

# Raising awareness about Kagga rice

Insights on seed purification, nutrition and genomic characterisation from Kagga crop cultivation

## Context ●●●

Kagga crop is a paddy variety cultivated in the saline soils of Ghazini area of the Aghanashini estuaries of coastal Karnataka. It has longer internodes (up to 140–160 cm in height) and a long panicle with an awn on the seeds. The dehusked rice grain is red-pigmented and slightly bigger in size. Kagga rice is a favourite food of local people, has several health benefits, is a rich source of nutrients, provides more energy to work for long hours, acts as coolant, prevents heat strokes, and is also used to treat diarrhoea and other digestive disorders. The grain powder can be used as baby food; Kagga Kanjji is an easily digestible food given to people suffering from fever. Kagga is the only variety of paddy that has submergence and salinity tolerance up to 14 dSm; it can tolerate flood up to seven days. However, cultivation of Kagga has drastically reduced due – non-availability of pure seeds, traditional paddy varieties like Karikagga and Bilikagga are often not uniform, leading to lower productivity and quality. There is a lack of comprehensive information on the nutrition and genomic aspects of Kagga, and nutrition and genomic characterisation will help identify the presence of macro and micro nutrients, vitamins, minerals and fibres as well as the key genes involved in salt tolerance.

Kagga  
Iron – 12.1 mg/kg  
Zinc – 19.5 mg/kg



## ●●● Intervention

Kagga seed purification and multiplication was promoted by MSSRF in collaboration with the University of Agricultural Sciences (UAS), Dharwad, and Department of Agriculture, Government of Karnataka (Karnataka State Department of Agriculture) among farmers of Kumta taluk. Community seed banks were established in Manikatta, Aghanashini, Igalkurve, Kagal and Betkuli, to encourage Kagga cultivation. Seed distribution programmes were organised and widely advertised.

Kagga paddy seeds were collected from different villages of Uttara Kannada district of Ghazini sites like Halkar and Manikatta for purification. A total 1000–1300 individual panicles were selected based on superior phenotypes. Nearly 350–400 high-yielding superior uniform progeny rows meeting the trait of interest of traditional Kagga variety were selected and harvested separately. About 153 kg of nucleus seeds were purified and distributed to Kagal and Manikatta farmers for cultivation.

The biochemical and nutritional analysis of Kagga showed 6.58 and 79.01 g/100g protein and carbohydrate contents respectively. The energy quantity was about 362.88 Kcal, the sugars and starch were 13.88 and 72.05g/100g respectively. Iron and zinc contents were 12.1 and

Salinity tolerance up to 14 dSm







## Kagga

Saltol locus confers salinity tolerance

19.5mg/kg whereas polished grain had 1.86 and 13.56 mg/kg respectively. Calcium of 58.58mg/L; moisture, fat, ash and crude fibre content were determined as 11.09, 2.28, 0.26 and 0.78 respectively. Free fatty acids in bran oil displayed 15.73 g/100g, while intermediate amylose type was observed with 21.95% amylose.

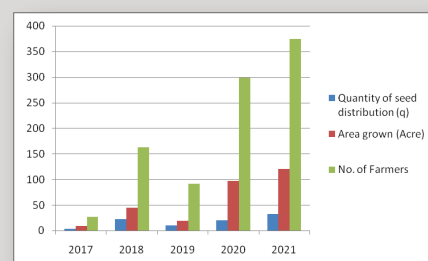
Genotyping of 47 rice landraces originating from geographically divergent coastal regions of India including Kagga, using a set of 28 genome wide Simple Sequence Repeat (SSR) markers, 11 salt responsive genic SSR markers and eight Saltol Quantitative Trait Loci (QTL) linked SSR markers were identified. The Saltol locus is a genomic region on chromosome 1 of rice that is associated with conferring salinity tolerance. Data derived from the genic SSR marker sets divided the landraces into five distinct populations, of which Kagga was found to group with landraces from West Bengal, with some intermediate genic characteristics shared with rice landraces from coastal Kerala and Goa.

## Outputs

The establishment of community seed banks in different villages of Kumta taluk enabled availability of purified Kagga seeds, around 44.90 quintals seeds were procured and distributed to farmers. Seed multiplication and crop improvement programme is also going on.

Crop survey, field day, seed procurement and seed distribution programmes created awareness and a significant increase in the Kagga seed distribution as well as demand for seeds among the farmers (Graph 1). Seven different Kagga paddy variants with distinct plant and grain traits with varied productivity were identified. Though all these Kagga varieties

had red kernels, but differed in grain type and awn character. In addition, now MSSRF is segregating populations for desirable traits like high yielding, short stature, high tillering, non-lodging, awnless plants, and tolerance to saline and submergence conditions. Among them, the best-performing plants will be selected and further evaluated in the next season under different saline conditions, and high-yielding varieties will be derived within a few years.



Graph 1. 2017-2021 Year-wise data on Kagga seed distribution (q), Kagga cultivating area (Acre) and number of farmers involved in Kagga cultivation

## Outcomes

Seed purification, nutrition and genetic characterisation and distribution of purified seeds created awareness among the farmers and improved Kagga cultivation, increased the area under cultivation significantly and the number of cultivating farmers over the year (Graph 1). Recently the Government of Karnataka included Kagga under the crop survey programme, and farmers will get compensation for crop loss due to natural calamities. The availability of ethnic nutritious traditional landraces of saline tolerant paddy is ensured.

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