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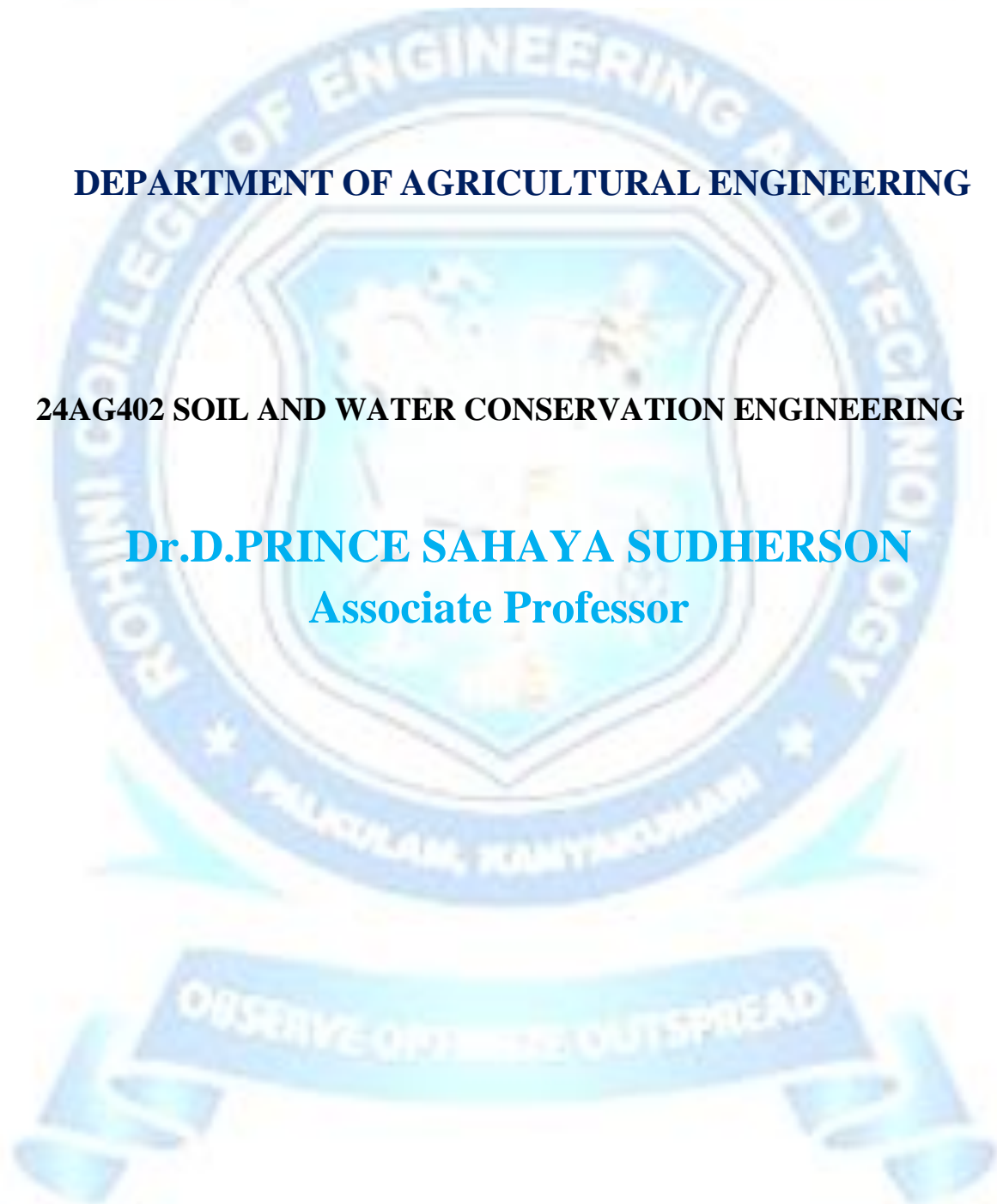
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DEPARTMENT OF AGRICULTURAL ENGINEERING

24AG402 SOIL AND WATER CONSERVATION ENGINEERING

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What is an in-situ conservation?

In-situ conservation means the conservation of a species in its natural habitat and the maintenance and recovery of viable population of species in their original place.

What is meant by In-situ soil moisture conservation?

Infiltration and percolation of rain water into the root profile, the in-situ moisture conservation techniques are recommended. It helps to intercept rain drops and reduce the splash effect, obtain a better intake of water by soil, through improving the contact of organic matter and soil structure.

1. MOISTURE CONSERVATION IN SITU

To increase the moisture availability to the agricultural crops, it is necessary to adopt moisture conservation techniques in addition to in situ the large scale soil and moisture conservation and water harvesting structures in the watershed. The principle behind the recommendation of different practices is to increase the soil water storage by reducing the runoff, temporarily impounding the water on the soil surface to increase the infiltration opportunity time and modifying the land configuration for rainwater harvesting.

Following practices are recommended for in situ moisture conservation:

Minor land shaping

The cultivation of crops on slopes without modifying them produces higher runoff, lesser infiltration of water and more erosion. When original ground slopes are modified by forming bunds and terraces, runoff can be controlled by providing more time for the water to infiltrate in the soil. This also helps in reducing the soil erosion. These land treatment measures increase infiltration and soil water storage. Almost whole of the arable land is divided into number of small fields by putting small bunds. The field shape, degree and length of slope vary to a great extent from place to place. Formation of bunds is an accepted method to facilitate infiltration and percolation of rain water to increase the soil water storage. Small holdings of the farmers and agricultural practices followed in the foothills of Shivaliks warrant narrow-based bunds on adjusted contours taking field boundaries and direction of slope into consideration.

Minor land shaping helps increase soil water storage in two ways:

- i) Infiltration of water into the soil causes less runoff and hence reduces soil erosion.
- ii) More soil water storage sustains the crop for a longer period without rain.

Tillage practices for enhancing the rain-water intake

Tillage in the rainfed areas is done for increasing and conserving soil moisture, controlling weeds and for preparation of seed-bed. Various tillage practices useful for

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moisture conservation are described below:



Pre-monsoon ploughing

This practice includes ploughing of fields about a month before the onset of monsoon rains which makes the field surface rough and clody. This practice improves infiltration of rainwater into the soil by providing more opportunity time thereby reducing runoff and soil erosion. It also helps in killing the weeds and insect-pest harboring in the soil due to high temperature during that period.

Pre-sowing tillage

During the kharif season, either there are dry spells or sometime there is heavy downpour (high intensity rainfall). Both the conditions are hazardous for the crops. In order to kharif avoid the crop damage due to waterlogging caused by heavy rainfalls, crops should be sown on the ridges. This method of sowing gives two advantages as the furrows helps in moisture conservation and act as channels for drainage of excess rain water thereby reducing the chances of water logging.

Post-sowing tillage

Post-sowing tillage operations during such as hoeing and inter- kharif culturing (haloding) help in pulverizing the rhizosphere for increasing infiltration of water and also control weeds. Haloding is an important practice in maize cultivation and involves ploughing with a traditional (plough between the inter-row spaces in a month old crop. This desi) Summer Ploughing 4 Pre-sowing tillage practice checks weeds, does earthing-up and create shallow ditches between the rows. The ditches, when constructed against slope or on flat surface, intercept and detain runoff water and help store more water. Haloding helps in creating soil mulch that blocks pores and checks evaporation losses of soil moisture. Haloding makes the soil surface rough thereby r e d u c i n g t h e r a t e o f evaporation. In addition, the earthing up supports the plants, aerates the rooting zone and decreases resistance to growing roots, thereby creating conditions for better plant growth.

Post-harvest tillage

This practice consists of repeated shallow tillage followed by planking immediately after harvesting of the crop. Preferably, the field is kharif ploughed in the evening and planked next morning to conserve dew drops fallen during night. Locally this practice is called as ' ', meaning Gil dabna conservation of the moisture. This practice is significantly sound. By ploughing the profile water is conserved by checking upward movement of water through breaking the continuity of capillaries towards the soil surface. This practice assumes greater significance in dryland areas where wheat is sown during the drier months of October-November and germination depends on residual profile moisture.

Importance of Water Harvesting

Rainwater harvesting, in its broadest sense, is a technology used for collecting and storing rainwater for human use from rooftops, land surfaces or rock catchments using simple techniques such as jars and pots as well as engineered techniques. Rainwater harvesting has been practiced for more than 4,000 years, owing to the temporal and spatial variability of rainfall. It is an important water source in many areas with significant rainfall but lacking any kind of conventional, centralised supply system. It is also a good option in areas where good quality fresh surface water or ground water is lacking. Water harvesting enables efficient collection and storage of rainwater, makes it accessible and substitute for poor quality water. There are a number of ways by which water harvesting can benefit a community.

- Improvement in the quality of ground water,
- Rise in the water levels in wells and bore wells that are drying up,
- Mitigation of the effects of drought and attainment of drought proofing,
- An ideal solution in areas having inadequate water resources,
- Reduction in the soil erosion as the surface runoff is reduced,
- Decrease in the choking of storm water drains and flooding of roads and
- Saving of energy to lift ground water.