

Effect of Different Cytokinin (BAP and Kinetin) for growth and yield performances of Sri Lankan Traditional Rice varieties (*Oryza sativa* L.) Suwadal and Kahatawee

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ABSTRACT

The study was carried out as pot experiments in the green house condition to evaluate the growth and yield performances of Sri Lankan Traditional Rice varieties (*Oryza sativa*) Suwadal and Kahatawee with cytokinin hormones. Five different concentrations of BAP and Kinetin (T1-0 mgL⁻¹, T2 0.1 mgL⁻¹, T3 0.3 mgL⁻¹, T4 0.5 mgL⁻¹, T5 0.8 mgL⁻¹) were applied to pots (1cm x 1cm x 1.5cm) separately. At the time of applying basal and top dressing each pot were treated by 200ml of BAP and Kinetin (cytokinin) separately. Each pot was treated by one hormone BAP or Kinetin. Shoot length, number of shoots/plant, number of panicles per plant, number of seeds per panicle, weight hundred seeds were measured. The experiment was conducted in a Complete Randomized design (CRD) with 3 replicates. Statistical analysis was carried out using the Student Newman-Kuells Means Separation Test of SAS program (9.1.3). Both rice varieties; Suwadal and Kahatawee enhanced growth and yield characters at 0.8 mgL⁻¹ Kinetine or 0.3 mgL⁻¹ BAP. BAP and Kinetin affected the same way to both plants on tillering. Number of tillers per plant and thousand grain weight per panicle significantly increased in Kahatawee and Suwedel with BAP and Kinetin at 0.3 mgL⁻¹. Plants grown with cytokinin observed 53-64% more number of tillers per plant compares to control.

Key words: BAP, Kahata wee, Kinetin, Suwadal

1.INTRODUCTION

Rice (*Oryza sativa*) is the staple food for more than 40 percent of the World population. Rice production can be increased through the large-scale adoption of modern high-yielding rice varieties and improved cultural practices. A plant growth regulator is defined as organic substances produced naturally in the higher plants controlling growth or other physiological functions at a site remote from its place of production and active in minute amounts [1]. Same plant growth regulator acts in a

different way in different stages of the same crop. There are five major classes of plant hormones. They are auxin, cytokines, gibberellins, abscisic acid and ethylene. Kinetine and 6-benzyloaminopurine (BAP) are two synthetic Cytokinin. Among the plant growth regulators Cytokinins proved to stimulate cell division, induce shoot formation and axillary shoot proliferation and to retard root formation. Therefore the objectives of this study were to evaluate the growth and yield performances of Suwadal and Kahatawee when applied in different concentrations of Kinetin and BAP.

2. METHODOLOGY

Experimental Location

Study was conducted at Faculty of Agriculture, University of Ruhuna, Mapalana, and Kamburupitiya. Mapalana is located in the low country wet zone (WL₂) where the annual rainfall is > 1900 mm. The mean monthly temperature is 27.5 °C and relative humidity is around 72%. Suwadal and Kahatawee seeds were obtained by Department of Agriculture. Pots (0.17x0.17x0.17 m³) were filled with paddy mud. After 14 days of nursery period healthy rice seedlings were transplanted in the pots separately and maintained 2 plants per pot.

Basal dressing applied to the soil before sowing seeds as Urea 50 Kg /ha, Triple Super Phosphate 62.5 Kg/ha, Murate Of Potash 50 Kg /ha. Top dressing applied to rice according to the recommendations of agriculture department after 21 days. Different concentrations (T1-0mg/l T2 0.1mg/l T3 0.3mg/l T4 0.5 mg/l T5 0.8 mg/l) of BAP and Cytokinin (200ml) were added separately to each pot when applied basal and top dressing.

After 3½ months paddy were harvested. Shoot lengths, number of panicles, number of tillers, number of seeds, thousand seed weight were measured. Each treatment was replicated three times. All management practices were conducted according to recommendation of the Department of Agriculture from seed germination to harvesting. Data was analyzed using SAS program (9.1.3)

3. RESULT AND DISCUSSION

The data in the table 1 indicated all observed parameters did not differ significantly among T3, T4, T5 which were containing 0.3, 0.5, 0.8 mg/l BAP. Lowest mean number of tillers (1.33), number of panicles (1.33), number of seeds/panicles (172.75) and thousand grain weights (10.13 g) were observed in control. Furthermore the data (table 1) revealed that mean plant height (85 cm) of Kahata wee traditional rice was not significantly different in control comparing BAP treated Kahata wee plants.

Table 1: Effect of BAP on Kahata rice plants

Treatments	No. of Tillers/ plant	No. of Panicles/ plant	No. of seeds/ panicle	1000 grain weight (g)	Plant height
T1	1.33 b	1.33 b	172.75 c	10.13 c	85 a
T2	2.16 a	2.16 a	224.5 bc	12.12b	76.25 a
T3	3.5 a	3.5 a	372.56 a	12.84 a	92.5 a
T4	2.67 a	2.67 a	291.5 ab	12.65ab	87.5 a
T5	2.83 a	2.83 a	255.5 ab	12.68ab	87.5 a

Column values followed by the same letter are not significantly different as determined by Duncan’s multiple range test (P=0.05). Values in same column with same letter denoted non- significant difference

The data in the table 2 indicated number of tillers, number of panicles and thousand grain weights, which were not significantly different from 0.3 mg/l and 0.8 mg/l BAP treated Suwadal rice plants. 0.3 mg/l BAP treated Suwadal rice plants exhibited highest mean value for the all observed parameters which are mean number of tillers (2.5), number of panicles (2.5), number of seeds (228.75), thousand grain weight (12.827) and plant height (95 cm).

Table 2: Effect of BAP on Suwadal rice plants

Treatments	No. of Tillers/ plant	No. of Panicles/ plant	No. of seeds/ panicle	1000 grain weight (g)	Plant height
T1	1.2 b	1.2 b	98 b	11.685 b	87.5 ab
T2	1.5 b	1.5 b	141.5 ab	11.865 b	66.25 b
T3	2.5 a	2.5 a	228.75 a	12.827 a	95 a
T4	1.5 b	1.5 b	144.5 ab	11.55 b	83.75 ab
T5	1.8 ab	1.8 ab	155.75 ab	12.26 ab	72.5 ab

Column values followed by the same letter are not significantly different as determined by Duncan’s multiple range test (P=0.05). Values in same column with same letter denoted non- significant difference

The data (Table 3,4) revealed that mean thousand grain weight and plant height of kinetin treated Kahata and Suwadal rice plants were not significantly different with both controls (Kahata and Suwadal). However maximum mean number of seeds was observed from 0.8 mg/l kinetin treated Kahata and Suwadal rice plants. Furthermore the data (Table 3,4) revealed that number of tillers and number of panicles were not significantly different from T3, T4, T5 which were containing 0.3, 0.5, 0.8mg/l kinetine. Lowest mean numbers of tillers (1.2, 1.2), number of

panicles (1.2, 1.2), number of seeds (105.25, 108.25) were observed from control in both varieties (Kahata weeand Suwadal). Even though, BAP more active than kinetin when considering performance of the Kahata wee, the data (table 1) revealed that mean number of tillers and number of panicles were significantly different in control comparing to all treated BAP kahata rice plants. As reported by [2], demonstrated that BAP is more active than any other Cytokinins in germination, as well as in breaking the dormancy of celery and lettuce seeds.

Table 3: Effect of Kinetin on Kahata plants

Treat ments	No. of Tillers/ plant	No. of Panicles/ plant	No. of seeds/ panicle	1000 grain weight (g)	Plant height
T1	1.2 b	1.2 b	105.25 c	11.89 a	81.25 a
T2	1.5 b	1.5 b	136.25 c	11.81 a	91.25 a
T3	2.8 a	2.8 a	252.00 ab	12.51 a	77.5 a
T4	2.33ab	2.33ab	236.25 b	12.33 a	91.25 a
T5	2.8a	2.8a	275.75 a	12.49 a	97.5 a

Column values followed by the same letter are not significantly different as determined by Duncan’s multiple range test(P=0.05). Values in same column with same letter denoted non- significant difference

Table 4: Effect of Kinetin on Suwadal rice plants

Treat ments	No. of Tillers/ plant	No. of Panicles/ plant	No. of seeds/ panicle	1000 grain weight (g)	Plant height
T1	1.2 b	1.2 b	108.25 c	11.57 a	87.5 a
T2	1.5 b	1.5 b	139 bc	11.93 a	80.0 a
T3	2.5 a	2.5 a	239.7 ab	12.36 a	92.5 a
T4	2 ab	2 ab	223.75 ab	12.33 a	73.75 a
T5	2.5 a	2.5 a	261.25 a	12.48 a	96.25 a

Column values followed by the same letter are not significantly different as determined by Duncan’s multiple range test(P=0.05). Values in same column with same letter denoted non- significant difference

4. CONCLUSIONS

It can be concluded that better growth and yield can be obtained from 0.8 mg/l Kinetin or 0.3mg/l BAP with regardless of traditional rice varieties. When considering the thousand grain weight close values were obtained in both kinetin treated varieties therefore BAP is better than kinetin to obtain higher yield for traditional rice varieties.

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