

Supplementary Data

Table 1: Hemolysis and protease production by *Bacillus* spp. isolated from soil samples

Bacterial isolates	Hemolysis production	Protease production
B35	B	+++
B16	B	+++
B32	–	-
B11	–	-
B19	–	-
B1	B	+++
B39	-	-
B38	B	++
B8	B	++
B30	B	++
B20	B	++
B31	–	–
B17	–	–
B4	–	–

(-): negative result; (+): low positive result; (++) moderate; (+++) high.
(B1,B17,B4,B8,B20,B31,B30):, *B. cereus* (B35,B16,B38,B39,B11):
B. subtilis ; (B19,B32): *B. amyloliquefaciens*

Table 2: Antibacterial activity of filtrates of *Bacillus* spp. against some pathogenic bacteria

<i>Bacillus</i> isolates	Test bacteria [inhibition zones in mm]					
	<i>S. aureus</i>	<i>S. pyogenes</i>	<i>E. coli</i>	<i>P. aeruginosa</i>	<i>Klebsiella</i> spp	<i>S. marcescens</i>
B1	11	9	4	-	-	4
B16	9	8	4	-	-	7

Table 3: Effect of different temperature on antibacterial activity

<i>Bacillus</i> isolates	Incubation temp.	Test bacteria [inhibition zones in mm]					
		<i>S. aureus</i>	<i>S. pyogens</i>	<i>E. coli</i>	<i>P. aeruginosa</i>	<i>Klebsilla</i> spp	<i>S. marcescens</i>
B1	30°C	12	10	5	-	4	6
	37°C	11	9	4	-	-	4
	42°C	-	-	-	-	-	-
B16	30°C	11	9	5	-	4	8
	37°C	9	8	4	-	-	7
	42°C	-	-	-	-	-	-

Table 4: Effect of different pH on antibacterial activity

<i>Bacillus</i> isolate	PH	Test bacteria [inhibition zones in mm]					
		<i>S. aureus</i>	<i>S. pyogenes</i>	<i>E. coli</i>	<i>P. aeruginosa</i>	<i>Klebsilla</i> spp	<i>S. marcescens</i>
B1	4	-	-	-	-	-	-
	5	-	-	-	-	-	-
	6	10	8	4	-	-	4
	7	11	9	4	-	-	5
	8	9	7	-	-	-	4
	9	-	-	-	-	-	-
B16	4	-	-	-	-	-	-
	5	-	-	-	-	-	-
	6	7	5	-	-	-	5
	7	9	8	4	-	-	7
	8	8	7	-	-	-	4
	9	-	-	-	-	-	6

Table 5: Effect of incubation time on antibacterial activity

<i>Bacillus</i> isolates	Incubation time	Test bacteria [inhibition zones in mm]					
		<i>S. aureus</i>	<i>S. pyogens</i>	<i>E. coli</i>	<i>P.aeruginosa</i>	<i>Klebsilla</i> spp	<i>S. marcescens</i>
B1	24hrs	8	6	-	-	-	-
	48hrs	11	9	4	-	-	4
	72hrs	16	12	6	-	5	5
B16	24hrs	9	5	-	-	-	-
	48hrs	10	8	4	-	-	5
	72hrs	15	10	5	-	4	7

Table 6: Biofilm formation by pathogenic bacteria

Pathogenic bacteria	Biofilm formation	
	Strong biofilm	Moderate biofilm
<i>S. aureus</i>	-	+
<i>S. pyogenes</i>	++	-
<i>E. coli</i>	-	+
<i>P. aeruginosa</i>	++	-
<i>Klebsiella</i> spp.	-	+
<i>S. marcescens</i> .	-	+

Table 7: Activity of purified extracts produced by *B. cereus* and *B. subtilis* on pathogenic bacteria

Pathogenic bacteria	Bacillus cereus				Bacillus subtilis		Antibiotic control: (I.Z. mm)	
	P1	P2	P3	P4	P1	P2		
	Inhibition zones (mm)							
S. aureus	12	9	13	13	10	11	CTX ₃₀ :14	FEP ₃₀ :15
S. pyogenes	16	11	11	13	13	14	IMP ₁₀ :27	ATM ₃₀ : -
E. coli	12	-	10	-	-	-	AK ₃₀ :15	FEP ₃₀ :14
P. aeruginosa	-	-	-	-	-	-	IMP ₁₀ :18	AK ₃₀ :12
Klebsiella spp.	-	-	12	-	13	12	CTX ₃₀ :14	IMP ₁₀ :28
S. marcescens	-	-	10	11	11	12	IMP ₁₀ :25	FEP ₃₀ :14

Table 8: The ratio of inhibition effect of purified extracts of *B. cereus* and *B. subtilis* on biofilm formation

Pathogenic bacteria	Antibiofilm %					
	<i>Bacillus cereus</i>				<i>Bacillus subtilis</i>	
	P1	P2	P3	P4	P1	P2
<i>S. aureus</i>	37.5	37.5	33.3	41.7	33.3	29.2
<i>S. pyogenes</i>	66.7	3.6	52.6	49.1	56.1	59.6
<i>E. coli</i>	42.3	42.3	53.8	42.3	42.3	38.5
<i>P. aeruginosa</i>	7.4	5.9	2.9	0	1.5	4.4
<i>Klebsiella spp.</i>	44.4	70.4	48.1	48.1	48.1	44.4
<i>S. marcescens</i>	15.8	21.1	26.3	26.3	21.1	26.3

Table 9: Activity of purified extract produced by *B. cereus* on the breast cancer MCF7 cell line

Extract Type % Cell survival	Concentration(µg/ml)								
	1µg Mean ± SE		10µg Mean ± SE		100µg Mean ± SE		1000 µg Mean ± SE		F ratio(p value)
P1	A 78.3	10.7	78.6	13.5	B 85.3	9.2	B 80.6	14.3	0.974(0.07)
P2	B 100.4	8.5	90.7	7.3	B 80.5	5.5	B 86.5	10.2	1.07 (0.42)
P3	B c 106.7	6.9	b 91.6	14.9	C b 92.4	3.7	A a 33.8	2.1	14.4 (0.001)**
P4	B c 107.6	9.6	c 110.1	4.2	C b102.6	3.7	A a 34.5	1.9	40.5 (0.000)**
F ratio(p value)	3.6(0.04)*		1.8(0.2)		11.2(0.001)**		5.45(0.01)**		-----

A, B, C: LSD for column and a ,b ,c: LSD for rows. *: Significant; **: High significant; Similar letters mean no significant differences between the comparative mean.