Agronomics Characteristics and Its Correlation of New Plant Type Promising Rice Lines

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ABSTRAK

Karakteristik Agronomi dan Korelasinya pada Galur-galur Harapan Padi Tipe Baru. Dalam program pemuliaan tanaman padi diperlukan pengetahuan tentang karakter dan korelasinya dengan hasil gabah. Penelitian dilakukan untuk mempelajari karakter tanaman dan korelasinya dari 35 galur harapan PTB dengan Ciherang dan Sintanur sebagai varietas pembanding, ditanam di dua lokasi, Bogor dan Pusakanagara, pada MT 2009 (MK dan MH). Rancangan yang digunakan adalah acak kelompok dengan tiga ulangan. Bibit umur 21 hari ditanam satu bibit per lubang, jarak tanam 20 cm x 20 cm, pada petak berukuran 2 x 5 m^2 per baris. Karakter tanaman bervariasi antargalur dan beberapa di antaranya berbeda nyata dengan varietas pembanding Ciherang dan Sintanur, kecuali untuk hasil gabah. B11742-RS*2-3-MR-34-1-2-1 merupakan galur dengan postur tanaman terendah, hasil gabah rendah, dan umur terpendek. Sebagian besar galur mempunyai karakter padi tipe baru (PTB). Hasil gabah berkorelasi positif dengan semua karakter, tetapi hanya berkorelasi nyata dan positif dengan tinggi tanaman, berkisar antara 91,4-120,7 cm.

Kata kunci: Padi, galur tipe baru, karakter, korelasi.

ABSTRACT

In a plant breeding program, knowledge of the character and interrelationships among yield and yield contributing characters are necessary. This study was carried out to identify the plant character and its correlation between yield-correlated traits of 35 NPT rice promising lines with Ciherang and Sintanur as check varieties, planted in two locations, Bogor and Pusakanagara and two seasons (2009 dry and wet season, DS-WS). Those lines were planted in Randomized Complete Block Design (RCBD) arrangement, in three replications. The 21-days-old seedling planted one seed per hole, spacing 20 cm x 20 cm, with a plot size of 2 x 5 m^2 per line. Plant characters varied and were significantly different from Ciherang and Sintanur as check varieties except for grain yield. B11742-RS*2-3-MR-34-1-2-1 was the line that had the lowest plant height, grain yield, and the shortest growth duration. Most of the lines had character as new plant type variety. Grain yield positively correlated with all characters, but only significantly and positively correlated with plant height at range from 91.4-120.7 cm.

Keywords: Rice, new plant type lines, character, correlation.

INTRODUCTION

Rice breeding program is always conducted to increase the rice productivity. Improvement of rice grain yield is the main target of breeding program to develop rice varieties. High yield potential improvement programs could be promoted through the establishment of a new plant type of rice (NPT).

NPTs are designed to have more efficient assimilate distribution to the grain. The desired NPT characteristics: 80-100 cm plant height, sturdy stem, 8-10 productive tillers, erect leaves, thick, dark green leaves, long panicle, total grain of 200-250/panicle, mature at 100-130 days, resistant to major pests and diseases (Khush, 2000). In 1995 new initiation began to breed the second generation NPT by crossing tropical japonica NPT lines with the elite indica lines to increase the number of tillers. The development of NPT rice has been conducted by Indonesian Center for Rice Research (ICRR) and Bogor Agricultural University (BAU) that used local variety in Indonesia (Peng *et al.,* 2008; Abdullah *et al.,* 2008).

In a hybridization program, knowledge of the interrelationships among yield and other characters are necessary. Understanding the relationship between yield and its components is of paramount importance for making the best use of these relationships in selection (Sarawgi *et al.,* 1997). However, grain yield is a complex trait, controlled

by many genes and highly affected by environment. In addition, grain yield also related with other characters such as growth duration, and yield components (Yoshida, 1981).

Correlation between two or more positive character which will facilitate the selection because it is will be followed by an increase in other properties. Conversely, if a negative correlation, it is difficult to obtain the expected character. If there is no correlation, then the selection becomes ineffective. The objectives of this study were to figure agronomic characters and correlation of grain yield with yield components among the NPT promising rice lines.

MATERIALS AND METHOD

Field studies were conducted from July 2009 to May 2010 at two locations, farmer's field in Bogor (elevation 200 m above sea level, asl) and Pusakanagara experimental farm (8 m asl), in the 2009 dry season (DS) and 2009 wet season (WS). randomized complete block design (RCBD), in three replications was used. Materials tested were 35 promising aromatic lines and check varieties were Ciherang and Sintanur. The total treatments amounted to 37 lines (Table 1).

The 21-days-old seedling were planted one seedling per hole with spacing of 20 cm x 20 cm, in

Table 1. Genetic materials for research on developing NPT lines.

Lines	Combinations
IPB 113-F-1	Pare Bau* x Fatmawati
IPB 113-F-2	Pare Bau x Fatmawati
IPB 115-F-3-2	Fatmawati x Lambau*
IPB 115-F-11	Fatmawati x Lambau
IPB 116-F-3-1	Pinjan* x Fatmawati
IPB 116-F-44-1	Pinjan x Fatmawati
IPB 116-F-46-1	Pinjan x Fatmawati
IPB 117-F-1-3	Fatmawati x Pulu Mandoti*
IPB 117-F-4-1	Fatmawati x Pulu Mandoti
IPB 117-F-6-1	Fatmawati x Pulu Mandoti
IPB 117-F-14-2	Fatmawati x Pulu Mandoti
IPB 117-F-15-2	Fatmawati x Pulu Mandoti
IPB 117-F-17-4	Fatmawati x Pulu Mandoti
IPB 117-F-17-5	Fatmawati x Pulu Mandoti
IPB 117-F-18-3	Fatmawati x Pulu Mandoti
IPB 117-F-45-2	Fatmawati x Pulu Mandoti
IPB 140-F-1-1	Sintanur* x (Fatmawati x IPB26-d-14j-1-1-2)
IPB 140-F-2-1	Sintanur x (Fatmawati x IPB26-d-14j-1-1-2)
IPB 140-F-3	Sintanur x (Fatmawati x IPB26-d-14j-1-1-2)
IPB 140-F-4	Sintanur x (Fatmawati x IPB26-d-14j-1-1-2)
IPB 140-F-5	Sintanur x (Fatmawati x IPB26-d-14j-1-1-2)
IPB 140-F-6	Sintanur x (Fatmawati x IPB26-d-14j-1-1-2)
IPB 140-F-7	Sintanur x (Fatmawati x IPB26-d-14j-1-1-2)
IPB 149-F-1	Lambau* x Fatmawati
IPB 149-F-2	Lambau x Fatmawati
IPB 149-F-3	Lambau x Fatmawati
IPB 149-F-4	Lambau x Fatmawati
IPB 149-F-5	Lambau x Fatmawati
IPB 149-F-7	Lambau x Fatmawati
IPB 149-F-8	Lambau x Fatmawati
B11249-9C-PN-3-3-2-2-MR-1	B10589F-KN//Memberamo/IR64
B11738-MR-1-2-Si-1-2	Gilirang*/BP342F-MR-1-3//Gilirang*
B11742-RS*2-3-MR-34-1-2-1	BP360E-MR-79-PN-2/IR71218/BP360E
B11823-MR-3-15-1	BP140F-MR-1-KN-1/Code/BP140F-MR-1
B11955-MR-84-1-4	B11738-MR-2-5/B11738-MR-6B
Ciherang	-
Sintanur	-

a plot size of 2 m x 5 m per genotype; there were 250 plants per plot. The rice plants were fertilized with urea, SP36, KCl at the rates of 250 kg/ha, 100 kg/ha, 100 kg/ha, respectively. Pests and diseases were controlled optimally. Parameters was observed: days to flowering, days to maturity, plant height (cm), number of productive tillers, grain total per panicle, percentage of filled grain, weight of 1.000 grain (g), and yield (t/ha).

The correlation between covariance was analyzed according to the formula of Singh and Chaudary (1979):

$$r\,(x_1\,x_2) = \frac{COV\,(x_1\,x_2)}{\sqrt{\sigma^2\,(x_1)\,\sigma^2\,(x_2)}}$$

where:
$r\,(x_1\,x_2)$ = correlation between x_1 and x_2
cov $x_1\,x_2$ = covariance $x_1\,x_2$
$\sigma^2(x_1)$ = variance of x_1
$\sigma^2(x_2)$ = variance of x_2

Correlation of significant different test between characters was calculated by t test,

$$t = \frac{R\,(x_1\,x_2)}{\sqrt{1\text{-}r^2\,(x_1\,x_2)/db}}$$

where:
$r\,(x_1\,x_2)$ = correlation between x_1 and x_2
$r^2\,(x_1\,x_2)$ = square of correlation between x_1 and x_2
df = degree of freedom (n-2)

RESULT AND DISCUSSION

The average of plant characters of agronomic characters, i.e. days to flowering, plant height, panicle length, days to maturity were varied and significantly different from Ciherang and Sintanur as check varieties (Table 2). The same result with yield components, i.e. number of productive tiller, filled grain per panicle, total grain per panicle, percentage of filled grain, 1.000 grain weigth, and yield (Table 3).

Days to Flowering

Days to flowering showed significant differences among lines at (Pr<0.0001). It ranged from 87-97 days after sowing (DAS) (Table 2). Lines IPB 113-F-2 and B11742-RS*2-3-MR-34-1-2-1 taking the shortest days to flowering (87 DAS) while IPB 140-F-5 and IPB 149-F-5 took the longest period (97 DAS) and were not significantly different from Ciherang and Sintanur. The average of this character was 92 DAS. However, this flowering time was longer than study of Akinwale *et al*. (2011) and Kabir *et al.* (2004) who reported the average days to flowering of rice lines was 85 DAS and 88.8 DAS, respectively.

Plant Height

Plant height showed significant difference (Pr<000.1) among the lines at maturity. The tallest plant was B11249-9C-PN-3-3-2-2-MR-1 (120.7 cm) and the shortest was B11742-RS*2-3-MR-34-1-2-1 line with 91.4 cm height. The average plant height was not significantly different with Ciherang or Sintanur.

Plant height is divided into three categories, namely short (<110 cm), medium (110-130 cm), and tall (>130 cm) (IRRI, 2002). Based on these categories, from the average data on plant height there were 22 lines were medium with plant height ranging from 110.1-120.7 cm, also Sintanur variety (112.2 cm) and 13 lines were short (91.4 cm-109.8 cm), also Ciherang variety (107 cm); none of these lines were tall.

Nematzadeh *et al*. (2007) reported plant height of 13 high-yielding varieties ranging from 111.61 to 124.5 cm that appeared to be lodging tolerant. Tall plant is not desired because it is sensitive to lodging, and lodging will reduce grain yield (Shahidullah *et al.*, 2009). Reducing plant height is one of the main objectives of rice breeding programs in Afghanistan (Sarhadi e*t al*., 2009).

Panicle Length

The tested lines have panicle length ranging from 25.2 to 31.7 cm. The lines with the longest panicle was IPB 140-F-6; while the shortest was B11742-RS*2-3-MR-34-1-2-1. Rice plants with long panicles potentially have high number of grain total and high yield because there is a positive correlation between panicle lengths with the number of grains per panicle (Haryanto *et al*., 2008) and weight of 1.000 grain (Akinwale *et al*., 2011).

Table 2. Average of plant growth variables of NPT lines in four environmental conditions, 2009 DS/WS.

Lines	Days to flowering (HST)	Plant heigth (cm)	Panicle length (cm)	Days to maturity (HST)
IPB 113-F-1	89 b	110.1	31.1 ab	118
IPB 113-F-2	87 ab	115.0	30.9 ab	118
IPB 115-F-3-2	91	106.4	31.2 ab	118
IPB 115-F-11	92	107.8	30.7 ab	119
IPB 116-F-3-1	89 b	103.9	28.8	117
IPB 116-F-44-1	90	106.6	29.6 a	120
IPB-116-F-46-1	88 b	99.8 b	27.6	120
IPB 117-F-1-3	91	109.8	28.4	121
IPB 117-F-4-1	95	108.5	29.0	123 ab
IPB 117-F-6-1	90	105.1	28.2	120
IPB 117-F-14-2	91	116.1	31.6 ab	122
IPB 117-F-15-2	94	117.0 a	33.0 ab	122
IPB 117-F-17-4	92	116.4 a	31.6 ab	121
IPB 117-F-17-5	94	114.9	31.3 ab	122
IPB 117-F-18-3	94	113.8	28.3	122
IPB 117-F-45-2	89 b	101.9 b	28.0	119
IPB 140-F-1-1	92	119.2 a	28.9 a	121
IPB 140-F-2-1	91	115.4	27.6	119
IPB 140-F-3	93	118.9 a	26.7	118
IPB 140-F-4	91	115.1	28.0	120
IPB 140-F-5	97	117.2 a	30.7 ab	123 ab
IPB 140-F-6	90	116.9 a	31.7 ab	120
IPB 140-F-7	92	114.1	29.3 a	120
IPB 149-F-1	94	117.1 a	29.6 a	122
IPB 149-F-2	94	114.9	30.0 ab	122
IPB 149-F-3	95	116.9 a	30.9 ab	123 ab
IPB 149-F-4	96	115.9	29.7 a	123 ab
IPB 149-F-5	97	111.0	28.1	123 ab
IPB 149-F-7	94	115.6	30.0 ab	123 ab
IPB 149-F-8	95	109.0	27.6	122
B11249-9C-PN-3-3-2-2-MR-1	91	120.7 a	28.8	120
B11738-MR-1-2-Si-1-2	96	110.2	28.1	122
B11742-RS*2-3-MR-34-1-2-1	87 ab	91.4	25.2 b	117
B11823-MR-3-15-1	94	98.1	28.9 a	123 ab
B11955-MR-84-1-4	92	105.6	28.5	121
Ciherang	92	107.0	26.7	119
Sintanur	94	112.2	27.8	119
Average	92	111.2	29.3	121
CV (%)	1.6	2.6	2.3	1.1
Pr>F	**	**	**	**

*) Figures in columns with letter a was significantly different from Ciherang, which followed by b was significantly different from Sintanur; that followed by ab were significantly different from Ciherang and Sintanur at 5% level of Tukey test

Days to Maturity

Days to maturity was measured from sowing to harvest, ranged between 117 DAS to 123 DAS. It followed the same trend with days to flowering with line B11742-RS*2-3-MR-34-1-2-1 taking the shortest period (117 DAS), while IPB 117-F-4-1, IPB 140-F-5, IPB 149-F-3, IPB 149-F-4, IPB 149-F-5, IPB 149-F-7, and B11823-MR-3-15-1 took the longest period to mature (123 DAS).

Number of Productive Tiller

Number of productive tillers varied significantly among lines. The average numbers of productive tillers of the 37 lines were relatively small. It ranged only 9 to 14 tillers with average 11 tillers. The lowest number of productive tiller were IPB 117-F-14-2, IPB 117-F-15-2, IPB 117-F-17-4, IPB 149-F-1, and IPB 149-F-3 lines; significantly different from check varieties Ciherang and

Table 3. Average of yield components and yield of NPT lines in four environmental conditions, 2009 DS/WS

Lines	Productive tiller	Filled grain per panicle	Total grain per panicle	Percentage of filled grain (%)	1.000 grain weigth (g)	Yield (t/ha)
IPB 113-F-1	10 ab	189 ab	263 ab	72.5 a	28.6	5.8
IPB 113-F-2	10 ab	187 ab	261 ab	71.8 a	29.9	6.1
IPB 115-F-3-2	10 ab	172 ab	290 ab	60.8	27.7	5.8
IPB 115-F-11	10 ab	171 ab	313 ab	55.3 b	27.2	5.6
IPB 116-F-3-1	12	182 ab	253 ab	72.1 a	27.9	6.9
IPB 116-F-44-1	11 a	159	266 ab	60.0	27.0	6.3
IPB-116-F-46-1	12	143	218 ab	68.7	26.7	6.9
IPB 117-F-1-3	11 a	147	225 ab	66.1	26.7	6.2
IPB 117-F-4-1	10 a	169 ab	288 ab	61.0	26.9	6.6
IPB 117-F-6-1	11 a	146	234 ab	64.2	28.7	6.1
IPB 117-F-14-2	9 ab	197 ab	298 ab	64.8	30.7	6.9
IPB 117-F-15-2	9 ab	192 ab	305 ab	63.2	28.8	6.6
IPB 117-F-17-4	9 ab	213 ab	319 ab	67.7	29.8	7.1
IPB 117-F-17-5	11 a	176 ab	295 ab	62.1	30.4	7.7
IPB 117-F-18-3	11 a	177 ab	273 ab	59.3	26.7	6.6
IPB 117-F-45-2	11 a	147	231 ab	64.5	27.3	6.3
IPB 140-F-1-1	11 a	175 ab	279 ab	65.8	27.4	6.8
IPB 140-F-2-1	11 a	190 ab	295 ab	65.5	27.2	7.0
IPB 140-F-3	12 a	124	154 ab	73.0 a	26.1 ab	6.5
IPB 140-F-4	11 a	171 ab	239 ab	71.9 a	30.1	6.5
IPB 140-F-5	11 a	152	208	73.8 a	29.6	6.2
IPB 140-F-6	12	165 b	200	74.9 a	30.5	7.2
IPB 140-F-7	12	155	228 ab	69.5	28.4	6.9
IPB 149-F-1	9 ab	182 ab	267 ab	68.8	29.6	6.3
IPB 149-F-2	10 ab	198 ab	304 ab	66.0	29.6	6.6
IPB 149-F-3	9 ab	196 ab	300 ab	66.0	28.2	6.4
IPB 149-F-4	10 ab	182 ab	267 ab	70.0	29.2	6.1
IPB 149-F-5	11 a	177 ab	260 ab	68.1	29.5	6.3
IPB 149-F-7	11 a	170 ab	268 ab	65.2	29.8	6.3
IPB 149-F-8	11 a	155	231 ab	70.0	29.2	6.1
B11249-9C-PN-3-3-2-2-MR-1	11 a	121	176	69.6	28.6	6.3
B11738-MR-1-2-Si-1-2	13	110	208	58.3	27.6	6.9
B11742-RS*2-3-MR-34-1-2-1	14	88	157 ab	54.4 b	27.0	5.6
B11823-MR-3-15-1	13	117	210 ab	55.9 b	29.0	6.1
B11955-MR-84-1-4	11 a	162 b	271 ab	60.2	29.9	6.6
Ciherang	15	121	174	69.0	27.9	6.7
Sintanur	13	116	169	69.2	27.9	7.7
Average	11	162	248	65.9	28.5	6.5
CV (%)	8.0	8.3	7.0	5.2	4.0	9.1
Pr>F	**	**	**	**	**	**

*) Figures in columns with letter a was significantly different from Ciherang, which followed by b was significantly different from Sintanur; that followed by ab were significantly different from Ciherang and Sintanur at 5% level of Tukey test

Sintanur with 15 and 13 tillers, respectively while Ciherang had the highest number. B11742-RS*2-3-MR-34-1-2-1 recorded the highest number among lines (14 tillers). Those numbers of productive tillers are higher than those of aromatic rices in Bangladesh. BRRI dhan37 that is reported to have the highest number of productive tillers has only 11 tillers. Low number of tiller follows the low productivity (Hossain *et al.*, 2005).

Filled Grains per Panicle

Range of the numbers of filled grains per panicle was from 88 to 213 grains. IPB 117-F-17-4 had the highest filled grains that was significantly higher than those of check varieties; the lowest was B11742-RS*2-3-MR-34-1-2-1 with the number of grains of 88 grains. The filled grain per panicle of

check varieties were relatively small, 121 and 116 grains, for Ciherang and Sintanur, respectively.

In addition to panicle length, the number of grains per panicle is one of yield components that affect the productivity of rice (Hossain *et al.*, 2005). High yield potential of aromatic rice Pusa Basmati-1 was reported by George *et al.* (2005) because of the large number of productive tillers, long panicle, and more number of grains per panicle.

Total Grain per Panicle

Range of total grain per panicle was from 154 (IPB 140-F-3) to 319 grains (IPB 117-F-17-4). Average numbers of total grain were more than 230 grains per panicle. It had more significant value than check varieties Ciherang and Sintanur, which had 174 and 169 grains, respectively. Haryanto *et al.* (2008) reported that in addition to the number of tillers, panicle length and 1.000 grain weight, the high number of grains total per panicle would also increase rice yield.

Percentage of Filled Grain

The percentage of filled grain ranged from 54.4% to 74.9%, while Ciherang and Sintanur had 69%. The shortest and the highest were B11742-RS*2-3-MR-34-1-2-1 and IPB 140-F-6, respectively. There were six other lines which had high percentage of filled grain, not significantly different from IPB 140-F-6, i.e. IPB 113-F-1 (72.5%), IPB 113-F-2 (71.8%), IPB 116-F-3-1 (72.1%), IPB 140-F-3 (73%), IPB 140-F-4 (71.9%), and IPB 140-F-5 (73.8%).

Weight of 1.000 Grain

Weight of 1.000 grain ranged from 26.1 g to 30.7 g. The highest weight was recorded in line IPB 117-F-14-2 (30.7 g) followed by IPB 140-F-6 (30.5 g) and IPB 117-F-17-5 (30.4 g). Most of the lines were not significantly different from those of Ciherang or Sintanur, with had value 27.9 g, except in line IPB 140-F-3 (26.1 g).

Grain Yield

Average of grain yield was 6.5 t/ha, while it ranged from 5.6 t/ha to 7.7 t/ha and all of the lines had not significantly different from Ciherang (6.7 t/ha) and Sintanur (7.7 t/ha). The highest grain yield (7.7 t/ha) was observed in IPB 117-F-17-5 while the lowest grain yield (5.6 t/ha) was observed in B11742-RS*2-3-MR-34-1-2-1. This result was higher than average grain yield in Bangladesh that yielded 3.5 t/ha (Hossain *et al.*, 2005).

Characters Correlation

Correlations are measures of the intensity of association between characters. The selection for one character result in progress for all characters that are positively correlated (Steel and Torrie, 1960). One or more characters even correlated between each other. This could be an effective method for selection in breeding program in order to get some lines with expected character. Plant height was significantly positive correlated with panicle length, days to flowering, number of filled grain per panicle, percentage of filled grain, 1.000 grain weight, and grain yield; while it had negative correlated with number of productive tiller (Table 4). Khan *et al.* (2009a) reported that grain yield was

Table 4. Simple phenotypic correlation between characters of NPT lines in four environmental conditions, 2009 DS/WS.

Characters	Plant height	Panicle length	Days to flowering	Days to maturity	Productive tiller	Filled grain per panicle	Number of total grain	Percentage of filled grain	1.000 grain weight	Yield
Plant height		0.5**	0.4**	0.3	-0.5**	0.5**	0.3	0.5**	0.4*	0.4*
Panicle length			0.2	0.2	-0.7**	0.7**	0.6**	0.1	0.5**	0.1
Days to flowering				0.8**	-0.3	0.2	0.2	0.0	0.2	0.2
Days to maturity					-0.3*	0.3	0.3	-0.1	0.3*	0.1
Number of productive tiller						-0.8**	-0.8**	-0.1	-0.3*	0.1
Filled grain per panicle							0.9**	0.2	0.4*	0.1
Number of total grain								-0.2	0.3	0.0
Percentage of filled grain									0.3	0.3
1.000 grain weight										0.2

not correlated positively with plant height among 25 rice genotypes collected from various national and international institutes in Pakistan.

Panicle length was significantly positive correlated with number of filled grain per panicle, number of total grain per panicle, and 1.000 grain weight. It negative correlated with number of productive tiller. Days to flowering were significantly positive correlated with days to maturity, while days to maturity were significantly positive correlated with 1.000 grain weight. It negative correlated with number of productive tiller.

Number of productive tiller was significantly negative correlated with number of filled grain per panicle, number of total grain per panicle, and 1.000 grain weight. It was also reported by Sarhadi *et al.* (2009) in Afghan native rice cultivar that number of productive tiller was not correlated with total grain per panicle, because varieties with the largest number of panicles per plant had the lowest number of grains per panicle. Number of filled grain per panicle was significantly positive correlated with number of total grain per panicle and 1.000 grain weight.

In this study, grain yield has positive correlation with all of the characters but not significant, except for plant height. In other case, panicles per plant, panicle length, and grain weight though had positively non significant correlation with yield (Ramakrishnan *et al*., 2006). Grain yield was positively associated and not significantly with days to maturity (Khan *et al*., 2009b). In the research of Sarawgi *et al*. (1997) grain yield per plant exhibited highly significant positive correlations with hundred grain weight. Surek and Beser (2003) reported that grain yield was significantly correlated with its component characters like the number of productive tillers per square meter and the number of filled grains per panicle.

CONCLUSION

Plant characters of promising varied and there were significantly different from Ciherang and Sintanur as check varieties except for grain yield. B11742-RS*2-3-MR-34-1-2-1 had the lowest plant height, grain yield, and the shortest growth duration. Most of the lines had character as new plant type variety. Grain yield had positively correlated with all characters, but only positive and significantly correlated with plant height.

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