

Supplementary Material

Algae 2019, 34(4): 253-266

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Supplementary Table S1. Analyzed specimens of *Ulva* species causing blooms around Jeju Island in this study

Species (voucher No.)	Site	Date	Habit type	GenBank accession No.	
				<i>tufA</i>	<i>rbcL</i>
<i>Ulva australis</i> Areschoug					
MSK-U3-JC-SM-L-3	Jocheon harbor, Jeju	Aug 8, 2017	Attached	-	○
MSK-U4-JC-SM-L-4	Jocheon harbor, Jeju	Aug 8, 2017	Attached	○	○
MSK-U5-JC-SM-L-5	Jocheon harbor, Jeju	Aug 8, 2017	Attached	○	○
MSK-U21-SY-SM-L-12	Shinyang, Seogwipo	Aug 16, 2017	Attached	○	○
MSK-U47-JD-SM-L-9	Jongdal harbor, Jeju	Aug 21, 2017	Attached	○	○
MSK-U49-JD-SM-D-11	Jongdal harbor, Jeju	Aug 21, 2017	Floating	○	○
MSK-U62-GD-SM-L-12	Geumdeung, Jeju	Aug 20, 2017	Attached	-	○
MSK-U66-GD-SM-L-16	Geumdeung, Jeju	Aug 20, 2017	Attached	○	○
MSK-1-JC-WT-L-1	Jocheon harbor, Jeju	Jan 16, 2018	Attached	○	○
MSK-2-JC-WT-L-2	Jocheon harbor, Jeju	Jan 16, 2018	Attached	○	○
MSK-3-JC-WT-L-3	Jocheon harbor, Jeju	Jan 16, 2018	Attached	○	○
MSK-5-JC-WT-L-5	Jocheon harbor, Jeju	Jan 16, 2018	Attached	○	○
MSK-58-PS-WT-L-1	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-59-PS-WT-L-2	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-60-PS-WT-L-3	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-61-PS-WT-L-4	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-62-PS-WT-L-5	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-70-PS-WT-L-13	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-72-PS-WT-L-15	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-73-PS-WT-L-16	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-78-PS-WT-L-21	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-85-PS-WT-L-27	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-85-PS-WT-L-27-2	Pyoseon, Seogwipo	Jan 7, 2018	Attached	-	○
MSK-86-PS-WT-L-28	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	-
MSK-87-PS-WT-L-29	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-92-PS-WT-D-34	Pyoseon, Seogwipo	Jan 7, 2018	Floating	-	○
MSK-93-PS-WT-D-35	Pyoseon, Seogwipo	Jan 7, 2018	Floating	○	○
MSK-118-SD-WT-L-6	Shindo, Seogwipo	Jan 6, 2018	Attached	○	○
MSK-119-SD-WT-D-7	Shindo, Seogwipo	Jan 6, 2018	Floating	○	○
MSK-123-PD-WT-L-1	Pyeongdae, Jeju	Jan 5, 2018	Attached	○	○
MSK-124-PD-WT-L-2	Pyeongdae, Jeju	Jan 5, 2018	Attached	-	○
MSK-125-PD-WT-L-3	Pyeongdae, Jeju	Jan 5, 2018	Attached	○	○
MSK-126-PD-WT-L-4	Pyeongdae, Jeju	Jan 5, 2018	Attached	○	○
MSK-130-SY-SP-L-2	Shinyang, Seogwipo	Mar 2, 2018	Attached	○	○
MSK-131-SY-SP-L-3	Shinyang, Seogwipo	Mar 2, 2018	Attached	○	○
MSK-132-SY-SP-L-4	Shinyang, Seogwipo	Mar 2, 2018	Attached	○	○
MSK-133-SY-SP-L-5	Shinyang, Seogwipo	Mar 2, 2018	Attached	-	○
MSK-145-SY-WT-D-40	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-148-SY-WT-L-3	Shinyang, Seogwipo	Jan 2, 2018	Attached	○	○
MSK-149-SY-WT-L-4	Shinyang, Seogwipo	Jan 2, 2018	Attached	○	○

Supplementary Table S1. Continued

Species (voucher No.)	Site	Date	Habit type	GenBank accession No.	
				<i>tufA</i>	<i>rbcl</i>
<i>Ulva lactuca</i> Linnaeus					
MSK-U53-GD-SM-L-8	Geumdeung, Jeju	Aug 20, 2017	Attached	-	○
MSK-U61-GD-SM-L-11	Geumdeung, Jeju	Aug 20, 2017	Attached	○	○
MSK-U65-GD-SM-L-15	Geumdeung, Jeju	Aug 20, 2017	Attached	○	○
MSK-U29-PS-SM-L-8	Pyoseon, Seogwipo	Aug 21, 2017	Attached	○	○
MSK-U30-PS-SM-L-9	Pyoseon, Seogwipo	Aug 21, 2017	Attached	○	○
MSK-U31-PS-SM-L-10	Pyoseon, Seogwipo	Aug 21, 2017	Attached	○	○
MSK-U32-PS-SM-L-11	Pyoseon, Seogwipo	Aug 21, 2017	Attached	○	○
MSK-U33-PS-SM-L-12	Pyoseon, Seogwipo	Aug 21, 2017	Attached	○	○
MSK-U34-PS-SM-L-13	Pyoseon, Seogwipo	Aug 21, 2017	Attached	○	○
MSK-33-GD-WT-L-1	Geumdeung, Jeju	Dec 22, 2017	Attached	○	○
MSK-34-GD-WT-L-2	Geumdeung, Jeju	Dec 22, 2017	Attached	○	○
MSK-35-GD-WT-L-3	Geumdeung, Jeju	Dec 22, 2017	Attached	○	○
MSK-38-GD-WT-L-6	Geumdeung, Jeju	Dec 22, 2017	Attached	○	○
MSK-39-GD-WT-L-7	Geumdeung, Jeju	Dec 22, 2017	Attached	○	○
MSK-40-GD-WT-L-8	Geumdeung, Jeju	Dec 22, 2017	Attached	○	○
MSK-53-GD-WT-D-21	Geumdeung, Jeju	Dec 22, 2017	Floating	○	○
MSK-79-PS-WT-L-22	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-80-PS-WT-L-23	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-81-PS-WT-L-24	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-82-PS-WT-L-24-1	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-83-PS-WT-L-25	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-84-PS-WT-L-26	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-97-PS-WT-D-39	Pyoseon, Seogwipo	Jan 7, 2018	Floating	○	○
MSK-127-PS-WT-L-1	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-128-PS-WT-L-2	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-146-SY-WT-L-1	Shinyang, Seogwipo	Jan 2, 2018	Attached	○	○
MSK-147-SY-WT-L-2	Shinyang, Seogwipo	Jan 2, 2018	Attached	○	○
MSK-150-SY-WT-L-5	Shinyang, Seogwipo	Jan 2, 2018	Attached	○	○
<i>Ulva laetevirens</i> Areschoug					
MSK-U1-JC-SM-L-1	Jocheon harbor, Jeju	Aug 8, 2017	Attached	○	○
MSK-U2-JC-SM-L-2	Jocheon harbor, Jeju	Aug 8, 2017	Attached	○	○
MSK-U3-JC-SM-L-3	Jocheon harbor, Jeju	Aug 8, 2017	Attached	○	-
MSK-U39-JD-SM-D-1	Jongdal harbor, Jeju	Aug 21, 2017	Floating	○	○
MSK-U46-JD-SM-L-8	Jongdal harbor, Jeju	Aug 21, 2017	Attached	○	○
MSK-U48-JD-SM-L-10	Jongdal harbor, Jeju	Aug 21, 2017	Attached	○	○
MSK-U18-SY-SM-L-9	Shinyang, Seogwipo	Aug 6, 2017	Attached	○	○
MSK-U19-SY-SM-L-10	Shinyang, Seogwipo	Aug 6, 2017	Attached	○	○
MSK-U20-SY-SM-L-11	Shinyang, Seogwipo	Aug 6, 2017	Attached	○	○
MSK-14-JC-WT-D-14	Jocheon harbor, Jeju	Jan 16, 2018	Floating	○	○
MSK-15-JD-WT-L-1	Jongdal harbor, Jeju	Dec 27, 2017	Attached	○	○
MSK-16-JD-WT-L-2	Jongdal harbor, Jeju	Dec 27, 2017	Attached	○	○
MSK-17-JD-WT-L-3	Jongdal harbor, Jeju	Dec 27, 2017	Attached	○	○
MSK-18-JD-WT-L-4	Jongdal harbor, Jeju	Dec 27, 2017	Attached	○	○
MSK-19-JD-WT-L-5	Jongdal harbor, Jeju	Dec 27, 2017	Attached	○	○
MSK-20-JD-WT-L-6	Jongdal harbor, Jeju	Dec 27, 2017	Attached	○	○
MSK-21-JD-WT-L-7	Jongdal harbor, Jeju	Dec 27, 2017	Attached	○	○
MSK-22-JD-WT-L-8	Jongdal harbor, Jeju	Dec 27, 2017	Attached	○	○
MSK-23-JD-WT-L-9	Jongdal harbor, Jeju	Dec 27, 2017	Attached	○	○
MSK-27-JD-WT-D-13	Jongdal harbor, Jeju	Dec 27, 2017	Floating	○	○
MSK-31-JD-WT-D-17	Jongdal harbor, Jeju	Dec 27, 2017	Floating	○	○
MSK-32-JD-WT-D-18	Jongdal harbor, Jeju	Dec 27, 2017	Floating	○	○
MSK-41-GD-WT-L-9	Geumdeung, Jeju	Dec 22, 2017	Attached	○	○
MSK-50-GD-WT-D-18	Geumdeung, Jeju	Dec 22, 2017	Floating	○	○
MSK-54-GD-WT-D-22	Geumdeung, Jeju	Dec 22, 2017	Floating	○	○
MSK-55-GD-WT-D-23	Geumdeung, Jeju	Dec 22, 2017	Floating	○	○
MSK-68-PS-WT-L-11	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-69-PS-WT-L-12	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-71-PS-WT-L-14	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-151-SY-WT-L-6	Shinyang, Seogwipo	Jan 2, 2018	Attached	○	-

Supplementary Table S1. Continued

Species (voucher No.)	Site	Date	Habit type	GenBank accession No.	
				<i>tufA</i>	<i>rbcl</i>
<i>Ulva ohnoi</i> M. Hiraoka & S. Shimada					
MSK-U10-SY-SM-D-1	Shinyang, Seogwipo	Aug 16, 2017	Floating	○	○
MSK-U11-SY-SM-D-2	Shinyang, Seogwipo	Aug 16, 2017	Floating	○	○
MSK-U12-SY-SM-D-3	Shinyang, Seogwipo	Aug 16, 2017	Floating	○	○
MSK-U13-SY-SM-D-4	Shinyang, Seogwipo	Aug 16, 2017	Floating	○	○
MSK-U14-SY-SM-D-5	Shinyang, Seogwipo	Aug 16, 2017	Floating	○	○
MSK-U15-SY-SM-D-6	Shinyang, Seogwipo	Aug 16, 2017	Floating	○	○
MSK-U16-SY-SM-D-7	Shinyang, Seogwipo	Aug 16, 2017	Floating	○	○
MSK-U17-SY-SM-D-8	Shinyang, Seogwipo	Aug 16, 2017	Floating	○	○
MSK-U22-PS-SM-D-1	Pyoseon, Seogwipo	Aug 21, 2017	Floating	○	○
MSK-U23-PS-SM-D-2	Pyoseon, Seogwipo	Aug 21, 2017	Floating	○	○
MSK-U25-PS-SM-L-4	Pyoseon, Seogwipo	Aug 21, 2017	Attached	○	○
MSK-U26-PS-SM-L-5	Pyoseon, Seogwipo	Aug 21, 2017	Attached	○	○
MSK-U27-PS-SM-L-6	Pyoseon, Seogwipo	Aug 21, 2017	Attached	○	○
MSK-U28-PS-SM-L-7	Pyoseon, Seogwipo	Aug 21, 2017	Attached	○	○
MSK-66-PS-WT-L-9	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-67-PS-WT-L-10	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-91-PS-WT-L-33	Pyoseon, Seogwipo	Jan 7, 2018	Attached	○	○
MSK-94-PS-WT-D-36	Pyoseon, Seogwipo	Jan 7, 2018	Floating	○	○
MSK-95-PS-WT-D-37	Pyoseon, Seogwipo	Jan 7, 2018	Floating	○	○
MSK-96-PS-WT-D-38	Pyoseon, Seogwipo	Jan 7, 2018	Floating	○	○
MSK-100-SY-WT-D-9	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-101-SY-WT-D-10	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-102-SY-WT-D-11	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-103-SY-WT-D-12	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-104-SY-WT-D-13	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	-
MSK-105-SY-WT-D-14	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-106-SY-WT-D-16	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-107-SY-WT-D-17	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-108-SY-WT-D-18	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-109-SY-WT-D-19	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-110-SY-WT-D-20	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-111-SY-WT-D-21	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-112-SY-WT-D-22	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
MSK-134-SY-SP-D-6	Shinyang, Seogwipo	Mar 2, 2018	Floating	○	○
MSK-135-SY-SP-D-7	Shinyang, Seogwipo	Mar 2, 2018	Floating	○	○
MSK-136-SY-SP-D-8	Shinyang, Seogwipo	Mar 2, 2018	Floating	○	○
MSK-137-SY-SP-D-9	Shinyang, Seogwipo	Mar 2, 2018	Floating	○	○
MSK-138-SY-SP-D-10	Shinyang, Seogwipo	Mar 2, 2018	Floating	○	○
MSK-139-SY-SP-D-11	Shinyang, Seogwipo	Mar 2, 2018	Floating	○	○
MSK-140-SY-SP-D-12	Shinyang, Seogwipo	Mar 2, 2018	Floating	○	○
MSK-141-SY-SP-D-13	Shinyang, Seogwipo	Mar 2, 2018	Floating	○	○
MSK-142-SY-SP-D-14	Shinyang, Seogwipo	Mar 2, 2018	Floating	○	○
MSK-143-SY-SP-D-15	Shinyang, Seogwipo	Mar 2, 2018	Floating	○	○
MSK-144-SY-SP-D-16	Shinyang, Seogwipo	Mar 2, 2018	Floating	○	○
MSK-152-SY-WT-D-15	Shinyang, Seogwipo	Jan 2, 2018	Floating	○	○
<i>Ulva pseudo-ohnoi</i> H. W. Lee, J. C. Kang & M. S. Kim					
MSK-U6-JC-SM-D-6	Jocheon harbor, Jeju	Aug 8, 2017	Floating	○	○
MSK-U7-JC-SM-D-7	Jocheon harbor, Jeju	Aug 8, 2017	Floating	-	○
MSK-U8-JC-SM-D-8	Jocheon harbor, Jeju	Aug 8, 2017	Floating	-	○
MSK-U9-JC-SM-D-9	Jocheon harbor, Jeju	Aug 8, 2017	Floating	-	○
MSK-U40-JD-SM-D-2	Jongdal harbor, Jeju	Aug 21, 2017	Floating	○	○
MSK-U41-JD-SM-D-3	Jongdal harbor, Jeju	Aug 21, 2017	Floating	○	○
MSK-U42-JD-SM-D-4	Jongdal harbor, Jeju	Aug 21, 2017	Floating	○	○
MSK-U43-JD-SM-D-5	Jongdal harbor, Jeju	Aug 21, 2017	Floating	○	○
MSK-U44-JD-SM-D-6	Jongdal harbor, Jeju	Aug 21, 2017	Floating	○	○
MSK-U45-JD-SM-D-7	Jongdal harbor, Jeju	Aug 21, 2017	Floating	○	○
MSK-U50-JD-SM-L-12	Jongdal harbor, Jeju	Aug 21, 2017	Attached	○	-
MSK-U51-JD-SM-L-13	Jongdal harbor, Jeju	Aug 21, 2017	Attached	○	○
MSK-U54-GD-SM-L-3	Geumdeung, Jeju	Aug 20, 2017	Attached	○	○

Supplementary Table S1. Continued

Species (voucher No.)	Site	Date	Habit type	GenBank accession No.	
				<i>tufA</i>	<i>rbcL</i>
<i>Ulva pseudo-ohnoi</i> H. W. Lee, J. C. Kang & M. S. Kim					
MSK-U55-GD-SM-D-4	Geumdeung, Jeju	Aug 20, 2017	Floating	○	○
MSK-U56-GD-SM-D-5	Geumdeung, Jeju	Aug 20, 2017	Floating	○	○
MSK-U57-GD-SM-D-6	Geumdeung, Jeju	Aug 20, 2017	Floating	○	○
MSK-U58-GD-SM-D-7	Geumdeung, Jeju	Aug 20, 2017	Floating	○	○
MSK-U59-GD-SM-D-8	Geumdeung, Jeju	Aug 20, 2017	Floating	○	○
MSK-U60-GD-SM-D-10	Geumdeung, Jeju	Aug 20, 2017	Floating	○	○
MSK-U63-GD-SM-D-13	Geumdeung, Jeju	Aug 20, 2017	Floating	○	-
MSK-U64-GD-SM-D-14	Geumdeung, Jeju	Aug 20, 2017	Floating	○	○
MSK-4-JC-WT-L-4	Jocheon harbor, Jeju	Jan 16, 2018	Attached	○	○
MSK-6-JC-WT-D-6	Jocheon harbor, Jeju	Jan 16, 2018	Floating	○	○
MSK-7-JC-WT-D-7	Jocheon harbor, Jeju	Jan 16, 2018	Floating	○	○
MSK-8-JC-WT-D-8	Jocheon harbor, Jeju	Jan 16, 2018	Floating	○	○
MSK-9-JC-WT-D-9	Jocheon harbor, Jeju	Jan 16, 2018	Floating	○	○
MSK-10-JC-WT-D-10	Jocheon harbor, Jeju	Jan 16, 2018	Floating	○	○
MSK-11-JC-WT-D-11	Jocheon harbor, Jeju	Jan 16, 2018	Floating	○	○
MSK-12-JC-WT-D-12	Jocheon harbor, Jeju	Jan 16, 2018	Floating	○	○
MSK-13-JC-WT-D-13	Jocheon harbor, Jeju	Jan 16, 2018	Floating	○	○
MSK-26-JD-WT-D-12	Jongdal harbor, Jeju	Dec 27, 2017	Floating	○	○
MSK-28-JD-WT-D-14	Jongdal harbor, Jeju	Dec 27, 2017	Floating	○	○
MSK-29-JD-WT-D-15	Jongdal harbor, Jeju	Dec 27, 2017	Floating	○	○
MSK-30-JD-WT-D-16	Jongdal harbor, Jeju	Dec 27, 2017	Floating	○	○
MSK-113-SD-WT-L-1	Shindo, Seogwipo	Jan 6, 2018	Attached	○	○
MSK-114-SD-WT-L-2	Shindo, Seogwipo	Jan 6, 2018	Attached	○	-
MSK-115-SD-WT-L-3	Shindo, Seogwipo	Jan 6, 2018	Attached	○	-
MSK-117-SD-WT-L-5	Shindo, Seogwipo	Jan 6, 2018	Attached	○	-
MSK-120-SD-WT-D-8	Shindo, Seogwipo	Jan 6, 2018	Floating	○	-
MSK-122-SD-WT-D-10	Shindo, Seogwipo	Jan 6, 2018	Floating	○	○