" Unraveling the Inter-specific hybrids of sugarcane for drought tolerant under the changing climates

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Abstract

In order to evaluate the drought tolerance efficiency of ISH (Inter specific hybrids) clones, an experimental trial was conducted with a total of 18 ISH entries alongside three standard varieties (Co 0238, CoJ 88, and Co 98014). The study assessed major morphological traits of the plants after subjecting them to drought stress during the formative phase. Under drought stress, significant reductions were observed in various parameters. Tiller population at 120 days after planting (DAP) experienced a 37% reduction, while tillers at 150 DAP and 180 DAP decreased by 10% and 12%, respectively. Leaf rolling was observed as a response to drought, with eleven clones exhibiting high intensity, six clones showing partial rolling, and four clones displaying no rolling. The mean reduction in leaf area at 180 DAP, after drought imposition, was recorded as 13.60%, with CoJ 88 demonstrating the lowest reduction at 0.4%. Four test entries (ISH-534, ISH-823, ISH-513, and ISH-536) performed better than Co 98014 in terms of leaf area reduction. The number of tillers at 150 DAP and 180 DAP, in both normal and drought conditions, were recorded as 1.07 and 0.96 lakhs/ha, and 1.10 and 0.94 lakhs/ha, respectively. At 150 DAP, nine clones outperformed the best standard, Co 98014 (0.68 lakhs/ha), while at 180 DAP, eight test clones (ISH-567, ISH-833, ISH-524, ISH-584, ISH-594, ISH-536, ISH-590, and ISH-502) were superior to the best standard, Co 0238 (0.78 lakhs/ha), in terms of tiller numbers. Eleven entries displayed the least reduction in NMC, surpassing the best standard. Cane height at 8th month recorded an average of 227cm under normal conditions and 185cm under drought conditions, with a 19% reduction. Co 98014 performed the best among the standards, and eleven ISH clones showed comparable values. Similarly, there was a 23% reduction in single cane weight under drought stress (0.60 kg) compared to normal conditions (0.81 kg). Co 98014 exhibited the least reduction among the standards (12%), and five ISH clones performed at par with it. CoJ 88 was the best performing standard for sucrose (18.43%), while entries such as ISH-524, ISH-513, ISH-536, ISH-519, and ISH-512 also demonstrated favorable performance. The mean reduction in cane yield under drought stress, at 300 days after planting, was 32.28%. Co 98014 exhibited the least reduction in cane yield under drought stress (21%), and test entries ISH-548 (3.5%) and ISH-823 (12%) showed relatively less yield reduction under drought conditions. The mean fiber percentage under normal and drought conditions was recorded as 14.69% and 15.45%, respectively. Overall, this study lays a foundation for the utilization of drought-tolerant ISH clones in breeding programs, offering the potential to enhance climate resilience in sugarcane production and contribute to the sustainable agricultural development of drought-prone regions.

References

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