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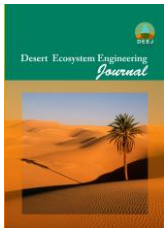

# Investigating the Effects of Different Methods of Precipitation Storage on Soil moisture and Growth Characteristics of *Acacia Oerfota* (Forssk) Schweinf Seedlings: A Case study of Paired Watershed of Dehgin, Hormozgan Province

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## Extended Abstract

**Introduction:** water is necessary for human, animal and vegetation lives. Therefore, providing sufficient water is an undeniable necessity for sustaining creatures' lives. Development of water supplies, thus, should occur in such a way as to keep the hydrological balance and biological functions of all ecosystems which is crucial for marginal lands. Precipitation storage is the general name for all different techniques used for collecting runoff and rain water to be saved in the soil profile or tanks and be used for growing trees and crops and developing them in dry lands. The precipitation storage is applied for afforestation in arid and semi-arid regions whose rainfall rates are not enough to sustain a good seedling or tree growth. Precipitation storage can increase the rate of planting trees in drought regions through the collection of rainfall, and runoff enhancement. Therefore, these techniques could compensate for the lack of soil moisture and help overcome good spells in critical growing stages, securing good water for plant when rainfall is erratic. This study, therefore, sought to investigate the effect of different precipitation storage techniques on preserving soil moisture and some growth characteristics of *Acacia oerfota* (Forssk.) Schweinf seedlings in Paired watershed of Dehgin, Hormozgan province.

**Material and methods:** Paired watershed of Dehgin is one of the sub watersheds of Esteghlal dam in Minab, Hormozgan province. Having collected *Acacia oerfota* seeds in the summer of 2018, they were planted in plastic pots. Collar diameter, stem height and quality characteristics of seedlings were measured. Seedlings were then planted with three replications (three blocks) in four treatments (diamond-shape micro catchment, semi-circular bunds, pitting, and control). following four months and five rainfall events, growth and quality characteristics of seedlings were measured in different precipitation storage techniques and the collected data were analyzed, using two-way analyses at the level of 95%. Soil moisture was measured based on different

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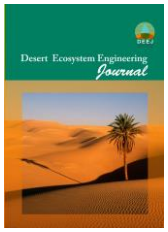

precipitation storage techniques and control, and the extracted data were analyzed by two-way analyses. The relationship between soil moisture, collar diameter and stem height were also measured via Pearson's correlations.

**Results:** the results of the study indicated that the seedling vitality with the amount of 2.86 was significantly lower in control than it was in different precipitation storage techniques. Collar diameter of seedlings in semi-circular bunds (1.95 mm) was higher than what it was in diamond-shape micro catchment, pitting and control (0.92, 0.88 and 0.89 mm). Height growth in semi-circular bunds with the amount of 10.12 cm was significantly higher than that in control with the amount of 6.2 cm. These significant differences were due to the function of different precipitation storage techniques. Soil moisture percentage in all treatments was reported as being different ($p<0.05$). The amounts of soil moisture were 13.46%, 11.95%, 11.5% and 10.34% in diamond-shape micro catchment, semi-circular bunds, pitting, and control respectively. It was also found that soil moisture had positive direct effect on collar diameter and seedling height ($p<0.01$).

**Discussion and Conclusion:** Vitality and establishment of tree seedlings depend on soil conditions and available moisture. As rain water is free of salts and other minerals that may harm plants and prevent their growth, it deemed great for plant growth. Considering the fact that rain water percolates into the soil, it forces salt down and away from root zone, allowing roots to grow better and making them tolerate more severe drought. The construction of diamond-shape micro catchments, semi-circular bunds and pitting in the study region, and collection of rain water and runoff led to the increase in soil moisture by improving infiltration rate, and thus facilitated plant growth. On the other hand, as plants require large quantities of water for growth, water was used during photosynthesis to produce carbohydrate as a necessary element for plant growth. Moreover, it is evident that leaves are important organs for photosynthesis and play an important role in survival and growth of plants. As the findings of the current study showed, soil moisture was higher in control method. It could thus be concluded that lower growth in control is due to lower moisture.
The results of this study indicated that precipitation storage techniques were highly crucial for the soil moisture storage to improve vegetation in arid and semi-arid areas and increase their growth and vitality. It was also found that soil moisture content and also growth characteristics of drought-tolerant seedlings of *Acacia oerfota*, were higher in semi-circular bunds than those in control and other precipitation storage methods. These seedlings have suitable shoots and large green leaves without dieback in dry climate of Dehgin, resulted from the rain water and runoff collected through precipitation storage techniques and absorbed by plants. Moreover, among all treatments, semi-circular bunds were the best precipitation storage methods for afforestation and pasture improvement in the studied region.

**Keywords:** Collar diameter, Dehgin watershed, Hormozgan, moisture preserve, seedling height.