note on the above-mentioned agricultural water efficient practices are given in **Annexure III**

d) ***Year-on-year increase in the number of blocks where electricity feeder separation has been adopted:***

Electricity line distribution data collected at the block level will be used to determine the annual increase in number of blocks adopting feeder separation for agriculture. The achievement of a State will be evaluated based on

- Annual increase in number of blocks that has adopted functional electricity feeder Separation in the entire block which is also functional

The claim for increase in area under demand side interventions needs to be entered separately for area covered through convergence, Atal Jal incentive fund and self/private financing under various sub-indicators in the MIS template. States need to enter gram panchayat wise data under various sub-indicators of DLI#4 along with sample source documents.

***Instructions for SPMU regarding submission of claim & source document collection for Third Party Physical Verification:***

- The claim data entered by DPMUs in the MIS is to be verified and approved by SPMU for onward submission to NPMU. The approved claim from the States shall be accepted by NPMU with the assumption that all original source documents by different line departments/individuals/private companies/NGOs/Trusts, towards incentive claim at Gram Panchayat level have been duly checked and verified by SPMU and approved by Project Director, SPMU.
- Department wise sample source document for each intervention needs to be uploaded in the DLI#4 module of MIS. In case of crop shifting claim, all the source documents to be uploaded in MIS for technical verification at NPMU.
- The area under crop shifting should be claimed based on field verification of the fully grown crops by line departments to ensure actual shifting of crop. Beneficiary wise area and details like existing high water intensive crop, replacing low water consuming crop are mandatory in the source documents to ensure that the area is incremental.
- SPMUs to ensure availability of original source documents maintained by line department/private agencies/Gram Panchayats, against the submitted claim at SPMU office, so that the same can be produced at the time of verification by TPGVA (QCI) along with additional compilations particularly for Atal Jal.

**The original documents can be of following types:-**

- 1) Documents originally maintained by line departments / Source document generated from Line departments' authorized portal that includes name of scheme, date of implementation, GP wise type of intervention, expenditure incurred/subsidy disbursed, beneficiary details and beneficiary wise area coverage certified by competent authority (line department official) along with a covering letter from the competent authority (line department official) certifying the source of the document and actual implementation of interventions.
- 2) In case of activities funded through Atal Jal incentive, Line departments' authorized portal generated document that includes GP wise type of Intervention, expenditure/subsidy disbursed, beneficiary details & area coverage, certified by competent authority of line department along with a covering letter certifying the source of the document, funding source and actual implementation of interventions.
- 3) In the case of private financing(CSR/ NGOs), the signed and certified document containing duration of implementation, GP wise name of beneficiaries, name of interventions, area coverage and expenditure/subsidy details along with a covering letter from competent authority of CSR/NGO certifying the actual implementation of the interventions and expenditure incurred/subsidy disbursement to beneficiaries.
- 4) In case of self-financing, Panchayat Secretary/ Sarpanch-certified document containing name of beneficiaries, name of intervention & area covered. Seal & signature of Panchayat Secretary/ Sarpanch is mandatory for considering the claim. All such claims under efficient irrigation, other water saving methods & crop shifting through self/private financing are required to be verified preferably at the field by SPMUs/DPMUs before submission to NPMU.

## Verification Methodology of DLI#4

The verification methodology comprises of two steps:

- a) Desktop assessment of claim at NPMU
- b) Physical verification of claim by QCI

### a) Desktop assessment of claim at NPMU

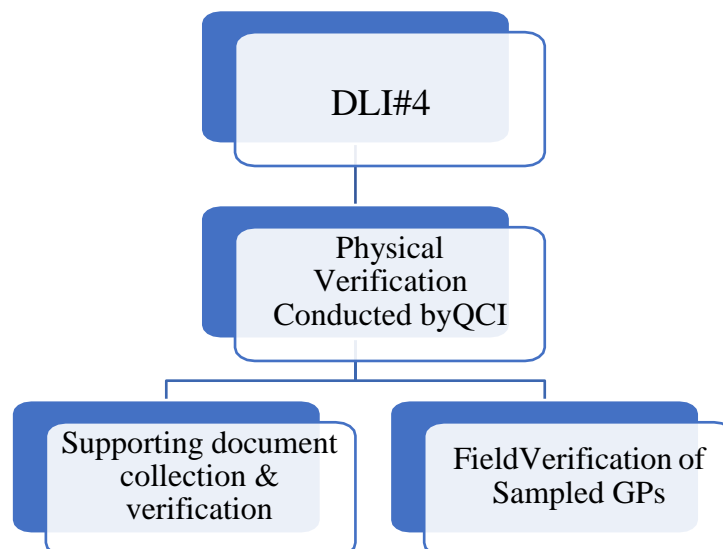
Desktop assessment of the submitted claim under DLI#4 is to be done by NPMU. The process to be followed for desktop assessment is given below-

- The claim of incremental area approved by SPMUs, through various modes of convergence such as on-going schemes/initiatives, Atal Jal incentive fund & self/private financing will be verified technically based on the information provided under demand-side interventions and sample source documents uploaded in the MIS.
- The claim for incremental area under crop shifting will be verified based on the source documents uploaded in the MIS module. The following will be verified at NPMU- GP wise information at beneficiary level on (a) existing water intensive crops & replacing low water consuming crops (as per **Annexure II**), (b) the purpose/aim of the scheme through which crop shifting has been implemented as per State claim and (c) declaration & proof from the line department mentioning that the crop shifting has been field verified by them when the crop was fully grown. Beneficiary details of current claim will be compared with previous claims to ensure that the area is incremental.
- Claim for blocks taken under electricity feeder separation in the claim year will be verified in comparison with the baseline data and the source document from line department. The claim under this sub-indicator will be considered if the entire block is brought under feeder separation in the claim duration.
- Area claimed through convergence will be cross verified with the information given in DLI#3 claim
- Area covered through Self Financing will only be considered if it is an increased area i.e, area covered under a particular intervention by a particular farmer cannot be claimed more than once during project tenure.
- Any inconsistency in the data will be highlighted to the SPMUs for proper justification before rejection of the claim.

After completion of the desktop assessment, the admitted claim area template will be shared with QCI for physical verification.

### b) Physical verification of claim by QCI

The physical verification by QCI as TPGVA shall be done in the following way -

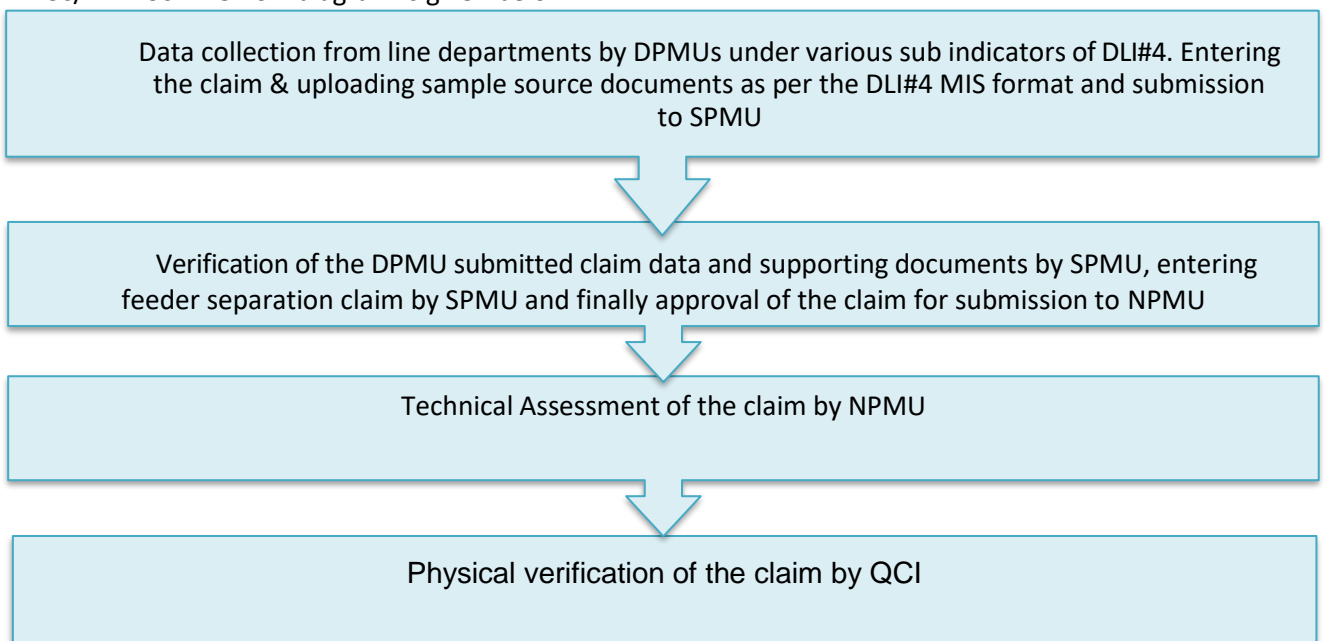


- **Sampling :** QCI will take 20% of the GPs as sample for physical verification from each District. Each District will be divided into 4 quartiles based upon area claimed in a given GP under this DLI and then sample will be collected from each Quartile based upon weighted average.
- **Document Collection:** QCI shall visit SPMU/DPMU office to collect and verify supporting documents pertaining to demand-side interventions against the area claims made by State. Document verification of the submitted claim of DLI#4 shall be carried out based on original documents collected from the Line department's Office/private agencies/Gram Panchayat at SPMU/DPMU level(as detailed in page no.2). QCI will also visit Line Departments as and when required during document collection period. Incentive/convergence documents must consist of beneficiary list along with area and the scanned copies received must be countersigned by competent authorities of the line departments. Self-finance documents consist of documents maintained at the gram panchayat/village level must be certified by the Panchayat Secretary/Sarpanch of the respective Gram Panchayat.
- **Document Verification:** After collecting the source documents from all the States, QCI shall carry out desktop verification of the claimed area for sampled gram panchayats from the data submitted by NPMU after technical assessment.
- **Field Verification:** QCI shall verify the demand-side interventions under DLI#4 for sampled GPs which will include the following:
  1. Area claimed under demand-side interventions will be assessed through individual interviews of the beneficiaries'/community members. During the citizen interaction, 50% of beneficiaries of demand-side interventions (1st April 2023 – 30th September 2023) should be present mandatorily.
  2. QCI shall also physically observe the interventions, wherever possible. Geo-tagged photographs of demand-side interventions along with Video photography to be done by the assessors of QCI wherever possible.

The field verification shall be conducted with the assistance of on-field team consisting of DPMU and Gram Panchayat officials.

### Process Flow for DLI#4 claim Verification

The protocol for DLI#4 verification ideally involves several steps and interlinked processes, an attempt has been made to consolidate the entire process flow in the form of a flow diagram for better understanding of SPMUs/DPMUs. The flow diagram is given below:



# Annexure I

State: Delhi\_7 » District: North\_80   2023-24

## Adoption of practices for efficient water use

### Increase in area with efficient irrigation system (Ha)

Irrigation System	Area covered through convergence	Area covered exclusively through Atal Jal Incentive	Area covered exclusively through self/private financing	Total area	Total Beneficiary
sprinkler	<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>
Drip	<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>
Pipeline Irrigation	<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>
<b>Total</b>					

### Increase in area with crop shifting (Ha)

S.No.	Name of existing high water consuming crop	Name of replacing low water consuming crop	Area with shifting from high to low water consuming crop	Name of Department	Name of Scheme	Total Beneficiary	Edit	Delete

### Increase in area under other water saving agriculture method (Ha)

Water Saving Methods	Area covered through convergence	Area covered exclusively through Atal Jal incentive	Area covered exclusively through self/private financing	Total Area	Total Beneficiary
Super seeder /happy seeder/zero tillage	<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>
Polyhouse /Net House	<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>
Plastic mulching	<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>
Hydrogel	<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>

## Electricity feeder separation

[Back To Module](#)

Select StateName

Select District

Select Block

2022-23

Search

Sr.No

State Name

District Name

Block Name

Year

Brought under feeder separation in claim duration

## Upload Sample Source Document


[Back To Module](#)


State: Delhi\_7 » District: North\_80

2023-24

Phase-1[Apr 2023 - Sep 2023]

### Upload Document

Description  :

Upload Document (\*.pdf,\*.xls,\*.xlsx)  :

Choose File No file chosen

Save

Sr.No

State Name

District Name

Year

Phase

Description

Documents

Edit

Delete

Data Validation

Remark

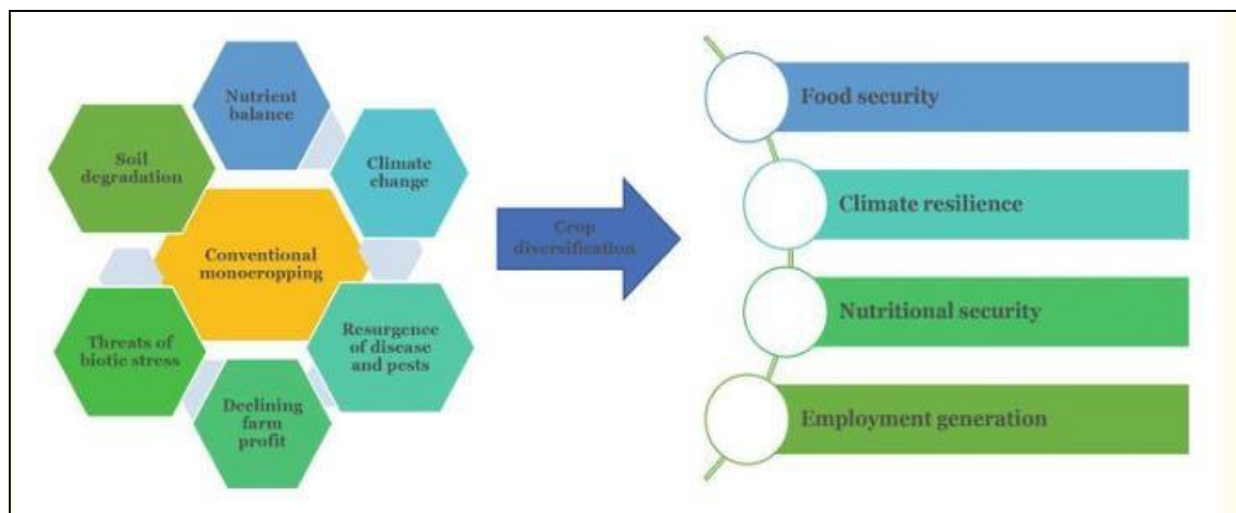
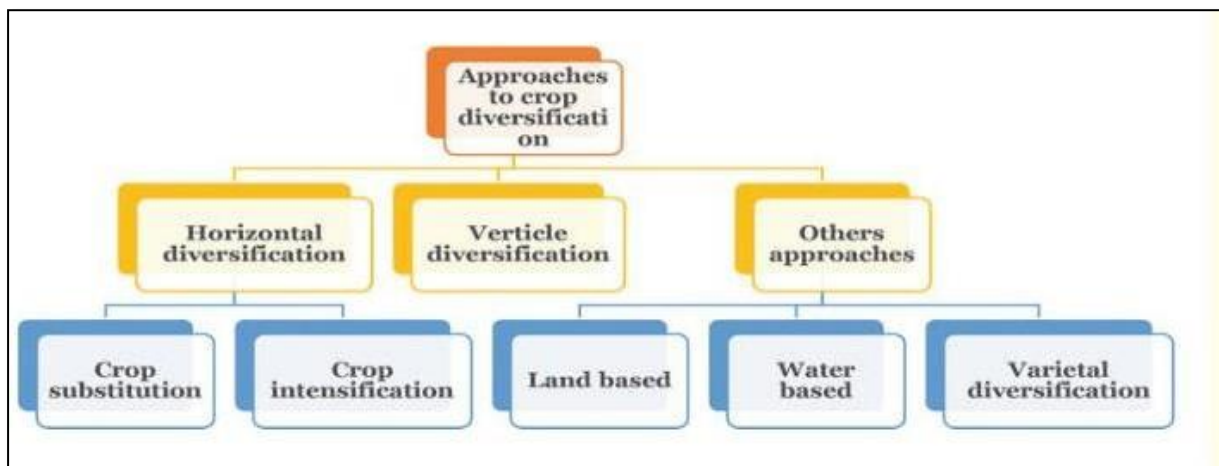
Status

No Data

**Crop Diversification: Scope under Atal Bhujal Yojana**

Crop diversification in general means growing more than one crop in an area. It refers to a shift from the regional dominance of one crop to the regional production of multiple crops. Diversification can be accomplished by adding a new crop species or different variety, or by changing the cropping system currently in use. Crop diversity encompasses several aspects such as crop species diversity, varietal diversity within crop species, and genetic diversity within crop species. Diversification can be done at the farm level as well as household level.

Crop diversification is recognized as one of the most feasible, cost-effective, and rational ways of developing a resilient agricultural cropping system. Crop diversification is a demand-driven, need-based, and situation-specific dynamic concept.



Intercropping, diverse crop rotations, mixed cropping, cultivation of grain legumes in generally cereal-dominated systems, relay cropping, alley cropping, and regionally adapted varieties or various combinations are all examples of agricultural diversification strategies.

**Under Atal Bhujal Yojana, crop diversification aims at replacing high water-consuming crops with low water-consuming crops to reduce the consumption of groundwater.**

**High and Low water-consuming crops classification:**

Consultation with agricultural experts from various institutions revealed that there is no fixed classification of crops based on water consumption. Based on literature review and the cultivation & irrigation practices of various crops, the following classification has been done where crops with average water requirement more than 1000mm are considered as high water consuming under Atal Bhujal Yojana.

**High water consuming crops-** Paddy, Sugarcane, Banana, Turmeric, Mango, Orange, Pineapple, Grape, Cotton, and Alfalfa are some high- water-consuming crops.

**Low water-consuming crops:** Millet ( Little millet, Kodo millet, Pearl millet, Finger millet, Sorghum, etc), Pulses ( Chickpea, Moth bean, Lentil, Red gram, Green Gram, Black Gram, Horse Gram, etc.) and some Oilseeds ( Linseed, Sesamum, Mustard, Safflower, etc.)

**Dryland perennial horticulture crops:** Pomegranate, Aonla, Guava, Jamun, Ber, Date palm, Karonda, Acid lime, and Custard apple.

**Water requirement of crops-** Crop water requirement data from various sources are given in the below table for reference.

Crop	Water requirement (mm)	Crop	Water requirement (mm)
Rice	1200	Tomato	600 – 800
Wheat	450 – 650	Potato	500 – 700
Sorghum	450 – 650	Pea	350 – 500
Maize	500 – 800	Onion	350 – 550
Sugarcane	1500 – 2500	Chillies	400 – 600
Sugarbeet	550 – 750	Cabbage	380 – 500
Groundnut	500 – 700	Banana	1200 – 2200
Cotton	700 – 1300	Citrus	900 – 1200
Soybean	450 – 700	Grapes	700 – 1200
Tobacco	400 – 600	Mango	1000 – 1200
Beans	300 – 500	Turmeric	1200 – 1400

Source: <http://www.angrau.ac.in/media/7380/agro201.pdf>

Crop	Water Requirement (mm)	Crop	Water Requirement (mm)
Rice	900-2500	Chillies	500
Wheat	450-650	Sunflower	350-500
Sorghum	450-650	Castor	500
Maize	500-800	Bean	300-500
Sugarcane	1500-2500	Cabbage	380-500
Groundnut	500-700	Pea	350-500
Cotton	700-1300	Banana	1200-2200
Soybean	450-700	Citrus	900-1200
Tobacco	400-600	Pineapple	700-1000
Tomato	600-800	Gingelly	350-400
Potato	500-700	Ragi	400-450
Onion	350-550	Grape	500-1200

Source: <https://indiawaterweek.thewaternetwork.com/article-FfV/micro-irrigation-in-india-an-assessment-of-bottlenecks-and-realities-8KehyZcWG6HrxYNy2s4loQUnderground/above-ground>  
[https://www.researchgate.net/figure/The-water-require-of-different-crops-grown-in-India\\_tbl1\\_332632426](https://www.researchgate.net/figure/The-water-require-of-different-crops-grown-in-India_tbl1_332632426)



**Brief note on water-saving agriculture methods considered under DLI#4**

**Super seeder** machines are the one-pass solution that combines the tasks of tilling, sowing, and seedbed covering. It is a combination of Seed Planter and Rotary Tiller with Press Wheels. The machine is the ultimate solution to removing paddy stubbles, mixing them with the soil, preparing the land, and sowing seeds. The mulch cover of rice straw may also help in mitigating evaporation losses.



A **Happy Seeder** is a no-till planter, towed behind a tractor, that sows (plants) seeds in rows directly without any prior seedbed preparation. It consists of a straw managing chopper and a zero till drill that makes it possible to sow new crop in the residue of the previous crop. It deposits the residue of the previous crop over the sown field as mulch. Mainly, it is used to sow wheat after the paddy harvest in North India. It also helps in saving water just like super seeder.



**Zero tillage** is the process where the crop seed will be sown through drillers without prior land preparation and disturbing the soil where previous crop stubbles are present. Zero tillage not only reduce the cost of cultivation it also reduces the soil erosion, crop duration and irrigation requirement and weed effect which is better than tillage. Zero Tillage (ZT) also called No Tillage or Nil Tillage. The machine used for zero tillage is called zero till seed cum fertilizer drill. No /Zero tillage reduces the compaction of the soil and reduces the water loss by runoff and prevents soil erosion. It also helps in saving evaporation losses that happens during land preparation.



**Polyhouse:** Polyhouse or a greenhouse is a house or a structure made of translucent material like glass or polyethylene where the plants grow and develop under controlled climatic conditions. In India, Polyhouse farming is the most popular greenhouse technology for its lowcost of construction. It creates a microclimate surrounding the crops that help in maximum growth regarding production and quality. It reduces evapotranspiration losses, the use of micro irrigation techniques in polyhouse increases the water use efficiency.



**Mulching:** Mulching is the process or practice of covering the soil/ground to make more favourable conditions for plant growth, development, and efficient crop production. Mulch is a technical term that means 'covering of soil'.

Plastic mulching is a thin film of polyethylene used to cover up the soil. Polyethylene is preferred because of its greater permeability to longwave radiation which can increase the temperature around plants during the night times. Mulch saves water by reducing evaporation losses.

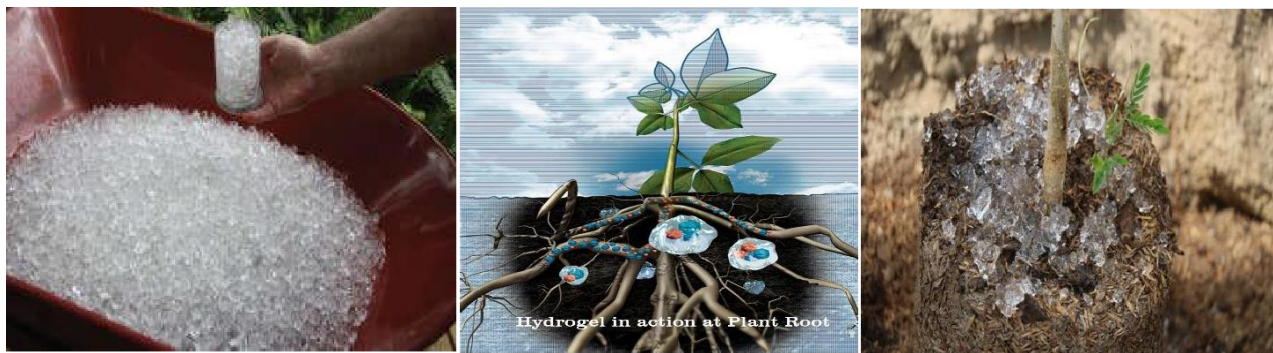


**Hydrogel:** A hydrogel is a three-dimensional (3D) network of hydrophilic polymers that can swell in water and hold a large amount of water while maintaining the structure due to chemical or physical cross-linking of individual polymer chains.

Natural hydrogels are those gels, whose polymers have natural origins such as gelatin and collagen. Synthetic hydrogels, on the other hand, are synthesized using synthetic polymers such as polyamides and polyethene glycol.

Hydrogel works as water reservoirs around the root zones of the plant. In presence of water, it expands to around 200-800 times the original volume. When the polymers come in contact

with water, the water penetrates the hydrogel system by osmosis. When the surrounding around the root zone begins to dry up, the hydrogel gradually dispenses up to 95% of its stored water to plant absorption.



**Direct Seeding Of Rice (DSR)-** DSR refers to the process of establishing a rice crop from seed sown in the field rather than by transplanting seedlings from the nursery. Direct seeding can be done by sowing pre-germinated seed into puddled soil (wet seeding) or standing water (water seeding) or a prepared seedbed (dry seeding).

Under the conventional rice establishment system, the nursery is raised from seed; 4-5 weekold seedlings are uprooted from the nursery and then transplanted in the main field. Under DSR, the seed is directly sown in the main field. DSR technique **can help save 15% to 20% water.**



**Laser Land Levelling:** Laser levelling is a process of smoothing the land surface ( $\pm 2$  cm) from its average elevation using laser-equipped drag buckets. This practice uses large horsepower tractors and soil movers that are equipped with global positioning systems (GPS) and/or laser-guided instrumentation so that the soil can be moved either by cutting or filling to create the desired slope/level. This technique is well known for achieving higher levels of accuracy in land levelling and offers great potential for water savings and higher grain yields.



An average of 1.98 million litres of water is required to grow a one-acre crop (Aryal and Jat, 2015). Precise land leveling can save 0.35 to 0.45 million litres of water for the same crop. Along with water saving, crop yields will increase by at least 7 percent for rice and 7–9 per cent for wheat (Aryal and Jat, 2015) and these figures can rise to 12 per cent. Other advantages that farmers observed included reductions in irrigation time, labor costs, reduces drudgery, uniform seed germination, reduced weed germination, etc.