



INDIA LAUNCHES WORLD'S FIRST GENOME-EDITED RICE VARIETIES: A BREAKTHROUGH FOR SUSTAINABLE AGRICULTURE

In a landmark achievement that places India at the forefront of agricultural innovation, Union Agriculture and Farmers Welfare Minister Shri. Shivraj Singh Chouhan announced the release of the world's first genome-edited rice varieties—DRR Dhan 100 (Kamala) and Pusa DST Rice 1. Developed by the Indian Council of Agricultural Research (ICAR), these climate-resilient and high-yielding varieties mark a significant leap toward sustainable food security and the second Green Revolution.

A GLOBAL FIRST IN GENOME-EDITING FOR RICE

India becomes the first country globally to successfully develop and release genome-edited rice varieties using CRISPR-Cas technology. Unlike traditional GMOs, this method edits native genes without introducing foreign DNA, ensuring enhanced traits such as higher yield, climate adaptability, reduced greenhouse gas emissions, and significant water savings.

"Under the leadership of Prime Minister Narendra Modi, India's vision of becoming a developed and self-reliant agricultural powerhouse is turning into reality," said Shri Chouhan during the launch at the Bharat Ratna C. Subramaniam Auditorium in New Delhi. "This breakthrough reflects a golden chapter in our research history and a major opportunity for Indian farmers."



THE SCIENTISTS BEHIND THE INNOVATION

Two separate teams led the development of the new rice lines:

- DRR Dhan 100 (Kamala) was developed by ICAR-Indian Institute of Rice Research (IIRR), Hyderabad, based on the popular Samba Mahsuri (BPT 5204) variety. Contributing scientists include Dr. Satyendra Kumar Mangruthia, Dr. R.M. Sundaram, Dr. R. Abdul Fiyaz, Dr. C.N. Neerja, and Dr. S.V. Sai Prasad.
- Pusa DST Rice 1, based on MTU 1010, was developed by ICAR-Indian

Agricultural Research Institute (IARI), New Delhi. The team includes Dr. Vishwanathan C, Dr. Gopal Krishnan S, Dr. Santosh Kumar, Dr. Shivani Nagar, Dr. Archana Vats, Dr. Soham Ray, Dr. Ashok Kumar Singh, and Dr. Pranjal Yadav.

- The Minister also acknowledged the leadership of Dr. M.L. Jat, Secretary (DARE) and Director General (ICAR), Dr. Devendra Kumar Yadava, DDG (Crop Science), and Dr. C.H. Srinivas Rao, Director, ICAR-IARI.



KEY BENEFITS OF THE GENOME-EDITED VARIETIES

The new rice lines offer transformative benefits:

- **Yield Increase:** Up to 19% increase in yields, particularly under stress conditions.
- **Water Conservation:** Savings of 7,500 million cubic meters of irrigation water due to shorter maturity (around 130 days).
- **Environmental Impact:** 20% reduction in greenhouse gas emissions, especially methane.
- **Stress Tolerance:** Enhanced resistance to drought, salinity, and other climate stresses.
- **Quality Retention:** Maintains the grain quality of the original parent varieties.

DRR Dhan 100 (Kamala)



A Breakthrough from ICAR



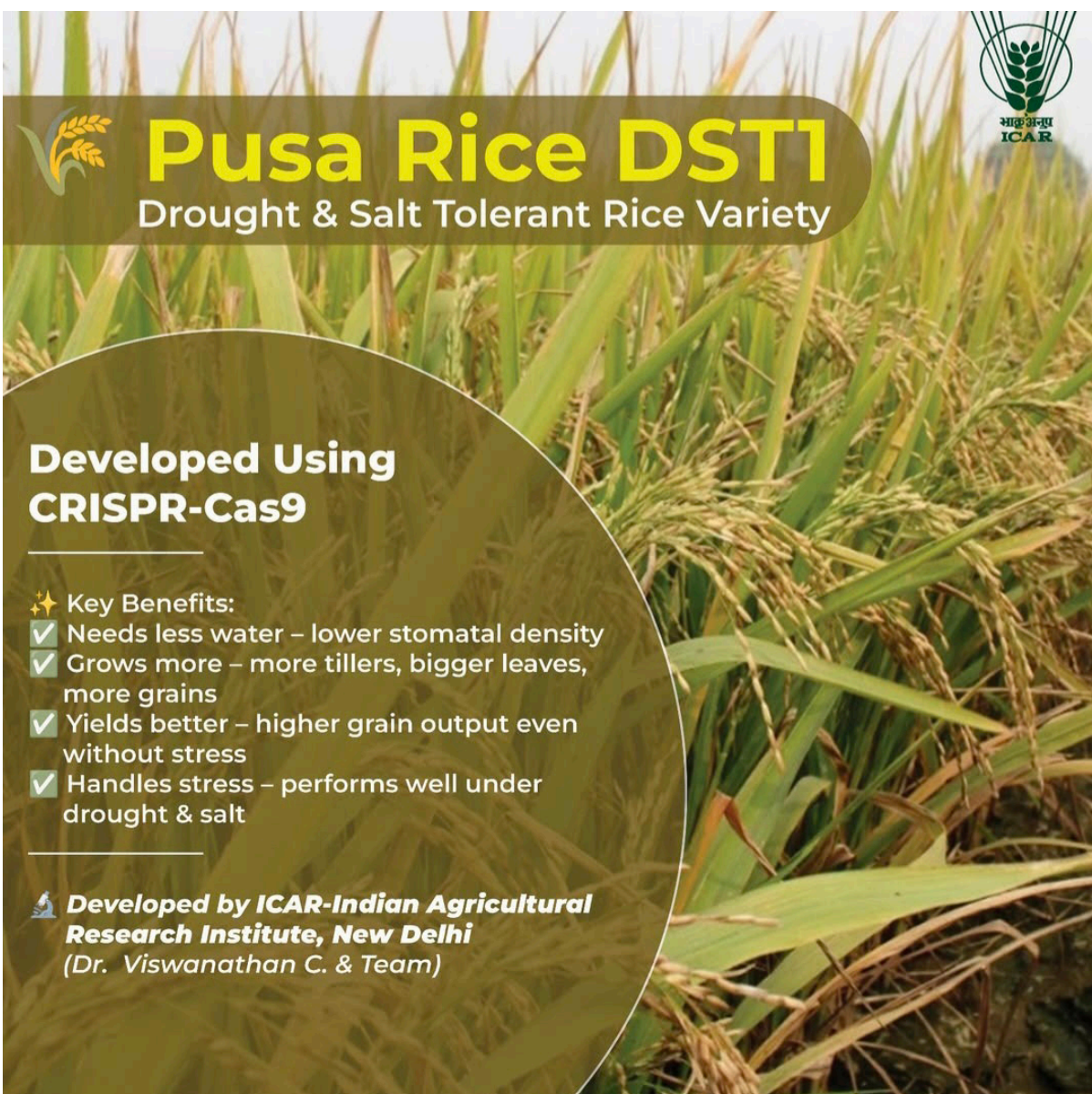
Developed using SDN1 genome editing in **popular Samba Mahsuri**, this high-yielding variety is a game changer for rice cultivation


Key Features:


- 19% increase in grain yield.
- 15-20 days earlier maturity.
- Moderate drought tolerance.
- Retained grain quality.



Developed By: Dr. Satendra K. Mangrauthia,
Dr. R.M. Sundaram & Team, **ICAR-Indian Institute of Rice Research, Hyderabad**

A poster for Pusa Rice DST1, a Drought & Salt Tolerant Rice Variety. The background is a photograph of a rice field with green leaves and golden-brown rice heads. In the top right corner is the ICAR logo. A dark green banner at the top contains the title 'Pusa Rice DST1' in large yellow letters, with 'Drought & Salt Tolerant Rice Variety' in white below it. A semi-transparent dark green circle on the left side contains the text 'Developed Using CRISPR-Cas9' in white. Below this, a list of key benefits is shown with green checkmarks. At the bottom of the circle, it says 'Developed by ICAR-Indian Agricultural Research Institute, New Delhi (Dr. Viswanathan C. & Team)' in white.


 **Pusa Rice DST1**
Drought & Salt Tolerant Rice Variety



**Developed Using
CRISPR-Cas9**

✦ Key Benefits:

- ✓ Needs less water – lower stomatal density
- ✓ Grows more – more tillers, bigger leaves, more grains
- ✓ Yields better – higher grain output even without stress
- ✓ Handles stress – performs well under drought & salt

 **Developed by ICAR-Indian Agricultural Research Institute, New Delhi**
(Dr. Viswanathan C. & Team)

NATIONAL AND REGIONAL IMPACT

These varieties are recommended for cultivation across key rice-growing regions, including Andhra Pradesh, Telangana, Tamil Nadu, Karnataka, Kerala, Odisha, Chhattisgarh, Maharashtra, Madhya Pradesh, Uttar Pradesh, Bihar, Jharkhand, and West Bengal.

By cultivating the new rice lines on five million hectares, India can expect an additional 4.5 million tons of paddy annually—helping to meet domestic demand and reinforce its role as a major rice exporter. The varieties are expected to be available to farmers within two years, pending IPR finalization and seed multiplication.

TOWARDS A SUSTAINABLE FUTURE

Minister Chouhan also introduced the “Minus 5 and Plus 10” strategy: reduce rice cultivation by 5 million hectares while increasing production by 10 million tons in the same area—freeing land for pulses and oilseeds.

"This innovation isn't just about rice—it's about India's journey to becoming the food basket of the world while preserving our natural resources," said Chouhan. He also emphasized the importance of

involving young farmers and scientists in adopting advanced techniques.

ICAR's 2018 initiative under the National Agricultural Science Fund laid the foundation for this milestone. With ₹500 crore allocated in the 2023–24 Union Budget for genome editing, similar innovations are now underway in oilseeds and pulses, signaling a broader transformation of Indian agriculture.



CONCLUSION

India's pioneering work in genome-edited rice is not only a scientific milestone but also a strategic stride toward food security, climate resilience, and sustainable farming. As the world grapples with increasing food demands and climate unpredictability, India's innovation sets a precedent for global agricultural transformation.