

Landmark Events in the Early History of Sugarcane Improvement

Vijeta Gupta

CCS HAU Regional Research Station, Uchani, Karnal 132 001, Haryana, India

SUMMARY

The scientific improvement of sugarcane was shaped by several critical discoveries between the mid-19th and early 20th centuries which reshaped sugarcane cultivation and breeding, moving the industry from relying solely on asexual reproduction to sexual hybridization and development of varieties having high yield, high sucrose and disease-resistance. Three landmark events—discovery of sexual reproduction in sugarcane (1858), identification of viable seed production (1885) and the benefits of interspecific hybridization and the development of Sereh disease-resistant clones in Java (1897)—represent turning points that revolutionized sugarcane breeding worldwide.

INTRODUCTION

Discovery of Sexual Reproduction in Sugarcane (1858)

Sugarcane was propagated commercially only vegetatively through setts (stem cuttings) before 1858. Breeders lacked understanding of its reproductive biology, which limited the possibility of genetic recombination.

In 1858, botanists and sugarcane breeders John R. Bovell in Barbados and J.B. Harrison in British Guiana (now Guyana) were the first to prove that sugarcane could reproduce sexually through seeds. The discovery that sugarcane is capable of sexual reproduction through true flowering and seed set was revolutionary because it opened the door for breeders to create new varieties with improved traits by crossing different parent plants.

Significance

- Allowed the conceptual possibility of deliberate cross-breeding.
- Opened pathways to developing genetically distinct lines.
- Shifted sugarcane from a clonally propagated crop to one that could also undergo systematic breeding.

Sugarcane Set Viable Seed (1885)

Although flowering was known, it was not until 1885 that viable seeds were successfully observed and documented in sugarcane. The confirmation that sugarcane *could produce viable seed capable of germination* was a major advance. In 1885, Barbados, Bovell and Harrison successfully germinated sugarcane seed and demonstrated that it could produce viable seedlings.

Significance

1. Allowed creation of large seedling populations from crosses.
2. Introduced greater genetic variability, essential for selecting improved varieties.
3. Sparked the beginning of scientific sugarcane hybridization work in several research stations globally.

Beneficial Effects of Interspecific Hybridization (1897)

One of the most transformative events in sugarcane breeding occurred in 1897, when researchers demonstrated the positive outcomes of interspecific hybridization, especially crosses between *Saccharum officinarum* (noble canes) and *Saccharum spontaneum* (wild canes).

Dr. F. Soltwedel of the Pasuruan Sugar Experiment Station recognized that the wild cane species *Saccharum spontaneum* was resistant to the disease, though it produced low sugar. Soltwedel and his successors began crossing the high-sugar *Saccharum officinarum* ('noble' cane) with the hardy, disease-resistant *Saccharum spontaneum*. These hybrids combined desirable traits such as high sugar content from *officinarum* and hardiness, disease resistance and vigor from *spontaneum*.

Significance

Initiated the era of **nobilization**, a process through which modern commercial cane varieties were developed.

- Led to increased yield, disease resistance, and adaptability.
- Marked the foundation of modern sugarcane genetics.

S. spontaneum x S. officinarum

F1 x S. officinarum

BC1 “Sereh Disease - Resistant clones”

CONCLUSION

These discoveries represent the earliest pillars of sugarcane improvement. The recognition of sexual reproduction (1858), proof of viable seeds (1885), exploitation of interspecies hybridization and identification of disease-resistant clones (1897) collectively shifted sugarcane from an empirically grown crop to a scientifically bred one.

REFERENCES

Cursi, D. E., Hoffmann, H. P., Barbosa, G. V. S., Bressiani, J. A., Gazaffi, R., Chapola, R. G., ... & Carneiro, M. S. (2022). History and current status of sugarcane breeding, germplasm development and molecular genetics in Brazil. *Sugar Tech*, 24(1), 112-133.

Galloway, J. H. (2005). The Sugar Cane Industry: An historical geography from its origins to 1914 (Vol. 12). Cambridge University Press.

Govindakurup, H., & Mohanraj, K. (2024). Historical Perspectives on Sugarcane Breeding for Value Addition. In Value Addition and Product Diversification in Sugarcane (pp. 33-60). Singapore: Springer Nature Singapore.