

PERMANOVA

Permutational MANOVA

Resemblance worksheet

Name: Reseml
Data type: Similarity
Selection: All
Transform: Square root
Resemblance: S17 Bray Curtis similarity

Sums of squares type: Type III (partial)
Fixed effects sum to zero for mixed terms
Permutation method: Unrestricted permutation of raw data
Number of permutations: 9999

Factors

Name	Abbrev.	Type	Levels
Species	Sp	Fixed	22

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Sp	21	1711,1	81,482	7,3274	0,0001	9909	0,0001
Res	152	1690,3	11,12				
Total	173	3401,4					

Details of the expected mean squares (EMS) for the model

Source	EMS
Sp	$1 \cdot V(\text{Res}) + 7,3481 \cdot S(\text{Sp})$
Res	$1 \cdot V(\text{Res})$

Construction of Pseudo-F ratio(s) from mean squares

Source	Numerator	Denominator	Num.df	Den.df
Sp	$1 \cdot \text{Sp}$	$1 \cdot \text{Res}$	21	152

Estimates of components of variation

Source	Estimate	Sq.root
S(Sp)	9,5755	3,0944
V(Res)	11,12	3,3347

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PAIR-WISE TESTS

Term 'Sp'

Groups	t	P (perm)	Unique perms	P (MC)
S_abanticus, S_chilo	3,4269	0,0173	56	0,0162
S_abanticus, S_coruhensis (Sakarya)	7,1462	0,017	56	0,0003
S_abanticus, S_coruhensis (Yeşilırmak)	1,4532	0,2892	35	0,2046
S_abanticus, S_coruhensis (Çoruh)	0,88334	0,3858	2826	0,3859
S_abanticus, S_coruhensis (Eastern Black Sea)	1,956	0,1031	56	0,0994
S_abanticus, S_coruhensis (Marmara)	2,7508	0,0992	10	0,0502
S_abanticus, S_euphrata	7,7894E-2	0,9812	220	0,9404
S_abanticus, S_fahrettini	3,9593	0,0992	10	0,0168
S_abanticus, S_kottelati	0,96145	0,4285	35	0,3845
S_abanticus, S_labecula	7,9901E-2	0,9287	815	0,9385
S_abanticus, S_munzuricus	1,0286	0,3381	220	0,3268
S_abanticus, S_okumusi	3,7365	0,009	220	0,0036
S_abanticus, S_opimus (Antalya)	1,0131	0,4585	56	0,3478
S_abanticus, S_opimus (Eastern Mediterranean)	1,0325	0,3706	35	0,3438
S_abanticus, S_opimus (Ceyhan)	2,1073	0,0328	7669	0,0418

S_abanticus, S_platycephalus	0,32587	0,9831	56	0,7499
S_abanticus, S_rizeensis (Çoruh)	5,723E-2	1	10	0,9592
S_abanticus, S_rizeensis (Western Black Sea)	5,3312	0,0316	35	0,0041
S_abanticus, S_rizeensis (Yeşilırmak)	1,1881	0,3	10	0,3205
S_abanticus, S_rizeensis (Eastern Black Sea)	3,9777	0,2477	4	0,0577
S_abanticus, S_tigridis	0,96741	0,3417	84	0,37
S_chilo, S_coruhensis (Sakarya)	8,2547	0,0096	126	0,0001
S_chilo, S_coruhensis (Yeşilırmak)	0,32405	0,7611	126	0,7508
S_chilo, S_coruhensis (Çoruh)	4,2797	0,0003	9474	0,0004
S_chilo, S_coruhensis (Eastern Black Sea)	5,4947	0,0091	126	0,0006
S_chilo, S_coruhensis (Marmara)	4,7427	0,0183	56	0,0035
S_chilo, S_euphrata	2,3312	0,043	1977	0,0409
S_chilo, S_fahrettini	2,0639	0,0714	56	0,0836
S_chilo, S_kottelati	2,1632	0,0752	126	0,0667
S_chilo, S_labecula	4,4413	0,0003	7306	0,0007
S_chilo, S_munzuricus	0,66335	0,5211	1981	0,518
S_chilo, S_okumusi	3,2202	0,0091	1973	0,0058
S_chilo, S_opimus (Antalya)	0,65655	0,4796	126	0,5313
S_chilo, S_opimus (Eastern Mediterranean)	0,87338	0,427	126	0,4111
S_chilo, S_opimus (Ceyhan)	1,7391	0,0909	9881	0,0875
S_chilo, S_platycephalus	1,111	0,3102	126	0,3019
S_chilo, S_rizeensis (Çoruh)	2,5683	0,0396	56	0,0405
S_chilo, S_rizeensis (Western Black Sea)	8,1408	0,0072	126	0,0002
S_chilo, S_rizeensis (Yeşilırmak)	0,2449	0,8521	21	0,8245
S_chilo, S_rizeensis (Eastern Black Sea)	3,7091	0,1652	6	0,0213
S_chilo, S_tigridis	4,5579	0,0048	462	0,0019
S_coruhensis (Sakarya), S_coruhensis (Yeşilırmak)	3,2383	0,0081	125	0,0147
S_coruhensis (Sakarya), S_coruhensis (Çoruh)	1,4682	0,1526	9490	0,1562
S_coruhensis (Sakarya), S_coruhensis (Eastern Black Sea)	2,0875	0,0824	126	0,0697
S_coruhensis (Sakarya), S_coruhensis (Marmara)	5,7451	0,0174	56	0,001
S_coruhensis (Sakarya), S_euphrata	2,1274	0,0169	1986	0,0522
S_coruhensis (Sakarya), S_fahrettini	7,7056	0,0192	56	0,0004
S_coruhensis (Sakarya), S_kottelati	4,7663	0,0071	126	0,0019
S_coruhensis (Sakarya), S_labecula	3,8182	0,0009	7286	0,0018
S_coruhensis (Sakarya), S_munzuricus	2,9549	0,01	1978	0,015
S_coruhensis (Sakarya), S_okumusi	6,1465	0,0004	1988	0,0003
S_coruhensis (Sakarya), S_opimus (Antalya)	1,8995	0,0094	123	0,0972
S_coruhensis (Sakarya), S_opimus (Eastern Mediterranean)	3,2826	0,0085	126	0,0143
S_coruhensis (Sakarya), S_opimus (Ceyhan)	3,4959	0,0009	9882	0,001
S_coruhensis (Sakarya), S_platycephalus	1,6883	0,0317	126	0,1365
S_coruhensis (Sakarya), S_rizeensis (Çoruh)	2,6337	0,0366	56	0,0354

S_coruhensis (Sakarya), S_rizeensis (Western Black Sea)	3,5988	0,0076	126	0,0073
S_coruhensis (Sakarya), S_rizeensis (Yeşilırmak)	3,2383	0,0484	21	0,0209
S_coruhensis (Sakarya), S_rizeensis (Eastern Black Sea)	0,87415	0,498	6	0,4363
S_coruhensis (Sakarya), S_tigridis	2,4556	0,0323	462	0,0352
S_coruhensis (Yeşilırmak), S_coruhensis (Çoruh)	3,6638	0,0039	7778	0,0006
S_coruhensis (Yeşilırmak), S_coruhensis (Eastern Black Sea)	2,5816	0,0151	126	0,0358
S_coruhensis (Yeşilırmak), S_coruhensis (Marmara)	1,8654	0,1778	35	0,121
S_coruhensis (Yeşilırmak), S_euphrata	1,9023	0,0212	694	0,088
S_coruhensis (Yeşilırmak), S_fahrettini	0,76898	0,4602	35	0,4828
S_coruhensis (Yeşilırmak), S_kottelati	1,2265	0,3135	35	0,2601
S_coruhensis (Yeşilırmak), S_labecula	3,0817	0,0158	3560	0,0061
S_coruhensis (Yeşilırmak), S_munzuricus	0,77776	0,4522	715	0,4534
S_coruhensis (Yeşilırmak), S_okumusi	2,2435	0,0472	715	0,0466
S_coruhensis (Yeşilırmak), S_opimus (Antalya)	0,42349	0,642	126	0,6779
S_coruhensis (Yeşilırmak), S_opimus (Eastern Mediterranean)	0,74256	0,5107	35	0,4892
S_coruhensis (Yeşilırmak), S_opimus (Ceyhan)	1,3523	0,1873	9701	0,1866
S_coruhensis (Yeşilırmak), S_platycephalus	1,0017	0,2721	126	0,3532
S_coruhensis (Yeşilırmak), S_rizeensis (Çoruh)	1,3853	0,2562	35	0,215
S_coruhensis (Yeşilırmak), S_rizeensis (Western Black Sea)	3,7547	0,0293	35	0,0098
S_coruhensis (Yeşilırmak), S_rizeensis (Yeşilırmak)	0,29844	0,5341	15	0,7886
S_coruhensis (Yeşilırmak), S_rizeensis (Eastern Black Sea)	1,353	0,4058	5	0,2609
S_coruhensis (Yeşilırmak), S_tigridis	2,4716	0,03	210	0,0395
S_coruhensis (Çoruh), S_coruhensis (Eastern Black Sea)	0,31235	0,768	9506	0,756
S_coruhensis (Çoruh), S_coruhensis (Marmara)	4,439E-2	0,9718	2813	0,9718
S_coruhensis (Çoruh), S_euphrata	1,3587	0,1845	9864	0,1871
S_coruhensis (Çoruh), S_fahrettini	5,4369	0,0009	2841	0,0002
S_coruhensis (Çoruh), S_kottelati	1,8435	0,0741	7823	0,0742
S_coruhensis (Çoruh), S_labecula	1,6789	0,1003	9863	0,1011
S_coruhensis (Çoruh), S_munzuricus	3,2549	0,0027	9892	0,0026
S_coruhensis (Çoruh), S_okumusi	9,6657	0,0001	9903	0,0001
S_coruhensis (Çoruh), S_opimus (Antalya)	3,3579	0,0126	9525	0,0022
S_coruhensis (Çoruh), S_opimus (Eastern Mediterranean)	2,4488	0,0185	7853	0,0203
S_coruhensis (Çoruh), S_opimus (Ceyhan)	6,5948	0,0001	9893	0,0001
S_coruhensis (Çoruh), S_platycephalus	1,5329	0,1222	9506	0,1384
S_coruhensis (Çoruh), S_rizeensis (Çoruh)	0,79674	0,4388	2817	0,4325
S_coruhensis (Çoruh), S_rizeensis (Western Black Sea)	3,4916	0,0014	7847	0,0016
S_coruhensis (Çoruh), S_rizeensis (Yeşilırmak)	2,3064	0,0309	325	0,0305
S_coruhensis (Çoruh), S_rizeensis (Eastern Black Sea)	0,8267	0,3978	25	0,425
S_coruhensis (Çoruh), S_tigridis	0,25691	0,8006	9795	0,8016
S_coruhensis (Eastern Black Sea), S_coruhensis (Marmara)	0,50393	0,6618	56	0,6303
S_coruhensis (Eastern Black Sea), S_euphrata	1,1859	0,2774	1977	0,2626

S_coruhensis (Eastern Black Sea), S_fahrettini	5,8528	0,0179	56	0,0008
S_coruhensis (Eastern Black Sea), S_kottelati	2,6153	0,0349	126	0,0366
S_coruhensis (Eastern Black Sea), S_labecula	1,9424	0,069	7235	0,0654
S_coruhensis (Eastern Black Sea), S_munzuricus	2,1957	0,0507	1987	0,0476
S_coruhensis (Eastern Black Sea), S_okumusi	5,5161	0,0008	1979	0,0003
S_coruhensis (Eastern Black Sea), S_opimus (Antalya)	1,6485	0,1881	126	0,141
S_coruhensis (Eastern Black Sea), S_opimus (Eastern Mediterranean)	2,2752	0,0438	126	0,056
S_coruhensis (Eastern Black Sea), S_opimus (Ceyhan)	3,1521	0,0029	9885	0,0036
S_coruhensis (Eastern Black Sea), S_platycephalus	1,1041	0,3435	126	0,3005
S_coruhensis (Eastern Black Sea), S_rizeensis (Çoruh)	1,1943	0,3157	56	0,2771
S_coruhensis (Eastern Black Sea), S_rizeensis (Western Black Sea)	4,1138	0,0078	126	0,0042
S_coruhensis (Eastern Black Sea), S_rizeensis (Yeşilırmak)	2,2938	0,1025	21	0,068
S_coruhensis (Eastern Black Sea), S_rizeensis (Eastern Black Sea)	1,2045	0,662	6	0,3006
S_coruhensis (Eastern Black Sea), S_tigridis	0,68007	0,5074	461	0,516
S_coruhensis (Marmara), S_euphrata	0,73213	0,3898	220	0,4905
S_coruhensis (Marmara), S_fahrettini	4,7667	0,1035	10	0,0098
S_coruhensis (Marmara), S_kottelati	2,1249	0,0835	35	0,0885
S_coruhensis (Marmara), S_labecula	1,2125	0,2451	816	0,2405
S_coruhensis (Marmara), S_munzuricus	1,5541	0,1357	220	0,1567
S_coruhensis (Marmara), S_okumusi	4,1511	0,0093	220	0,0025
S_coruhensis (Marmara), S_opimus (Antalya)	1,1884	0,3537	56	0,2835
S_coruhensis (Marmara), S_opimus (Eastern Mediterranean)	1,6448	0,2223	35	0,1614
S_coruhensis (Marmara), S_opimus (Ceyhan)	2,3615	0,0184	7657	0,0219
S_coruhensis (Marmara), S_platycephalus	0,72595	0,6701	56	0,4915
S_coruhensis (Marmara), S_rizeensis (Çoruh)	0,80582	0,7016	10	0,4642
S_coruhensis (Marmara), S_rizeensis (Western Black Sea)	4,3939	0,059	35	0,0077
S_coruhensis (Marmara), S_rizeensis (Yeşilırmak)	1,6852	0,0979	10	0,1884
S_coruhensis (Marmara), S_rizeensis (Eastern Black Sea)	6,6642	0,2479	4	0,022
S_coruhensis (Marmara), S_tigridis	0,23058	0,8586	84	0,8213
S_euphrata, S_fahrettini	3,3518	0,0144	219	0,0078
S_euphrata, S_kottelati	0,57437	0,6908	709	0,5748
S_euphrata, S_labecula	0,21773	0,8648	9896	0,8266
S_euphrata, S_munzuricus	1,3735	0,1887	8059	0,1885
S_euphrata, S_okumusi	5,6369	0,0004	8071	0,0001
S_euphrata, S_opimus (Antalya)	1,7219	0,1014	1971	0,1132
S_euphrata, S_opimus (Eastern Mediterranean)	1,045	0,397	708	0,3171
S_euphrata, S_opimus (Ceyhan)	3,565	0,0009	9907	0,0006
S_euphrata, S_platycephalus	0,39764	0,793	1978	0,7031
S_euphrata, S_rizeensis (Çoruh)	0,10473	0,9523	220	0,9255
S_euphrata, S_rizeensis (Western Black Sea)	3,485	0,0012	708	0,0058
S_euphrata, S_rizeensis (Yeşilırmak)	1,1443	0,225	55	0,2849

S_euphrata, S_rizeensis (Eastern Black Sea)	1,0547	0,1991	9	0,3196
S_euphrata, S_tigridis	0,80748	0,5602	4290	0,4349
S_fahrettini, S_kottelati	3,2793	0,0556	35	0,0215
S_fahrettini, S_labecula	6,1071	0,0011	816	0,0001
S_fahrettini, S_munzuricus	1,8263	0,0908	220	0,095
S_fahrettini, S_okumusi	1,3593	0,2083	220	0,2024
S_fahrettini, S_opimus (Antalya)	0,12646	0,9274	56	0,9128
S_fahrettini, S_opimus (Eastern Mediterranean)	1,9493	0,1432	35	0,1118
S_fahrettini, S_opimus (Ceyhan)	0,65517	0,5248	7702	0,5238
S_fahrettini, S_platycephalus	1,8237	0,1491	56	0,1128
S_fahrettini, S_rizeensis (Çoruh)	3,1777	0,0992	10	0,0349
S_fahrettini, S_rizeensis (Western Black Sea)	7,2169	0,0264	35	0,0011
S_fahrettini, S_rizeensis (Yeşilırmak)	1,1429	0,4003	10	0,3347
S_fahrettini, S_rizeensis (Eastern Black Sea)	3,0004	0,2547	4	0,0945
S_fahrettini, S_tigridis	5,3258	0,0132	84	0,0012
S_kottelati, S_labecula	1,2635	0,223	3585	0,2197
S_kottelati, S_munzuricus	0,63371	0,5516	714	0,5443
S_kottelati, S_okumusi	3,8407	0,0065	715	0,0021
S_kottelati, S_opimus (Antalya)	0,99976	0,4476	126	0,3461
S_kottelati, S_opimus (Eastern Mediterranean)	0,53355	0,6257	35	0,6185
S_kottelati, S_opimus (Ceyhan)	2,1684	0,034	9693	0,034
S_kottelati, S_platycephalus	7,1987E-2	0,9827	126	0,9493
S_kottelati, S_rizeensis (Çoruh)	0,73039	0,4516	35	0,4993
S_kottelati, S_rizeensis (Western Black Sea)	5,4274	0,0319	35	0,0013
S_kottelati, S_rizeensis (Yeşilırmak)	0,80372	0,598	15	0,4732
S_kottelati, S_rizeensis (Eastern Black Sea)	2,1533	0,1933	5	0,1254
S_kottelati, S_tigridis	1,8746	0,1028	210	0,0965
S_labecula, S_munzuricus	2,197	0,034	9841	0,0392
S_labecula, S_okumusi	8,1472	0,0001	9851	0,0001
S_labecula, S_opimus (Antalya)	2,4289	0,0456	7379	0,029
S_labecula, S_opimus (Eastern Mediterranean)	1,9138	0,0658	3566	0,0704
S_labecula, S_opimus (Ceyhan)	4,738	0,0001	9891	0,0001
S_labecula, S_platycephalus	0,74085	0,4833	7355	0,4647
S_labecula, S_rizeensis (Çoruh)	1,3249E-2	0,9969	815	0,9951
S_labecula, S_rizeensis (Western Black Sea)	6,1811	0,0001	3551	0,0001
S_labecula, S_rizeensis (Yeşilırmak)	2,1261	0,0745	136	0,048
S_labecula, S_rizeensis (Eastern Black Sea)	1,9606	0,0625	16	0,0677
S_labecula, S_tigridis	1,1792	0,2521	8969	0,2502
S_munzuricus, S_okumusi	4,1414	0,0007	8155	0,0006
S_munzuricus, S_opimus (Antalya)	1,1147	0,2985	1987	0,2905
S_munzuricus, S_opimus (Eastern Mediterranean)	0,12571	0,8973	714	0,907

S_munzuricus, S_opimus (Ceyhan)	2,7275	0,0086	9919	0,0088
S_munzuricus, S_platycephalus	0,59034	0,5553	1983	0,5714
S_munzuricus, S_rizeensis (Çoruh)	1,0171	0,3281	220	0,3367
S_munzuricus, S_rizeensis (Western Black Sea)	3,8979	0,0033	714	0,003
S_munzuricus, S_rizeensis (Yeşilırmak)	0,22084	0,8548	55	0,8349
S_munzuricus, S_rizeensis (Eastern Black Sea)	1,3838	0,2029	10	0,1946
S_munzuricus, S_tigridis	1,9927	0,0685	4306	0,0728
S_okumusi, S_opimus (Antalya)	0,97805	0,3396	1980	0,3433
S_okumusi, S_opimus (Eastern Mediterranean)	3,2559	0,0115	714	0,0069
S_okumusi, S_opimus (Ceyhan)	0,42029	0,6794	9890	0,6885
S_okumusi, S_platycephalus	3,6295	0,0062	1988	0,0036
S_okumusi, S_rizeensis (Çoruh)	3,6634	0,0091	220	0,0045
S_okumusi, S_rizeensis (Western Black Sea)	6,4203	0,0012	715	0,0001
S_okumusi, S_rizeensis (Yeşilırmak)	2,0719	0,0952	55	0,0668
S_okumusi, S_rizeensis (Eastern Black Sea)	2,7408	0,0995	10	0,0262
S_okumusi, S_tigridis	5,6869	0,0005	4292	0,0001
S_opimus (Antalya), S_opimus (Eastern Mediterranean)	0,80764	0,4401	126	0,439
S_opimus (Antalya), S_opimus (Ceyhan)	0,77166	0,4477	9878	0,4515
S_opimus (Antalya), S_platycephalus	1,0609	0,334	126	0,3206
S_opimus (Antalya), S_rizeensis (Çoruh)	1,0131	0,3927	56	0,3548
S_opimus (Antalya), S_rizeensis (Western Black Sea)	2,1324	0,0495	126	0,069
S_opimus (Antalya), S_rizeensis (Yeşilırmak)	0,44436	0,9038	21	0,6759
S_opimus (Antalya), S_rizeensis (Eastern Black Sea)	0,80923	0,5	6	0,4598
S_opimus (Antalya), S_tigridis	1,6851	0,156	462	0,1268
S_opimus (Eastern Mediterranean), S_opimus (Ceyhan)	1,9099	0,0641	9702	0,0611
S_opimus (Eastern Mediterranean), S_platycephalus	0,38496	0,7355	126	0,7072
S_opimus (Eastern Mediterranean), S_rizeensis (Çoruh)	0,93825	0,3783	35	0,3897
S_opimus (Eastern Mediterranean), S_rizeensis (Western Black Sea)	4,0764	0,0289	35	0,0062
S_opimus (Eastern Mediterranean), S_rizeensis (Yeşilırmak)	0,29466	0,6	15	0,7828
S_opimus (Eastern Mediterranean), S_rizeensis (Eastern Black Sea)	1,4145	0,4121	5	0,2482
S_opimus (Eastern Mediterranean), S_tigridis	1,9506	0,0856	210	0,0837
S_opimus (Ceyhan), S_platycephalus	2,4124	0,0172	9883	0,0182
S_opimus (Ceyhan), S_rizeensis (Çoruh)	2,1187	0,0341	7684	0,0411
S_opimus (Ceyhan), S_rizeensis (Western Black Sea)	3,7946	0,0003	9689	0,0002
S_opimus (Ceyhan), S_rizeensis (Yeşilırmak)	1,1855	0,2616	1124	0,244
S_opimus (Ceyhan), S_rizeensis (Eastern Black Sea)	1,6119	0,0881	47	0,1112
S_opimus (Ceyhan), S_tigridis	3,2683	0,0017	9909	0,002
S_platycephalus, S_rizeensis (Çoruh)	0,33244	0,8863	56	0,7523
S_platycephalus, S_rizeensis (Western Black Sea)	2,4801	0,0166	126	0,0419
S_platycephalus, S_rizeensis (Yeşilırmak)	0,50364	0,8591	21	0,6346
S_platycephalus, S_rizeensis (Eastern Black Sea)	0,76802	0,3354	6	0,4931

S_platycephalus, S_tigridis	0,9035	0,5158	462	0,3918
S_rizeensis (Çoruh), S_rizeensis (Western Black Sea)	3,6154	0,028	35	0,0123
S_rizeensis (Çoruh), S_rizeensis (Yeşilırmak)	1,0133	0,4904	10	0,3911
S_rizeensis (Çoruh), S_rizeensis (Eastern Black Sea)	1,1439	0,5	4	0,3687
S_rizeensis (Çoruh), S_tigridis	0,67572	0,4727	84	0,5232
S_rizeensis (Western Black Sea), S_rizeensis (Yeşilırmak)	3,5704	0,0632	15	0,0228
S_rizeensis (Western Black Sea), S_rizeensis (Eastern Black Sea)	1,2532	0,4027	5	0,2994
S_rizeensis (Western Black Sea), S_tigridis	4,3493	0,0051	210	0,0028
S_rizeensis (Yeşilırmak), S_rizeensis (Eastern Black Sea)	1,0772	0,6654	3	0,4814
S_rizeensis (Yeşilırmak), S_tigridis	2,0128	0,1052	28	0,0886
S_rizeensis (Eastern Black Sea), S_tigridis	1,2933	0,4205	7	0,2524

Denominators

Groups	Denominator	Den.df
S_abanticus, S_chilo	1*Res	6
S_abanticus, S_coruhensis (Sakarya)	1*Res	6
S_abanticus, S_coruhensis (Yeşilırmak)	1*Res	5
S_abanticus, S_coruhensis (Çoruh)	1*Res	25
S_abanticus, S_coruhensis (Eastern Black Sea)	1*Res	6
S_abanticus, S_coruhensis (Marmara)	1*Res	4
S_abanticus, S_euphrata	1*Res	10
S_abanticus, S_fahrettini	1*Res	4
S_abanticus, S_kottelati	1*Res	5
S_abanticus, S_labecula	1*Res	16
S_abanticus, S_munzuricus	1*Res	10
S_abanticus, S_okumusi	1*Res	10
S_abanticus, S_opimus (Antalya)	1*Res	6
S_abanticus, S_opimus (Eastern Mediterranean)	1*Res	5
S_abanticus, S_opimus (Ceyhan)	1*Res	47
S_abanticus, S_platycephalus	1*Res	6
S_abanticus, S_rizeensis (Çoruh)	1*Res	4
S_abanticus, S_rizeensis (Western Black Sea)	1*Res	5
S_abanticus, S_rizeensis (Yeşilırmak)	1*Res	3
S_abanticus, S_rizeensis (Eastern Black Sea)	1*Res	2
S_abanticus, S_tigridis	1*Res	7
S_chilo, S_coruhensis (Sakarya)	1*Res	8
S_chilo, S_coruhensis (Yeşilırmak)	1*Res	7
S_chilo, S_coruhensis (Çoruh)	1*Res	27
S_chilo, S_coruhensis (Eastern Black Sea)	1*Res	8
S_chilo, S_coruhensis (Marmara)	1*Res	6
S_chilo, S_euphrata	1*Res	12

S_chilo, S_fahrettini	1*Res	6
S_chilo, S_kottelati	1*Res	7
S_chilo, S_labecula	1*Res	18
S_chilo, S_munzuricus	1*Res	12
S_chilo, S_okumusi	1*Res	12
S_chilo, S_opimus (Antalya)	1*Res	8
S_chilo, S_opimus (Eastern Mediterranean)	1*Res	7
S_chilo, S_opimus (Ceyhan)	1*Res	49
S_chilo, S_platycephalus	1*Res	8
S_chilo, S_rizeensis (Çoruh)	1*Res	6
S_chilo, S_rizeensis (Western Black Sea)	1*Res	7
S_chilo, S_rizeensis (Yeşilırmak)	1*Res	5
S_chilo, S_rizeensis (Eastern Black Sea)	1*Res	4
S_chilo, S_tigridis	1*Res	9
S_coruhensis (Sakarya), S_coruhensis (Yeşilırmak)	1*Res	7
S_coruhensis (Sakarya), S_coruhensis (Çoruh)	1*Res	27
S_coruhensis (Sakarya), S_coruhensis (Eastern Black Sea)	1*Res	8
S_coruhensis (Sakarya), S_coruhensis (Marmara)	1*Res	6
S_coruhensis (Sakarya), S_euphrata	1*Res	12
S_coruhensis (Sakarya), S_fahrettini	1*Res	6
S_coruhensis (Sakarya), S_kottelati	1*Res	7
S_coruhensis (Sakarya), S_labecula	1*Res	18
S_coruhensis (Sakarya), S_munzuricus	1*Res	12
S_coruhensis (Sakarya), S_okumusi	1*Res	12
S_coruhensis (Sakarya), S_opimus (Antalya)	1*Res	8
S_coruhensis (Sakarya), S_opimus (Eastern Mediterranean)	1*Res	7
S_coruhensis (Sakarya), S_opimus (Ceyhan)	1*Res	49
S_coruhensis (Sakarya), S_platycephalus	1*Res	8
S_coruhensis (Sakarya), S_rizeensis (Çoruh)	1*Res	6
S_coruhensis (Sakarya), S_rizeensis (Western Black Sea)	1*Res	7
S_coruhensis (Sakarya), S_rizeensis (Yeşilırmak)	1*Res	5
S_coruhensis (Sakarya), S_rizeensis (Eastern Black Sea)	1*Res	4
S_coruhensis (Sakarya), S_tigridis	1*Res	9
S_coruhensis (Yeşilırmak), S_coruhensis (Çoruh)	1*Res	26
S_coruhensis (Yeşilırmak), S_coruhensis (Eastern Black Sea)	1*Res	7
S_coruhensis (Yeşilırmak), S_coruhensis (Marmara)	1*Res	5
S_coruhensis (Yeşilırmak), S_euphrata	1*Res	11
S_coruhensis (Yeşilırmak), S_fahrettini	1*Res	5
S_coruhensis (Yeşilırmak), S_kottelati	1*Res	6
S_coruhensis (Yeşilırmak), S_labecula	1*Res	17
S_coruhensis (Yeşilırmak), S_munzuricus	1*Res	11

S_coruhensis (Yeşilırmak), S_okumusi	1*Res	11
S_coruhensis (Yeşilırmak), S_opimus (Antalya)	1*Res	7
S_coruhensis (Yeşilırmak), S_opimus (Eastern Mediterranean)	1*Res	6
S_coruhensis (Yeşilırmak), S_opimus (Ceyhan)	1*Res	48
S_coruhensis (Yeşilırmak), S_platycephalus	1*Res	7
S_coruhensis (Yeşilırmak), S_rizeensis (Çoruh)	1*Res	5
S_coruhensis (Yeşilırmak), S_rizeensis (Western Black Sea)	1*Res	6
S_coruhensis (Yeşilırmak), S_rizeensis (Yeşilırmak)	1*Res	4
S_coruhensis (Yeşilırmak), S_rizeensis (Eastern Black Sea)	1*Res	3
S_coruhensis (Yeşilırmak), S_tigridis	1*Res	8
S_coruhensis (Çoruh), S_coruhensis (Eastern Black Sea)	1*Res	27
S_coruhensis (Çoruh), S_coruhensis (Marmara)	1*Res	25
S_coruhensis (Çoruh), S_euphrata	1*Res	31
S_coruhensis (Çoruh), S_fahrettini	1*Res	25
S_coruhensis (Çoruh), S_kottelati	1*Res	26
S_coruhensis (Çoruh), S_labecula	1*Res	37
S_coruhensis (Çoruh), S_munzuricus	1*Res	31
S_coruhensis (Çoruh), S_okumusi	1*Res	31
S_coruhensis (Çoruh), S_opimus (Antalya)	1*Res	27
S_coruhensis (Çoruh), S_opimus (Eastern Mediterranean)	1*Res	26
S_coruhensis (Çoruh), S_opimus (Ceyhan)	1*Res	68
S_coruhensis (Çoruh), S_platycephalus	1*Res	27
S_coruhensis (Çoruh), S_rizeensis (Çoruh)	1*Res	25
S_coruhensis (Çoruh), S_rizeensis (Western Black Sea)	1*Res	26
S_coruhensis (Çoruh), S_rizeensis (Yeşilırmak)	1*Res	24
S_coruhensis (Çoruh), S_rizeensis (Eastern Black Sea)	1*Res	23
S_coruhensis (Çoruh), S_tigridis	1*Res	28
S_coruhensis (Eastern Black Sea), S_coruhensis (Marmara)	1*Res	6
S_coruhensis (Eastern Black Sea), S_euphrata	1*Res	12
S_coruhensis (Eastern Black Sea), S_fahrettini	1*Res	6
S_coruhensis (Eastern Black Sea), S_kottelati	1*Res	7
S_coruhensis (Eastern Black Sea), S_labecula	1*Res	18
S_coruhensis (Eastern Black Sea), S_munzuricus	1*Res	12
S_coruhensis (Eastern Black Sea), S_okumusi	1*Res	12
S_coruhensis (Eastern Black Sea), S_opimus (Antalya)	1*Res	8
S_coruhensis (Eastern Black Sea), S_opimus (Eastern Mediterranean)	1*Res	7
S_coruhensis (Eastern Black Sea), S_opimus (Ceyhan)	1*Res	49
S_coruhensis (Eastern Black Sea), S_platycephalus	1*Res	8
S_coruhensis (Eastern Black Sea), S_rizeensis (Çoruh)	1*Res	6
S_coruhensis (Eastern Black Sea), S_rizeensis (Western Black Sea)	1*Res	7
S_coruhensis (Eastern Black Sea), S_rizeensis (Yeşilırmak)	1*Res	5

S_coruhensis (Eastern Black Sea), S_rizeensis (Eastern Black Sea)	1*Res	4
S_coruhensis (Eastern Black Sea), S_tigridis	1*Res	9
S_coruhensis (Marmara), S_euphrata	1*Res	10
S_coruhensis (Marmara), S_fahrettini	1*Res	4
S_coruhensis (Marmara), S_kottelati	1*Res	5
S_coruhensis (Marmara), S_labecula	1*Res	16
S_coruhensis (Marmara), S_munzuricus	1*Res	10
S_coruhensis (Marmara), S_okumusi	1*Res	10
S_coruhensis (Marmara), S_opimus (Antalya)	1*Res	6
S_coruhensis (Marmara), S_opimus (Eastern Mediterranean)	1*Res	5
S_coruhensis (Marmara), S_opimus (Ceyhan)	1*Res	47
S_coruhensis (Marmara), S_platycephalus	1*Res	6
S_coruhensis (Marmara), S_rizeensis (Çoruh)	1*Res	4
S_coruhensis (Marmara), S_rizeensis (Western Black Sea)	1*Res	5
S_coruhensis (Marmara), S_rizeensis (Yeşilırmak)	1*Res	3
S_coruhensis (Marmara), S_rizeensis (Eastern Black Sea)	1*Res	2
S_coruhensis (Marmara), S_tigridis	1*Res	7
S_euphrata, S_fahrettini	1*Res	10
S_euphrata, S_kottelati	1*Res	11
S_euphrata, S_labecula	1*Res	22
S_euphrata, S_munzuricus	1*Res	16
S_euphrata, S_okumusi	1*Res	16
S_euphrata, S_opimus (Antalya)	1*Res	12
S_euphrata, S_opimus (Eastern Mediterranean)	1*Res	11
S_euphrata, S_opimus (Ceyhan)	1*Res	53
S_euphrata, S_platycephalus	1*Res	12
S_euphrata, S_rizeensis (Çoruh)	1*Res	10
S_euphrata, S_rizeensis (Western Black Sea)	1*Res	11
S_euphrata, S_rizeensis (Yeşilırmak)	1*Res	9
S_euphrata, S_rizeensis (Eastern Black Sea)	1*Res	8
S_euphrata, S_tigridis	1*Res	13
S_fahrettini, S_kottelati	1*Res	5
S_fahrettini, S_labecula	1*Res	16
S_fahrettini, S_munzuricus	1*Res	10
S_fahrettini, S_okumusi	1*Res	10
S_fahrettini, S_opimus (Antalya)	1*Res	6
S_fahrettini, S_opimus (Eastern Mediterranean)	1*Res	5
S_fahrettini, S_opimus (Ceyhan)	1*Res	47
S_fahrettini, S_platycephalus	1*Res	6
S_fahrettini, S_rizeensis (Çoruh)	1*Res	4
S_fahrettini, S_rizeensis (Western Black Sea)	1*Res	5

S_fahrettini, S_rizeensis (Yeşilırmak)	1*Res	3
S_fahrettini, S_rizeensis (Eastern Black Sea)	1*Res	2
S_fahrettini, S_tigridis	1*Res	7
S_kottelati, S_labecula	1*Res	17
S_kottelati, S_munzuricus	1*Res	11
S_kottelati, S_okumusi	1*Res	11
S_kottelati, S_opimus (Antalya)	1*Res	7
S_kottelati, S_opimus (Eastern Mediterranean)	1*Res	6
S_kottelati, S_opimus (Ceyhan)	1*Res	48
S_kottelati, S_platycephalus	1*Res	7
S_kottelati, S_rizeensis (Çoruh)	1*Res	5
S_kottelati, S_rizeensis (Western Black Sea)	1*Res	6
S_kottelati, S_rizeensis (Yeşilırmak)	1*Res	4
S_kottelati, S_rizeensis (Eastern Black Sea)	1*Res	3
S_kottelati, S_tigridis	1*Res	8
S_labecula, S_munzuricus	1*Res	22
S_labecula, S_okumusi	1*Res	22
S_labecula, S_opimus (Antalya)	1*Res	18
S_labecula, S_opimus (Eastern Mediterranean)	1*Res	17
S_labecula, S_opimus (Ceyhan)	1*Res	59
S_labecula, S_platycephalus	1*Res	18
S_labecula, S_rizeensis (Çoruh)	1*Res	16
S_labecula, S_rizeensis (Western Black Sea)	1*Res	17
S_labecula, S_rizeensis (Yeşilırmak)	1*Res	15
S_labecula, S_rizeensis (Eastern Black Sea)	1*Res	14
S_labecula, S_tigridis	1*Res	19
S_munzuricus, S_okumusi	1*Res	16
S_munzuricus, S_opimus (Antalya)	1*Res	12
S_munzuricus, S_opimus (Eastern Mediterranean)	1*Res	11
S_munzuricus, S_opimus (Ceyhan)	1*Res	53
S_munzuricus, S_platycephalus	1*Res	12
S_munzuricus, S_rizeensis (Çoruh)	1*Res	10
S_munzuricus, S_rizeensis (Western Black Sea)	1*Res	11
S_munzuricus, S_rizeensis (Yeşilırmak)	1*Res	9
S_munzuricus, S_rizeensis (Eastern Black Sea)	1*Res	8
S_munzuricus, S_tigridis	1*Res	13
S_okumusi, S_opimus (Antalya)	1*Res	12
S_okumusi, S_opimus (Eastern Mediterranean)	1*Res	11
S_okumusi, S_opimus (Ceyhan)	1*Res	53
S_okumusi, S_platycephalus	1*Res	12
S_okumusi, S_rizeensis (Çoruh)	1*Res	10

S_okumusi, S_rizeensis (Western Black Sea)	1*Res	11
S_okumusi, S_rizeensis (Yeşilırmak)	1*Res	9
S_okumusi, S_rizeensis (Eastern Black Sea)	1*Res	8
S_okumusi, S_tigridis	1*Res	13
S_opimus (Antalya), S_opimus (Eastern Mediterranean)	1*Res	7
S_opimus (Antalya), S_opimus (Ceyhan)	1*Res	49
S_opimus (Antalya), S_platycephalus	1*Res	8
S_opimus (Antalya), S_rizeensis (Çoruh)	1*Res	6
S_opimus (Antalya), S_rizeensis (Western Black Sea)	1*Res	7
S_opimus (Antalya), S_rizeensis (Yeşilırmak)	1*Res	5
S_opimus (Antalya), S_rizeensis (Eastern Black Sea)	1*Res	4
S_opimus (Antalya), S_tigridis	1*Res	9
S_opimus (Eastern Mediterranean), S_opimus (Ceyhan)	1*Res	48
S_opimus (Eastern Mediterranean), S_platycephalus	1*Res	7
S_opimus (Eastern Mediterranean), S_rizeensis (Çoruh)	1*Res	5
S_opimus (Eastern Mediterranean), S_rizeensis (Western Black Sea)	1*Res	6
S_opimus (Eastern Mediterranean), S_rizeensis (Yeşilırmak)	1*Res	4
S_opimus (Eastern Mediterranean), S_rizeensis (Eastern Black Sea)	1*Res	3
S_opimus (Eastern Mediterranean), S_tigridis	1*Res	8
S_opimus (Ceyhan), S_platycephalus	1*Res	49
S_opimus (Ceyhan), S_rizeensis (Çoruh)	1*Res	47
S_opimus (Ceyhan), S_rizeensis (Western Black Sea)	1*Res	48
S_opimus (Ceyhan), S_rizeensis (Yeşilırmak)	1*Res	46
S_opimus (Ceyhan), S_rizeensis (Eastern Black Sea)	1*Res	45
S_opimus (Ceyhan), S_tigridis	1*Res	50
S_platycephalus, S_rizeensis (Çoruh)	1*Res	6
S_platycephalus, S_rizeensis (Western Black Sea)	1*Res	7
S_platycephalus, S_rizeensis (Yeşilırmak)	1*Res	5
S_platycephalus, S_rizeensis (Eastern Black Sea)	1*Res	4
S_platycephalus, S_tigridis	1*Res	9
S_rizeensis (Çoruh), S_rizeensis (Western Black Sea)	1*Res	5
S_rizeensis (Çoruh), S_rizeensis (Yeşilırmak)	1*Res	3
S_rizeensis (Çoruh), S_rizeensis (Eastern Black Sea)	1*Res	2
S_rizeensis (Çoruh), S_tigridis	1*Res	7
S_rizeensis (Western Black Sea), S_rizeensis (Yeşilırmak)	1*Res	4
S_rizeensis (Western Black Sea), S_rizeensis (Eastern Black Sea)	1*Res	3
S_rizeensis (Western Black Sea), S_tigridis	1*Res	8
S_rizeensis (Yeşilırmak), S_rizeensis (Eastern Black Sea)	1*Res	1
S_rizeensis (Yeşilırmak), S_tigridis	1*Res	6
S_rizeensis (Eastern Black Sea), S_tigridis	1*Res	5

Average Similarity between/within groups

	S_abanticus	S_chilo	S_coruhensis	(Sakarya)	S_coruhensis	(Yeşilırmak)
	S_coruhensis	(Çoruh)	S_coruhensis	(Eastern Black Sea)		
	S_coruhensis	(Marmara)			S_euphrata	
S_abanticus	99,407					
S_chilo	97,746	98,812				
S_coruhensis (Sakarya)	98,22	95,968		99,653		
S_coruhensis (Yeşilırmak)	97,109	97,299		95,499		96,171
S_coruhensis (Çoruh)	98,518	96,868		98,729		96,163
98,331						
S_coruhensis (Eastern Black Sea)	98,941	96,751		99,103		96,281
98,716			99,021			
S_coruhensis (Marmara)	99,245	96,992		98,975		96,522
98,774			99,32			99,786
S_euphrata	98,902	97,197		98,141		96,783
98,215			98,665			99,038
98,437						
S_fahrettini	95,691	97,725		93,915		97,101
94,905			94,697			94,937
95,529						
S_kottelati	99,098	98,239		97,546		97,211
98,066			98,323			98,571
98,417						
S_labecula	99,167	97,685		98,258		96,873
98,42			98,776			99,009
98,629						
S_munzuricus	97,833	97,9		96,722		96,905
97,169			97,241			97,423
97,392						
S_okumusi	93,083	95,316		91,315		95,282
92,309			92,093			92,332
93,087						
S_opimus (Antalya)	94,618	94,158		93,929		94,066
94,127			94,364			94,68
94,539						
S_opimus (Eastern Mediterranean)	98,151	98,058		96,906		97,04
97,403			97,543			97,838

97,731					
S_opimus (Ceyhan)	93,693	94,965		92,02	94,736
92,861			92,784		93,037
93,507					
S_platycephalus	98,123	96,802		97,567	96,522
97,595			97,944		98,221
97,896					
S_rizeensis (Çoruh)	98,879	97,651		98,257	96,731
98,333			98,642		98,795
98,419					
S_rizeensis (Western Black Sea)	96,479	94,23		98,258	93,764
97,244			97,474		97,233
96,401					
S_rizeensis (Yeşilırmak)	97,797	97,877		96,301	97,187
96,913			97,075		97,325
97,444					
S_rizeensis (Eastern Black Sea)	97,957	95,705		99,707	95,237
98,609			98,951		98,711
97,878					
S_tigridis	98,96	97,133		98,82	96,459
98,598			98,99		99,177
98,578					

	S_fahrettini	S_kottelati	S_labecula	S_munzuricus	S_okumusi	S_opimus
(Antalya)	S_opimus (Eastern Mediterranean)			S_opimus (Ceyhan)		
	S_platycephalus					
S_abanticus						
S_chilo						
S_coruhensis (Sakarya)						
S_coruhensis (Yeşilırmak)						
S_coruhensis (Çoruh)						
S_coruhensis (Eastern Black Sea)						
S_coruhensis (Marmara)						
S_euphrata						

S_fahrettini	97,571				
S_kottelati	96,364	98,642			
S_labecula	95,645	98,787	98,847		
S_munzuricus	96,686	97,919	97,734	97,156	
S_okumusi	96,742	93,754	93,037	94,391	96,43
S_opimus (Antalya) 91,942	93,742	94,48	94,494	94,154	93,225
S_opimus (Eastern Mediterranean) 94,303	96,776	98,201	97,974 97,297	97,576	94,394
S_opimus (Ceyhan) 93,064	95,508	94,115	93,581 94,295	94,281 94,235	95,148
S_platycephalus 94,281 96,757	95,57	97,748	97,915 97,214	96,975 93,573	93,344
S_rizeensis (Çoruh) 94,388 97,756	95,643	98,582	98,729 97,856	97,654 93,524	93,036
S_rizeensis (Western Black Sea) 92,203 95,875	92,182	95,806	96,525 95,167	94,993 90,296	89,59
S_rizeensis (Yeşilırmak) 94,227 97,003	97,056	97,873	97,575 97,693	97,371 94,531	94,964
S_rizeensis (Eastern Black Sea) 93,668 97,351	93,653	97,283	98,003 96,643	96,468 91,759	91,053
S_tigridis 94,416 97,877	95,079	98,45	98,796 97,69	97,468 93,087	92,473
(Yeşilırmak) S_abanticus		S_rizeensis (Çoruh) S_rizeensis (Eastern Black Sea)	S_rizeensis (Western Black Sea)	S_rizeensis S_tigridis	
S_chilo					

S_coruhensis (Sakarya)				
S_coruhensis (Yeşilırmak)				
S_coruhensis (Çoruh)				
S_coruhensis (Eastern Black Sea)				
S_coruhensis (Marmara)				
S_euphrata				
S_fahrettini				
S_kottelati				
S_labecula				
S_munzuricus				
S_okumusi				
S_opimus (Antalya)				
S_opimus (Eastern Mediterranean)				
S_opimus (Ceyhan)				
S_platycephalus				
S_rizeensis (Çoruh)	97,99			
S_rizeensis (Western Black Sea)	96,527		98,688	
S_rizeensis (Yeşilırmak)	97,444		94,564	
95,755				
S_rizeensis (Eastern Black Sea)	98,005		98,521	
96,039		0		
S_tigridis	98,657		97,092	
97,186		98,57		98,783

