



Biostimulation of *Plectranthus amboinicus* (Lour.) Spreng. with Different Yeast Strains: Morphological Performance, Productivity, Phenotypic Plasticity, and Antioxidant Activity

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Table S1. Effects of yeast strains of *Rhodotorula muciligenese*, *Candida sake*, *Candida apicola*, and *Candida kunwiensis* yeast strains at 0, 1×10^4 , 1×10^7 , and 1×10^9 concentrations on plant height (cm), branches number, and leaves number of *Plectranthus amboinicus* (Lour.) Spreng. in 2019 and 2020 growing seasons.

Treatments	Plant height		Number of branches		Number of leaves	
	First season	Second season	First Season	Second season	First season	Second season
Yeast strain (Y)						
<i>Rhodotorula muciligenese</i> (Y1)	76.2±1.9d	72.1±1.8c	5.2±0.5c	5.6±0.5b	91.8±2.1b	90.0±2.7bc
<i>Candida sake</i> (Y2)	84.3±3.2c	87.2±4.3b	6.0±0.7b	5.9±0.6b	92.8±2.2b	92.1±2.6b
<i>Candida apicola</i> (Y3)	91.4±4.5a	94.9±5.6a	7.5±0.9a	8.8±0.9a	97.8±3.0a	99.0±3.7a
<i>Candida kunwiensis</i> (Y4)	88.7±4.0b	87.7±4.4b	4.3±0.3d	5.3±0.3b	83.2±0.7c	87.0±1.7c
P value	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**
Concentrations (CFU mL ⁻¹) (C)						
0 (C1)	66.0±0.6c	62.7±0.2c	2.7±0.1c	3.7±0.1c	81.3±0.5c	78.0±0.5c
1×10^4 (C2)	90.8±2.3ab	92.3±3.3b	6.0±0.6b	6.4±0.7b	93.9±2.2b	96.5±1.8ab
1×10^7 (C3)	93.4±2.4a	94.9±3.4a	7.6±0.5a	8.3±0.6a	97.3±2.3a	99.2±1.9a
1×10^9 (C4)	90.4±2.6b	92.0±3.5b	6.7±0.5b	7.3±0.6b	92.9±2.2b	94.4±2.4b
P value	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**

* and ** indicate, respectively, differences at $p \leq 0.05$ and 0.01 probability level. Means followed by the same letter in each column are not significantly different according to Tukey's test ($p \leq 0.05$).

Table S2. Effects of yeast strains of *Rhodotorula muciligenese*, *Candida sake*, *Candida apicola*, and *Candida kunwiensis* yeast strains at 0, 1×10^4 , 1×10^7 , and 1×10^9 concentrations on root length (cm), root weight (g), and root:shoot length ratio of *Plectranthus amboinicus* (Lour.) Spreng. in 2019 and 2020 growing seasons.

Treatments	Root length		Root weight		Root:shoot length ratio	
	First season	Second season	First season	Second season	First season	Second season
Yeast strain (Y)						
<i>Rhodotorula muciligenese</i> (Y1)	11.5±0.3d	12.2±0.3d	6.4±0.4d	7.2±0.5d	0.151±0.003d	0.169±0.003c
<i>Candida sake</i> (Y2)	15.7±0.9b	17.8±1.2b	9.8±1.0b	10.6±1.1b	0.184±0.005b	0.202±0.006a
<i>Candida apicola</i> (Y3)	18.9±1.5a	20.4±1.6a	11.7±1.3a	12.0±1.3a	0.203±0.008a	0.211±0.007a
<i>Candida kunwiensis</i> (Y4)	14.8±0.8c	16.0±0.9c	8.6±0.7c	9.1±0.8c	0.166±0.002c	0.182±0.002b
<i>P</i> value	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**
Concentrations (CFU mL ⁻¹) (C)						
0 (C1)	10.5±0.1c	11.1±0.1c	4.6±0.1c	4.8±0.2c	0.159±0.001c	0.178±0.003c
1×10^4 (C2)	16.5±1.2b	18.3±1.2b	10.2±0.9b	10.9±0.8b	0.179±0.009b	0.195±0.007ab
1×10^7 (C3)	17.7±1.1a	19.4±1.3a	11.4±0.8a	12.2±0.7a	0.188±0.008a	0.202±0.007a
1×10^9 (C4)	16.2±1.0b	17.6±1.2b	10.4±0.7b	11.0±0.7b	0.178±0.007b	0.189±0.007bc
<i>P</i> value	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**

* and ** indicate, respectively, differences at $p \leq 0.05$ and 0.01 probability level. Means followed by the same letter in each column are not significantly different according to Tukey's test ($p \leq 0.05$).

Table S3. Effects of yeast strains of *Rhodotorula muciligenese*, *Candida sake*, *Candida apicola*, and *Candida kunwiensis* yeast strains at 0 , 1×10^4 , 1×10^7 , and 1×10^9 concentrations on fresh weight (g), essential oil (%), and essential oil yield (mL) of *Plectranthus amboinicus* (Lour.) Spreng. in 2019 and 2020 growing seasons.

Treatments	Fresh weight		Essential oil		Essential oil yield	
	First season	Second season	First Season	Second season	First season	Second season
Yeast strain (Y)						
<i>Rhodotorula muciligenese</i> (Y1)	217.7±11.3d	230.2±12.7d	0.190±0.003c	0.196±0.004c	0.418±0.027d	0.455±0.030d
<i>Candida sake</i> (Y2)	329.0±30.7b	321.6±28.6b	0.205±0.006b	0.213±0.006b	0.693±0.075b	0.702±0.073b
<i>Candida apicola</i> (Y3)	349.0±34.0a	337.3±31.1a	0.212±0.007a	0.220±0.007a	0.764±0.087a	0.765±0.084a
<i>Candida kunwiensis</i> (Y4)	263.3±19.0c	250.5±16.0c	0.193±0.004c	0.199±0.004c	0.516±0.043c	0.506±0.039c
P value	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**
Concentrations (CFU mL ⁻¹) (C)						
0 (C1)	154.2±1.4d	159.1±1.6d	0.174±0.001c	0.179±0.002c	0.268±0.001c	0.284±0.001c
1×10^4 (C2)	336.3±20.9b	328.3±18.3b	0.205±0.004b	0.212±0.004b	0.697±0.054b	0.702±0.051b
1×10^7 (C3)	343.0±21.5a	334.8±18.7a	0.212±0.004a	0.219±0.004a	0.736±0.057a	0.742±0.054a
1×10^9 (C4)	325.6±21.0c	317.6±18.2c	0.210±0.004a	0.218±0.004a	0.691±0.056b	0.699±0.052b
P value	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**

* and ** indicate, respectively, differences at $p \leq 0.05$ and 0.01 probability level. Means followed by the same letter in each column are not significantly different according to Tukey's test ($p \leq 0.05$).

Table S4. Effects of yeast strains of *Rhodotorula muciligenese*, *Candida sake*, *Candida apicola*, and *Candida kunwiensis* yeast strains at 0, 1×10^4 , 1×10^7 , and 1×10^9 concentrations on total carbohydrate (%), total ash (%), and protein (%) of *Plectranthus amboinicus* (Lour.) Spreng. in 2019 and 2020 growing seasons.

Treatments	Total carbohydrate		Total ash		Protein	
	First season	Second season	First Season	Second season	First season	Second season
Yeast strain (Y)						
<i>Rhodotorula muciligenese</i> (Y1)	27.5±0.6c	28.9±0.8b	7.6±0.2b	7.6±0.2c	7.1±0.2c	7.7±0.2c
<i>Candida sake</i> (Y2)	28.8±0.8b	31.1±1.1a	8.1±0.3a	8.2±0.3b	7.5±0.3b	8.2±0.3b
<i>Candida apicola</i> (Y3)	30.2±1.1a	31.5±1.2a	8.2±0.3a	8.3±0.3a	7.8±0.3a	8.6±0.4a
<i>Candida kunwiensis</i> (Y4)	26.5±0.5c	28.9±0.7b	7.1±0.1c	7.1±0.1d	6.7±0.2d	7.3±0.2d
P value	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**
Concentrations (CFU mL ⁻¹) (C)						
0 (C1)	24.5±0.3c	25.1±0.2c	6.5±0.0d	6.6±0.0d	6.1±0.1c	6.6±0.1c
1×10^4 (C2)	28.5±0.5b	30.4±0.6b	7.8±0.2c	7.8±0.2c	7.3±0.2b	8.1±0.2b
1×10^7 (C3)	30.5±0.7a	33.3±0.6a	8.7±0.2a	8.6±0.2a	8.2±0.2a	8.9±0.2a
1×10^9 (C4)	29.4±0.6ab	31.6±0.5b	7.9±0.2b	8.1±0.2b	7.6±0.2b	8.2±0.2b
P value	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**

* and ** indicate, respectively, differences at $p \leq 0.05$ and 0.01 probability level. Means followed by the same letter in each column are not significantly different according to Tukey's test ($p \leq 0.05$).

Table S5. Effects of yeast strains of *Rhodotorula muciligenese*, *Candida sake*, *Candida apicola*, and *Candida kunwiensis* yeast strains at 0, 1×10^4 , 1×10^7 , and 1×10^9 concentrations on antioxidant DPPH, and antioxidant FRAP of *Plectranthus amboinicus* (Lour.) Spreng. in 2019 and 2020 growing seasons.

Treatments	Antioxidant DPPH		Antioxidant FRAP	
	First season	Second season	First season	Second season
Yeast strain (Y)				
<i>Rhodotorula muciligenese</i> (Y1)	193.5±1.8c	203.2±1.8c	111.1±3.0b	120.0±3.9c
<i>Candida sake</i> (Y2)	206.6±3.8b	216.8±3.9b	118.0±4.2a	128.2±5.4b
<i>Candida apicola</i> (Y3)	213.2±4.9a	223.8±5.2a	122.6±4.9a	132.7±6.2a
<i>Candida kunwiensis</i> (Y4)	192.8±1.6c	203.9±1.8c	108.5±2.4b	116.5±3.2c
P value	0.00**	0.00**	0.00**	0.00**
Concentrations (CFU mL ⁻¹) (C)				
0 (C1)	186.0±0.8c	195.5±0.9c	96.0±1.4c	98.6±0.8c
1×10^4 (C2)	202.6±3.4b	213.5±3.3b	117.9±2.2b	129.4±2.4b
1×10^7 (C3)	209.8±3.6a	220.4±3.7a	126.7±3.1a	138.6±3.5a
1×10^9 (C4)	207.6±3.8a	218.3±3.9a	119.5±2.1b	130.7±2.3b
P value	0.00**	0.00**	0.00**	0.00**

* and ** indicate, respectively, differences at $p \leq 0.05$ and 0.01 probability level. Means followed by the same letter in each column are not significantly different according to Tukey's test ($p \leq 0.05$).

Table S6. Effects of yeast strains of *Rhodotorula muciligenese*, *Candida sake*, *Candida apicola*, and *Candida kunwiensis* yeast strains at 0, 1×10^4 , 1×10^7 , and 1×10^9 concentrations N (%), P (mg 100 mL⁻¹), and K (mg 100 mL⁻¹) of *Plectranthus amboinicus* (Lour.) Spreng. in 2019 and 2020 growing seasons.

Treatments	N		P		K	
	First season	Second season	First season	Second season	First season	Second season
Yeast strain (Y)						
<i>Rhodotorula muciligenese</i> (Y1)	1.14±0.04c	1.23±0.03c	84.24±2.22b	86.93±2.30b	154.64±3.93c	159.93±4.06c
<i>Candida sake</i> (Y2)	1.20±0.04b	1.32±0.05b	90.09±3.31a	93.07±3.41a	165.62±6.02b	167.79±5.23b
<i>Candida apicola</i> (Y3)	1.25±0.05a	1.37±0.06a	92.94±3.78a	94.18±3.64a	169.68±6.70a	172.33±6.27a
<i>Candida kunwiensis</i> (Y4)	1.07±0.03d	1.16±0.03d	78.91±1.88c	83.27±1.87c	146.06±3.05d	151.64±3.15d
P value	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**
Concentrations (CFU mL ⁻¹) (C)						
0 (C1)	0.97±0.01c	1.06±0.01c	72.77±0.74c	75.26±0.86c	133.66±0.56c	138.24±0.50d
1×10^4 (C2)	1.17±0.03b	1.29±0.03b	87.19±2.24b	90.26±1.81b	161.50±3.60b	165.69±3.27c
1×10^7 (C3)	1.31±0.03a	1.42±0.04a	96.98±2.34a	99.90±2.17a	177.94±4.09a	178.87±3.05a
1×10^9 (C4)	1.21±0.03b	1.31±0.03b	89.24±2.34b	92.05±1.81b	162.90±3.78b	168.88±3.61b
P value	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**

* and ** indicate, respectively, differences at $p \leq 0.05$ and 0.01 probability level. Means followed by the same letter in each column are not significantly different according to Tukey's test ($p \leq 0.05$).