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Evaluation of different Kalanamak rice genotypes for yield and yield related traits of eastern Uttar Pradesh

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Abstract

Crop genotypes play a dominant position in crop manufacturing systems. Uttar Pradesh has been the home of a number of the finest first-class scented rices. Kalanamak is an crucial and popular scented rice range grown in Japanese Uttar Pradesh. This variety is famous for its taste and aroma. In eastern India it's miles cooked in honour of visitor or given as present. it could be boon for farmers of Japanese Uttar Pradesh and Tarai area of Bihar. In present examine 7+2 strains/types of Kalanamak, accumulated from IARI, New Delhi had been evaluated on the basis of essential to know the results of diverse characters on yield for selection criteria for excessive yielding genotype. The experiments laid out of two set on farmers subject of Sant Kabir Nager district with One block and One villages viz: block Dhanghata (surana). Yield and yield associated tendencies have been studied. Statistical evaluation exhibited that rice varieties differed extensively for days to 50% flowering, plant peak cm, panicle per sq., no. of spikelet's/panicle, SRF% grain yield kg/ha, grain kind and insect/pest and ailment. furthermore, drastically fantastic genotypic correlations of grain yield with plant height and panicle/m² had been found. most important element analysis also labeled advanced types, suggests that maximum yield become recorded for station trial and farmers field the genotypes of Pusa 1652-10-eleven-2-1-1-1 on station and farmers subject grain yield of (3134 kg/ha & 3096 kg/ha), % boom over check Bouna Kalanamak on station and farmers discipline 18.four % & 19.39%, accompanied by means of Pusa 07-sixty two-3-13 grain yield of on station and farmers area (3059 kg/ha & 3088 kg/ha), grain yield growth over test was on station and farmers field 15.21% and 18.78% have high yield balance. The investment on production by using adopting advanced Kalanamak line/varieties with a cost of Rs. 32750/ha. Cultivation of beneath stepped forward Kalanamak line/varities Pusa 1652-10-11-2-1-1-1 fetch higher internet go back of value Rs. 95,976/- as compared to check variety Bouna Kalanamak to quantity of Rs. eighty,383/- ha, accompanied by means of Pusa 07-62-3-thirteen Rs. ninety five, 480/-, Pusa 1638-07-a hundred thirty-2-67-1-1-1 Rs. ninety two, 504/- and Pusa 1652-10-11-2-2-2-3 of Rs. 90,613/-. The B:C ratio of stepped forward Kalanamak traces/sorts of Pusa 1652-10-eleven-2-1-1-1 was 2.ninety eight, accompanied by way of Pusa 07-sixty two-three-thirteen turned into 2.97 in comparison to check variety Bouna Kalanamak was 2.50. Pusa 1652-10-eleven-2-1-1-1 and Pusa 07-sixty two-3-thirteen can be used as business cultivars in Sant Kabir Nager and other Tarai district of jap Uttar Pradesh area after multi- vicinity yield take a look at trials.

Keywords: Rice, scented Rices, Kalanamak, evaluation, yield, domestic market

Introduction

More than ninety % of the sector's rice is grown and fed on in Asia, where 60% of the energy are fed on with the aid of three billion Asians (Khush, 1997) ^[1] world consistent with capita intake is placed across the fifty six. Nine kg (FAO, 2013) ^[2]. India is one of the international's biggest manufacturers of white rice, accounting for 20% of all international rice production. Aromatic rice, which has stronger aroma and kernel elongation than everyday rice, has more in call for in one-of-a-kind countries of the world. India is certainly one of the biggest exporter of basmati rice in international (Husaini *et al.*, 2009) ^[5] The consumer call for has increased markedly to pay a top class fee for fragrance (Louis *et al.*, 2005) ^[9] Scented rices develop fine and produce finest pleasant grains beneath cool, humid situations, which might be commonplace in Himalayan Tarai of U.P and Uttarakhand and foot hills of Vindhya Hills. As a result Himalayan Tarai of Uttar Pradesh (U.P) and Uttarakhand is probably the vicinity of beginning of fragrant rices (Khush, 2000) ^[7, 8].

Among non-basmati fragrant rices, Kalanamak is the maximum famous scented rice variety grown in Uttar Pradesh. It is amongst one of the most crucial scented rice kinds of India. This range is well-known for its flavor and aroma. It is cooking at marriages is considered auspicious and its smoke is thought to be purifying the surroundings. It derives its name from its black husk. It's miles grown extensively in Tarai region of Uttar Pradesh adjoining Nepal specifically in the districts of Siddharthnagar, Santkabirnagar and Basti and in small wallet in districts Gorakhpur, Maharajganj, Balrampur, Gonda, Bahraich, Shrawasti, Deoria and Padrauna (North jap simple quarter of Japanese UP). Consistent with (H.N. Singh *et al.*, 2006) [4, 10] there's no reliable file, however substantial discussion with farmers of its native region of cultivation discovered that Kalanamak used to be the maximum famous range on this location till the Nineteen Seventies. Rice is one cereal this is fed on particularly as whole milled and as boiled grain. The favored residences may additionally range from one ethnic institution or geographical region to another and might range from united states to united states of America (Juliano *et al.*, 1964) [6]. The farmers commenced fast changing Kalanamak, especially because of its low and unstable yields. The vital production environment (favorable rain fed lowland) that changed into well suitable to Kalanamak additionally supplied a really perfect scenario for the Mahsuri institution of rice types. Due to yield benefits, the inclusion of those varieties on farms more desirable farmers' gross earnings. Hence the region under those types multiplied and Kalanamak reduced. The region income courting became negative for Kalanamak, while it was the opposite for Mahsuri (Singh H.N. *et al.* 2005) [4, 10]. In farmers' fields, productiveness ranged among 1.2 to one.7 t/ha. Within the absence of any systematic breeding software and disorganized seed manufacturing (100% farmers use their personal stored seed), the extent of admixtures significantly multiplied, as a consequence adversely affecting its exceptional. Little try has been made in the beyond to improve Kalanamak with appreciate to pleasant and/or yield. A discussion board inclusive of the Indigenous aromatic Rice Export development & merchandising foundation wishes to be established. These days such a discussion board exists best for Basmati viz. the Basmati Export development foundation, which largely functions in concord with APEDA and inputs from buyers. The position of farmers and scientists in one of these basis wishes to be appreciably increased.

The main goals of the prevailing observe have been, to assess Kalanamak rice line/varieties for yield and yield related developments and look at the phenotypic and genotypic correlations amongst diverse yield related traits turned into on station and farmers fields.

Materials and Methods

The prevailing look at turned into finished by way of Krishi Vigyan Kendra Sant Kabir Nager, Acharya Narendra Dev university of Agriculture and generation, Kumarganj, Ayodhya for one year 2021-22. The experiments laid out of two set 1st become on station and 2d on farmers area of Maharajganj district with two block and two villages viz: block. To evaluate the 7+2 Kalanamak rice line/varieties. The nursery became sown 3rd week of June every yr. After 25 days, seedlings transplanted in the principal field in Randomized whole Block design (RCBD) in 3 replications with a spacing of 20 x 15 cm. recommended dose of fertilizer 60: forty: forty: 15 kg N: P: ok: and ZnSO₄/ha half of the dose of N and full dose of P: k and ZnSO₄ have been carried out basal, while last N have been top-

wearing 2 equal splits—at tillering and panicle initiation degree. to control weeds, nomini gold @ zero.25 litre/ha changed into implemented after 25 days antique transplanting. Crop became harvested at physiological adulthood and grain yield was calculated at 14% grain moisture. Unmarried plant observations have been recorded on 5 vegetation selected at random in step with genotype consistent with replication for characters viz., plant peak cm, panicle in line with square, no. of spikelet's/panicle, SRF% grain yield kg/ha, grain type and insect/pest and ailment. The records on grain yield of every plot have been recorded one by one by means of threshing the harvested rice genotypes. The statistics so obtain have been subjected to statistical evaluation after vital transformation for very last statistical evaluation (Gomez and Gomez, 1983) [3]. Two season data on grain yield separately recorded the suggest fee.

The statistics on seed yield, price of cultivation and gross and internet financial go back were collected from technological demonstration plot. Further to this, information on farmer practices had been additionally accumulated from the identical region. The gain fee (B:C) ratio turned into calculated primarily based on gross return. The following formulae had been used to calculate the parameters as counseled by means of (Das *et al.* 1998) [11]

1. Growth in grain Yield = Grain yield from Kalanamak line/range – Grain yield from take a look at range plot / Grain yield from Kalanamak line/range X a hundred
2. Internet return = Gross go back – value of cultivation
3. Gain/fee Ratio = Gross return/price of Cultivation X a hundred

Results and Discussion

Yield and attributing traits on station

Highly significant varietal differences were observed for days to 50% flowering in the varieties tested (Table 1). The days to 50% flowering ranged from 113 days Pusa 1652-0759-2-29-1-2, Pusa 1652-10-11-2-2-2-3 and Bouna Kalanamak to 121 days for Kalanamak (Treditional) variety.

Farmers field

The times to 50% flowering ranged from 110 days Pusa 1652-0759-2-29-1-2 to 122 days for Kalanamak (Treditional) variety. Giant varietal variations had been observed for range of panicle consistent with sq. within the sorts tested (table 1). The reason of difference in number of effective tiller in line with sq. is the variation within the genetic makeup of the range. Some of the various yield additives efficient tillers are very critical because the very last yield is specially a function of the range of panicles bearing tillers consistent with unit region. in the result of this examine, Pusa 1638-07-five-three line produced the highest wide variety of panicle of on station & farmers subject (273/m²) & farmers discipline Pusa 1638-07-5-3 (275/m²) accompanied via Pusa 1652-10-11-2- 1-1-1 of on station and farmers discipline (257 m² & 256 m²). The bottom variety of panicle in step with square (153 & 170) turned into recorded for Kalanamak (Treditional) which changed into notably decrease than 273 and 275. (Table 1 & 1 a). The rice varieties exhibited particularly tremendous differences on grain yield as shown in table 2 and discern 1. The genotypes of Pusa 1652-10-eleven-2-1-1-1 on station and farmers discipline grain yield of (3135 kg/ha & 3060 kg/ha), % boom over take a look at Bouna Kalanamak on station and farmers field 18.four% & 19.39%, followed with the aid of Pusa 07-sixty two-3-thirteen grain yield of on station and farmers discipline (3059 kg/ha & 3088 kg/ha),

grain yield boom over check was on station and farmers field 16.07% and 19.78% have excessive yield balance offered.

Economics

Unique line/type of Kalanamak have been taken into consideration in financial analysis of farmers field demonstrations. The inputs and outputs fee of commodities prevailed at some point of the farmers discipline, had been taken for calculating fee of cultivation, net returns and B:C ratio. (Desk 3). The funding on production by way of adopting improved Kalanamak line/sorts with a price of Rs. 32750/ha. Cultivation of underneath stepped forward Kalanamak line/varieties Pusa 1652-10-11-2-1-1-1 fetch better net return of

price Rs. 95996/- as compared to check range Bouna Kalanamak to amount of Rs. 95480 /- ha, followed via Pusa 71083 Rs 95480/-, Pusa 1638-07-a hundred thirty-2-sixty seven-1-1-1 Rs. 92,504/- and Pusa 1652-10-eleven-2-2-2-3 of Rs. 90613/-.The B:C ratio of advanced Kalanamak lines/sorts of Pusa 1652-10-11-2-1-1-1 was 2.92, accompanied through Pusa 07-sixty two-three-13 become 2.ninety seven in comparison to test variety Bouna Kalanamak became 2.17. The outcomes indicated great variations amongst rice varieties for plant height, range of panicle/m² and grain yield. The best grain yield become obtained from the Pusa 1652-10-11-2-1-1-1 and Pusa 07-sixty two-3-thirteen.

Table 1: Relationship between growth traits of kalanamak line/varieties (On station)

| S. No. | Strains/Varieties | Days to 50% flowering | | | Days to days to maturity | | | Plant height cm | | | Panicle/m ² | | | No. of spiklets/panicle | | |
|--------|-------------------|-----------------------|------|------|--------------------------|------|------|-----------------|------|------|------------------------|------|------|-------------------------|------|-------|
| | | 2020 | 2021 | Mean | 2020 | 2021 | Mean | 2020 | 2021 | Mean | 2020 | 2021 | Mean | 2020 | 2021 | Mean |
| 1 | ASGST 26 | 112 | 114 | 113 | 139 | 142 | 141 | 127 | 121 | 124 | 227 | 231 | 229 | 335 | 342 | 339 |
| 2 | Pusa1638 (Sel) | 111 | 114 | 113 | 139 | 143 | 141 | 114 | 118 | 116 | 269 | 273 | 271 | 272 | 290 | 281 |
| 3 | ASGST 39 | 114 | 116 | 115 | 142 | 145 | 144 | 108 | 110 | 109 | 206 | 210 | 208 | 290 | 304 | 297 |
| 4 | ASGST 34 | 113 | 115 | 114 | 141 | 144 | 143 | 98 | 102 | 100 | 255 | 261 | 258 | 212 | 218 | 215 |
| 5 | Pusa 1176 (Check) | 113 | 111 | 112 | 141 | 140 | 141 | 93 | 95 | 94 | 241 | 244 | 243 | 242 | 250 | 246 |
| 6 | ASGST 11 | 115 | 117 | 116 | 143 | 146 | 145 | 101 | 104 | 103 | 248 | 257 | 253 | 214 | 220 | 217 |
| 7 | ASGST 36 | 113 | 115 | 114 | 141 | 144 | 143 | 98 | 94 | 96 | 255 | 242 | 249 | 290 | 293 | 292 |
| 8 | ASGST 16 | 121 | 122 | 122 | 149 | 151 | 150 | 149 | 153 | 151 | 148 | 157 | 153 | 238 | 242 | 240 |
| 9 | Pusa-SL-03 | 111 | 113 | 112 | 139 | 142 | 141 | 106 | 108 | 107 | 187 | 193 | 190 | 116 | 127 | 122 |
| 10 | KN-3 (Check) | 116 | 122 | 119 | 136 | 142 | 139 | 102 | 106 | 104 | 188 | 192 | 190 | 120 | 125 | 122.5 |

Table 1(a): Relationship between growth traits of kalanamak line/varieties (Farmers field)

| S. No. | Strains/Varieties | Days to 50% flowering | | | | | | Plant height cm | | | | | | Panicle /m ² | | | | | |
|--------|-------------------|-----------------------|-----|-------|-----|-----|------|-----------------|-------|-----|-----|-------|------|-------------------------|-------|-----|-----|-------|------|
| | | F1 | F2 | F3 | F4 | F5 | Mean | F1 | F2 | F3 | F4 | F5 | Mean | F1 | F2 | F3 | F4 | F5 | Mean |
| 1 | ASGST 26 | 109 | 114 | 110 | 107 | 112 | 110 | 131 | 136 | 121 | 120 | 127 | 127 | 237 | 231 | 223 | 228 | 225 | 229 |
| 2 | Pusa1638 (Sel) | 113 | 112 | 110 | 107 | 112 | 111 | 110 | 104 | 112 | 121 | 117 | 113 | 272 | 274 | 268 | 276 | 285 | 275 |
| 3 | ASGST 39 | 115 | 117 | 116 | 114 | 117 | 116 | 104 | 108 | 110 | 112 | 106 | 108 | 204 | 208 | 212 | 205 | 202 | 206 |
| 4 | ASGST 34 | 112 | 114 | 116 | 110 | 111 | 113 | 104 | 106 | 108 | 102 | 104 | 105 | 261 | 252 | 257 | 261 | 250 | 256 |
| 5 | Pusa 1176 (Check) | 114 | 115 | 119 | 113 | 116 | 115 | 96 | 98 | 102 | 94 | 93 | 97 | 240 | 235 | 242 | 250 | 244 | 242 |
| 6 | ASGST 11 | 118 | 119 | 121 | 117 | 116 | 118 | 106 | 110 | 104 | 102 | 105 | 105 | 253 | 260 | 264 | 242 | 250 | 254 |
| 7 | ASGST 36 | 114 | 118 | 110 | 116 | 113 | 114 | 94 | 91 | 97 | 103 | 106 | 98 | 242 | 240 | 250 | 257 | 250 | 248 |
| 8 | ASGST 16 | 122 | 124 | 120 | 122 | 123 | 122 | 157 | 150 | 144 | 157 | 160 | 154 | 150 | 164 | 172 | 180 | 184 | 170 |
| 9 | Pusa-SL-03 | 110 | 113 | 116 | 114 | 112 | 113 | 102 | 106 | 110 | 112 | 108 | 108 | 193 | 200 | 202 | 206 | 208 | 202 |
| | KN-3 (Check) | 110 | 113 | 111.5 | 113 | 112 | 110 | 113 | 111.5 | 110 | 113 | 111.5 | 110 | 113 | 111.5 | 110 | 113 | 111.5 | 110 |

Table 2: Relationship between yields and disease of kalanamak line/varieties (On station)

| S. No. | Strains/Varieties | SPF % | | | Grain yield kg/ha | | | % Increase over check bauna kalanamak | Grain Type | Disease | | |
|--------|-------------------|-------|------|------|-------------------|------|------|--|------------|---------|----|-----|
| | | 2020 | 2021 | Mean | 2020 | 2021 | Mean | | | FS | BS | BLB |
| 1 | ASGST 26 | 86 | 91 | 89 | 2701 | 2951 | 2826 | 7.4 | SS | 3 | 0 | 0 |
| 2 | Pusa1638 (Sel) | 96 | 98 | 97 | 2751 | 2861 | 2806 | 6.34 | MB | 2 | 0 | 0 |
| 3 | ASGST 39 | 91 | 93 | 92 | 2901 | 3011 | 2956 | 12.29 | SS | 3 | 2 | 2 |
| 4 | ASGST 34 | 91 | 94 | 93 | 3101 | 3168 | 3135 | 19.04 | MB | 5 | 2 | 2 |
| 5 | Pusa 1176 (Check) | 91 | 95 | 93 | 2901 | 3012 | 2957 | 12.33 | MS | 2 | 0 | 0 |
| 6 | ASGST 11 | 96 | 99 | 98 | 2951 | 3168 | 3060 | 16.21 | MS | 5 | 0 | 0 |
| 7 | ASGST 36 | 86 | 90 | 88 | 2701 | 2712 | 2707 | 2.92 | SS | 2 | 1 | 1 |
| 8 | ASGST 16 | 91 | 94 | 93 | 2301 | 2411 | 2356 | - | SB | 3 | 0 | 0 |
| 9 | Pusa-SL-03 | 96 | 96 | 96 | 2601 | 2711 | 2656 | - | SS | 2 | 0 | 1 |
| 10 | KN-3 (Check) | 95 | 93 | 94 | 2701 | 2712 | 2707 | 2.92 | SS | 2 | 0 | 1 |

Table 2(a): Relationship between yields and disease of kalanamak line/varieties (Farmers fields)

| S. No. | Strains/Varieties | No. of Spiklets/panicle | | | | | SPF % | | | | | Grain yield kg/ha | | | | | % Increase over check | | | |
|--------|-------------------|-------------------------|-----|-------|-----|-----|-------|----|----|------|----|-------------------|------|------|------|------|-----------------------|------|--------|--------|
| | | F1 | F2 | F3 | F4 | F5 | Mean | F1 | F2 | F3 | F4 | F5 | Mean | F1 | F2 | F3 | | F4 | F5 | Mean |
| 1 | ASGST 26 | 337 | 341 | 324 | 338 | 341 | 336 | 98 | 94 | 82 | 91 | 86 | 90 | 2801 | 2651 | 2764 | 2660 | 2784 | 2732 | 5.32 |
| 2 | Pusa1638 (Sel) | 268 | 276 | 282 | 268 | 264 | 272 | 98 | 90 | 93 | 87 | 82 | 90 | 2811 | 2660 | 2551 | 2691 | 2751 | 2693 | 3.81 |
| 3 | ASGST 39 | 292 | 304 | 275 | 277 | 268 | 283 | 93 | 96 | 88 | 82 | 84 | 89 | 2951 | 3011 | 2861 | 2911 | 3191 | 2985 | 16.07 |
| 4 | ASGST 34 | 210 | 216 | 214 | 208 | 213 | 212 | 93 | 96 | 98 | 82 | 84 | 91 | 2911 | 3151 | 3061 | 3151 | 3211 | 3097 | 20.39 |
| 5 | Pusa 1176 (Check) | 244 | 237 | 232 | 237 | 231 | 236 | 92 | 94 | 88 | 96 | 97 | 93 | 2951 | 2801 | 2968 | 2751 | 3151 | 2924 | 12.72 |
| 6 | ASGST 11 | 210 | 214 | 212 | 216 | 221 | 215 | 98 | 99 | 92 | 94 | 96 | 96 | 3011 | 3151 | 3091 | 2961 | 3191 | 3081 | 18.78 |
| 7 | ASGST 36 | 280 | 288 | 296 | 282 | 275 | 284 | 87 | 88 | 92 | 86 | 85 | 88 | 2601 | 2751 | 2801 | 2501 | 2668 | 2664 | 2.69 |
| 8 | ASGST 16 | 233 | 237 | 224 | 232 | 230 | 231 | 92 | 88 | 86 | 93 | 94 | 91 | 2411 | 2016 | 2291 | 2311 | 2441 | 2294 | -11.56 |
| 9 | Pusa-SL-03 | 120 | 118 | 122 | 124 | 116 | 120 | 97 | 96 | 93 | 95 | 96 | 95 | 2701 | 2501 | 2401 | 2751 | 2616 | 2594 | — |
| 10 | KN-3 (Check) | 121 | 120 | 120.5 | 123 | 113 | 118 | 96 | 95 | 95.5 | 92 | 93 | 92.5 | 2757 | 2601 | 2679 | 2751 | 2616 | 2683.5 | - |

Conclusion

In conclusion, the study revealed significant varietal differences in days to 50% flowering, panicle density, and grain yield among the tested rice varieties both on station and in farmers' fields. Varieties like Pusa 1638-07-5-3 and Pusa 1652-10-11-2-1-1-1 demonstrated superior performance in terms of panicle density and grain yield, exhibiting potential for higher productivity. Moreover, economic analysis emphasized the profitability of adopting improved Kalanamak lines/varieties, with higher net returns and favorable benefit-cost ratios compared to the traditional variety Bouna Kalanamak. These findings underscore the importance of varietal selection and agricultural practices in optimizing rice yield and economic returns for farmers. Further research and extension efforts can build upon these insights to enhance rice production and farmer livelihoods.

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