

Enhancing seed set and seed yield of sewan grass (*Lasiurus indicus*) through physiological approaches

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Introduction

Western part of Rajasthan, the *Thar* desert, is the most thickly populated desert of the World, possessing more than 55 million population each of human and livestock. Aberrant weather conditions and poor soil fertility pose major threats to arable crops cultivation. Livestock rearing is directly dependent on fodder availability but due to harsh agro-climatic conditions there is severe fodder scarcity. *Lasiurus indicus*, perennial grass grown in hot and warm grassland climate thrives well under moisture stress on sandy plains, low dunes and hummocks of this region, receiving annual rainfall below 200 mm. For decades, these grasslands in turn supported an ever increasing livestock population in the Indian desert. Establishment of this grass is hampered by low seed availability because of its poor seed yield due to poor seed set. While sufficient literature is available on forage productivity of Sewan grass, however, information on seed set and seed yield production is lacking.

Materials and Methods

The present study was conducted to assess the improvement of seed yield through application of different levels of hormones on different morpho-physiological and biochemical characters that affect seed set and seed yield. The soil of the experimental site at Chandan, CAZRI, RRS, Jaisalmer, Rajasthan, India having elevation of 196 meters (latitude 26° 59' 31.32 N and longitude 71° 20' 29.59 E) was sandy loam and slightly alkaline (pH 7.5) with 0.36% organic carbon, electrical conductivity- 0.16 mmho, available nitrogen – 285 kg.ha⁻¹, available phosphorus - 24 kg.ha⁻¹, available potash - 356 kg.ha⁻¹. The study was conducted during the year 2014-2015 in 20x6m plots, where row-to-row and plant to plant spacing was kept 1m. Different levels of plant hormones [T₂- Cycocel 100 ppm, T₃- Cycocel 200 ppm, T₄- Paclobutrazol 200 ppm, T₅- Paclobutrazol 400 ppm, T₆- Cycocel 100 ppm + Paclobutrazol 200 ppm, T₇- Salicylic acid 100 ppm and T₈- Salicylic acid 200 ppm] were sprayed at pre-flowering and anthesis stage on the sewan grass planted in RBD design with three replications. Water sprayed plants (T₁) served as control.

Results and Discussion

High atmospheric, canopy and soil temperature were recorded during the cropping season. The improvement in physiological growth and yield characters *viz.*, increasing in leaf area, % green leaves (Fig 1.), number of tillers, number of spikelets, seeds per spike were observed with different levels of hormones.

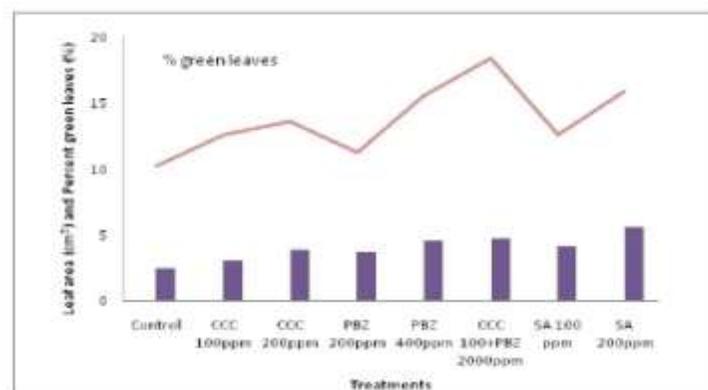


Fig 1. Effect of different levels of hormones on leaf area and % green leaves of *Lasiurus indicus*

Maximum increase in leaf area (94%), % green leaves (79%), number of tillers (54%), number of spikelets (56%), spike length(72%) over control was observed in the plants treated with Cycocel 100ppm + Pactobutrazol200ppm at seed filling stage. The 2 to 4°C lower canopy temperature, 7.0 – 52.4% higher in RWC and 9.1 – 41.8% higher in seed set as compared to control (water treated) were also recorded with different levels of hormones. The canopy temperature at seed filling stage showed significant positive relationship with seed set and also influenced seed yield and other parameters. Biochemical studies showed higher total sugar content in stem and higher total phenol and free proline content in leaves compared to control (Fig.2).

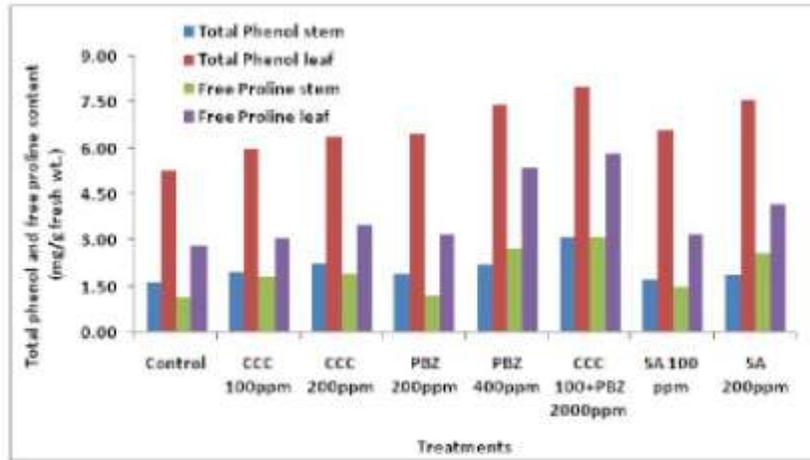


Fig 2. Effect of different levels of hormones on totalphenol and proline content of leaf and stem of *Lasiurus indicus*

Hormone application significantly increased total soluble sugar, phenol and free proline content over the control in leaf and stem. It showed positive relationship with seed yield. Among the treatments, Cycocel 100ppm + Pactobutrazol 200ppm showed maximum seed set and seed yield. The increase in leaf area, % green leaves and relative water content due to hormones application helps in lowering canopy temperature. The hormones application also enhanced metabolic activity as reflected from increase phenol sugar and free proline content in leaves and stem. The cumulative effects of these characters increases yield attributing characters and increases seed set and seed yield under high hot arid climatic condition.pasting. The soil & ambient temperature coupled with plant water status (RWC) seem to play important role in seed yield as also reported earlier by Ramirez and Hacker, 1993., Mathiassen *et al.* 2007

Conclusion

Thus, our study revealed that seed setting and yield of sewan grass could be significantly increased (21.7% and 30.0% over control) by foliar spray of combination of Cycocel (100ppm) and Pactobutrazol (200ppm). The soil & ambient temperature coupled with plant water status (RWC) seem to play important role in seed yield. The biochemical parameters, phenol, proline and sugar content also seem to be important for seed setting and influenced by hormones.

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