Sequencing of Sugarcane Genome

Why in news?

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A global team of researchers recently announced the sequencing of sugarcane genome.

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Why is it so significant?

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- Sugarcane produces 80% of the world’s sugar.
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- It has also emerged as the primary crop for biofuel production.
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- The sugarcane genome is nearly 20 times bigger than that of rice.
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- Its complex genetic makeup has so far posed challenges to classical sequencing approaches.
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- So significantly, sugarcane is one of the last crop plants to be genome-mapped.
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- In comparison, the rice genome was cracked nearly 14 years ago.
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How was it done?

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- Each of the 10 basic sugarcane chromosomes is duplicated in 8-10 copies with a total of more than 100 chromosomes.
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- In comparison, the human genome has just 23 pairs of chromosomes.
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- An earlier discovery that the genomic structures of sugarcane and sorghum

being very similar helped here.
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- Sugarcane and sorghum share large fragments with numerous genes in the same order.
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- So scientists used the sorghum genome (which was sequenced years ago) as a template.
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- The template was used to assemble and select the sugarcane chromosome fragments to sequence.
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What are the benefits?

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- Until now, breeding programmes were restricted to hybridisation and was followed by cumbersome field assessments.
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- With the recent finding, sugarcane breeding will be able to enter the age of molecular biology.
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- The finding will help scientists create a reference genome of sugarcane.
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- The reference sequence can help in effectively analysing and comparing variations between various sugarcane varieties.
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- It can also help develop new molecular screening techniques to supplement conventional breeding methods.
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- Characteristics that contribute to improving a variety rely on the combination of several genes inherited.
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- The traits may include yield, drought resistance and ability to withstand pest attacks.
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- So if scientists can identify genes associated with these agronomic traits, they can easily be transferred to commercial varieties.
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- This in turn could shorten the time required for getting a new variety to the field.
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- **Varieties** - Theoretically, the maximum sucrose content that sugarcane can

have is around 25%.
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- This could be breached with the knowledge of molecular mechanisms involved in sucrose storage in the plant.
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- Very significantly, sugarcane is a known water-consuming crop.
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- Genetic sequences linked to enduring water stress can help develop varieties that require lesser water.
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What lies ahead for India?

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- The cracking of the sugarcane genome can transform the sector.
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- But India needs to clarify its stance on GM foods as India does not currently allow GM food crops.
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- This is essential to reap the benefit of the advances in sugar genome sequencing.
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- Notably, Brazil (with largest area in the world under sugarcane) recently allowed commercial cultivation of the world's first GM sugarcane.
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Source: BusinessLine

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