

Supplementary Materials

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Supplementary Table S1. Specimen information and GenBank accession numbers for all *Kappaphycus* species used in this study

Specimen	Collection site	Collection date	Haplotype			Accession No.		Reference
			COI-5P	cox2-3	COI-5P-cox2-3	COI-5P	cox2-3	
<i>Kappaphycus striatus</i>								
1 MAL1 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691917	MT946611	This study
2 MAL2 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691918	MT946612	This study
3 MAL3 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691919	MT946613	This study
4 MAL4 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691920	MT946614	This study
5 MAL5 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-K	KSTR-1	KSTR-K2	MW691921	MT946615	This study
6 MAL6 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691922	MT946616	This study
7 MAL7 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-H	89	KSTR-H1	MW691923	MT946617	This study
8 MAL8 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691924	MT946618	This study
9 MAL9 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691925	MT946619	This study
10 MAL10 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691926	MT946620	This study
11 MAL11 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691927	MT946621	This study
12 MAL12 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691928	MT946622	This study
13 MAL13 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-H	89	KSTR-H1	MW691929	MT946623	This study
14 MAL14 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691930	MT946624	This study
15 MAL15 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691931	MT946625	This study
16 MAL16 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691932	MT946626	This study
17 SIL17 (W)	Silaki, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-H	89	KSTR-H1	MW691933	MT946627	This study
18 SIL18 (W)	Silaki, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-H	89	KSTR-H1	MW691934	MT946628	This study
19 MAL19 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691935	MT946629	This study
20 MAL20 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691936	MT946630	This study
21 MAL21 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691937	MT946631	This study
22 MAL22 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691938	MT946632	This study
23 MAL23 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691939	MT946633	This study
24 MAL24 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691940	MT946634	This study
25 MAL25 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691941	MT946635	This study
26 MAL26 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691942	MT946636	This study
27 MAL27 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691943	MT946637	This study
28 MAL28 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691944	MT946638	This study
29 MAL29 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691945	MT946639	This study
30 MAL30 (W)	Malilnep, Bolinao, Pangasinan, PH	Sep 20, 2019	KSTR-J	KSTR-1	KSTR-J2	MW691946	MT946640	This study
<i>Kappaphycus alvarezii</i>								
31 SamW-001 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691879	MT946570	This study
32 SamW-002 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691880	MT946571	This study
33 SamW-003 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	-	KALV-3	-	-	MT946572	This study
34 SamW-004 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691881	MT946573	This study
35 SamW-005 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-E	KALV-3	KALV-E3	MW691882	MT946574	This study
36 SamW-006 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-F	KALV-3	KALV-F3	MW691883	MT946575	This study
37 SamW-007 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691884	MT946576	This study
38 SamW-008 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691885	MT946577	This study
39 SamW-009 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-C	KALV-3	KALV-C3	MW691886	MT946578	This study
40 SamW-010 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691887	MT946579	This study
41 SamW-011 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691888	MT946580	This study
42 SamW-012 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691889	MT946581	This study
43 SamW-013 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-6	KALV-D7	MW691890	MT946582	This study
44 SamW-014 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691891	MT946583	This study
45 SamW-015 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-6	KALV-D7	MW691892	MT946584	This study
46 SamW-016 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691893	MT946585	This study
47 SamW-017 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691894	MT946586	This study
48 SamW-018 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-6	KALV-D7	MW691895	MT946587	This study
49 SamW-019 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691896	MT946588	This study
50 SamW-020 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	-	KALV-3	-	-	MT946589	This study
51 SamW-021 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691897	MT946590	This study
52 SamW-022 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691898	MT946591	This study
53 SamW-023 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691899	MT946592	This study
54 SamW-024 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691900	MT946593	This study
55 SamW-025 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691901	MT946594	This study
56 SamW-026 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691902	MT946595	This study
57 SamW-027 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691903	MT946596	This study
58 SamW-028 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691904	MT946597	This study
59 SamW-029 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-C	KALV-3	KALV-C3	MW691905	MT946598	This study
60 SamW-030 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691906	MT946599	This study
61 SamW-031 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-C	KALV-3	KALV-C3	MW691907	MT946600	This study
62 SamW-032 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691908	MT946601	This study
63 SamW-033 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691909	MT946602	This study
64 SamW-034 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691910	MT946603	This study
65 SamW-035 (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Oct 24, 2019	KALV-D	KALV-3	KALV-D3	MW691911	MT946604	This study
66 KaCR-C (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Feb 25, 2019	KALV-D	KALV-4	KALV-D4	MW691912	MT946605	This study
67 KaCR-R (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Feb 25, 2019	KALV-D	KALV-3	KALV-D3	MW691913	MT946606	This study
68 KaCR-S (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Feb 25, 2019	KALV-D	KALV-5	KALV-D6	MW691914	MT946607	This study
69 KaTR-N (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Feb 25, 2019	-	KALV-3	-	-	MT946608	This study
70 KaTR-O (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Feb 25, 2019	KALV-D	KALV-3	KALV-D3	MW691915	MT946609	This study
71 KaTR-Q (W)	Nabalikad Reef, Guiuan, Eastern Samar, PH	Feb 25, 2019	KALV-G	KALV-3	KALV-G3	MW691916	MT946610	This study

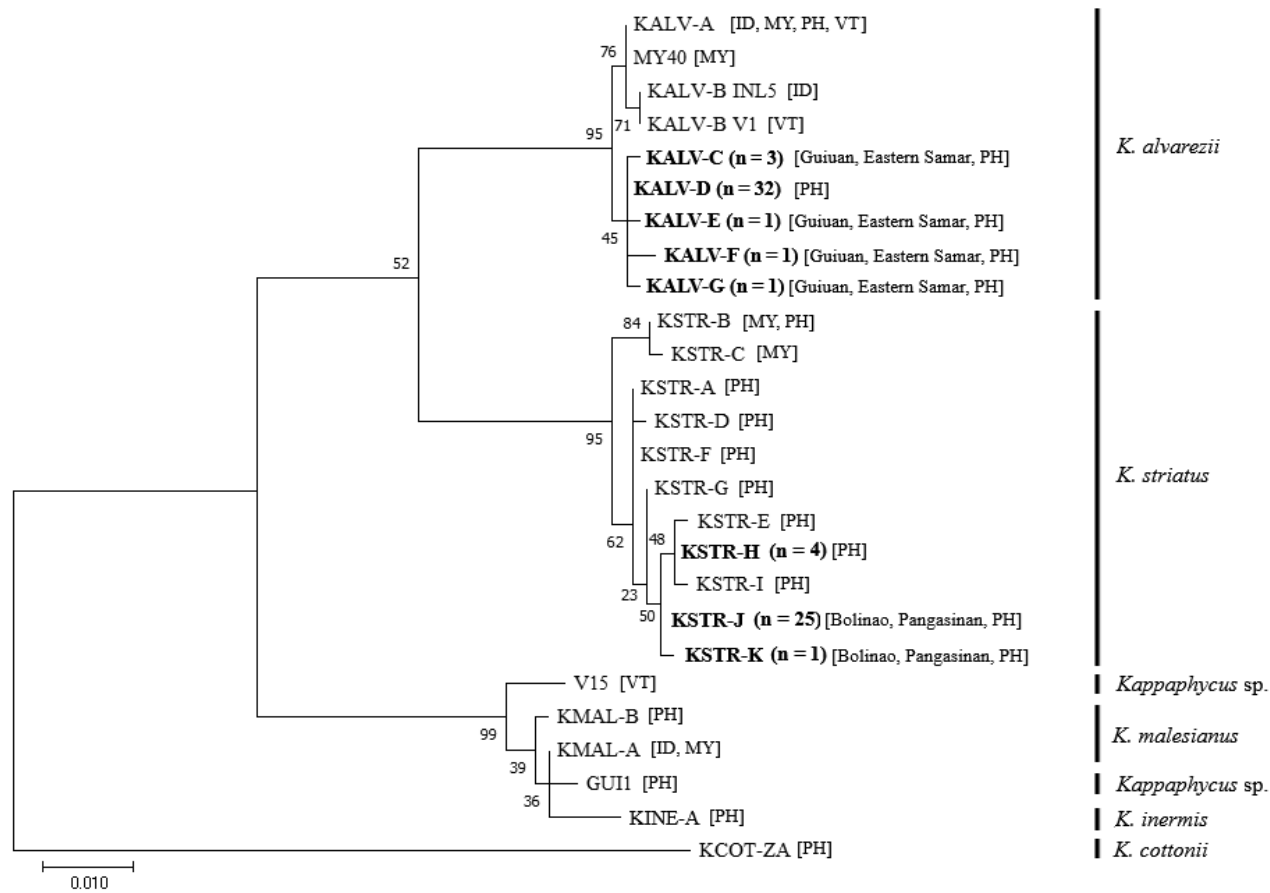
Supplementary Table S1. Continued

Specimen	Collection site	Collection date	Haplotype			Accession No.		Reference	
			COI-5P	cox2-3	COI-5P-cox2-3	COI-5P	cox2-3		
Other GenBank sequences									
72	<i>K. alvarezii</i> SUR 101 (F)	Balibadon, Cortes, Surigao del Sur, PH	-	KALV-A	KALV-1	KALV-A1	KT316568	KT316616	Dumilag et al. (2016a)
73	<i>K. alvarezii</i> 40 (F)	Salakan, Sabah, Malaysia	-	MY40	3	(MY40) KALV-A5	KC905238	JN663765	Lim et al. (2014)
74	<i>K. alvarezii</i> AOL 417 (F)	Brgy. Ibo, Mactan Island, Cebu, PH	-	KALV-A	3	KALV-A5	KT316556	KT316604	Dumilag et al. (2016a)
75	<i>K. alvarezii</i> E130	Zanzibar, Tanzania	-	-	130	-	-	AY687436	Zuccarello et al. (2006)
76	<i>K. alvarezii</i> E16	Madagascar	-	-	16	-	-	AY687430	Zuccarello et al. (2006)
77	<i>K. alvarezii</i> EGF-A (W)	Guiuan, Eastern Samar, PH	-	KALV-A	KALV-4	KALV-A4	KT316558	KT316606	Dumilag et al. (2016a)
78	<i>K. alvarezii</i> EGF-B (W)	Guiuan, Eastern Samar, PH	-	KALV-A	KALV-4	KALV-A4	KT316559	KT316607	Dumilag et al. (2016a)
79	<i>K. alvarezii</i> EGF-C (W)	Guiuan, Eastern Samar, PH	-	KALV-C	KALV-3	KALV-C3	KT316560	KT316608	Dumilag et al. (2016a)
80	<i>K. alvarezii</i> EGF-D (W)	Guiuan, Eastern Samar, PH	-	KALV-C	KALV-3	KALV-C3	KT316561	KT316609	Dumilag et al. (2016a)
81	<i>K. alvarezii</i> EGF-E (W)	Guiuan, Eastern Samar, PH	-	KALV-A	KALV-4	KALV-A4	KT316562	KT316610	Dumilag et al. (2016a)
82	<i>K. alvarezii</i> EGF-F (W)	Guiuan, Eastern Samar, PH	-	KALV-A	KALV-4	KALV-A4	KT316563	KT316611	Dumilag et al. (2016a)
83	<i>K. alvarezii</i> EGF-G (W)	Guiuan, Eastern Samar, PH	-	KALV-C	KALV-3	KALV-C3	KT316564	KT316612	Dumilag et al. (2016a)
84	<i>K. alvarezii</i> EGF-H (W)	Guiuan, Eastern Samar, PH	-	KALV-C	KALV-3	KALV-C3	KT316565	KT316613	Dumilag et al. (2016a)
85	<i>K. alvarezii</i> EGF-I (W)	Guiuan, Eastern Samar, PH	-	KALV-A	KALV-4	KALV-A4	KT316566	KT316614	Dumilag et al. (2016a)
86	<i>K. alvarezii</i> Kp13	Sete Ondas, Rio de Janeiro, Brazil	-	-	Kp13	-	-	KC247819	De Barros-Barreto et al. (2013)
87	<i>K. alvarezii</i> L5 (F)	Pengantap, Lombok, Indonesia	-	INL5	3	INL5	KC905230	KC605348	Lim et al. (2014)
88	<i>K. alvarezii</i> L6 Brown (F)	Pengantap, Lombok, Indonesia	-	KA	3	(KA) KALV-A5	KC905231	KC905349	Lim et al. (2014)
89	<i>K. alvarezii</i> RCS1	Hoyanjog Island, Tagana-an, Surigao del Norte, PH	-	KALV-D	UR13	KALV-D1	KU186961	KX173445	Dumilag et al. (2016b)
90	<i>K. alvarezii</i> Reef4	Reef Paje-Jambiani, Tanzania	-	-	Reef4	-	-	JQ713901	Halling et al. (2013)
91	<i>K. alvarezii</i> S2 (W)	South Sulawesi, Indonesia	-	INS2	3	(INS2) KALV-A5	KC905229	KC905347	Lim et al. (2014)
92	<i>K. alvarezii</i> SUR 128 (F)	Liang Bay, Surigao del Sur, PH	-	KALV-A	KALV-2	KALVA2	KT316572	KT316620	Dumilag et al. (2016a)
93	<i>K. alvarezii</i> SUR 133 (F)	Liang Bay, Surigao del Sur, PH	-	KALV-A	KALV-1	KALV-A1	KT316573	KT316621	Dumilag et al. (2016a)
94	<i>K. alvarezii</i> SUR 144 (F)	Maowa Island, Hinatuan, Surigao del Sur, PH	-	KALV-A	3	KALV-A5	KT316574	KT316622	Dumilag et al. (2016a)
95	<i>K. alvarezii</i> UR13	Uroa, Tanzania	-	-	UR13	-	-	JQ713902	Halling et al. (2013)
96	<i>K. alvarezii</i> V1 “Brown-Short” (F)	Cam Ranh, Khanh Hoa, Vietnam	-	INL5	UR13	V1	KC905268	KC905378	Lim et al. (2014)
97	<i>K. alvarezii</i> V14 (F)	Phan Rang, Ninh Thuan, Vietnam	-	V14	3	(V14) KALV-A5	KC905267	KC905377	Lim et al. (2014)
98	<i>K. alvarezii</i> V2 “Brown-Long” (F)	Cam Ranh, Khanh Hoa, Vietnam	-	KA	UR13	V2	KC905269	KC905379	Lim et al. (2014)
99	<i>K. cottonii</i> AOL537 (W)	Sitio Daisy, Paayas, Burgos, Ilocos Norte, PH	-	KCOT-ZA	KCOT-11	KCOT-ZA11	MF134543	MF134640	Dumilag et al. (2017)
100	<i>K. inermis</i> RVD10016 (W)	Burgos, Ilocos Norte, PH	-	KINE-A	KINE-1	KINEA1	KT316578	KT316629	Dumilag et al. (2016a)
101	<i>K. malesianus</i> TAW 108 (W)	Tinambak, Tongmageng, Sitangkai, Tawi-Tawi, PH	-	KMAL-B	MY216	KMAL-B2	KT316583	KT316636	Dumilag et al. (2016a)
102	<i>K. malesianus</i> TAW 109 (W)	Tinambak, Tongmageng, Sitangkai, Tawi-Tawi, PH	-	KMAL-B	KMAL-1	KMAL-B1	KT316584	KT316637	Dumilag et al. (2016a)
103	<i>K. striatus</i> 220 (W)	Karindingan, Sabah, Malaysia	-	MY220	MY220	MY220	KC905305	KC905415	Lim et al. (2014)
104	<i>K. striatus</i> 27 (F)	Sabangkat, Sabah, Malaysia	-	-	89	-	-	KC905385	Lim et al. (2014)
105	<i>K. striatus</i> AOL 477 (F)	Calatagan, Batangas, PH	-	KSTR-F	89	(KSTR-F1) KSA	KT316591	KT316645	Dumilag et al. (2016a)
106	<i>K. striatus</i> E48	Kudingaren Keke Island, SW Sulawesi, Indonesia	-	-	48	-	-	AY687431	Zuccarello et al. (2006)
107	<i>K. striatus</i> E89	Jolo, Philippines	-	-	89	-	-	AY687434	Zuccarello et al. (2006)
108	<i>K. striatus</i> GUI2 “Cottonii” (W)	Guimaras Island, Panay, Philippines	-	GUI2	89	GUI2	KC905277	KC905387	Lim et al. (2014)
109	<i>K. striatus</i> RCS3	Hoyanjog Island, Tagana-an, Surigao del Norte, PH	-	KSTR-I	89	KSTR-I1	KU186974	KX173458	Dumilag et al. (2016b)
110	<i>K. striatus</i> S1 (W)	South Sulawesi, Indonesia	-	KSB	INS1	INS1	KC905299	KC905409	Lim et al. (2014)
111	<i>K. striatus</i> S7 (W)	South Sulawesi, Indonesia	-	KSA	KSA	KSA	KC905271	KC905381	Lim et al. (2014)
112	<i>K. striatus</i> SIT4 (F)	Sitangkai, Tawi-Tawi, PH	-	SIT4	117	SIT4	JX624031	JX624079	Lim et al. (2014)
113	<i>K. striatus</i> SIT7 “Cottonii Red (Sacol)” (F)	Sitangkai, Tawi-Tawi, Mindanao, PH	-	SIT7	89	SIT7	KC905290	KC905400	Lim et al. (2014)
114	<i>K. striatus</i> TAW 103 (F)	Tinambak, Tongmageng, Sitangkai, Tawi-Tawi, PH	-	KSTR-G	89	KSTR-G1	KT316597	KT316651	Dumilag et al. (2016a)
115	<i>K. striatus</i> TAW 119 (F) “Vanguard”	Tinambak, Tongmageng, Sitangkai, Tawi-Tawi, PH	-	KSTR-H	89	KSTR-H1	KT316600	KT316655	Dumilag et al. (2016a)
116	<i>K. striatus</i> V6 (F)	Cam Ranh, Khanh Hoa, Vietnam	-	KSA	89	KSA	JX624027	JX624078	Lim et al. (2014)
117	<i>K. striatus</i> ZAM 106 (F)	Sacol Strait, Zamboanga del Sur, PH	-	KSTR-A	89	KSA	KT316602	KT316659	Dumilag et al. (2016a)
118	<i>Kappaphycus</i> sp. E57	Reef 44, Kaneohe Bay, Oahu, USA	-	-	57	-	-	AY687432	Zuccarello et al. (2006)
119	<i>Kappaphycus</i> sp. GUI1 (W)	Guimaras Island, Panay, PH	-	GUI1	GUI1	GUI1	KC905320	KC905430	Lim et al. (2014)
120	<i>Kappaphycus</i> sp. V15 (W)	Truong, Sa Island, Khanh Hoa, Vietnam	-	V15	V15	V15	KC905321	KC905431	Zuccarello et al. (2006)

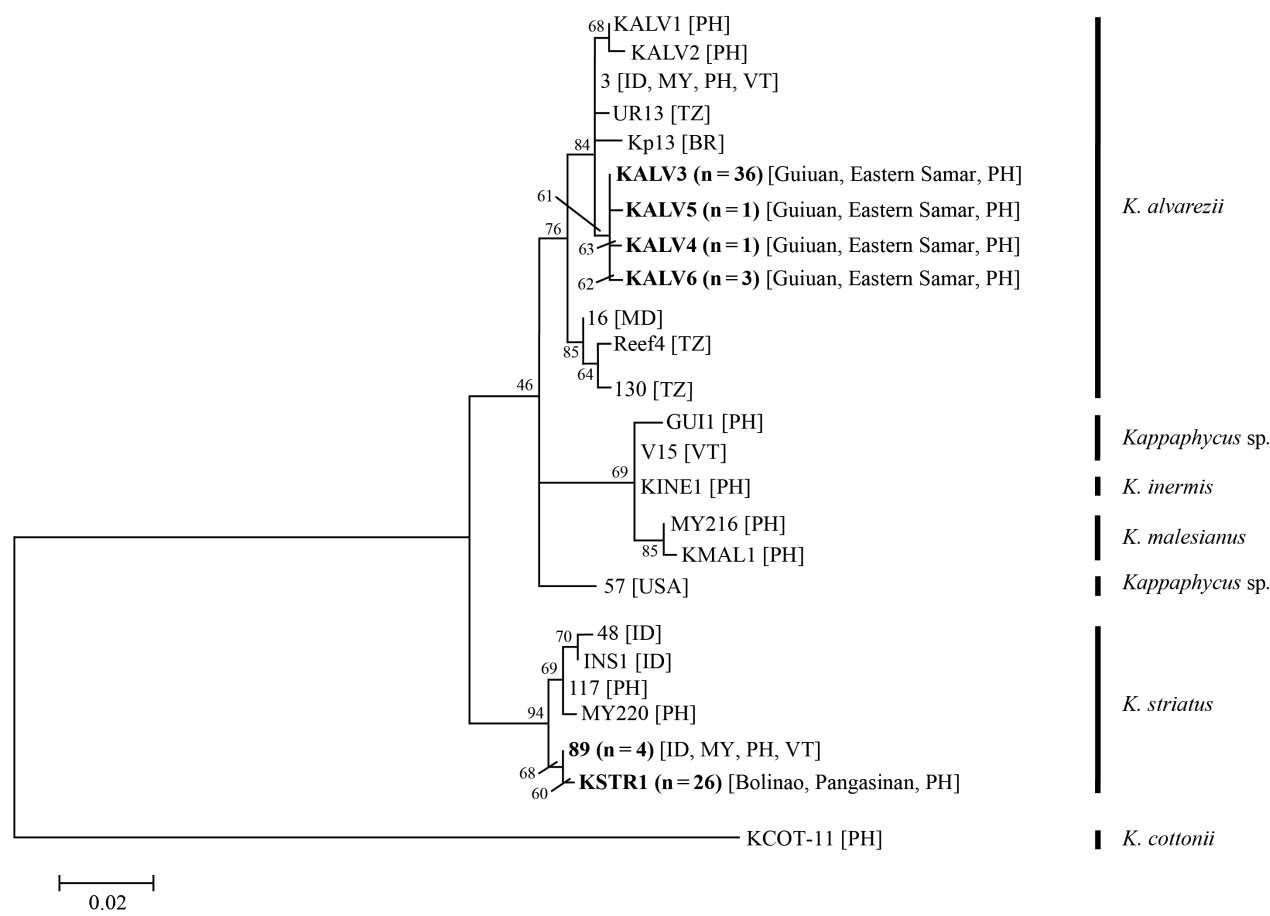
W, wild specimens; F, farmed specimens; PH, Philippines.

Supplementary Table S2. Summary of external morphological characteristics of collected wild *Kappaphycus* species

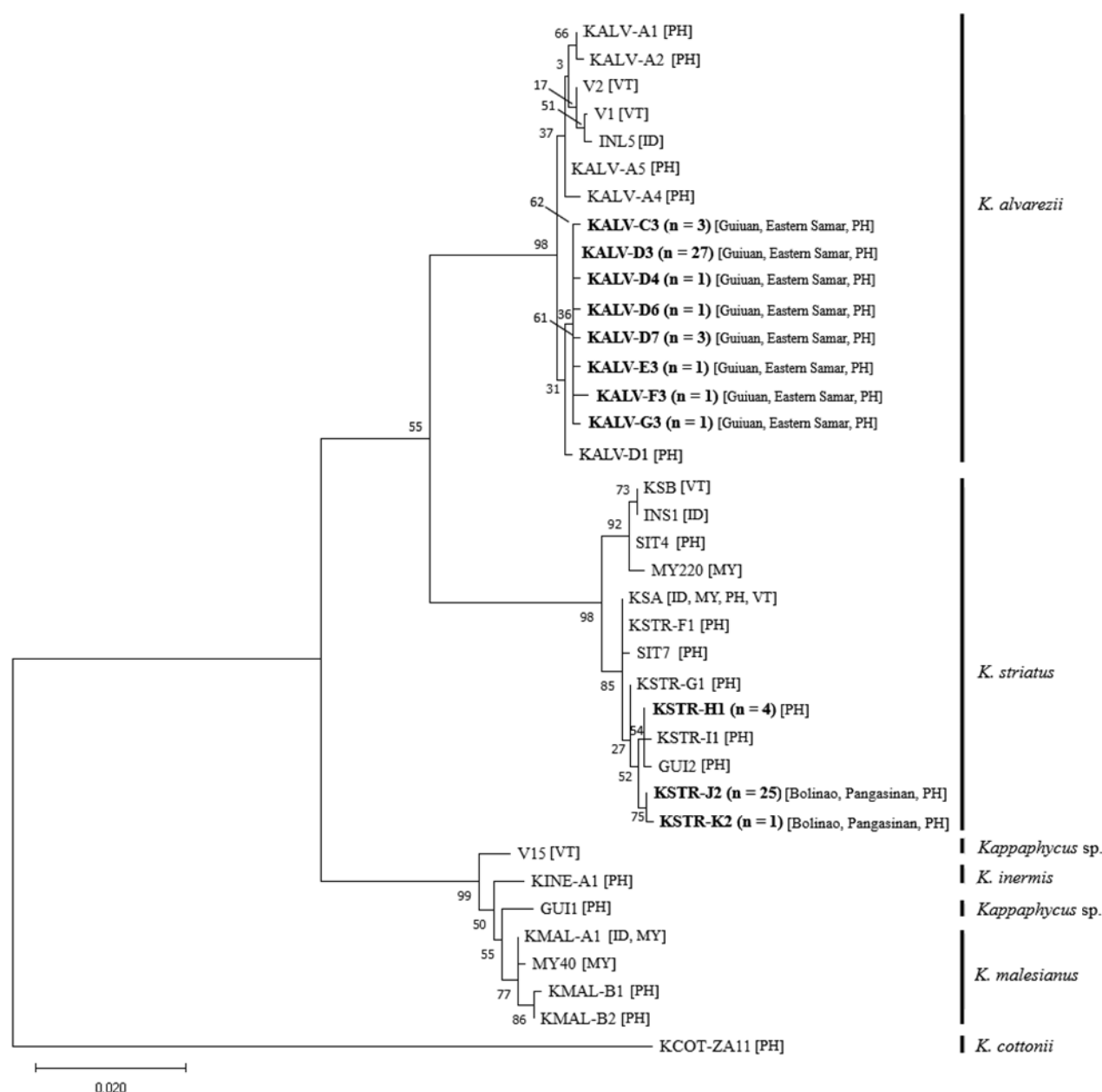
Species	Haplotype	Sample	Plant size (cm)	Color	Habit	Branching type	Surface texture
<i>K. alvarezii</i>	KALV-D3	SamW-001	22.0–23.0	Light brown to light green	Erect, short thalli	Thalli is terete (diameter <1 cm) forming irregular branching pattern, often with dense and long secondary and tertiary branches; blunt or pointy apices	Surface is glossy with uneven protrusions
<i>K. alvarezii</i>	KALV-D3	SamW-014	16.0–18.0	Green	Erect, short thalli	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-027	15	Light brown	Erect, short thalli	Same as above	Rough surface with uneven protrusions throughout thalli
<i>K. alvarezii</i>	KALV-D3	KaCR-R	18	Light green	Erect	Thalli is terete (diameter <1 cm), forms dichotomous, unilateral, secondary branch	Cartilaginous and glossy; somewhat dense spherical to elongated protrusions indicate presence of tetrasporangial nemathecia
<i>K. alvarezii</i>	KALV-D3	KaTR-O	17	Green	Erect	Thalli is terete (diameter <0.5 cm); thalli diameter with cystocarp is ≤1.0 cm; lateral growth, no branch formations yet	Cartilaginous and glossy; cystocarps present, hemispherical in shape and scattered throughout thalli
<i>K. alvarezii</i>	KALV-D3	SamW-002	20.0–22.0	Deep red	Erect	Cylindrical, tapering towards apex (diameter <1 cm); one to two primary axes gives rise to long dichotomous secondary branches; tertiary branches are dense and shorter in length (<2 cm); pointed terminal branch	Smooth and glossy primary branch but rough tertiary branches; semispherical denticulations are present
<i>K. alvarezii</i>	KALV-D3	SamW-029	15.0–18.0	Deep red	Erect	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	KaTR-Q	17.0–20.0	Red	Erect	Thalli is terete (diameter <1 cm), alternate branching, short secondary branch; blunt to pointed apices	Cartilaginous and glossy; cystocarps present, hemispherical in shape and scattered throughout thalli
<i>K. alvarezii</i>	KALV-3 (cox2-3)	SamW-003	27.0–30.0	Bicolor / tricolor (presence of green, light brown and small reddish patches)	Erect with discoid holdfast and distinct stipe	Somewhat terete and moderately thicker branch (diameter <1.5 cm); short stipe (0.5–1.5 cm) gives rise to multiaxial secondary lateral branches, sometimes sympodial; tertiary branchlets are unilateral to pinnate; bifurcating apices are common and pointy	Surface is rough except basal stem; cartilaginous; dense but blunt-ended protrusions
<i>K. alvarezii</i>	KALV-D3	SamW-004	22.5–25.0	Same as above	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-E3	SamW-005	24.0–27.0	Same as above	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-008	25.0–27.0	Same as above	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-012	19.0–21.0	Same as above	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-022	30.0–35.0	Same as above	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-3 (cox2-3)	KaTR-N	20.0–22.0	Same as above	Erect	Terete thalli (diameter <1.5 cm), forms secondary lateral branches, sometimes sympodial; tertiary branchlets are unilateral to pinnate; pointed apices	Cartilaginous and glossy; cystocarps present, hemispherical and scattered throughout thalli
<i>K. alvarezii</i>	KALV-D3	SamW-011	40.0–50.0	Generally light brown to light green with a hint of bicoloration (patches of reddish brown and dark brown)	Erect thalli, crustose holdfast attached to coralline substrate	Branch is cylindrical with almost uniform diameter from basal to terminal branch (diameter <1 cm); branch constricted near the base; basal stem gives rise to multiple pinnate, lateral, or unilateral secondary branches; secondary and tertiary branches are long and dense, tapering towards the apex	Thalli fleshy, pliable; basal stem is smooth; irregular protuberances oftentimes form new growth points
<i>K. alvarezii</i>	KALV-D3	SamW-017	40.0–45.0	Same as above	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-3 (cox2-3)	SamW-020	30.0–35.0	Dark brown with different shades of brown	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-021	35.0–40.0	Light brown base to light green	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-026	40.0–45.0	Light brown base, light green to dark green	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-028	60.0–70.0	Generally light brown to light green with a hint of bicoloration (patches of reddish brown and dark brown)	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-030	40.0–45.0	Light brown base, light green to dark green	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-034	35.0–0.0	Dark brown, light brown	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-016	25.0–27.0	Light brown, light green	Thalli bushy and erect, crustose holdfast, short stipe (<2 cm)	Branch is cylindrical and moderately thicker in diameter (<1.5 cm); unilateral and pinnate secondary branch gives rise to pseudodichotomous and dichotomous tertiary branch forming a dense frond; decreasing in length towards terminal branch; blunt to pointy apices	Thalli fleshy and cartilaginous; main axis is smooth; protuberance lesser on the terminal branch
<i>K. alvarezii</i>	KALV-D3	SamW-019	30	Same as above	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-023	28.0–30.0	Same as above	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-F3	SamW-006	30.0–35.0	Dark brown to gray	Thalli bushy and erect	Terete branch wider diameter (≤1.5 cm) at base, decreasing with each level of branching; branch is constricted near base; secondary branch is alternate, pseudodichotomous, or opposite; dense tertiary branches are shorter in length; apices blunt to pointed	Surface is uneven, cartilaginous, and glossy
<i>K. alvarezii</i>	KALV-D3	SamW-007	27.0–30.0	Same as above	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D3	SamW-010	17.0–20.0	Brown, light brown	Erect thalli, crustose holdfast, stipe apparent	Cylindrical thalli (diameter <1 cm) forms dense branching in the secondary to tertiary branch; secondary branching is unilateral to pinnate; dichotomous branching near apex; apices are slender and pointed	Surface is relatively smooth and glossy; thalli fleshy and cartilaginous
<i>K. alvarezii</i>	KALV-D3	SamW-025	25.0–30.0	Same as above	Same as above	Same as above	Same as above
<i>K. alvarezii</i>	KALV-C3	SamW-009	18	Dark brown	Decumbent	Cylindrical branch (diameter <1 cm); multiaxial and irregular branching pattern; pointy apices	Surface is uneven, with round to spiny protuberances that resembles <i>Eucheuma</i> spines
<i>K. alvarezii</i>	KALV-D3	SamW-024	20	Light green	Erect, discoid holdfast, short stipe	Cylindrical branch (diameter <1.5 cm); primary branch gives rise to sympodial and indefinite lateral branch; often regularly spaced terminal branchlets; blunt to pointed apices	Smooth with few uneven protrusions; cartilaginous
<i>K. alvarezii</i>	KALV-D3	SamW-035	25	Light brown	Erect with discoid holdfast	Terete branch (diameter <0.9 cm) forms alternate branching originating from the primary axis; unevenly spaced tertiary branches are dichotomous; round to pointed apices	Cartilaginous; slightly rough surface concentrated at the secondary to tertiary branch
<i>K. alvarezii</i>	KALV-C3	SamW-031	Not available	Not available	Not available	Not available	Not available
<i>K. alvarezii</i>	KALV-D3	SamW-032	Not available	Not available	Not available	Not available	Not available
<i>K. alvarezii</i>	KALV-D3	SamW-033	Not available	Not available	Not available	Not available	Not available
<i>K. alvarezii</i>	KALV-D4	KaCR-C	15.0–16.5	Green	Erect	Thalli cylindrical (<0.8 cm), dichotomous main axis, simple secondary branches giving rise to opposite or falsely dichotomous tertiary branches; occasional angular growth points concentrated in some parts of the thalli (base or terminal axis)	Thalli cartilaginous and pliable; surface is rough, glossy, bearing simple blunt protuberances; somewhat dense spherical to elongated protrusions indicate presence of tetrasporangial nemathecia
<i>K. alvarezii</i>	KALV-D6	KaCR-S	22.0–25.0	Green	Erect	Cylindrical thalli (<1.0 cm) forms long dichotomous main axis; lateral branching	Thalli cartilaginous, glossy, and brittle; tetrasporangial nemathecia are densely scattered throughout the thalli
<i>K. alvarezii</i>	KALV-D7	SamW-013	18.0–20.0	Red	Erect	Cylindrical thalli diameter is <1 cm but sometimes thicker near secondary branch; multiaxial axis gives rise to dichotomous or sympodial secondary branch; terminal branch are irregularly spaced and short; terminal branch are bifurcating or trichotomous	Cartilaginous; uneven surface with irregular blunt protrusions
<i>K. alvarezii</i>	KALV-D7	SamW-015	30.0–33.0	Bicolor (light green and light brown)	Erect, discoid holdfast	Same as above	Same as above
<i>K. alvarezii</i>	KALV-D7	SamW-018	35.0–40.0	Light brown to green	Erect, crustose holdfast	Cylindrical thalli (≤1.0 cm) forms long dichotomous main axis; long and dense secondary branch; alternate, irregular branching; slender apices	Fleshy and pliable; smooth basal portion; irregular blunt protrusions from mid-terminal branch
<i>K. striatus</i>	KSTR-H1	MAL7	25.0–27.0	Brown	Decumbent	Thalli is cylindrical (diameter <1.5 cm); branches are entwined forming a compact, single clump; apex is blunt with a few tapering apices	Thick and hard thalli; surface is rough throughout the thalli with grazer bite marks
<i>K. striatus</i>	KSTR-H1	MAL13	20.0–21.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-H1	SIL17	15.0–17.0	Yellowish green, green	Restricted erect growth and entwined with other seaweeds	Thalli is cylindrical (diameter <1cm) tapering towards apex; branching is irregular, indeterminate, secondary branches thinner in diameter (<0.5 cm)	Thalli fleshy; surface with irregular protuberances, denser in the main axis; visible bite marks
<i>K. striatus</i>	KSTR-H1	SIL18	10.0–15.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL1	7.5–9.0	Brown, yellowish brown	Prostrate and short	Cylindrical thalli (diameter ≤1.5 cm) and irregular branching; basal stem diameter is larger but with inconspicuous main axis; secondary branches exhibit irregular furcation; round and conical apex	Thalli cartilaginous and flexible; surface is generally rough bearing blunt protrusions and bite marks; cystocarpic fronds are short, bearing hemispherical cystocarps (<0.5 cm) swollen with round ends, clustering, and scattered irregularly in the thalli; cystocarps are mostly in premature stage
<i>K. striatus</i>	KSTR-J2	MAL2	8.0–10.0	Yellowish brown to green	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL3	15.0–18.0	Same as above	Same as above	Same as above	Thalli cartilaginous and flexible; surface is generally rough bearing blunt protrusions and bite marks
<i>K. striatus</i>	KSTR-J2	MAL6	10.0–12.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL9	15.0–17.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL10	20.0–30.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL15	12.0–15.0	Brown, yellowish brown	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL16	20.0–25.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL19	17.0–20.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL20	20.0–23.0	Same as above	Same as above	Same as above	Thalli cartilaginous and flexible; surface is generally rough bearing blunt protrusions and bite marks; cystocarpic fronds are short, bearing hemispherical cystocarps (<0.5 cm) swollen with round ends, clustering, and scattered irregularly in the thalli; cystocarps are mostly in premature stage
<i>K. striatus</i>	KSTR-J2	MAL22	15.0–20.0	Same as above	Same as above	Same as above	Thalli cartilaginous and flexible; surface is generally rough bearing blunt protrusions and bite marks
<i>K. striatus</i>	KSTR-J2	MAL23	10.0–12.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL25	15.0–18.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL26	23.0–25.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL28	25.0–30.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL30	13.0–15.0	Yellowish brown to dark green	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL4	30.0–35.0	Brown, yellowish brown	Decumbent; holdfast position cannot be determined; deeply entangled with other seaweeds	Cylindrical thalli (diameter ≤1.0 cm) densely branching forming a bushy clump; branching is indeterminate and irregular	Thalli thick and cartilaginous; very rough surface with uneven protrusions and denticulations scattered throughout thalli
<i>K. striatus</i>	KSTR-K2	MAL5	25.0–27.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL8	25.0–30.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL14	25.0–27.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL21	20.0–28.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL29	18.0–20.0	Same as above	Same as above	Same as above	Same as above
<i>K. striatus</i>	KSTR-J2	MAL11	17.0–20.0	Same as above	Compact, holdfast inconspicuous	Cylindrical thalli (diameter <1 cm); alternate to irregular branching; pointed apical points	Thalli thick and brittle; surface is rough with irregular protuberances in secondary branchlets
<i>K. striatus</i>	KSTR-J2	MAL12	17.0–20.0	Same as above	Erect	Cylindrical thalli (diameter <1 cm), tapering toward terminal branch; dichotomous branching with dense tertiary branch	Smooth surface; protrusions showing new growth points
<i>K. striatus</i>	KSTR-J2	MAL24	15.0–17.0	Same as above	Decumbent, shaded, and encrusted with other seaweeds; dense and compact; holdfast inconspicuous	Cylindrical thalli (diameter <1 cm) forming concave clump; inconspicuous main branch and irregular branching	Thalli thick and brittle; surface is rough with irregular protuberances and bite marks
<i>K. striatus</i>	KSTR-J2	MAL27	20.0–22.0	Same as above	Same as above	Same as above	Same as above



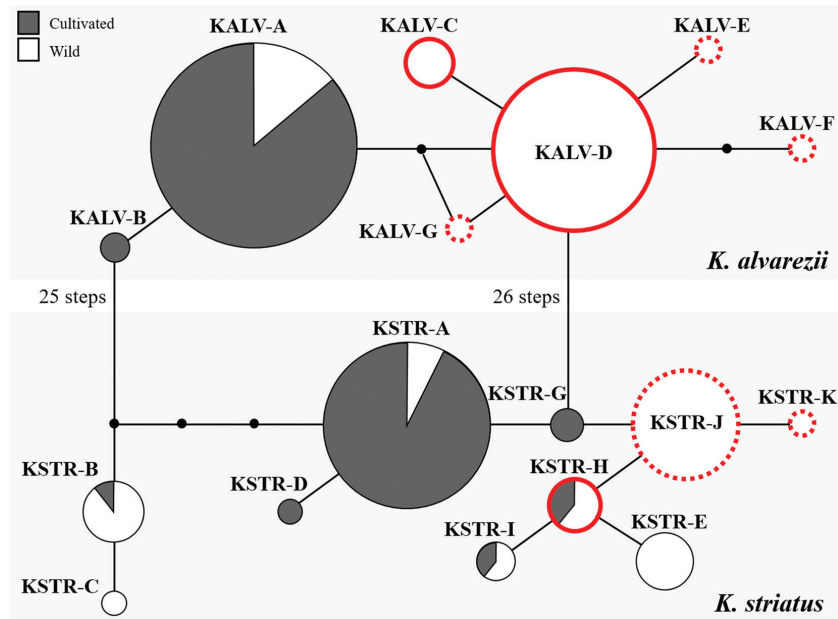
Supplementary Fig. S1. Maximum likelihood (ML) tree of wild *Kappaphycus* sequences inferred from the mitochondrial 5' region of the cytochrome c oxidase subunit I gene (COI-5P) sequences. Numbers at each node indicate ML bootstrap supports. Some haplotypes contain identical sequences that are not shown in this tree. Haplotype names in bold format represent the number of specimens collected in this study. ID, Indonesia; MY, Malaysia; PH, Philippines; VT, Vietnam.



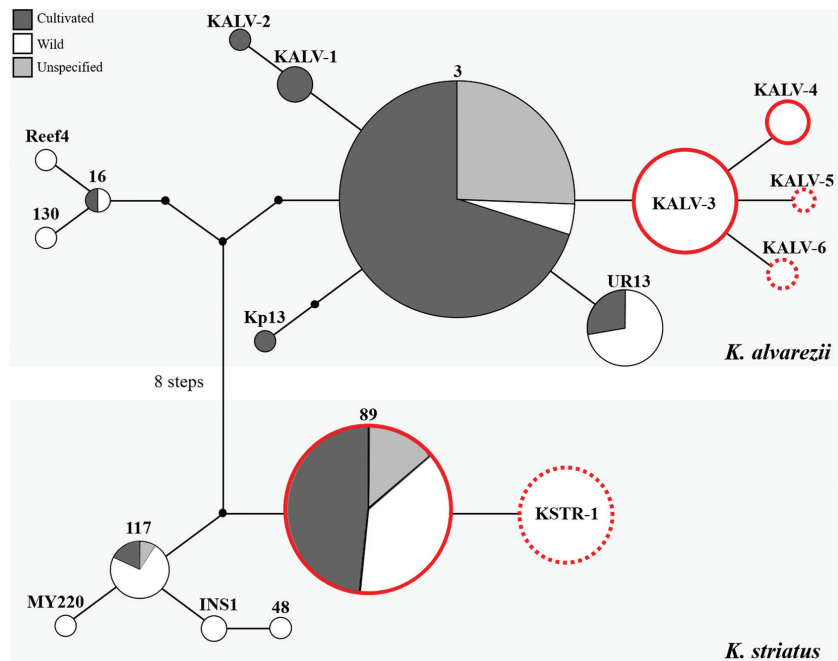
Supplementary Fig. S2. Maximum likelihood (ML) tree of wild *Kappaphycus* sequences inferred from the mitochondrial *cox2-3* spacer. Numbers at each node indicate ML bootstrap supports. Some haplotypes contain identical sequences that are not shown in this tree. Haplotype names in bold format represent the number of specimens collected in this study. PH, Philippines; ID, Indonesia; MY, Malaysia; VT, Vietnam; TZ, Tanzania; BR, Brazil; MD, Madagascar; USA, Hawaii.



Supplementary Fig. S3. Maximum likelihood (ML) tree of wild *Kappaphycus* sequences inferred from the concatenated COI-5P-cox2-3 spacer sequences. Numbers at each node indicate ML bootstrap supports. Some haplotypes contain identical sequences that are not shown in this tree. Haplotype names in bold format represent the number of specimens collected in this study. PH, Philippines; VT, Vietnam; ID, Indonesia; MY, Malaysia.



Supplementary Fig. S4. Statistical parsimony haplotype network based on the 5' region of the mitochondrial cytochrome c oxidase subunit I gene (COI-5P) sequences. Lines indicate point mutations. Small black circles represent missing haplotypes. Red borders represent haplotypes identified in this study. Dotted borders denote novel haplotypes. Symbol size approximate number of individual sequences from this study and published literature (Lim et al. 2014, Dumilag et al. 2016a, 2016b).



Supplementary Fig. S5. Statistical parsimony haplotype network based on the *cox2-3* spacer sequences. Lines indicate point mutations. Small black circles represent missing haplotypes. Red borders represent haplotypes identified in this study. Dotted borders denote novel haplotypes. Symbol size approximate number of individual sequences from this study and published literature (Zuccarello et al. 2006, De Barros-Barreto et al. 2013, Halling et al. 2013, Lim et al. 2014, Dumilag et al. 2016a, 2016b).

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