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## Yield performance of different aromatic rice varieties in Krishna western delta

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### Abstract

A field experiment was conducted during *Kharif*, 2013 at Rice Research Station, Bapatla to study the yield performance of different aromatic rice varieties in Krishna western delta. The experiment was laid out in a randomized block design with four replications. The rice varieties were tested namely Sumathi, Sugandha samba, PUSA 1121, Kasthuri and vasumathi. All the yield contributing characters and yield were differed significantly due to the variety. Results revealed that PUSA 1121 produced the maximum number of productive tillers/plant (16), longest panicle length (24.6 cm), more number of grains per panicle (178) and gave the maximum grain yield (3410 kg ha<sup>-1</sup>) followed by Sugandha samba aromatic rice variety.

**Keywords:** Aromatic rice, variety, yield

### Introduction

Rice is one of the most important cereal crops and feeds billions of people around the world. Aromatic rice, such as Basmati and Jasmine, has a characteristic fragrance and good grain quality. The aromatic rice grains valued at a higher market price than non-aromatic rice varieties (Zhang *et al.*, 2008) [15]. Basmati is one of the unique specialty rice varieties, which has been cultivated for centuries at the foot of Himalayan mountain ranges. Basmati rice was a predominant constituent of the rich and royal menus. Basmati rice has a harmonious combination of defined kernel dimensions, appealing aroma, fluffy texture of cooked rice, high volume expansion during cooking, linear kernel elongation with minimum breadth-wise swelling, palatability, easy digestibility and longer shelf-life. In India, Basmati rice is primarily grown in the Indo-Gangetic region of north-western region comprising the seven states Punjab, Haryana, Himachal Pradesh, Uttarakhand, Jammu and Kathua districts of Jammu and Kashmir, and 27 districts of western Uttar Pradesh. This region has been earmarked as the Geographical Indication (GI) for Basmati rice and the GI status has been conferred to Basmati rice in 2016 (GI No. 145 of the Geographical Indication Registry, Government of India, vide certificate No. 238 dated 15.02.2016). India is the largest cultivator and exporter of Basmati rice, followed by Pakistan. Basmati rice from the Indian subcontinent is highly prized in the international market for its unique grain, cooking and eating quality. The name 'Basmati' is likely to have originated from the Sanskrit word, bas from 'vasay' connoting aroma; and mati from may up meaning ingrained from the beginning. Common usage could have resulted in change of vas to bas resulting in Basmati. The earliest mention of the word Basmati has been made in the epic "Heer and Ranjha" composed by the Punjabi poet Varish Shah in 1766.

The basmati rice is known for its typical fragrance when cooked. They also fetch a premium price in the local and regional market, besides having considerable export potential. The basmati is promising foreign exchange earner (Singh *et al.*, 2012) [12]. The fine grain, soft texture and extra elongation with least breadth-wise swelling on cooking endow 'Basmati' rice a special place in domestic and international market (Siddiqi, 2012). Basmati rice of Indian subcontinent is high priced in international market for its unique quality. The traditional basmati varieties are tall, prone to lodging, diseases, photoperiod and temperature sensitive and very low yielding. In present study the basmati varieties namely Sumathi, Sugandha samba, PUSA 1121, Kasthuri and Vasumathi were selected for assessment and performance, as these varieties are high yielding.

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## Materials and Methods

A field experiment was conducted at Agricultural Research Station, Bapatla during *Kharif*, 2013. The nursery beds were puddled with country plough, cleaned and levelled with ladder. Aromatic rice varieties were sown separately in nursery and twenty five days old seedlings were transplanted into main field by adopting a spacing of 20 cm between rows and 15 cm between plants with in a row. Nitrogen was applied as per the treatments in three equal splits in the form of urea. First split of nitrogen was applied as basal dose at the time of planting of the crop remaining two equal splits of nitrogen was broadcasted at maximum tillering and panicle initiation stages. Phosphorus was applied at the rate of 60 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup> in the form of single super phosphate as basal and potassium 40 kg K<sub>2</sub>O ha<sup>-1</sup> in the form of muriate of potash was applied in two equal splits as basal dose at the time of transplanting and panicle initiation stage. Gap filling, weeding, irrigation and other necessary intercultural operations were done in proper time. Harvesting was done plot wise. Five hills were selected randomly from each unit plot for taking yield component data at harvest. One m<sup>2</sup> area from each plot was selected from the central portion and was cut manually from the ground level to take grain and straw yields. The harvested crop of each plot was separately bundled, properly tagged and then brought to the threshing floor. The harvested crops were threshed manually. The grain was cleaned and dried to a moisture content of 14%. Straws were sun dried properly. Final grain and straw yields per plot were recorded and converted to tonnes per hectare. Data recorded for yield parameters were compiled and tabulated in proper form for statistical analysis. (Gomez and Gomez 1984)<sup>[3]</sup>.

## Results and Discussion

The experimental data revealed that plant height of varieties showed significantly difference in plant height (Table 1). The highest plant height was found in PUSA 1121 variety (124.3 cm) which was statistically at par with sumathi (123.4 cm). While, the lowest plant height was observed in the variety Vasumathi (110.2 cm). Variation of plant height might be due to the differences of their genetic make-up. Khatun (2001), Islam (2007)<sup>[6]</sup> and Hossain *et al.* (2008)<sup>[4]</sup> also observed the variable plant heights among the varieties. Significant differences were observed for producing effective number of tillers. Maximum number of effective tillers was observed in PUSA 1121 (16) which were statistically similar to Vasumathi (15) and sugandha samba (15) varieties. The lowest number of effective tillers/hill (12) was recorded in Sumathi. However, the difference in tiller productivity of rice

depends on the genetic potentiality (Roy *et al.*, 2004)<sup>[10]</sup> of the varieties. This result is supported by Mannan and Siddique (1991)<sup>[9]</sup> and Chowdhury *et al.* (1993)<sup>[11]</sup> who stated that effective tillers/hill varied with their variety. The length of panicle was significantly affected by variety. The longest panicle (24.6 cm) was found in the variety PUSA 1121 which was statistically identical with Sugandha samba. The lowest panicle length (22.2 cm) was recorded from the variety Sumathi. The variation as assessed might be mainly due to the genetic background of the varieties. Similar result was also recorded by Idris and Matin (1990)<sup>[5]</sup>, Islam (2007)<sup>[6]</sup> and Hossain *et al.* (2008)<sup>[4]</sup> who reported that panicle length influenced by depending on variety. Number of filled grains/panicle was found significant. Number of filled grains/panicle was the highest (178) in the variety PUSA 1121. The lowest number of grains (100) were recorded in the variety Sumathi. The results were also supported by Singh and Gangwer (1989)<sup>[13]</sup> who stated that varietal differences regarding the number of filled grains/panicle might be due to their differences in genetic constituents. Maximum grain weight was observed from PUSA 1121 (24.8 g), which was statistically similar to the variety sugandha samba (24.2 g). The lowest weight of grain was observed from sumathi (21.9 g). The significant difference was found in 1000-grain weight among the genotypes due to genetic variability (Mannan *et al.*, 2010)<sup>[8]</sup>. However, 1000-grain weight is usually a stable varietal character (Yoshida, 1981)<sup>[14]</sup>. Grain yield differed significantly among the aromatic rice varieties in the present study (Table 1). PUSA 1121 produced the highest grain yield (3.41 kg ha<sup>-1</sup>). The lowest grain yield (1889 kg ha<sup>-1</sup>) was obtained from Sumathi which was statistically similar with Kasthuri (2338 kg ha<sup>-1</sup>). Grain yield of rice mainly depends on the number of effective tillers per unit area, panicle length, filled grains/panicle and 1000-grain weight. The result is also agreement with the findings of Islam (2007)<sup>[6]</sup> and Hossain *et al.* (2008)<sup>[4]</sup> who reported the yield of aromatic rice varied among rice varieties. The varietal effect on straw yield also showed significantly. The highest straw yield (4175 kg ha<sup>-1</sup>) was obtained from PUSA 1121 which was statistically at par with Sugandha samba (3861 kg ha<sup>-1</sup>). The lowest straw yield (2074 kg ha<sup>-1</sup>) was recorded from Sumathi. Similar results were reported by Ghose (2003)<sup>[2]</sup> and Islam (2007)<sup>[6]</sup>. The highest harvest index (44.9 %) was recorded from the variety PUSA 1121, which was statistically on par with the variety Sugandha samba and the lowest harvest index (40.5%) was obtained from the variety Kashuri. Hossain *et al.* (2008)<sup>[4]</sup> reported that difference of variety had a great influence on harvest index.

**Table 1:** Performance of aromatic rice varieties on growth, yield attributes, yield and harvest index

Treatment	Plant height (cm)	No. of productive tillers/ plant	Length of the panicle (cm)	No of grains/ panicle	Grain yield (kg ha <sup>-1</sup> )	Straw yield (kg ha <sup>-1</sup> )	Harvest index (%)	Test weight (g)
Sumathi	123.4	12	22.2	100	1889	2074	43.6	21.9
Sugandhasamba	115.3	15	23.8	152	2917	3861	43.0	24.2
Pusa 1121	124.3	16	24.6	178	3410	4175	44.9	24.8
Kasthuri	116.0	14	22.9	122	2338	3365	40.5	23
Vaasumathi	110.2	15	23.4	145	2792	3861	41.9	23.7
SEm±	0.8	0.32	0.4	3.33	132	178	0.2	0.3
CD (0.05)	2.4	0.97	1.3	18.8	396	528	0.7	0.9
CV (%)	5.7	5.85	5.9	5.8	8.2	7.8	5.1	4.3

## Conclusion

From the present study, it can be concluded that aromatic fine rice variety PUSA 1121 performed better in terms of yield components like number of productive tillers/plant, panicle

length, number of filled grains/panicle, test weight grain yield and straw yield followed by Sugandha samba variety in Krishna western delta.

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