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Effect of growth regulators on two varieties of rice (Peizataifeng & Huayou 86)

Sarita Kumari*
Department of Botany, B.N.M.University, Madhepura, Bihar, India

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Abstract : In this study Gibberellic acid (GA3), Paclobutrozol (PBZ), 6- Benzylaaminopurine (6-BA) treatment and distilled water (control) were sprayed to two hybrid rice cultivars (Peizataifeng and Huayou 86) at the heading stage in the field experiments in both early and late season in 2007. In early season, grain yield of peizataifeng under PBZ and 6-BA treatment was remarkably higher than that of ok respectively. The higher yield was found for GA3, PBZ and 6-BA treatment, while the lowest one was found under control treatment.

Keywords : Gibberellic acid (GA-3), Paclobutrazol (PBZ), 6-Benzylaminpurine(6-BA)

INTRODUCTION

It is important to realize that the use of regulators in agriculture is much more extensive than is commonly realized the field is relatively old when one considers that ethylene has been used to degreen oranges since 1920's and auxins have been used to promote rooting of cuttings since the 1930's During this rather long history plant growth regulator research Indirectly gave a major boost to the herbicide industry. It was studies on rooting and auxins that lead ultimately to the discovery of 2,4-D. This compound at the first highly active organic herbicide with species selectivity was the keystone of the modern chemical herbicide industry at the present time there are some applications of growth regulators to major field crops. Plant growth regulators to play important roles in plant growth and development, but little are known about roles of plant growth regulators in yield, grain qualities and antioxidant enzyme activities in super hybrid rice.

*Corresponding author :
Phone: 8540079860, 7762943139
E-mail : saritasaharsa1984@gmail.com

MATERIALAND METHOD

In this study gibberellic acid (GA3), paclobutrazol (PBZ), 6-Benzylamino purine (6-BA) treatment and distilled water (control) were sprayed to two hybrid rice cultivars (Peizataifeng and Huayou 86) at the heading stage in the field experiments in both early and rate season in 2007. Treatments were arranged in a split-plot design with four replications. Cultivars treatment with two newly developed super hybrid rice Peizataifeng and Huayou 86 were the main plots and plant growth regulators treatment were the subplots. Subplot treatment included (1) plots sprayed with distilled water (CK), (2) plots sprayed with 20 mg L-1 GA3 prepared using 95% ethanol as surfactant (GA3), (3) plots sprayed with 50 mg L-1 PBZ (PBZ), (4) plots sprayed with 30 mg L-1 6-ba (6-BA).

RESULTS

In early season grain yield of Peizataifeng under PBZ and 6-BA treatments was remarkably higher than that of CK, respectively. The higher yield was found for GA3, PBZ and 6-BA treatments, while the lowest one was found

under control treatment. Significant differences were found in the number of spikelets per panicle and grain filling percentage between GA3, PBZ, 6-BA treatment and CK in two cultivars of Peizataifeng and Huayou 86 in both early and late season in 2007. There was significant increase in the number of spikelets per panicle and grain filling percentage under plant growth regulator treatment in Peizataifeng and Huayou 86 compared with the CK, respectively. Higher grain yield under GA3, PBZ and 6-BA treatments was mainly ascribed to significant higher spikelets per panicle and grain filling percentage. On average, grain yield of Huayou 86 was higher than that of Peizataifeng. Average grain yield was higher in late season than that in early season.

Table 1 Effects of plant growth regulators on yield and its components of cultivars of *Peizataifeng* and *Huayou 86* in both early and late seasons in 2007

Treatments		Panicle number (m^{-2})	No. of Spikelets per panicle	Grain filling percentage (%)	1000-grain-weight (g)	Yield (kg ha^{-1})
2007 early rice						
Peizataifeng	CK	250 b	179.5 b	78.1 b	22.1 a	6807.7 b
	GA3	258 b	205.3 a	86.7 a	22.2 a	6565.0 b
	PBZ	258 b	198.0 a	85.8 a	23.1 a	7388.3 a
	6-BA	275 a	196.8 a	84.6 a	22.8 a	7626.7 a
	mean	260 A	194.9 A	83.8 A	22.5 A	7096.9 B
Huayou86	CK	228 b	140.6 a	80.4 b	19.8 b	7583.3 a
	GA3	271 a	122.9 b	86.2 a	20.0 b	7020.0 a
	PBZ	275 a	145.4 a	86.6 a	21.6 a	7930.0 a
	6-BA	258 ab	138.3 b	84.5 a	21.7 a	7940.7 a
	mean	258 A	136.8 B	84.4 A	20.7 B	7618.5 A
2007 late rice						
Peizataifeng	CK	273 a	135.0 b	80.8 b	21.7 b	7080.0 b
	GA3	276 a	141.4 ab	86.9 a	21.9 ab	7920.1 a
	PBZ	266 a	135.6 b	84.3 a	23.0 a	7740.0 ab
	6-BA	273 a	149.2 a	83.9 a	22.6 a	7680.7 ab
	mean	272 A	140.3 B	84.0 B	22.3 A	7605.0 B
Huayou86	CK	265 b	165.3 a	86.9 a	20.4 a	8280.0 a
	GA3	280 a	171.8 a	89.7 a	20.7 a	9040.0 a
	PBZ	269 b	168.3 a	88.9 a	20.4 a	8406.0 a
	6-BA	283 a	168.4 a	88.4 a	20.2 a	8620.0 a
	mean	274 A	168.5 A	88.4 A	20.5 B	8586.5 A

Within a column for two groups of genotypes, common letters are not significantly different at the 5% level.

Table 2 Effects of plant growth regulators on brown rice rate, milled rice rate, head rice rate, chalkiness and amylose content of cultivars *Peizataifeng* and *Huayou 86* in both early and late seasons in 2007

Treatments		Brown rice (%)	Milled rice (%)	Head rice (%)	Chalkiness (%)	Amylose content (%)
2007 early rice						
Peizataifeng	CK	81.5 a	73.8 a	63.4 b	9.8 b	11.8 b
	GA3	81.6 a	74.3 a	66.2 ab	13.2 a	12.5 b
	PBZ	81.9 a	75.9 a	68.9 a	10.1 b	17.1 a
	6-BA	82.0 a	75.4 a	66.5 ab	13.6 a	17.6 a
	mean	81.7 A	74.9 A	66.3 B	11.7A	14.7 A
Huayou86	CK	81.4 a	75.4 a	66.0 b	12.9 a	15.5 a
	GA3	82.5 a	75.6 a	67.5 b	12.4 a	15.1 a
	PBZ	82.7 a	75.3 a	74.7 a	10.7 a	16.5 a
	6-BA	81.3 a	74.0 a	67.2 b	11.4 a	14.3 a
	mean	82.0 A	75.1 A	68.9 A	11.9 A	15.4 A
2007 late rice						
Peizataifeng	CK	82.0 a	76.3 a	67.7 a	8.3 ab	14.5 b
	GA3	82.4 a	77.2 a	70.0 a	10.1 a	17.9 a
	PBZ	82.1 a	76.8 a	69.7 a	9.2 a	17.2 a
	6-BA	82.0 a	77.4 a	69.7 a	6.7 b	17.2 a
	mean	82.1 A	76.9 B	69.3 A	8.6 A	16.7 A
Huayo .86	CK	81.9 a	78.6 a	68.9 a	7.0 b	14.0 b
	GA3	81.7 a	78.6 a	70.1 a	8.7 b	18.5 a
	PBZ	82.2 a	79.0 a	71.3 a	12.1 a	18.7 a
	6-BA	81.2 a	79.0 a	70.1 a	10.1 ab	18.0 a
	mean	81.7 A	79.0 A	70.1 A	9.5 A	17.3 A

CONCLUSION

Overall, foliar application of plant growth regulator at heading stage can increase grain yields in Peizataifeng and Huayou 86 in both early and late seasons in 2007. In early season, grain yield of Peizataifeng under PBZ and 6-BA treatments was remarkably higher than that of CK, respectively. The higher yield was found for GA3, PBZ and 6-BA treatment, while the lowest one was found under control treatment. Significant differences were found in the number of spikelets per panicle and grain filling percentage between GA3, PBZ, 6-BA treatment and CK in two cultivars of Peizataifeng and Huayou in both early and late season in 2007. There was significant increase in the number of spikelets per panicle and grain filling percentage under plant growth regulator treatments in Peizataifeng and Huayou 86 compared with the CK, respectively.

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