



Seed Germination Behaviour as Influenced by Physical and Chemical Treatments in *Zizyphus rotundifolia* (Lamk.) in Bundelkhand Region (U.P.) India

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Abstract

Zizyphus rotundifolia (Lamk.) is a multipurpose shrub common to Bundelkhand region. It is a thorny tomentose bush abundant and often gregarious growing naturally in the wastelands and other uncultivated lands providing green fodder to livestock for a longer period. It is a drought dry hardy shrub and can withstand harsh conditions of the climate and soil of dry sub-humid and semi-arid regions of Bundelkhand (U.P.). The seeds have strong dormancy which restricts its immediate multiplication. The four-year-old seeds of *Z. rotundifolia* were subjected to nine different physical and chemical treatments to ascertain appropriate seed treatment method for higher germination. Treatment with 2% K_2SO_4 and 100 ppm Ethrel for 24 hrs. recorded significantly higher germination percentage (77%) over control (30%), water soaking (33%), hot water treatment (40%), heat exposure of seeds at 40°C (47%) and soil burial treatments (47%). Seeds treated with 2% K_2SO_4 for 24 hrs. started emerging (first emergence) after 4.00 ± 0.58 days of sowing as compared to the control seeds which showed 1st emergence after 8.67 ± 0.33 days. Similarly, 50% emergence with the treatment achieved after 5.33 ± 0.33 days of sowing for which control seeds took 13.33 ± 0.14 days. The results of the study showed that dormancy of seeds could be overcome by treating with either 100 ppm Ethrel or 2% K_2SO_4 for 24 hrs.

KeyWords: Dormancy, Ethrel, Germination, K_2SO_4 treatment, *Zizyphus rotundifolia*.

Introduction

Bundelkhand region is extended in about 59.2 thousand sq. km. area. Out of which about 11.4 thousand sq. km. is available for livestock grazing. The total requirement of dry matter for the present livestock is about 98.11 lac tons but availability through the grazing resources is hardly capable of producing only 25% of the total fodder requirement. As per the livestock census of 2012, Bundelkhand region (U.P.) harbours 30.18 million livestock comprising of 20% cattle, 13% buffalo, 23% sheep and 44% goat. Animal husbandry play a key role in the livelihood of farmers and majority of the livestock in this region are raised extensively on the open pastures/rangelands. In Bundelkhand region, the pastures are composed of predominantly annual grasses, forbs, some perennial grasses, shrubs and trees (Miyazaki, 1994). Perennial grasses provide fodder to animals only in post monsoon months from September to November and during rest of the period top-feed of trees/shrubs contributed significantly to the diet to livestock (Rathor, et al., 2011). These sparse browse plants and shrubs have potential to supplement the quantity and quality of pastures for grazing livestock in Bundelkhand region and are an effective insurance against the seasonal feed storages (Abusuwar and Ahmed, 2010). The main

feature of browse plants is their higher crude protein (CP) and mineral contents (Sahoo, et al., 2016). The concentration of CP in the leaves to the majority of fodder trees and shrubs is about 10% even in the dry season when it tends to decrease in grasses (Abusuwar and Ahmed, 2010). Bundelkhand region is bestowed with many top-feed trees and shrubs that are used by the livestock for browsing and lopping.

Zizyphus rotundifolia, locally known as Jhar-ber or Jhar-beri or Kanta-ber is a multipurpose shrub growing naturally in the wastelands, rangelands and other uncultivated lands of Bundelkhand region during rainy season and provides green foliage to livestock for a longer period of time. This drought hardy shrub can also grow well under saline soil conditions (Abdulrahman, et al., 2011). It has high potential to produce dry matter (forage) with quantity increasing gradually from June to January in the arid and semi-arid regions (Saleem, et al., 2012).

Despite its ability to grow under harsh climatic conditions and good potential as forage shrub, its multiplication is restricted due to the presence of dormancy in its seeds (Sohail, et al., 2015). Though dormancy is one of the ways that enables seeds to survive for a number of years in the soil seed bank of this region, it is considered a big hurdle to the effective use

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