

# Pokkali rice is going places

## Scientists turn to it to develop varieties tolerant to temperature

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Not many Malayalis may have heard about pokkali, but Kerala's very own indigenous rice variety is inspiring scientists the world over to develop new rice cultivars in an effort to build resilience against climate change.

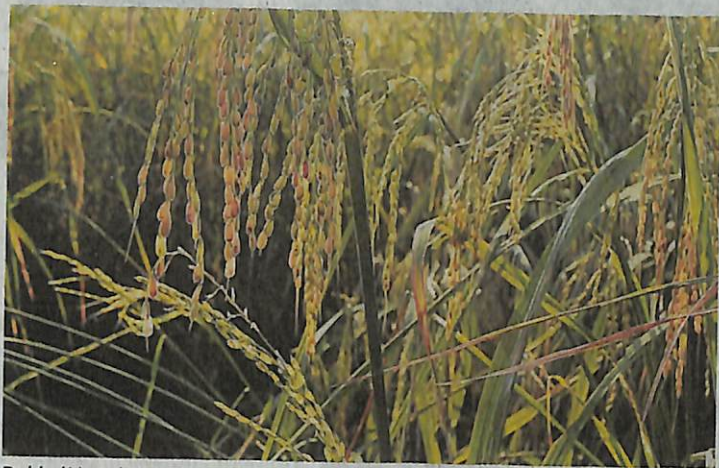
Several teams of researchers have turned to pokkali to study how the indigenous rice variety, which is traditionally cultivated only in the districts of Ernakulam, Thrissur and Alappuzha, is able to thrive in naturally-occurring saline coastal paddy fields.

A team, including scientists from New Delhi's Jawaharlal Nehru University (JNU), has found through a series of experiments conducted over six years that the high expression of a specific gene - OsIF - stabilizes the plant's photosynthetic machinery in high salinity conditions, thereby playing a crucial role in pokkali's tolerance to salty conditions.

### 'Transgenic' rice

The team developed a new rice variety by moving this single gene from pokkali to IR64 (a high-yielding variety cultivated in more than 200 countries). They found that this resulting 'transgenic' or modified rice was even more tolerant to salty conditions and high temperatures than pokkali itself.

"Pokkali has an excellent gene pool which is very useful for salinity tolerance," said Professor Ashwani Pareek of JNU, co-author of the study published in *Scientific Reports*, who has been studying the genetic basis of pokkali's impressive salinity tolerance for the past two decades. In his laboratory, at least a dozen unique genes from pokkali have been identified and characterised for stress tolerance.



Pokkali is tolerant to submergence in water for a week, the reason why it was unaffected by the August floods. ■ FILE PHOTO

rance. Kochi's Rice Research Station (RRS) also created a similar variety in 2015 by moving another portion of pokkali's DNA (named Saltol QTL, which has also been shown to aid the plant's salt tolerance) into Jyothi, one of the State's popular rice breeds.

Named Jyotsna and released officially less than a year ago after successful field trials in 2017, the new variety is now being distributed to farmers, said Shylaraj K.S., Director of the RRS.

### Useful traits

On an average, pokkali fields yield only around one-and-a-half tonnes per hectare, she said. "While pokkali's best yields are up to four tonnes per hectare, Jyotsna easily produces up to six tonnes in good soil conditions," she said. Several foreign research institutes, including the International Rice Research Institute in the Philippines, have also been studying pokkali's gene pools and has identified a portion of DNA on one of its chromosomes that is crucial for salt tolerance, said Dr.

Pareek.

With pokkali also being tolerant to submergence in water for a week, it does have numerous useful traits, said Dr. Shylaraj. As a result, farmers reported that pokkali fields in Kadamakkudy and Varapuzha were relatively unaffected by the floods that ravaged paddy fields where other short rice varieties were cultivated, she said.

### Need for conservation

In a recent review of Kerala's indigenous rice varieties published in the journal *Current Science*, scientists at Chennai's M.S. Swaminathan Research Foundation argue that given the wide range of such adaptations of these indigenous rice varieties as well as their ability to thrive under harsh climatic conditions, conserving them is critical in promoting climate-resilient agriculture. "Unpredictable monsoons and higher temperatures are fallout of climate change and we need high-yielding varieties that can trump over these," said Dr. Pareek.