

APPENDIX A

Media

Various media were used in this study as isolation medium, storage medium or test medium and prepared as followed formula (per liter). All agar media preparation by dissolving composition in distill water, adjust pH and add agar, boiling until melt and sterilization by autoclave at 121 C for 15 minutes.

A.1 Refresh and purify actinomycetes isolates medium and Genomic DNA extraction medium

Glucose Yeast Extract Agar

Glucose	10	g
Yeast extract	10	g
Agar	15	g
Distill water	1	l
Final pH 7.2		

Non – Sporulating Agar [Maldonado *et al.*, 2009]

Casamino acid	20	g
Soluble starch	20	g
Yeast extract	4	g
Agar	15	g
Distill water	1	l
Final pH 6.5		

A.2 International *Streptomyces* Project medium (ISP medium) [Shirling and Gottlieb, 1966; Williams *et al.*, 1983]

International *Streptomyces* Project Medium 2 (ISP-2) or yeast malt extract (YM) agar

Yeast extract	4 g
Malt extract	10 g
Glucose	4 g
pH	7.0

International *Streptomyces* Project Medium 3 (ISP-3) agar or Oatmeal (OM) agar

Oatmeal	20 g
Agar	18 g
Distill water	1 l

Mixing oatmeal in distill water 500 ml, was boiled for 15 – 30 min and filtrated, then adjust volume of filtrates solution to 1000 ml with distilled water. Agar were in oatmeal solution and sterilized by autoclaved at 121°C for 15 min.

International *Streptomyces* Project Medium 6 (ISP-6) agar or Peptone-yeast extract iron agar

Peptone Iron Agar, dehydrate	36 g
Yeast extract	1 g
Agar	15 g
Distill water	1 l
pH	7.0-7.

APPENDIX B

Chemical reagents and buffer

B.1 Chemical and reagents for genomic DNA extraction and gel electrophoresis detection.

CTAB lysis buffer

10% Cetyltrimethylammonium bromide solution (CTAB)

CTAB	10 g
0.7 M Sodium chloride	100 ml

The CTAB was added slowly to NaCl solution at 65°C for completely solubilization.

Phosphate buffer (240 mM)

KH ₂ PO ₄	3.627 g
K ₂ HPO ₄	4.180 g
Distilled water	100 ml

pH 8.0

The CTAB solution (100 ml) was mixed in phosphate buffer (100 ml) and sterilized by autoclaved at 121°C for 15 min.

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0.5 M Ethylenediaminetetraacetic acid (EDTA)

Na ₂ EDTA.2H ₂ O	18.6	g
Sodium hydroxide	2	g
Distilled water	88	ml
pH	8.0	

Phenol: Chloroform: Isoamyl alcohol solution (25 : 24 : 1)

Phenol	25	ml
Chloroform	24	ml
Isoamyl alcohol	1	ml

Chloroform: Isoamyl alcohol solution (24 : 1)

Chloroform	24	ml
Isoamyl alcohol	1	ml

TAE buffer (stock solution 50X)

Tris-base (Hydroxymethyl) aminomethane	121	g
Glacial acetic acid	28.55	ml
0.5 M EDTA	50	ml
Distill water (up to)	500	ml

TAE Ethidium bromide

10 mg/ ml Ethidium bromide	2.5	µl
1X TAE buffer	500	ml

B.2 Chemical and reagents for cell wall analysis by TLC method**Solvent solution for running TLC plate method**

Methanol	80	ml
Distill water	26	ml
6N HCl	4	ml
Pyridine	10	ml

Acetonic-ninhydrin spraying reagent

Ninhydrin	0.2	g
Acetone	100	ml



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APPENDIX C

Antimicrobial activity and nucleotide sequence



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Appendix C.1 Qualitative antimicrobial activity of active actinomycete associated with *Nostochopsis* spp. which cultivated in Med.30

Code	<i>Aeromonas</i>					Control		<i>Pseudomonas</i>					Control		<i>Vibrio</i>					Control	
	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD
NCM01	5.00	5.00	5.00	5.00	0.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00	5.00	0.00	8.00	8.00	7.00	7.67	0.58	5.00	0.00
NCM04	8.00	8.00	8.00	8.00	0.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	9.00	0.00	6.00	6.00	7.00	6.33	0.58	8.00	0.00
NCMn01	5.00	9.00	7.00	7.00	2.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	9.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCMn02	9.00	7.00	9.00	8.33	1.15	10.00	0.00	5.00	5.00	5.00	5.00	0.00	9.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCMn03	12.00	15.00	11.00	12.67	2.08	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCMn07	8.00	8.00	7.00	7.67	0.58	5.00	0.58	6.00	6.00	6.00	6.00	0.00	5.00	0.58	6.00	6.00	6.00	6.00	0.00	5.00	0.58
NCMn09	10.00	9.00	10.00	9.67	0.58	7.00	0.00	7.00	7.00	7.00	7.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCMn10	11.00	9.00	10.00	10.00	1.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCR01	13.00	12.00	10.00	11.67	1.53	7.00	0.00	8.00	8.00	6.00	7.33	1.15	6.00	0.00	6.00	6.00	5.00	5.67	0.58	7.00	0.00
NCR02	12.00	10.00	10.00	10.67	1.15	7.00	0.00	7.00	8.00	7.00	7.33	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	7.00	0.00
NCR03	10.00	9.00	10.00	9.67	0.58	7.00	0.00	5.00	7.00	5.00	5.67	1.15	6.00	0.00	7.00	7.00	5.00	6.33	1.15	7.00	0.00
NCR04	6.00	5.00	7.00	6.00	1.00	10.00	0.00	6.00	5.00	5.00	5.33	0.58	9.00	0.00	7.00	7.00	5.00	6.33	1.15	8.00	0.00
NCR05	9.00	10.00	10.00	9.67	0.58	7.00	0.00	11.00	12.00	12.00	11.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCR06	14.00	12.00	12.00	12.67	1.15	7.00	0.00	7.00	7.00	7.00	7.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	7.00	0.00
NCRHn01	9.00	9.00	8.00	8.67	0.58	7.00	0.00	8.00	8.00	8.00	8.00	0.00	6.00	0.00	6.00	6.00	7.00	6.33	0.58	7.00	0.00
NCRHn04	10.00	13.00	11.00	11.33	1.53	7.00	0.00	8.00	8.00	7.00	7.67	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	7.00	0.00
NCRHn05	7.00	7.00	8.00	7.33	0.58	6.00	0.58	5.00	5.00	5.00	5.00	0.00	6.00	0.58	8.00	8.00	8.00	8.00	0.00	6.00	0.58
NCRHn08	5.00	7.00	7.00	6.33	1.15	10.00	0.00	5.00	5.00	5.00	5.00	0.00	9.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCG04	17.00	14.00	15.00	15.33	1.53	4.00	0.00	8.00	7.00	8.00	7.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCGn01	10.00	10.00	12.00	10.67	1.15	10.00	0.00	6.00	5.00	6.00	5.67	0.58	9.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCGn02	7.00	7.00	8.00	7.33	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCGn04	8.00	7.00	8.00	7.67	0.58	10.00	0.00	5.00	5.00	5.00	5.00	0.00	9.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCGn07	5.00	8.00	10.00	7.67	2.52	10.00	0.00	5.00	5.00	5.00	5.00	0.00	9.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCH01	9.00	9.00	8.00	8.67	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	5.00	7.00	6.33	1.15	7.00	0.00
NCH03	10.00	9.00	10.00	9.67	0.58	7.00	0.00	7.00	7.00	7.00	7.00	0.00	6.00	0.00	6.00	5.00	6.00	5.67	0.58	7.00	0.00
NCH05	8.00	8.00	7.00	7.67	0.58	5.00	0.00	6.00	6.00	7.00	6.33	0.58	5.00	0.00	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NCH06	8.00	7.00	7.00	7.33	0.58	6.00	0.00	5.00	6.00	5.00	5.33	0.58	6.00	0.00	6.00	5.00	6.00	5.67	0.58	6.00	0.00
NCHn03	10.00	8.00	8.00	8.67	1.15	10.00	0.00	5.00	5.00	5.00	5.00	0.00	9.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCHn05	8.00	8.00	7.00	7.67	0.58	10.00	0.00	5.00	5.00	5.00	0.00	0.00	9.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCS03	8.00	7.00	7.00	7.33	0.58	5.00	0.58	5.00	5.00	6.00	5.33	0.58	5.00	0.58	6.00	6.00	6.00	6.00	0.00	5.00	0.58
NCS05	11.00	13.00	13.00	12.33	1.15	7.00	0.00	11.00	11.00	10.00	10.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCSn01	9.00	8.00	9.00	8.67	0.58	7.00	0.00	8.00	8.00	8.00	8.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00

Appendix C.1 (continued)

Code	<i>Escherichia coli</i>					Control		<i>Candida albicans</i>					Control		<i>Streptococcus aureus</i>					Control	
	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD
NCM01	5.00	5.00	5.00	5.00	0.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NCM04	5.00	5.00	5.00	5.00	0.00	7.00	0.00	6.00	6.00	8.00	6.67	1.15	10.67	1.53	7.00	7.00	6.00	6.67	0.58	11.33	1.15
NCMn01	7.00	5.00	5.00	5.67	1.15	7.00	0.00	5.00	8.00	7.00	6.67	1.53	10.67	1.53	5.00	5.00	5.00	5.00	0.00	11.33	1.15
NCMn02	5.00	5.00	5.00	5.00	0.00	7.00	0.00	6.00	6.00	5.00	5.67	0.58	10.67	1.53	8.00	7.00	7.00	7.33	0.58	11.33	1.15
NCMn03	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	5.00	6.00	5.67	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCMn07	8.00	8.00	9.00	8.33	0.58	5.00	0.58	7.00	8.00	7.00	7.33	0.58	5.00	0.58	7.00	8.00	7.00	7.33	0.58	5.00	0.58
NCMn09	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	8.00	8.00	7.67	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCMn10	6.00	6.00	6.00	6.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCR01	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	7.00	0.00	5.00	8.00	5.00	6.00	1.73	7.00	0.00
NCR02	5.00	5.00	6.00	5.33	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	7.00	0.00	6.00	6.00	6.00	6.00	0.00	7.00	0.00
NCR03	6.00	6.00	6.00	6.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	7.00	0.00	6.00	6.00	5.00	5.67	0.58	7.00	0.00
NCR04	5.00	5.00	5.00	5.00	0.00	7.00	0.00	5.00	6.00	5.00	5.33	0.58	10.67	1.53	6.00	5.00	5.00	5.33	0.58	11.33	1.15
NCR05	5.00	5.00	5.00	5.00	0.00	6.00	0.00	9.00	9.00	10.00	9.33	0.58	7.00	0.00	7.00	7.00	7.00	7.00	0.00	7.00	0.00
NCR06	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	7.00	0.00	8.00	9.00	8.00	8.33	0.58	7.00	0.00
NCRHn01	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	8.00	7.00	7.33	0.58	7.00	0.00	7.00	7.00	7.00	7.00	0.00	7.00	0.00
NCRHn04	6.00	6.00	6.00	6.00	0.00	6.00	0.00	7.00	7.00	8.00	7.33	0.58	7.00	0.00	6.00	5.00	6.00	5.67	0.58	7.00	0.00
NCRHn05	10.00	9.00	9.00	9.33	0.58	6.00	0.58	8.00	7.00	8.00	7.67	0.58	6.00	0.58	5.00	5.00	5.00	5.00	0.00	6.00	0.58
NCRHn08	7.00	5.00	5.00	5.67	1.15	7.00	0.00	5.00	5.00	5.00	5.00	0.00	10.67	1.53	6.00	5.00	5.00	5.33	0.58	11.33	1.15
NCG04	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	5.00	5.00	5.33	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCGn01	5.00	5.00	5.00	5.00	0.00	7.00	0.00	6.00	5.00	9.00	6.67	2.08	10.67	1.53	7.00	5.00	5.00	5.67	1.15	11.33	1.15
NCGn02	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCGn04	5.00	5.00	5.00	5.00	0.00	7.00	0.00	6.00	5.00	9.00	6.67	2.08	10.67	1.53	7.00	5.00	5.00	5.67	1.15	11.33	1.15
NCGn07	5.00	5.00	5.00	5.00	0.00	7.00	0.00	5.00	7.00	9.00	7.00	2.00	10.67	1.53	6.00	6.00	5.00	5.67	0.58	11.33	1.15
NCH01	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00	6.00	5.00	6.00	5.67	0.58	7.00	0.00
NCH03	6.00	6.00	5.00	5.67	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	7.00	0.00	7.00	8.00	7.00	7.33	0.58	7.00	0.00
NCH05	5.00	5.00	6.00	5.33	0.58	5.00	0.00	5.00	5.00	5.00	5.00	0.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NCH06	8.00	8.00	7.00	7.67	0.58	6.00	0.00	7.00	7.00	7.00	7.00	0.00	6.00	0.00	5.00	6.00	5.00	5.33	0.58	6.00	0.00
NCHn03	5.00	5.00	5.00	5.00	0.00	7.00	0.00	6.00	5.00	8.00	6.33	1.53	10.67	1.53	6.00	6.00	5.00	5.67	0.58	11.33	1.15
NCHn05	5.00	5.00	5.00	5.00	0.00	7.00	0.00	5.00	7.00	5.00	5.67	1.15	10.67	1.53	5.00	6.00	5.00	5.33	0.58	11.33	1.15
NCS03	5.00	5.00	5.00	5.00	0.00	5.00	0.58	6.00	6.00	5.00	5.67	0.58	5.00	0.58	6.00	5.00	6.00	5.67	0.58	5.00	0.58
NCS05	5.00	5.00	5.00	5.00	0.00	6.00	0.00	8.00	7.00	8.00	7.67	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCSn01	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	7.00	6.00	6.67	0.58	7.00	0.00	6.00	6.00	6.00	6.00	0.00	7.00	0.00

Appendix C.1 (continued)

Code	<i>Streptyllococcus aureus</i> MRS					Control	
	1	2	3	Mean	SD	Mean	SD
NCM01	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NCM04	18.00	19.00	19.00	18.67	0.58	9.00	0.00
NCMn01	12.00	15.00	9.00	12.00	3.00	9.00	0.00
NCMn02	15.00	13.00	10.00	12.67	2.52	9.00	0.00
NCMn03	6.00	6.00	5.00	5.67	0.58	7.00	0.00
NCMn07	8.00	8.00	8.00	8.00	0.00	5.00	0.58
NCMn09	7.00	7.00	8.00	7.33	0.58	7.00	0.00
NCMn10	6.00	5.00	6.00	5.67	0.58	7.00	0.00
NCR01	5.00	5.00	6.00	5.33	0.58	7.00	0.00
NCR02	8.00	8.00	8.00	8.00	0.00	7.00	0.00
NCR03	7.00	7.00	5.00	6.33	1.15	7.00	0.00
NCR04	24.00	24.00	21.00	23.00	1.73	9.00	0.00
NCR05	8.00	7.00	7.00	7.33	0.58	7.00	0.00
NCR06	8.00	6.00	8.00	7.33	1.15	7.00	0.00
NCRHn01	6.00	6.00	6.00	6.00	0.00	7.00	0.00
NCRHn04	7.00	7.00	7.00	7.00	0.00	7.00	0.00
NCRHn05	7.00	7.00	7.00	7.00	0.00	6.00	0.58
NCRHn08	15.00	17.00	13.00	15.00	2.00	9.00	0.00
NCG04	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCGn01	11.00	12.00	10.00	11.00	1.00	9.00	0.00
NCGn02	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NCGn04	9.00	11.00	10.00	10.00	1.00	9.00	0.00
NCGn07	15.00	14.00	15.00	14.67	0.58	9.00	0.00
NCH01	6.00	6.00	5.00	5.67	0.58	7.00	0.00
NCH03	5.00	6.00	6.00	5.67	0.58	7.00	0.00
NCH05	6.00	5.00	6.00	5.67	0.58	5.00	0.00
NCH06	8.00	8.00	7.00	7.67	0.58	6.00	0.00
NCHn03	17.00	14.00	16.00	15.67	1.53	9.00	0.00
NCHn05	9.00	10.00	12.00	10.33	1.53	9.00	0.00
NCS03	5.00	5.00	5.00	5.00	0.00	5.00	0.58
NCS05	8.00	8.00	7.00	7.67	0.58	7.00	0.00
NCSn01	7.00	7.00	8.00	7.33	0.58	7.00	0.00



Appendix C.2 Qualitative antimicrobial activity of active actinomycete associated with *Nostochopsis* spp. which cultivated in M52

Code	<i>Aeromonas</i>					Control		<i>Pseudomonas</i>					Control		<i>Vibrio</i>					Control	
	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD
NCM01	5.00	5.00	5.00	5.00	0.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	8.00	8.00	7.00	7.67	0.58	6.00	0.00
NCM04	5.00	5.00	5.00	5.00	0.00	9.33	0.58	5.00	5.00	5.00	5.00	0.00	9.00	0.00	6.00	5.00	6.00	5.67	0.58	8.00	0.00
NCMn01	12.00	13.00	11.00	12.00	1.00	9.33	0.58	8.00	7.00	8.00	7.67	0.58	9.00	0.00	6.00	5.00	5.00	5.33	0.58	8.00	0.00
NCMn02	5.00	5.00	5.00	5.00	0.00	9.33	0.58	5.00	5.00	6.00	5.33	0.58	9.00	0.00	10.00	9.00	7.00	8.67	1.53	8.00	0.00
NCMn03	10.00	11.00	11.00	10.67	0.58	7.00	0.00	7.00	7.00	8.00	7.33	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NCMn07	7.00	7.00	7.00	7.00	0.00	5.00	0.00	6.00	5.00	7.00	6.00	1.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NCMn09	10.00	10.00	9.00	9.67	0.58	7.00	0.00	8.00	7.00	8.00	7.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NCMn10	10.00	9.00	10.00	9.67	0.58	7.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NCR01	12.00	11.00	11.00	11.33	0.58	7.00	0.00	8.00	8.00	8.00	8.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NCR02	5.00	5.00	5.00	5.00	0.00	7.00	0.00	9.00	8.00	9.00	8.67	0.58	6.00	0.00	7.00	7.00	7.00	7.00	0.00	6.00	0.00
NCR03	9.00	9.00	7.00	8.33	1.15	7.00	0.00	7.00	5.00	6.00	6.00	1.00	6.00	0.00	5.00	6.00	5.00	5.33	0.58	6.00	0.00
NCR04	15.00	17.00	13.00	15.00	2.00	9.33	0.58	6.00	5.00	5.00	5.33	0.58	9.00	0.00	7.00	8.00	7.00	7.33	0.58	8.00	0.00
NCR05	10.00	10.00	9.00	9.67	0.58	7.00	0.00	8.00	8.00	7.00	7.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NCR06	5.00	5.00	5.00	5.00	0.00	7.00	0.00	10.00	9.00	10.00	9.67	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NCRHn01	9.00	9.00	9.00	9.00	0.00	7.00	0.00	9.00	8.00	8.00	8.33	0.58	6.00	0.00	8.00	7.00	8.00	7.67	0.58	6.00	0.00
NCRHn04	5.00	5.00	5.00	5.00	0.00	7.00	0.00	9.00	9.00	8.00	8.67	0.58	6.00	0.00	9.00	9.00	10.00	9.33	0.58	6.00	0.00
NCRHn05	5.00	5.00	5.00	5.00	0.00	5.00	0.00	7.00	8.00	8.00	7.67	0.58	6.00	0.00	6.00	6.00	5.00	5.67	0.58	6.00	0.00
NCRHn08	5.00	5.00	5.00	5.00	0.00	9.33	0.58	5.00	5.00	5.00	5.00	0.00	9.00	0.00	6.00	6.00	5.00	5.67	0.58	8.00	0.00
NCG04	7.00	7.00	7.00	7.00	0.00	7.00	0.00	6.00	5.00	6.00	5.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NCGn01	12.00	15.00	12.00	13.00	1.73	9.33	0.58	8.00	11.00	8.00	9.00	1.73	9.00	0.00	8.00	7.00	6.00	7.00	1.00	8.00	0.00
NCGn02	7.00	7.00	7.00	7.00	0.00	7.00	0.00	8.00	7.00	7.00	7.33	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NCGn04	12.00	14.00	12.00	12.67	1.15	9.33	0.58	5.00	5.00	6.00	5.33	0.58	9.00	0.00	9.00	7.00	6.00	7.33	1.53	8.00	0.00
NCGn07	5.00	5.00	5.00	5.00	0.00	9.33	0.58	5.00	5.00	5.00	5.00	0.00	9.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCH01	9.00	9.00	9.00	9.00	0.00	7.00	0.00	8.00	7.00	8.00	7.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NCH03	5.00	5.00	5.00	5.00	0.00	7.00	0.00	7.00	7.00	8.00	7.33	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NCH05	7.00	8.00	7.00	7.33	0.58	5.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	9.00	7.00	8.00	8.00	1.00	6.00	0.00
NCH06	9.00	9.00	9.00	9.00	0.00	5.00	0.00	5.00	6.00	5.00	5.33	0.58	6.00	0.00	7.00	7.00	6.00	6.67	0.58	6.00	0.00
NCHn03	5.00	5.00	5.00	5.00	0.00	9.33	0.58	5.00	5.00	5.00	5.00	0.00	9.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCHn05	5.00	5.00	5.00	5.00	0.00	9.33	0.58	5.00	5.00	5.00	0.00	0.00	9.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCS03	8.00	8.00	8.00	8.00	0.00	5.00	0.00	6.00	7.00	8.00	7.00	1.00	6.00	0.00	9.00	7.00	7.00	7.67	1.15	6.00	0.00
NCS05	9.00	8.00	9.00	8.67	0.58	7.00	0.00	10.00	9.00	9.00	9.33	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NCSn01	15.00	12.00	12.00	13.00	1.73	7.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00

Appendix C.2 (continued)

Code	<i>Escherichia coli</i>					Control		<i>Candida albicans</i>					Control		<i>Streptococcus aureus</i>					Control	
	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD
NCM01	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NCM04	5.00	5.00	5.00	5.00	0.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	10.67	0.58	5.00	5.00	6.00	5.33	0.58	9.67	0.58
NCMn01	7.00	8.00	8.00	7.67	0.58	7.00	0.00	11.00	11.00	13.00	11.67	1.15	10.67	0.58	5.00	5.00	6.00	5.33	0.58	9.67	0.58
NCMn02	5.00	5.00	5.00	5.00	0.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	10.67	0.58	5.00	5.00	5.00	5.00	0.00	9.67	0.58
NCMn03	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	8.00	8.00	7.67	0.58	8.00	0.00
NCMn07	7.00	8.00	7.00	7.33	0.58	6.00	0.00	7.00	8.00	7.00	7.33	0.58	6.00	0.00	7.00	8.00	7.00	7.33	0.58	6.00	0.00
NCMn09	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00	6.00	6.00	6.00	6.00	0.00	8.00	0.00
NCMn10	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCR01	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	8.00	7.00	8.00	7.67	0.58	8.00	0.00
NCR02	7.00	6.00	6.00	6.33	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00	14.00	12.00	11.00	12.33	1.53	8.00	0.00
NCR03	5.00	5.00	6.00	5.33	0.58	6.00	0.00	6.00	6.00	5.00	5.67	0.58	6.00	0.00	13.00	10.00	11.00	11.33	1.53	8.00	0.00
NCR04	8.00	9.00	10.00	9.00	1.00	7.00	0.00	11.00	11.00	13.00	11.67	1.15	10.67	0.58	5.00	5.00	5.00	5.00	0.00	9.67	0.58
NCR05	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	8.00	0.00
NCR06	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00	9.00	8.00	9.00	8.67	0.58	8.00	0.00
NCRHn01	6.00	6.00	6.00	6.00	0.00	6.00	0.00	7.00	7.00	8.00	7.33	0.58	6.00	0.00	14.00	11.00	11.00	12.00	1.73	8.00	0.00
NCRHn04	7.00	6.00	7.00	6.67	0.58	6.00	0.00	7.00	7.00	7.00	7.00	0.00	6.00	0.00	14.00	13.00	13.00	13.33	0.58	8.00	0.00
NCRHn05	8.00	8.00	8.00	8.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NCRHn08	5.00	5.00	5.00	5.00	0.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	10.67	0.58	5.00	5.00	5.00	5.00	0.00	9.67	0.58
NCG04	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCGn01	5.00	5.00	5.00	5.00	0.00	7.00	0.00	11.00	12.00	13.00	12.00	1.00	10.67	0.58	8.00	8.00	7.00	7.67	0.58	9.67	0.58
NCGn02	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCGn04	9.00	9.00	10.00	9.33	0.58	7.00	0.00	11.00	13.00	13.00	12.33	1.15	10.67	0.58	5.00	5.00	6.00	5.33	0.58	9.67	0.58
NCGn07	5.00	5.00	7.00	5.67	1.15	7.00	0.00	5.00	5.00	5.00	5.00	0.00	10.67	0.58	5.00	7.00	5.00	5.67	1.15	9.67	0.58
NCH01	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00	10.00	8.00	11.00	9.67	1.53	8.00	0.00
NCH03	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	8.00	8.00	7.00	7.67	0.58	8.00	0.00
NCH05	6.00	6.00	6.00	6.00	0.00	6.00	0.00	8.00	7.00	7.00	7.33	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NCH06	6.00	7.00	7.00	6.67	0.58	6.00	0.00	8.00	8.00	7.00	7.67	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NCHn03	5.00	5.00	7.00	5.67	1.15	7.00	0.00	5.00	5.00	5.00	5.00	0.00	10.67	0.58	5.00	5.00	5.00	5.00	0.00	9.67	0.58
NCHn05	5.00	5.00	5.00	5.00	0.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	10.67	0.58	5.00	5.00	5.00	5.00	0.00	9.67	0.58
NCS03	5.00	5.00	5.00	5.00	0.00	6.00	0.00	8.00	9.00	8.00	8.33	0.58	6.00	0.00	5.00	6.00	5.00	5.33	0.58	6.00	0.00
NCS05	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	7.00	7.00	7.00	0.00	8.00	0.00
NCSn01	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00	10.00	10.00	8.00	9.33	1.15	8.00	0.00

Appendix C.2 (continued)

Code	<i>Streptococcus aureus</i> MRS					Control	
	1	2	3	Mean	SD	Mean	SD
NCM01	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NCM04	13.00	12.00	12.00	12.33	0.58	9.00	0.00
NCMn01	14.00	15.00	18.00	15.67	2.08	9.00	0.00
NCMn02	9.00	11.00	10.00	10.00	1.00	9.00	0.00
NCMn03	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCMn07	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NCMn09	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCMn10	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCR01	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCR02	6.00	6.00	6.00	6.00	0.00	8.00	0.00
NCR03	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCR04	15.00	14.00	13.00	14.00	1.00	9.00	0.00
NCR05	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCR06	6.00	6.00	6.00	6.00	0.00	8.00	0.00
NCRHn01	6.00	6.00	6.00	6.00	0.00	8.00	0.00
NCRHn04	7.00	7.00	7.00	7.00	0.00	8.00	0.00
NCRHn05	8.00	8.00	8.00	8.00	0.00	5.00	0.00
NCRHn08	20.00	18.00	15.00	17.67	2.52	9.00	0.00
NCG04	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCGn01	12.00	16.00	12.00	13.33	2.31	9.00	0.00
NCGn02	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCGn04	15.00	17.00	16.00	16.00	1.00	9.00	0.00
NCGn07	14.00	15.00	14.00	14.33	0.58	9.00	0.00
NCH01	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCH03	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCH05	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NCH06	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NCHn03	21.00	24.00	20.00	21.67	2.08	9.00	0.00
NCHn05	12.00	11.00	13.00	12.00	1.00	9.00	0.00
NCS03	6.00	6.00	6.00	6.00	0.00	5.00	0.00
NCS05	5.00	5.00	5.00	5.00	0.00	8.00	0.00
NCSn01	6.00	6.00	6.00	6.00	0.00	8.00	0.00



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Appendix C.3 Qualitative antimicrobial activity of active actinomycete associated with *Nostoc commune* which cultivated in Med.30

Code	Aeromonas					Control		Pseudomonas					Control		Vibrio					Control	
	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD
NTRHn01	8.00	8.00	7.00	7.67	0.58	9.67	0.58	6.00	6.00	6.00	6.00	0.00	7.33	0.58	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRHn02	12.00	10.00	10.00	10.67	1.15	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRHn06	20.00	15.00	13.00	16.00	3.61	9.67	0.58	5.00	6.00	5.00	5.33	0.58	7.33	0.58	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRHn07	8.00	8.00	7.00	7.67	0.58	9.67	0.58	6.00	6.00	6.00	6.00	0.00	7.33	0.58	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRHn08	8.00	7.00	8.00	7.67	0.58	5.00	0.58	9.00	9.00	8.00	8.67	0.58	5.00	0.58	6.00	5.00	5.00	5.33	0.58	5.00	0.58
NTRHn10	8.00	8.00	7.00	7.67	0.58	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRHn11	8.00	8.00	8.00	8.00	0.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRHn12	20.00	15.00	14.00	16.33	3.21	9.67	0.58	6.00	6.00	6.00	6.00	0.00	7.33	0.58	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRHn16	7.00	7.00	7.00	7.00	0.00	5.00	0.58	6.00	6.00	6.00	6.00	0.00	5.00	0.58	8.00	8.00	9.00	8.33	0.58	5.00	0.58
NTRHn18	5.00	5.00	5.00	5.00	0.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRH01	8.00	7.00	8.00	7.67	0.58	9.67	0.58	7.00	5.00	5.00	5.67	1.15	7.33	0.58	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRH02	8.00	7.00	7.00	7.33	0.58	5.00	0.58	5.00	6.00	5.00	5.33	0.58	5.00	0.58	6.00	5.00	6.00	5.67	0.58	5.00	0.58
NTRH05	12.00	12.00	11.00	11.67	0.58	10.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00	7.00	7.00	6.00	6.67	0.58	6.00	0.00
NTRH06	7.00	7.00	8.00	7.33	0.58	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	8.00	8.00	8.00	8.00	0.00	6.00	0.00
NTRH07	5.00	5.00	5.00	5.00	0.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	8.00	8.00	7.00	7.67	0.58	6.00	0.00
NTRH19	6.00	6.00	5.00	5.67	0.58	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTMn03	7.00	7.00	6.00	6.67	0.58	10.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00	8.00	8.00	7.00	7.67	0.58	6.00	0.00
NTM03	11.00	10.00	10.00	10.33	0.58	9.67	0.58	6.00	6.00	7.00	6.33	0.58	7.33	0.58	8.00	7.00	7.00	7.33	0.58	6.00	0.00
NTHn01	5.00	5.00	6.00	5.33	0.58	10.00	0.00	6.00	5.00	5.00	5.33	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTHn02	8.00	8.00	7.00	7.67	0.58	9.67	0.58	5.00	5.00	5.00	5.00	0.00	7.33	0.58	6.00	6.00	5.00	5.67	0.58	6.00	0.00
NTHn03	12.00	10.00	11.00	11.00	1.00	9.67	0.58	0.00	0.00	0.00	0.00	0.00	7.33	0.58	10.00	10.00	9.00	9.67	0.58	6.00	0.00
NTGn01	5.00	5.00	5.00	5.00	0.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTGn05	10.00	9.00	10.00	9.67	0.58	9.67	0.58	5.00	5.00	5.00	5.00	0.00	7.33	0.58	6.00	6.00	7.00	6.33	0.58	6.00	0.00
NTGn08	13.00	12.00	12.00	12.33	0.58	9.67	0.58	6.00	6.00	5.00	5.67	0.58	7.33	0.58	10.00	11.00	10.00	10.33	0.58	6.00	0.00
NTG01	5.00	5.00	5.00	5.00	0.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG02	8.00	8.00	8.00	8.00	0.00	9.67	0.58	6.00	6.00	6.00	6.00	0.00	7.33	0.58	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG03	12.00	10.00	12.00	11.33	1.15	9.67	0.58	5.00	5.00	5.00	5.00	0.00	7.33	0.58	8.00	8.00	7.00	7.67	0.58	6.00	0.00
NTG04	22.00	17.00	15.00	18.00	3.61	9.67	0.58	5.00	5.00	6.00	5.33	0.58	7.33	0.58	13.00	11.00	11.00	11.67	1.15	6.00	0.00
NTG05	7.00	7.00	8.00	7.33	0.58	9.67	0.58	5.00	6.00	5.00	5.33	0.58	7.33	0.58	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTG07	8.00	7.00	7.00	7.33	0.58	9.67	0.58	5.00	6.00	5.00	5.33	0.58	7.33	0.58	6.00	5.00	6.00	5.67	0.58	6.00	0.00
NTG08	5.00	5.00	5.00	5.00	0.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG09	13.00	10.00	12.00	11.67	1.53	9.67	0.58	5.00	6.00	6.00	5.67	0.58	7.33	0.58	8.00	9.00	8.00	8.33	0.58	6.00	0.00
NTG10	6.00	6.00	5.00	5.67	0.58	10.00	0.00	5.00	5.00	6.00	5.33	0.58	6.00	0.00	6.00	5.00	5.00	5.33	0.58	6.00	0.00
NTG11	7.00	7.00	7.00	7.00	0.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTSn04	10.00	10.00	9.00	9.67	0.58	9.67	0.58	5.00	5.00	5.00	5.00	0.00	7.33	0.58	6.00	6.00	7.00	6.33	0.58	6.00	0.00
NTSn05	8.00	8.00	7.00	7.67	0.58	9.67	0.58	5.00	6.00	5.00	5.33	0.58	7.33	0.58	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTSn06	7.00	8.00	8.00	7.67	0.58	9.67	0.58	6.00	6.00	6.00	6.00	0.00	7.33	0.58	7.00	7.00	7.00	7.00	0.00	6.00	0.00
NTSn07	8.00	7.00	7.00	7.33	0.58	9.67	0.58	6.00	6.00	6.00	6.00	0.00	7.33	0.58	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTSn08	10.00	10.00	8.00	9.33	1.15	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTSn09	5.00	5.00	5.00	5.00	0.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	8.00	7.00	8.00	7.67	0.58	6.00	0.00
NTSn10	10.00	10.00	8.00	9.33	1.15	10.00	0.00	6.00	5.00	5.00	5.33	0.58	6.00	0.00	6.00	8.00	8.00	7.33	1.15	6.00	0.00
NTSn11	5.00	5.00	5.00	5.00	0.00	5.00	0.58	5.00	6.00	5.00	5.33	0.58	5.00	0.58	7.00	7.00	6.00	6.67	0.58	5.00	0.58
NTSn12	11.00	11.00	10.00	10.67	0.58	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	8.00	8.00	8.00	8.00	0.00	6.00	0.00
NTS01	9.00	9.00	8.00	8.67	0.58	7.00	0.00	9.00	9.00	9.00	9.00	0.00	6.00	0.00	8.00	6.00	8.00	7.33	1.15	6.00	0.00
NTS02	13.00	12.00	10.00	11.67	1.53	9.67	0.58	5.00	5.00	5.00	5.00	0.00	7.33	0.58	6.00	6.00	7.00	6.33	0.58	6.00	0.00
NTS03	7.00	7.00	8.00	7.33	0.58	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTS04	10.00	10.00	10.00	10.00	0.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	7.00	5.00	6.33	1.15	6.00	0.00
NTS05	5.00	5.00	5.00	5.00	0.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00	5.00	0.00	8.00	8.00	7.00	7.67	0.58	5.00	0.00
NTS07	9.00	9.00	8.00	8.67	0.58	10.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	7.00	7.00	7.00	0.00	6.00	0.00
NT07	6.00	6.00	5.00	5.67	0.58	5.67	0.58	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NT08	5.00	5.00	5.00	5.00	0.00	5.67	0.58	6.00	5.00	5.00	5.33	0.58	6.00	0.00	5.00	6.00	5.00	5.33	0.58	6.00	0.00

Appendix C.3 (continued)

Code	Escherichia coli					Control		Candida albicans					Control		Streptococcus aureus					Control	
	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD
NTRHn01	5.00	5.00	5.00	5.00	0.00	6.33	0.58	5.00	5.00	5.00	5.00	0.00	7.00	0.00	5.00	6.00	5.00	5.33	0.58	5.67	0.58
NTRHn02	6.00	6.00	5.00	5.67	0.58	6.00	0.00	7.00	6.00	7.00	6.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRHn06	13.00	11.00	12.00	12.00	1.00	6.33	0.58	15.00	12.00	14.00	13.67	1.53	7.00	0.00	5.00	5.00	5.00	5.00	0.00	5.67	0.58
NTRHn07	8.00	8.00	9.00	8.33	0.58	6.33	0.58	7.00	8.00	7.00	7.33	0.58	7.00	0.00	0.00	0.00	0.00	0.00	0.00	5.67	0.58
NTRHn08	6.00	6.00	6.00	6.00	0.00	5.00	0.58	6.00	6.00	6.00	6.00	0.00	5.00	0.58	5.00	5.00	6.00	5.33	0.58	5.00	0.58
NTRHn10	6.00	6.00	6.00	6.00	0.00	6.00	0.00	7.00	7.00	8.00	7.33	0.58	6.00	0.00	8.00	8.00	8.00	8.00	0.00	6.00	0.00
NTRHn11	6.00	6.00	6.00	6.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRHn12	5.00	5.00	5.00	5.00	0.00	6.33	0.58	18.00	17.00	15.00	16.67	1.53	7.00	0.00	6.00	5.00	5.00	5.33	0.58	5.67	0.58
NTRHn16	6.00	6.00	6.00	6.00	0.00	5.00	0.58	5.00	5.00	5.00	5.00	0.00	5.00	0.58	6.00	6.00	6.00	6.00	0.00	5.00	0.58
NTRHn18	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRH01	9.00	10.00	9.00	9.33	0.58	6.33	0.58	7.00	7.00	8.00	7.33	0.58	7.00	0.00	5.00	6.00	5.00	5.33	0.58	5.67	0.58
NTRH02	8.00	8.00	7.00	7.67	0.58	5.00	0.58	7.00	7.00	7.00	7.00	0.00	5.00	0.58	5.00	6.00	5.00	5.33	0.58	5.00	0.58
NTRH05	6.00	6.00	6.00	6.00	0.00	6.00	0.00	9.00	8.00	9.00	8.67	0.58	6.00	0.00	12.00	10.00	12.00	11.33	1.15	6.00	0.00
NTRH06	10.00	9.00	9.00	9.33	0.58	6.00	0.00	8.00	7.00	8.00	7.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRH07	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRH19	7.00	7.00	6.00	6.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	12.00	12.00	11.00	11.67	0.58	6.00	0.00
NTMn03	8.00	8.00	7.00	7.67	0.58	6.00	0.00	7.00	7.00	7.00	7.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTM03	9.00	9.00	8.00	8.67	0.58	6.33	0.58	7.00	7.00	8.00	7.33	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	5.67	0.58
NTHn01	6.00	6.00	5.00	5.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	5.00	5.00	5.33	0.58	6.00	0.00
NTHn02	7.00	7.00	5.00	6.33	1.15	6.33	0.58	7.00	6.00	6.00	6.33	0.58	7.00	0.00	5.00	5.00	6.00	5.33	0.58	5.67	0.58
NTHn03	6.00	6.00	5.00	5.67	0.58	6.33	0.58	6.00	6.00	6.00	6.00	0.00	7.00	0.00	0.00	0.00	0.00	0.00	0.00	5.67	0.58
NTGn01	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTGn05	5.00	5.00	5.00	5.00	0.00	6.33	0.58	7.00	7.00	6.00	6.67	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	5.67	0.58
NTGn08	14.00	15.00	12.00	13.67	1.53	6.33	0.58	7.00	7.00	8.00	7.33	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	5.67	0.58
NTG01	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG02	5.00	5.00	5.00	5.00	0.00	6.33	0.58	5.00	5.00	5.00	5.00	0.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	5.67	0.58
NTG03	7.00	7.00	5.00	6.33	1.15	6.33	0.58	7.00	8.00	7.00	7.33	0.58	7.00	0.00	6.00	5.00	5.00	5.33	0.58	5.67	0.58
NTG04	13.00	10.00	12.00	11.67	1.53	6.33	0.58	22.00	19.00	15.00	18.67	3.51	7.00	0.00	5.00	6.00	6.00	5.67	0.58	5.67	0.58
NTG05	12.00	10.00	11.00	11.00	1.00	6.33	0.58	6.00	6.00	6.00	6.00	0.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	5.67	0.58
NTG07	8.00	8.00	7.00	7.67	0.58	6.33	0.58	7.00	7.00	7.00	7.00	0.00	7.00	0.00	5.00	6.00	5.00	5.33	0.58	5.67	0.58
NTG08	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG09	6.00	5.00	6.00	5.67	0.58	6.33	0.58	6.00	0.00	6.00	4.00	3.46	7.00	0.00	6.00	5.00	5.00	5.33	0.58	5.67	0.58
NTG10	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG11	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTSn04	6.00	6.00	6.00	6.00	0.00	6.33	0.58	8.00	7.00	8.00	7.67	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	5.67	0.58
NTSn05	5.00	5.00	5.00	5.00	0.00	6.33	0.58	7.00	6.00	7.00	6.67	0.58	7.00	0.00	6.00	5.00	5.00	5.33	0.58	5.67	0.58
NTSn06	6.00	5.00	6.00	5.67	0.58	6.33	0.58	6.00	7.00	6.00	6.33	0.58	7.00	0.00	6.00	5.00	5.00	5.33	0.58	5.67	0.58
NTSn07	6.00	5.00	6.00	5.67	0.58	6.33	0.58	6.00	6.00	6.00	6.00	0.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	5.67	0.58
NTSn08	8.00	9.00	8.00	8.33	0.58	6.00	0.00	12.00	10.00	12.00	11.33	1.15	6.00	0.00	10.00	12.00	12.00	11.33	1.15	6.00	0.00
NTSn09	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	9.00	10.00	10.00	9.67	0.58	6.00	0.00
NTSn10	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00	12.00	12.00	10.00	11.33	1.15	6.00	0.00
NTSn11	6.00	6.00	6.00	6.00	0.00	5.00	0.58	7.00	7.00	8.00	7.33	0.58	5.00	0.58	5.00	5.00	5.00	5.00	0.00	5.00	0.58
NTSn12	7.00	7.00	8.00	7.33	0.58	6.00	0.00	9.00	10.00	9.00	9.33	0.58	6.00	0.00	13.00	12.00	13.00	12.67	0.58	6.00	0.00
NTS01	6.00	6.00	6.00	6.00	0.00	6.00	0.00	7.00	7.00	6.00	6.67	0.58	6.00	0.00	14.00	12.00	12.00	12.67	1.15	8.00	0.00
NTS02	6.00	6.00	6.00	6.00	0.00	6.33	0.58	7.00	7.00	6.00	6.67	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	5.67	0.58
NTS03	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTS04	8.00	8.00	9.00	8.33	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTS05	5.00	5.00	5.00	5.00	0.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NTS07	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	7.00	6.00	6.67	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NT07	5.00	6.00	5.00	5.33	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	5.67	0.58	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NT08	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	5.67	0.58	6.00	5.00	5.00	5.33	0.58	7.00	0.00

Appendix C.3 (continued)

Code	Streptococcus aureus MRS					Control	
	1	2	3	Mean	SD	Mean	SD
NTRHn01	5.00	6.00	5.00	5.33	0.58	6.00	0.00
NTRHn02	15.00	15.00	14.00	14.67	0.58	7.00	0.00
NTRHn06	17.00	14.00	12.00	14.33	2.52	6.00	0.00
NTRHn07	8.00	8.00	8.00	8.00	0.00	6.00	0.00
NTRHn08	9.00	9.00	10.00	9.33	0.58	5.00	0.58
NTRHn10	12.00	12.00	10.00	11.33	1.15	7.00	0.00
NTRHn11	9.00	9.00	8.00	8.67	0.58	7.00	0.00
NTRHn12	20.00	17.00	14.00	17.00	3.00	6.00	0.00
NTRHn16	8.00	8.00	7.00	7.67	0.58	5.00	0.58
NTRHn18	8.00	8.00	9.00	8.33	0.58	7.00	0.00
NTRH01	11.00	10.00	11.00	10.67	0.58	6.00	0.00
NTRH02	9.00	9.00	7.00	8.33	1.15	5.00	0.58
NTRH05	10.00	10.00	9.00	9.67	0.58	7.00	0.00
NTRH06	7.00	7.00	7.00	7.00	0.00	7.00	0.00
NTRH07	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NTRH19	13.00	12.00	13.00	12.67	0.58	7.00	0.00
NTMn03	13.00	13.00	11.00	12.33	1.15	7.00	0.00
NTM03	7.00	5.00	7.00	6.33	1.15	6.00	0.00
NTHn01	5.00	6.00	5.00	5.33	0.58	7.00	0.00
NTHn02	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTHn03	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTGn01	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NTGn05	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTGn08	10.00	9.00	9.00	9.33	0.58	6.00	0.00
NTG01	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NTG02	6.00	6.00	5.00	5.67	0.58	6.00	0.00
NTG03	6.00	6.00	5.00	5.67	0.58	6.00	0.00
NTG04	23.00	15.00	15.00	17.67	4.62	6.00	0.00
NTG05	8.00	8.00	8.00	8.00	0.00	6.00	0.00
NTG07	11.00	10.00	10.00	10.33	0.58	6.00	0.00
NTG08	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NTG09	6.00	6.00	5.00	5.67	0.58		
NTG10	5.00	5.00	6.00	5.33	0.58	7.00	0.00
NTG11	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NTSn04	7.00	7.00	6.00	6.67	0.58	6.00	0.00
NTSn05	6.00	6.00	7.00	6.33	0.58	6.00	0.00
NTSn06	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTSn07	5.00	5.00	6.00	5.33	0.58	6.00	0.00
NTSn08	13.00	11.00	12.00	12.00	1.00	7.00	0.00
NTSn09	11.00	11.00	12.00	11.33	0.58	7.00	0.00
NTSn10	13.00	12.00	13.00	12.67	0.58	7.00	0.00
NTSn11	6.00	6.00	6.00	6.00	0.00	5.00	0.58
NTSn12	15.00	10.00	10.00	11.67	2.89	7.00	0.00
NTS01	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTS02	7.00	7.00	7.00	7.00	0.00	6.00	0.00
NTS03	13.00	11.00	11.00	11.67	1.15	7.00	0.00
NTS04	13.00	13.00	10.00	12.00	1.73	7.00	0.00
NTS05	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NTS07	5.00	5.00	5.00	5.00	0.00	7.00	0.00
NT07	6.00	6.00	5.00	5.67	0.58	6.00	0.00
NT08	5.00	5.00	5.00	5.00	0.00	6.00	0.00



Appendix C.4 Qualitative antimicrobial activity of active actinomycete associated with *Nostoc commune* which cultivated in M52

Code	Aeromonas					Control		Pseudomonas					Control		Vibrio					Control	
	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD
NTRHn01	5.00	5.00	5.00	5.00	0.00	9.33	0.58	6.00	5.00	5.00	5.33	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRHn02	5.00	5.00	5.00	5.00	0.00	9.33	0.58	8.00	8.00	8.00	8.00	0.00	10.33	0.58	5.00	5.00	5.00	5.00	0.00	10.00	0.00
NTRHn06	7.00	7.00	7.00	7.00	0.00	9.33	0.58	6.00	5.00	5.00	5.33	0.58	6.00	0.00	7.00	7.00	8.00	7.33	0.58	6.00	0.00
NTRHn07	18.00	15.00	15.00	16.00	1.73	9.33	0.58	6.00	5.00	5.00	5.33	0.58	6.00	0.00	8.00	8.00	7.00	7.67	0.58	6.00	0.00
NTRHn08	8.00	7.00	8.00	7.67	0.58	5.00	0.00	9.00	8.00	8.00	8.33	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRHn10	5.00	5.00	6.00	5.33	0.58	9.33	0.58	7.00	7.00	5.00	6.33	1.15	10.33	0.58	6.00	6.00	6.00	6.00	0.00	10.00	0.00
NTRHn11	5.00	5.00	5.00	5.00	0.00	9.33	0.58	6.00	6.00	5.00	5.67	0.58	10.33	0.58	5.00	6.00	5.00	5.33	0.58	10.00	0.00
NTRHn12	7.00	8.00	7.00	7.33	0.58	9.33	0.58	6.00	6.00	5.00	5.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRHn16	9.00	9.00	9.00	9.00	0.00	5.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRHn18	5.00	6.00	6.00	5.67	0.58	9.33	0.58	6.00	6.00	6.00	6.00	0.00	10.33	0.58	6.00	6.00	6.00	6.00	0.00	10.00	0.00
NTRH01	19.00	17.00	15.00	17.00	2.00	9.33	0.58	5.00	5.00	5.00	5.00	0.00	6.00	0.00	10.00	9.00	10.00	9.67	0.58	6.00	0.00
NTRH02	9.00	8.00	9.00	8.67	0.58	5.00	0.00	7.00	8.00	8.00	7.67	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRH05	10.00	9.00	9.00	9.33	0.58	9.33	0.58	9.00	7.00	9.00	8.33	1.15	10.33	0.58	6.00	6.00	5.00	5.67	0.58	10.00	0.00
NTRH06	8.00	8.00	8.00	8.00	0.00	9.33	0.58	5.00	5.00	5.00	5.00	0.00	10.33	0.58	5.00	5.00	5.00	5.00	0.00	10.00	0.00
NTRH07	8.00	7.00	7.00	7.33	0.58	9.33	0.58	9.00	8.00	8.00	8.33	0.58	10.33	0.58	8.00	8.00	8.00	8.00	0.00	10.00	0.00
NTRH19	8.00	5.00	7.00	6.67	1.53	9.33	0.58	6.00	5.00	6.00	5.67	0.58	10.33	0.58	5.00	5.00	6.00	5.33	0.58	10.00	0.00
NTMn03	7.00	6.00	7.00	6.67	0.58	9.33	0.58	5.00	5.00	5.00	5.00	0.00	10.33	0.58	7.00	7.00	6.00	6.67	0.58	10.00	0.00
NTM03	12.00	10.00	12.00	11.33	1.15	9.33	0.58	5.00	6.00	5.00	5.33	0.58	6.00	0.00	7.00	7.00	8.00	7.33	0.58	6.00	0.00
NTHn01	5.00	5.00	6.00	5.33	0.58	9.33	0.58	11.00	10.00	9.00	10.00	1.00	10.33	0.58	5.00	5.00	5.00	5.00	0.00	10.00	0.00
NTHn02	8.00	7.00	7.00	7.33	0.58	9.33	0.58	5.00	5.00	6.00	5.33	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTHn03	8.00	8.00	7.00	7.67	0.58	9.33	0.58	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	7.00	6.00	6.67	0.58	6.00	0.00
NTGn01	8.00	7.00	8.00	7.67	0.58	9.33	0.58	9.00	9.00	8.00	8.67	0.58	10.33	0.58	6.00	5.00	5.00	5.33	0.58	10.00	0.00
NTGn05	10.00	9.00	9.00	9.33	0.58	9.33	0.58	6.00	6.00	5.00	5.67	0.58	6.00	0.00	7.00	6.00	6.00	6.33	0.58	6.00	0.00
NTGn08	10.00	9.00	10.00	9.67	0.58	9.33	0.58	6.00	6.00	6.00	6.00	0.00	6.00	0.00	13.00	13.00	10.00	12.00	1.73	6.00	0.00
NTG01	9.00	8.00	9.00	8.67	0.58	9.33	0.58	10.00	9.00	11.00	10.00	1.00	10.33	0.58	5.00	6.00	5.00	5.33	0.58	10.00	0.00
NTG02	10.00	10.00	9.00	9.67	0.58	9.33	0.58	6.00	6.00	6.00	6.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG03	9.00	9.00	8.00	8.67	0.58	9.33	0.58	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	8.00	7.00	7.33	0.58	6.00	0.00
NTG04	21.00	19.00	19.00	19.67	1.15	9.33	0.58	6.00	6.00	6.00	6.00	0.00	6.00	0.00	10.00	9.00	9.00	9.33	0.58	6.00	0.00
NTG05	9.00	9.00	8.00	8.67	0.58	9.33	0.58	5.00	6.00	6.00	5.67	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTG07	8.00	7.00	7.00	7.33	0.58	9.33	0.58	6.00	5.00	5.00	5.33	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG08	8.00	7.00	7.00	7.33	0.58	9.33	0.58	10.00	9.00	9.00	9.33	0.58	10.33	0.58	5.00	5.00	5.00	5.00	0.00	10.00	0.00
NTG09	7.00	7.00	8.00	7.33	0.58	9.33	0.58	5.00	6.00	5.00	5.33	0.58	6.00	0.00	9.00	8.00	8.00	8.33	0.58	6.00	0.00
NTG10	10.00	8.00	8.00	8.67	1.15	9.33	0.58	8.00	8.00	7.00	7.67	0.58	10.33	0.58	6.00	5.00	5.00	5.33	0.58	10.00	0.00
NTG11	8.00	9.00	8.00	8.33	0.58	9.33	0.58	9.00	8.00	8.00	8.33	0.58	10.33	0.58	5.00	5.00	5.00	5.00	0.00	10.00	0.00
NTSn04	10.00	10.00	8.00	9.33	1.15	9.33	0.58	5.00	6.00	5.00	5.33	0.58	6.00	0.00	7.00	7.00	6.00	6.67	0.58	6.00	0.00
NTSn05	11.00	10.00	10.00	10.33	0.58	9.33	0.58	5.00	5.00	5.00	5.00	0.00	6.00	0.00	10.00	9.00	9.00	9.33	0.58	6.00	0.00
NTSn06	13.00	11.00	13.00	12.33	1.15	9.33	0.58	6.00	6.00	6.00	6.00	0.00	6.00	0.00	10.00	7.00	10.00	9.00	1.73	6.00	0.00
NTSn07	7.00	7.00	8.00	7.33	0.58	9.33	0.58	6.00	5.00	5.00	5.33	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTSn08	5.00	5.00	5.00	5.00	0.00	9.33	0.58	7.00	7.00	7.00	7.00	0.00	10.33	0.58	5.00	5.00	5.00	5.00	0.00	10.00	0.00
NTSn09	5.00	5.00	6.00	5.33	0.58	9.33	0.58	5.00	5.00	5.00	5.00	0.00	10.33	0.58	5.00	5.00	5.00	5.00	0.00	10.00	0.00
NTSn10	5.00	5.00	5.00	5.00	0.00	9.33	0.58	7.00	7.00	6.00	6.67	0.58	10.33	0.58	10.00	9.00	9.00	9.33	0.58	10.00	0.00
NTSn11	9.00	8.00	8.00	8.33	0.58	5.00	0.00	5.00	6.00	5.00	5.33	0.58	6.00	0.00	7.00	7.00	9.00	7.67	1.15	6.00	0.00
NTSn12	6.00	6.00	5.00	5.67	0.58	9.33	0.58	5.00	5.00	6.00	5.33	0.58	10.33	0.58	7.00	7.00	8.00	7.33	0.58	10.00	0.00
NTS01	9.00	9.00	9.00	9.00	0.00	7.00	0.00	8.00	9.00	8.00	8.33	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	7.00	0.00
NTS02	9.00	8.00	8.00	8.33	0.58	9.33	0.58	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	6.00	6.00	6.33	0.58	6.00	0.00
NTS03	5.00	5.00	5.00	5.00	0.00	9.33	0.58	6.00	5.00	5.00	5.33	0.58	10.33	0.58	5.00	5.00	5.00	5.00	0.00	10.00	0.00
NTS04	5.00	6.00	5.00	5.33	0.58	9.33	0.58	9.00	7.00	8.00	8.00	1.00	10.33	0.58	6.00	6.00	5.00	5.67	0.58	10.00	0.00
NTS05	5.00	5.00	5.00	5.00	0.00	5.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	8.00	8.00	7.00	7.67	0.58	6.00	0.00
NTS07	5.00	5.00	5.00	5.00	0.00	9.33	0.58	5.00	5.00	6.00	5.33	0.58	10.33	0.58	6.00	6.00	6.00	6.00	0.00	10.00	0.00
NT07	8.00	8.00	8.00	8.00	0.00	9.33	0.58	6.00	6.00	6.00	6.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NT08	7.00	8.00	7.00	7.33	0.58	9.33	0.58	6.00	5.00	5.00	5.33	0.58	6.00	0.00	5.00	6.00	6.00	5.67	0.58	6.00	0.00

Appendix C.4 (continued)

Code	Escherichia coli					Control		Candida albicans					Control		Streptphylococcus aureus					Control	
	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD	1	2	3	Mean	SD	Mean	SD
NTRHn01	5.00	5.00	5.00	5.00	0.00	5.67	0.58	6.00	6.00	5.00	5.67	0.58	7.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRHn02	5.00	5.00	5.00	5.00	0.00	10.33	1.53	10.00	9.00	9.00	9.33	0.58	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTRHn06	12.00	10.00	10.00	10.67	1.15	5.67	0.58	7.00	7.00	8.00	7.33	0.58	7.00	0.00	6.00	5.00	5.00	5.33	0.58	6.00	0.00
NTRHn07	14.00	12.00	11.00	12.33	1.53	5.67	0.58	23.00	19.00	18.00	20.00	2.65	7.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRHn08	6.00	6.00	6.00	6.00	0.00	6.00	0.00	6.00	7.00	7.00	6.67	0.58	6.00	0.00	5.00	5.00	6.00	5.33	0.58	6.00	0.00
NTRHn10	6.00	6.00	5.00	5.67	0.58	10.33	1.53	7.00	7.00	6.00	6.67	0.58	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTRHn11	6.00	6.00	6.00	6.00	0.00	10.33	1.53	6.00	6.00	6.00	6.00	0.00	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTRHn12	6.00	6.00	5.00	5.67	0.58	5.67	0.58	6.00	6.00	6.00	6.00	0.00	7.00	0.00	6.00	5.00	5.00	5.33	0.58	6.00	0.00
NTRHn16	6.00	6.00	6.00	6.00	0.00	6.00	0.00	8.00	8.00	9.00	8.33	0.58	6.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRHn18	11.00	11.00	9.00	10.33	1.15	10.33	1.53	7.00	7.00	7.00	7.00	0.00	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTRH01	13.00	11.00	11.00	11.67	1.15	5.67	0.58	23.00	19.00	19.00	20.33	2.31	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRH02	8.00	8.00	10.00	8.67	1.15	6.00	0.00	7.00	7.00	8.00	7.33	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTRH05	10.00	9.00	10.00	9.67	0.58	10.33	1.53	10.00	9.00	9.00	9.33	0.58	11.67	0.58	8.00	8.00	7.00	7.67	0.58	14.33	0.58
NTRH06	6.00	6.00	6.00	6.00	0.00	10.33	1.53	12.00	10.00	10.00	10.67	1.15	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTRH07	12.00	11.00	12.00	11.67	0.58	10.33	1.53	11.00	11.00	10.00	10.67	0.58	11.67	0.58	12.00	10.00	12.00	11.33	1.15	14.33	0.58
NTRH19	13.00	10.00	10.00	11.00	1.73	10.33	1.53	11.00	9.00	10.00	10.00	1.00	11.67	0.58	10.00	9.00	9.00	9.33	0.58	14.33	0.58
NTMn03	11.00	9.00	10.00	10.00	1.00	10.33	1.53	12.00	12.00	11.00	11.67	0.58	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTM03	6.00	6.00	6.00	6.00	0.00	5.67	0.58	8.00	7.00	7.00	7.33	0.58	7.00	0.00	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTHn01	5.00	5.00	5.00	5.00	0.00	10.33	1.53	13.00	12.00	13.00	12.67	0.58	11.67	0.58	5.00	6.00	5.00	5.33	0.58	14.33	0.58
NTHn02	5.00	5.00	5.00	5.00	0.00	5.67	0.58	6.00	6.00	5.00	5.67	0.58	7.00	0.00	6.00	5.00	6.00	5.67	0.58	6.00	0.00
NTHn03	5.00	5.00	5.00	5.00	0.00	5.67	0.58	8.00	6.00	8.00	7.33	1.15	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTGn01	6.00	6.00	6.00	6.00	0.00	10.33	1.53	6.00	6.00	6.00	6.00	0.00	11.67	0.58	5.00	5.00	6.00	5.33	0.58	14.33	0.58
NTGn05	5.00	5.00	5.00	5.00	0.00	5.67	0.58	6.00	6.00	6.00	6.00	0.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTGn08	11.00	10.00	10.00	10.33	0.58	5.67	0.58	13.00	12.00	10.00	11.67	1.53	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG01	11.00	10.00	11.00	10.67	0.58	10.33	1.53	10.00	10.00	9.00	9.67	0.58	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTG02	5.00	5.00	5.00	5.00	0.00	5.67	0.58	6.00	6.00	6.00	6.00	0.00	7.00	0.00	5.00	6.00	5.00	5.33	0.58	6.00	0.00
NTG03	5.00	5.00	5.00	5.00	0.00	5.67	0.58	7.00	7.00	8.00	7.33	0.58	7.00	0.00	6.00	5.00	6.00	5.67	0.58	6.00	0.00
NTG04	12.00	10.00	10.00	10.67	1.15	5.67	0.58	22.00	20.00	18.00	20.00	2.00	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG05	7.00	7.00	7.00	7.00	0.00	5.67	0.58	7.00	6.00	6.00	6.33	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG07	8.00	5.00	5.00	6.00	1.73	5.67	0.58	7.00	6.00	6.00	6.33	0.58	7.00	0.00	5.00	6.00	6.00	5.67	0.58	6.00	0.00
NTG08	7.00	7.00	7.00	7.00	0.00	10.33	1.53	5.00	5.00	5.00	5.00	0.00	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTG09	5.00	5.00	5.00	5.00	0.00	3.33	2.89	11.00	9.00	9.00	9.67	1.15	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG10	5.00	5.00	5.00	5.00	0.00	10.33	1.53	11.00	10.00	11.00	10.67	0.58	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTG11	7.00	6.00	7.00	6.67	0.58	10.33	1.53	5.00	5.00	5.00	5.00	0.00	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTSn04	6.00	6.00	6.00	6.00	0.00	5.67	0.58	7.00	7.00	8.00	7.33	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTSn05	6.00	6.00	6.00	6.00	0.00	5.67	0.58	6.00	7.00	6.00	6.33	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTSn06	6.00	6.00	6.00	6.00	0.00	5.67	0.58	7.00	7.00	6.00	6.67	0.58	7.00	0.00	6.00	5.00	6.00	5.67	0.58	6.00	0.00
NTSn07	5.00	5.00	5.00	5.00	0.00	5.67	0.58	6.00	6.00	6.00	6.00	0.00	7.00	0.00	5.00	6.00	5.00	5.33	0.58	6.00	0.00
NTSn08	11.00	14.00	8.00	11.00	3.00	10.33	1.53	7.00	7.00	6.00	6.67	0.58	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTSn09	9.00	9.00	8.00	8.67	0.58	10.33	1.53	5.00	5.00	5.00	5.00	0.00	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTSn10	14.00	9.00	9.00	10.67	2.89	10.33	1.53	7.00	7.00	7.00	7.00	0.00	11.67	0.58	6.00	5.00	5.00	5.33	0.58	14.33	0.58
NTSn11	8.00	8.00	7.00	7.67	0.58	6.00	0.00	7.00	8.00	8.00	7.67	0.58	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTSn12	16.00	10.00	8.00	11.33	4.16	10.33	1.53	10.00	9.00	9.00	9.33	0.58	11.67	0.58	5.00	5.00	6.00	5.33	0.58	14.33	0.58
NTS01	5.00	5.00	5.00	5.00	0.00	6.00	0.00	7.00	7.00	8.00	7.33	0.58	6.00	0.00	7.00	7.00	7.00	7.00	0.00	7.00	0.00
NTS02	6.00	6.00	6.00	6.00	0.00	5.67	0.58	7.00	7.00	8.00	7.33	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTS03	9.00	9.00	8.00	8.67	0.58	10.33	1.53	6.00	6.00	5.00	5.67	0.58	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NTS04	10.00	10.00	11.00	10.33	0.58	10.33	1.53	5.00	5.00	5.00	5.00	0.00	11.67	0.58	5.00	6.00	5.00	5.33	0.58	14.33	0.58
NTS05	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTS07	7.00	7.00	7.00	7.00	0.00	10.33	1.53	5.00	6.00	5.00	5.33	0.58	11.67	0.58	5.00	5.00	5.00	5.00	0.00	14.33	0.58
NT07	5.00	5.00	5.00	5.00	0.00	5.67	0.58	6.00	6.00	5.00	5.67	0.58	7.00	0.00	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NT08	5.00	5.00	5.00	5.00	0.00	5.67	0.58	7.00	6.00	6.00	6.33	0.58	7.00	0.00	6.00	5.00	5.00	5.33	0.58	6.00	0.00

Appendix C.4 (continued)

Code	Streptphylococcus aureus MRS					Control	
	1	2	3	Mean	SD	Mean	SD
NTRHn01	6.00	5.00	6.00	5.67	0.58	6.00	0.00
NTRHn02	5.00	5.00	5.00	5.00	0.00	12.00	1.00
NTRHn06	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTRHn07	30.00	18.00	15.00	21.00	7.94	6.00	0.00
NTRHn08	6.00	6.00	6.00	6.00	0.00	5.00	0.00
NTRHn10	5.00	5.00	5.00	5.00	0.00	12.00	1.00
NTRHn11	5.00	5.00	5.00	5.00	0.00	12.00	1.00
NTRHn12	11.00	10.00	9.00	10.00	1.00	6.00	0.00
NTRHn16	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NTRHn18	6.00	6.00	5.00	5.67	0.58	12.00	1.00
NTRH01	17.00	15.00	16.00	16.00	1.00	6.00	0.00
NTRH02	6.00	6.00	6.00	6.00	0.00	5.00	0.00
NTRH05	11.00	11.00	9.00	10.33	1.15	12.00	1.00
NTRH06	5.00	5.00	5.00	5.00	0.00	12.00	1.00
NTRH07	11.00	11.00	11.00	11.00	0.00	12.00	1.00
NTRH19	9.00	10.00	10.00	9.67	0.58	12.00	1.00
NTMn03	13.00	10.00	11.00	11.33	1.53	12.00	1.00
NTM03	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTHn01	6.00	6.00	6.00	6.00	0.00	12.00	1.00
NTHn02	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTHn03	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTGn01	10.00	10.00	9.00	9.67	0.58	12.00	1.00
NTGn05	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTGn08	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTG01	11.00	10.00	10.00	10.33	0.58	12.00	1.00
NTG02	5.00	5.00	6.00	5.33	0.58	6.00	0.00
NTG03	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTG04	18.00	15.00	16.00	16.33	1.53	6.00	0.00
NTG05	8.00	8.00	7.00	7.67	0.58	6.00	0.00
NTG07	13.00	11.00	11.00	11.67	1.15	6.00	0.00
NTG08	12.00	10.00	11.00	11.00	1.00	12.00	1.00
NTG09	5.00	6.00	5.00	5.33	0.58	6.00	0.00
NTG10	6.00	6.00	5.00	5.67	0.58	12.00	1.00
NTG11	12.00	10.00	10.00	10.67	1.15	12.00	1.00
NTSn04	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTSn05	7.00	7.00	6.00	6.67	0.58	6.00	0.00
NTSn06	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NTSn07	5.00	5.00	5.00	5.00	0.00	6.00	0.00
NTSn08	5.00	5.00	5.00	5.00	0.00	12.00	1.00
NTSn09	5.00	5.00	5.00	5.00	0.00	12.00	1.00
NTSn10	5.00	5.00	5.00	5.00	0.00	12.00	1.00
NTSn11	6.00	6.00	6.00	6.00	0.00	5.00	0.00
NTSn12	8.00	6.00	8.00	7.33	1.15	12.00	1.00
NTS01	6.00	6.00	6.00	6.00	0.00	7.00	0.00
NTS02	7.00	7.00	6.00	6.67	0.58	6.00	0.00
NTS03	6.00	5.00	5.00	5.33	0.58	12.00	1.00
NTS04	5.00	5.00	5.00	5.00	0.00	12.00	1.00
NTS05	5.00	5.00	5.00	5.00	0.00	5.00	0.00
NTS07	6.00	6.00	5.00	5.67	0.58	12.00	1.00
NT07	6.00	6.00	6.00	6.00	0.00	6.00	0.00
NT08	6.00	5.00	6.00	5.67	0.58	6.00	0.00



16S rRNA gene sequence of NCMn07 isolated from *Nostochopsis* spp.

3'-TTTATAAATCCTAGTCAGTCGAACGATGAACCACTTCGGTGGGGATTAGT
GGCGAACGGGTGAGTAACACGTGGGCAATCTGCCCTGCACTCTGGGACAAG
CCCTGGAAACGGGGTCTAATACCGGATACTGATCCGCCTGGCCTTCCTGGCG
GTTCAAACCTCCGGCGGTGCAGGATAACCCCCGCCCTATCACCTTGTTGG
TGAGGTAACGGCTCACCAAGGCAACAACGGGTACCCGGCCTGAAAGGGCA
ACCGGCCACCCTGGAAGTGAACACGGCCCAAACCTCCTACGGAAGGCACCA
TTGGGAAATATTGCACAAGGGGCAAACCCCTGATGCACCAACCCCCCGTGA
GGAATGACGGCCTTCGGTTTGTAACCTCTTTCACCAGGAAAAAACGAAA
TTGACGGTACCTGCAAAAAAACCGCCGGCTAACTACTTGCCACCACCCGCG
GTAATACTTAGGGCGCGAGCGTTGTCCGGAATTATTGGGCGTAAAAAGTTC
GTAGGCGGCTGTCCCGTCGGTTGTGAAAGCCCGGGGCTTAACCCCGGGTCT
GCATTCAATACGGGCAGGCTAAATTCGGTAGGGGAAATCGGAATTCCTGG
TTTTACCGTTAAATTGCCCAAATTCAGGAGAACCCCGTGTGCCAAAGGCGA
ATCTCTGGCCAATACTGACCCTAAGAACCAAACCTTGGGAACCAACAGGA
TTAATACCCTGGTATTCCCGCCTTAAACGGTGGAAGTGGTGTGGGCAAATT
CCACGTCTTCGGTGCCGCAGCTACCGCATTAAATCCCGCCTGGGGAAATACG
CCCGCAGGCTAAACTCAAGGAATTGACGGGGCCCGCACAGCGGCGAACATG
TGGCTTATTCGACGCACGCGAAGATCTTACCAGGCTTGACTACACGGAAAC
TCTGAAACAGCCCCCTTGTGTCGGTTCAGGTGGTCATGCTGCCTCACTCTG
TCGTAAATTTTGGTTATTCCCCACGACGCACCTTTTCCTTTTGCACAGGCTTT
TTGTTCTGGGAATCCGGAAACCCCGGGTCATTCGAAAAAGTGGGACAAATC
AATCTCATCCCCTATTCTTGGTTGAAAGGGTCAATGCCGTTAATAGGTGCTA
CCCCCGTGGAGGAATCCAAACCGTCCATTTGATTTGTTCAAATAGCCCGGAG
TCGATCCAATCCAATCCATTTCCGGGAAGTTCGGGCTTAACCACTTCTTCC
ACTTGAACAAACAGGCACCTTCCGATTCATGCCTTGATTGTCGGTAGTTAAT
AAATTTAATAATTATTAATAAAAAAATTAACAACC-5'

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Poster presentation	Inthasotti, T. and Pathom-aree, W., “Diversity of actinomycetes associated with freshwater macroalgae: <i>Nostoc commune</i> Voucher ex Bornet&Flahault,” Commission on Higher Education Congress III University Staff Development Consortium, 9-11 October 2010, 373.

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