Fig. S1. Site map depicting surveying and sampling from western Himalayas under the states Himachal Pradesh and Uttarakhand. Blue circles represent surveyed sites and red circles showed sites of species presence.

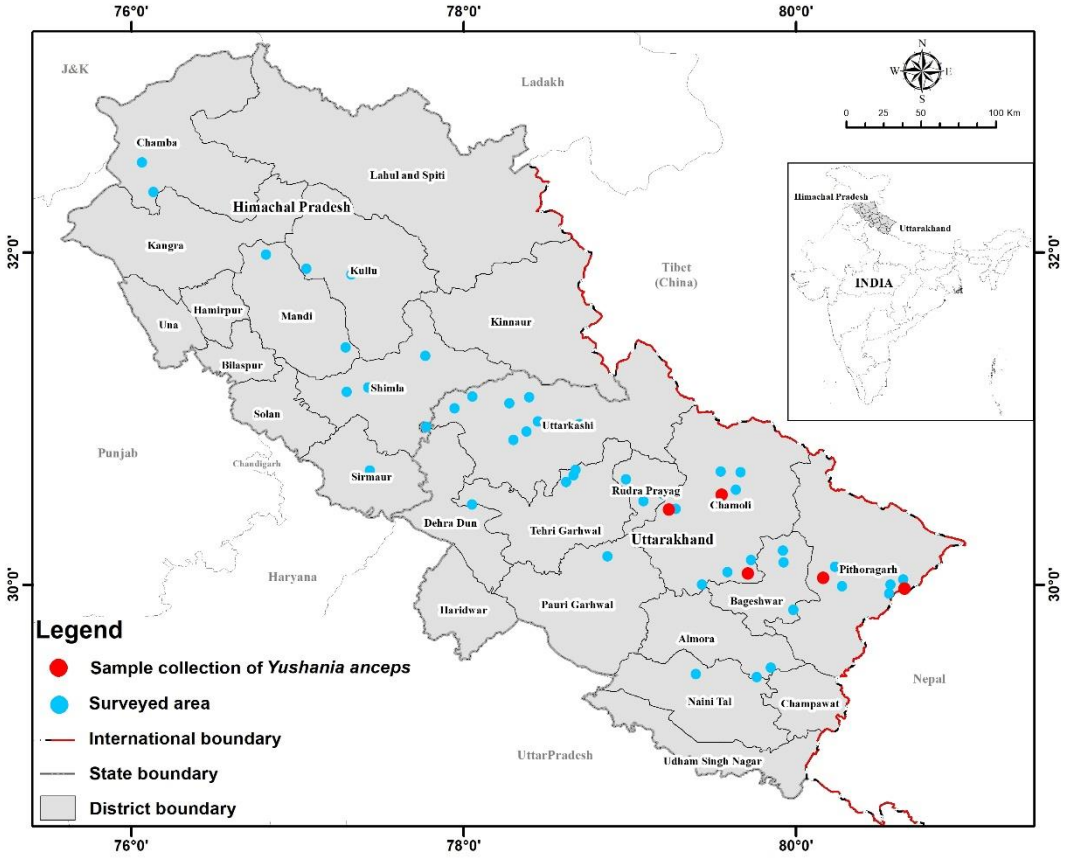

Fig. S2. Response curve of bioclimatic variables contributed to the habitat suitability for current distribution scenario: a) Bio 3 = Iso-thermality, b) Bio 7 = Annual temperature range, c) Bio 9 = Mean temperature of driest quarter, d) Bio 13 = Precipitation of wettest month, e) Bio 16 = Precipitation of wettest quarter, f) Bio 18 = Precipitation of warmest quarter, g) Bio 19 = Precipitation of coldest quarter, h) Alt = Altitude, i) Slop = Slope, j) Asp = Aspect, k) Soil, and l) DNI = Direct normal irradiance. The curves showed the mean response of the 20 replicate MaxEnt runs (red) and the mean +/- one standard deviation (blue, two shades for categorical variables)

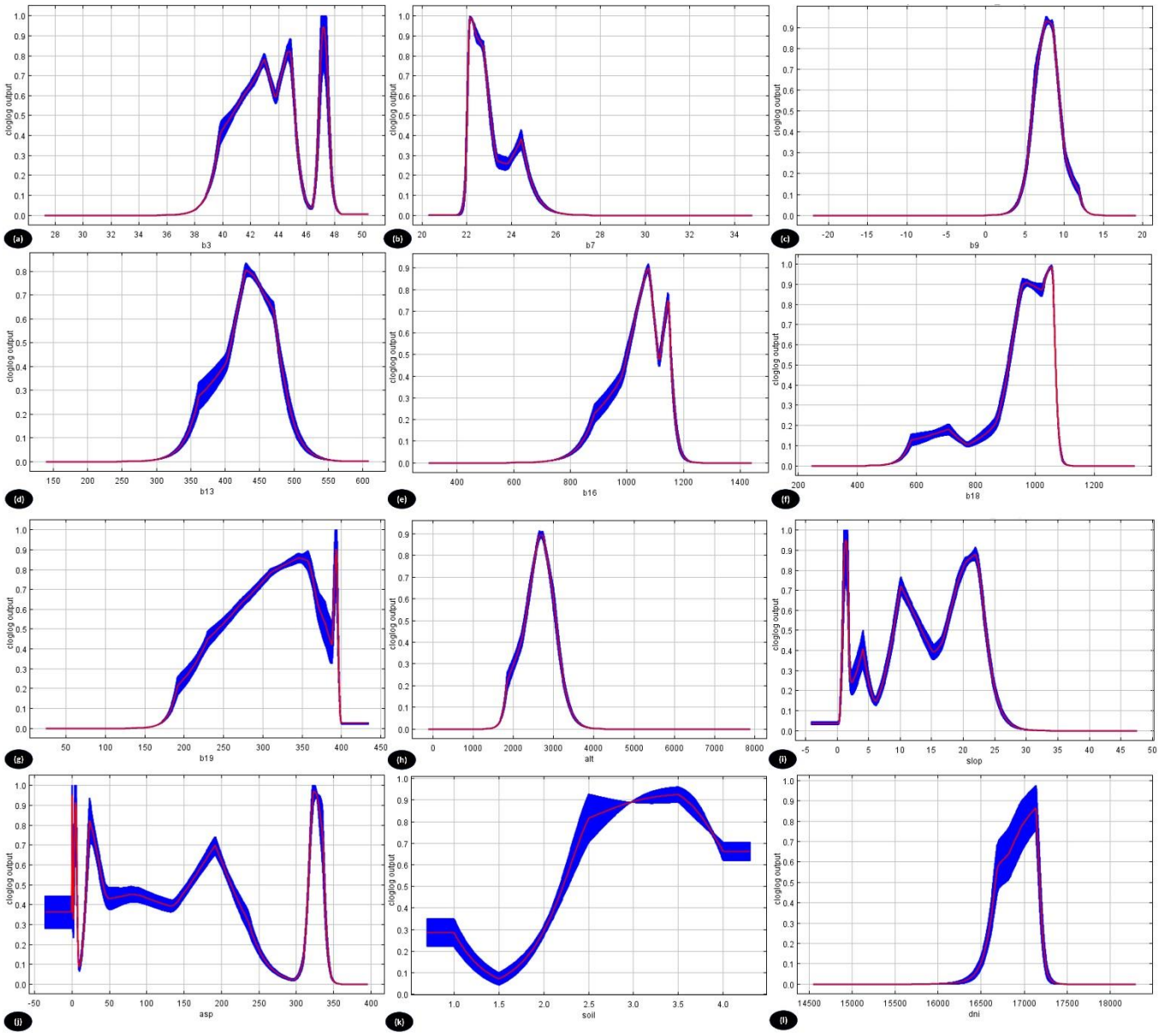

Fig. S3. Overlaying of MaxEnt output over Köppen-Geiger Climatic Classification (KGCC) map

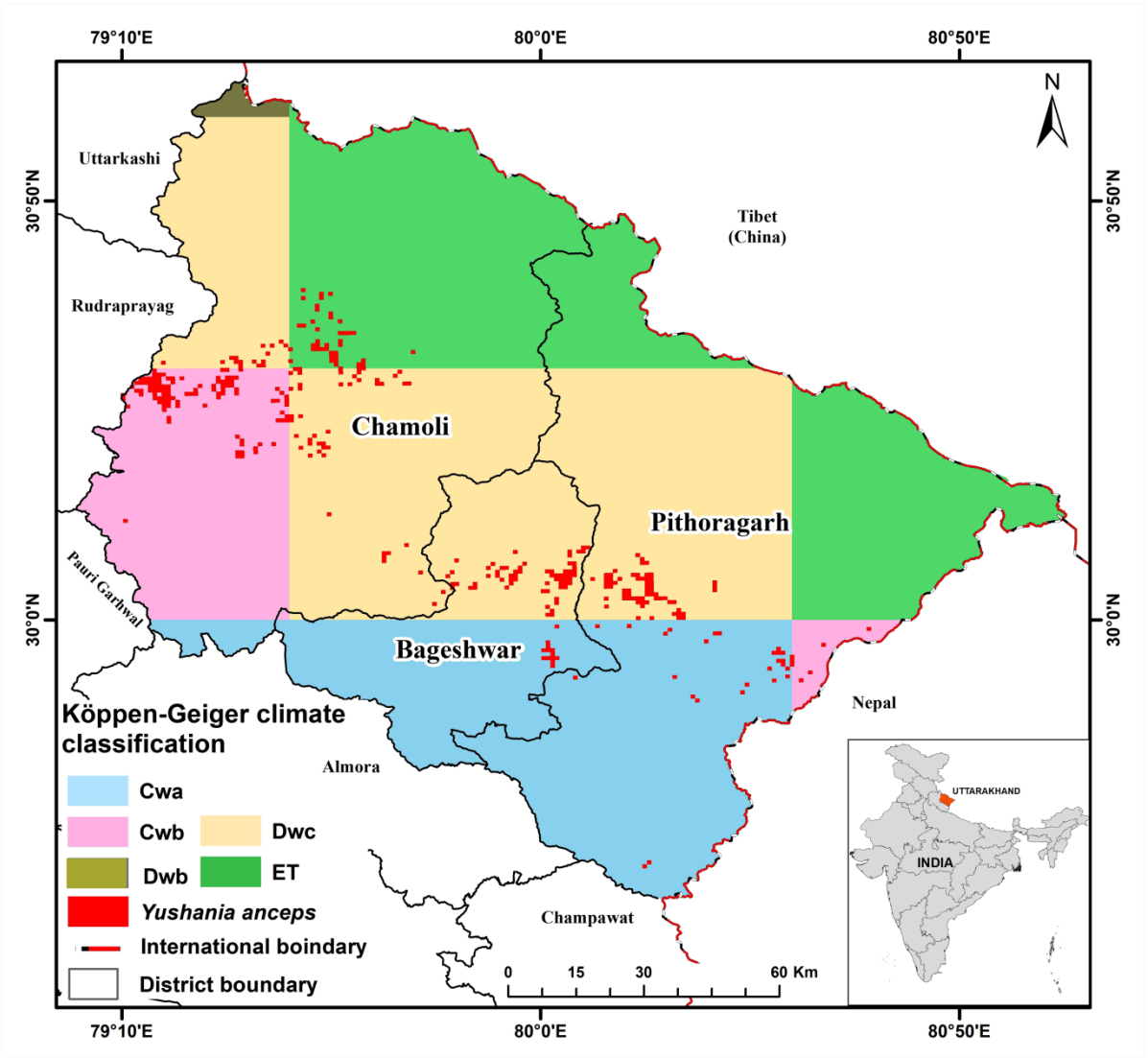

Fig. S4. Diversity maps generated by spatial overlaying of allelic richness (a) and private allelic richness (b)

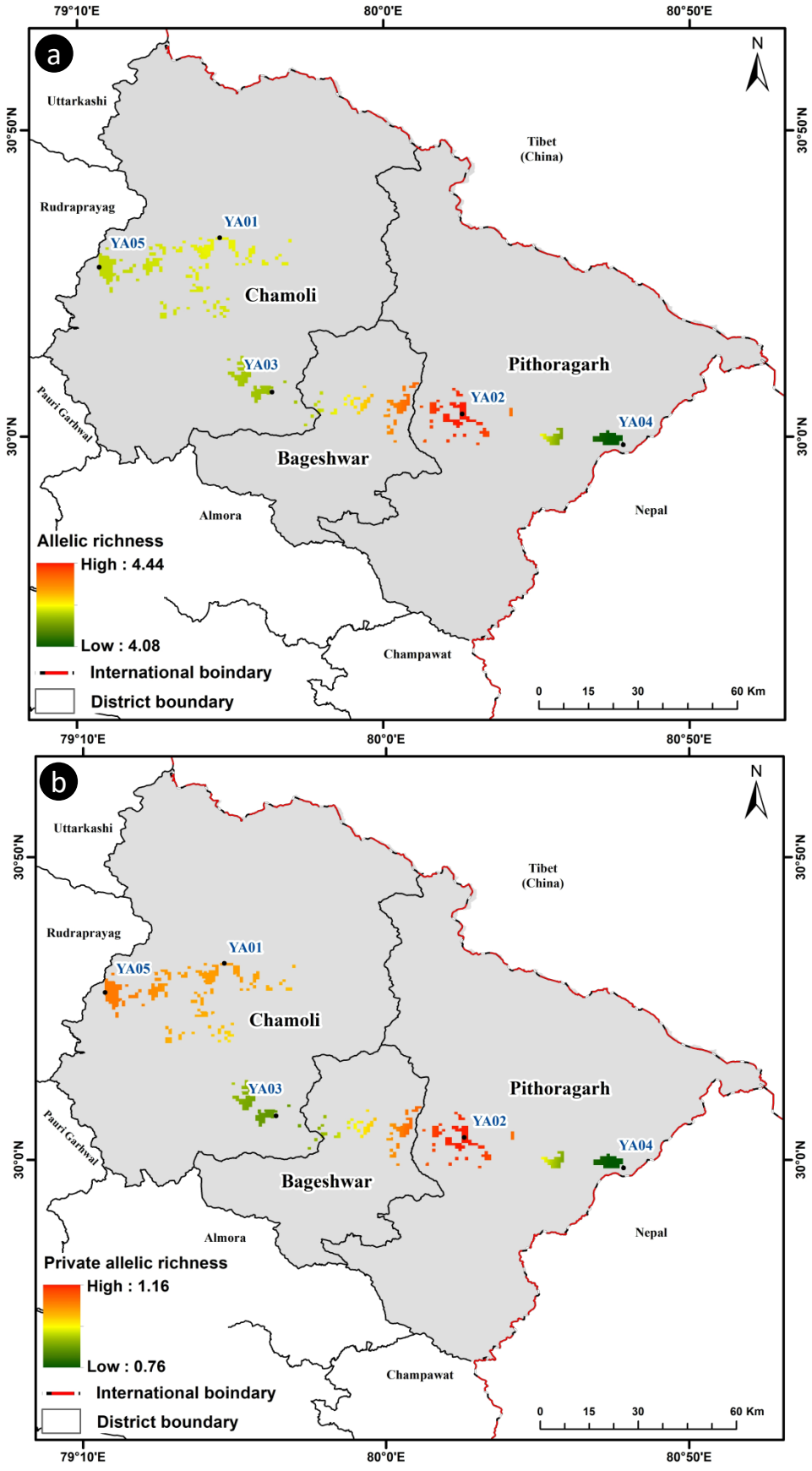

Fig. S5. Graphical representation of the estimated Ln probability of data (a) and ΔK (b) for each K value

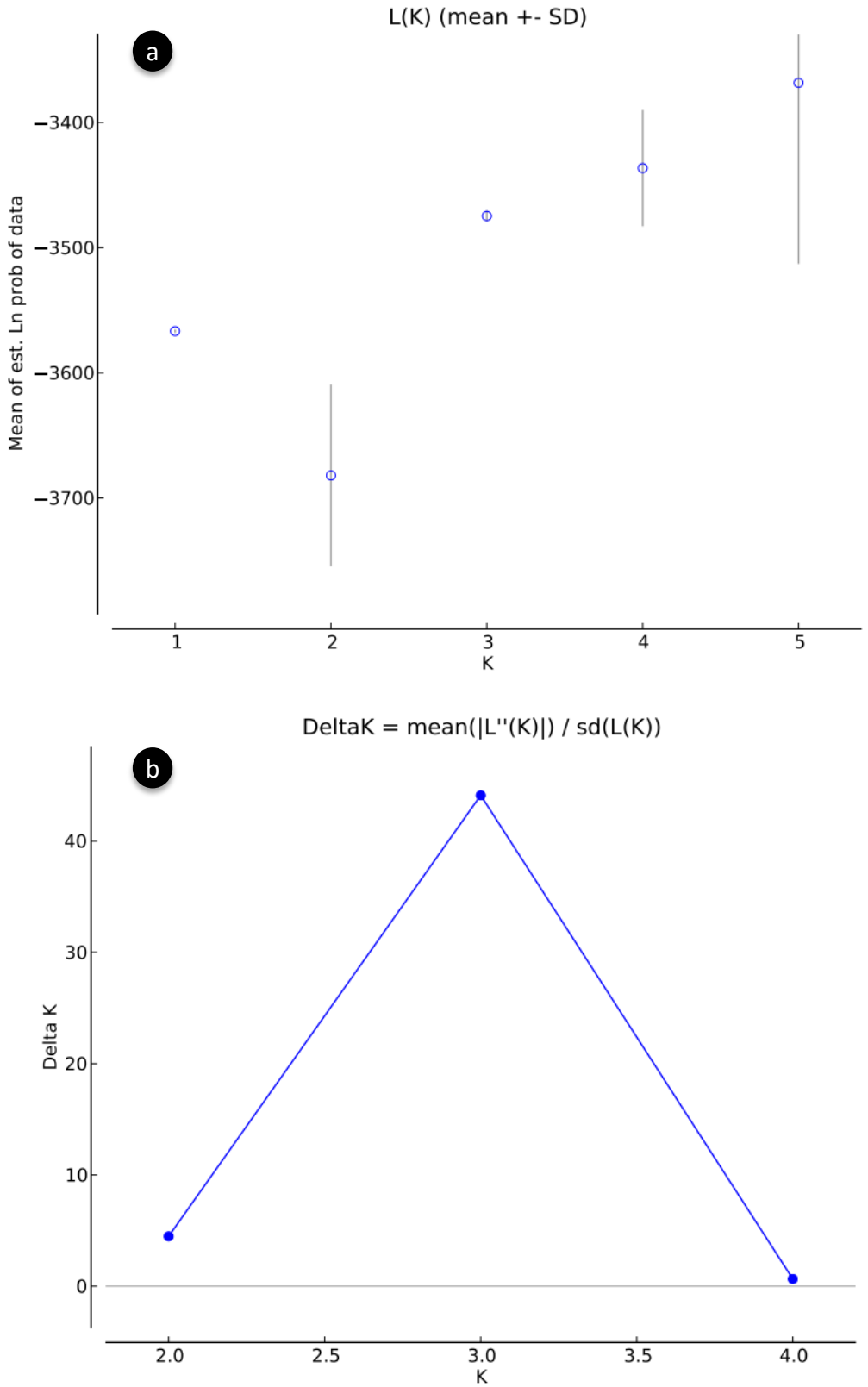

Fig. S6. Relationship between genetic (Pair-wise F_{ST}) and geographic distance (Km) for studied populations of *Yushania anceps*.

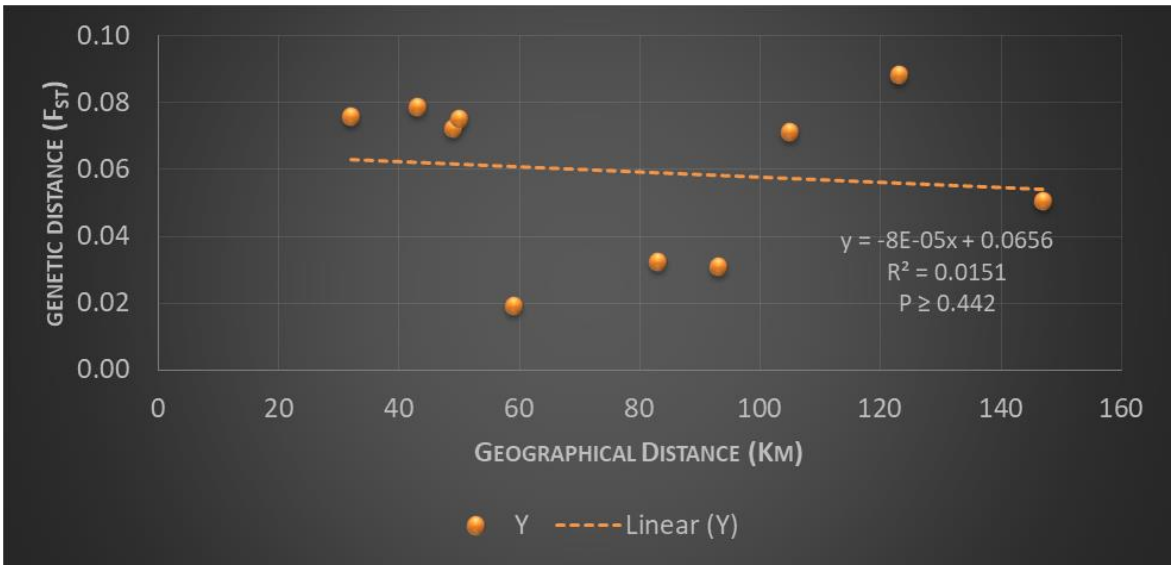

Fig. S7. Spatial genetic clustering of studied populations of *Yushania anceps* through principal coordinate analysis.

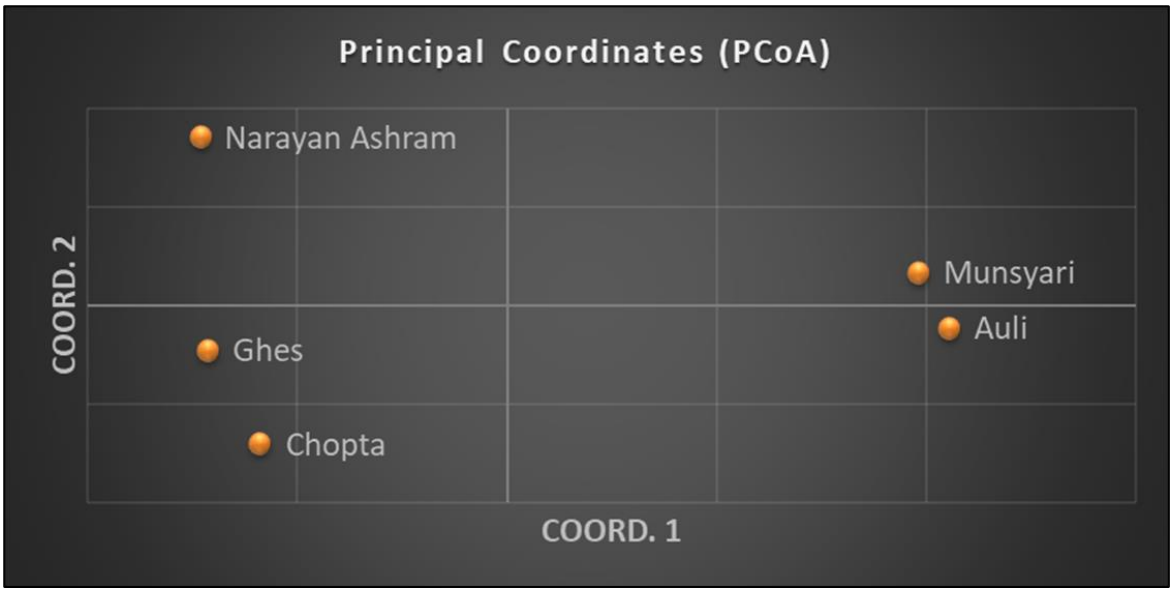

Table S1. Multi-collinearity test by using cross-correlations (Pearson correlation coefficients, r) among environmental variables

Variables	Bio 1	Bio 2	Bio 3	Bio 4	Bio 5	Bio 6	Bio 7	Bio 8	Bio 9	Bio 10	Bio 11	Bio 12	Bio 13	Bio 14	Bio 15	Bio 16	Bio 17	Bio 18	Bio 19	Alt	Slop	Asp	Soil	Dni	Prec	T_{av}	T_{max}	T_{min}	Vap	Wind
Bio 1	1.000	0.418	0.353	-0.304	0.987	-0.737	0.336	0.994	0.995	0.997	0.996	0.026	0.292	-0.149	0.238	0.119	-0.077	-0.492	-0.128	-0.987	0.075	0.101	-0.181	0.183	-0.007	0.790	0.767	0.788	0.599	-0.336
Bio 2		1.000	0.853	-0.094	0.543	-0.514	0.662	0.440	0.339	0.438	0.427	-0.681	-0.523	-0.529	0.342	-0.656	-0.644	-0.589	-0.566	-0.333	0.204	-0.142	0.022	-0.102	-0.670	0.394	0.519	0.233	0.477	0.227
Bio 3*			1.000	-0.515	0.440	-0.353	0.198	0.334	0.289	0.339	0.401	-0.836	-0.545	-0.810	0.617	-0.650	-0.879	-0.639	-0.840	-0.226	0.038	-0.144	0.209	-0.132	-0.806	0.467	0.593	0.302	0.649	0.241
Bio 4				1.000	-0.264	0.042	0.566	-0.210	-0.319	-0.243	-0.383	0.409	-0.083	0.786	-0.866	-0.038	0.637	0.499	0.757	0.215	0.293	-0.014	-0.228	0.101	0.389	-0.552	-0.549	-0.533	-0.740	0.198
Bio 5					1.000	-0.737	0.445	0.988	0.970	0.991	0.982	-0.072	0.187	-0.203	0.256	0.008	-0.155	-0.523	-0.189	-0.965	0.080	0.056	-0.162	0.177	-0.111	0.779	0.777	0.752	0.611	-0.272
Bio 6						1.000	-0.487	-0.758	-0.722	-0.744	-0.721	0.026	-0.126	0.031	-0.046	0.054	0.043	0.593	0.031	0.750	-0.486	-0.169	0.419	0.096	-0.064	-0.538	-0.536	-0.520	-0.361	0.216
Bio 7*							1.000	0.406	0.281	0.395	0.282	-0.054	-0.165	0.179	-0.245	-0.274	0.083	-0.211	0.159	-0.365	0.324	-0.048	-0.296	0.090	-0.113	0.092	0.149	0.026	-0.044	0.123
Bio 8								1.000	0.986	0.998	0.983	0.050	0.267	-0.079	0.150	0.094	-0.031	-0.450	-0.064	-0.986	0.115	0.104	-0.194	0.181	0.019	0.753	0.735	0.747	0.542	-0.313
Bio 9*									1.000	0.990	0.992	0.097	0.369	-0.111	0.231	0.201	-0.021	-0.470	-0.086	-0.991	0.074	0.131	-0.201	0.178	0.063	0.784	0.747	0.799	0.582	-0.379
Bio 10										1.000	0.988	0.043	0.285	-0.110	0.195	0.111	-0.048	-0.478	-0.092	-0.988	0.097	0.096	-0.194	0.182	0.005	0.768	0.747	0.765	0.567	-0.329
Bio 11											1.000	-0.022	0.278	-0.220	0.308	0.106	-0.141	-0.521	-0.199	-0.974	0.049	0.099	-0.150	0.159	-0.050	0.813	0.793	0.806	0.647	-0.339
Bio 12												1.000	0.833	0.848	-0.524	0.871	0.956	0.488	0.878	-0.164	0.117	0.257	-0.272	0.024	0.917	-0.148	-0.290	0.026	-0.422	-0.433
Bio 13*													1.000	0.427	0.018	0.979	0.651	0.081	0.480	-0.403	0.026	0.252	-0.240	-0.075	0.727	0.239	0.085	0.412	0.045	-0.636
Bio 14														1.000	-0.887	0.482	0.955	0.650	0.996	0.022	0.249	0.162	-0.271	0.076	0.818	-0.410	-0.495	-0.295	-0.700	-0.138
Bio 15															1.000	-0.045	-0.730	-0.673	-0.860	-0.155	-0.249	-0.084	0.190	-0.147	-0.561	0.523	0.545	0.477	0.767	-0.131
Bio 16*																1.000	0.700	0.222	0.534	-0.232	-0.026	0.249	-0.185	-0.072	0.762	0.095	-0.062	0.276	-0.074	-0.586
Bio 17																	1.000	0.580	0.975	-0.066	0.165	0.209	-0.309	0.103	0.891	-0.304	-0.423	-0.151	-0.600	-0.282
Bio 18*																		1.000	0.636	0.436	-0.192	-0.039	0.110	0.033	0.474	-0.579	-0.619	-0.511	-0.657	0.003
Bio 19*																			1.000	-0.004	0.216	0.193	-0.286	0.107	0.841	-0.387	-0.481	-0.261	-0.685	-0.166
Alt*																				1.000	-0.102	-0.128	0.246	-0.183	-0.123	-0.753	-0.710	-0.776	-0.521	0.395
Slop*																					1.000	0.144	-0.567	-0.401	0.207	-0.126	-0.118	-0.127	-0.193	-0.035
Asp*																						1.000	-0.127	0.066	0.279	0.005	-0.013	0.031	-0.101	0.076
Soil*																							1.000	-0.040	-0.367	0.136	0.178	0.078	0.247	0.088
Dni*																								1.000	-0.132	0.109	0.139	0.075	-0.054	0.472
Prec																									1.000	-0.286	-0.428	-0.108	-0.526	-0.413
T_{av}																										1.000	0.984	0.978	0.919	-0.432
T_{max}																											1.000	0.925	0.930	-0.291
T_{min}																												1.000	0.866	-0.573
Vap																													1.000	-0.364
Wind																														1.000

Note: If two variables had >±0.80, only one of them was selected in the same model. Correlation was significant at $\alpha = 0.05$. Finally selected variables for MaxEnt modelling were highlighted with astrik (*)

Table S2. Basic information of satellite data scenes of SENTINEL downloaded from USGS

Sl. no.	Districts cover per scene	Tile number	Acquired date (Year / Month / Date)	Platform	Map projection / Units	UTM zone
1.	Bageshwar Chamoli,	T44RLU T44RLV	2021/02/10, 2020/11/07	SENTINEL-2B, SENTINEL-2A	UTM, Meter	44
2.	Almora Pithoragarh	T44RMT, T44RMU	2020/12/25	SENTINEL-2B, SENTINEL-2A	UTM, Meter	44

Table S3. Geo-spatial detail of sampled populations of *Yushania anceps*

Sl. no.	Pop Code	Location detail	Number of samples	Latitude (N)	Longitude (E)	Altitude (m)
1.	YA01	Auli_Chamoli	30	30˚32'26.2"	79˚33'07.0"	2641
2.	YA02	Munsyari_Pitoragarh	27	30˚03'42.3"	80˚12'54.1"	2974
3.	YA03	Ghes_Chamoli	9	30˚7'16.70"	79˚41'51.6"	2400
4.	YA04	Narayan Ashram_Pitoragarh	14	29˚58'40.1"	80˚39'10.8"	2879
5.	YA05	Chopta_Chamoli	30	30˚27'38.2"	79˚13'38.8"	2658

Table S4. Confusion matrix derived measures of classification accuracy for the MaxEnt model output map

Measure	Calculated value	Range with explanation	Interpretation
AUC	0.911±0.128	0⊣, AUC ≥ 0.9 = very good, 0.9 > AUC ≤ 0.8 = good, and AUC < 0.8 = poor	Very good
Kappa (*K*)	0.513	-1 to +1 (Cohen 1960); poor K < 0.4, good 0.4 < K < 0.75, excellent K > 0.75. (Landis and Koch 1977)	Good agreement
Normalized Mutual Information (NMI) n(s)	0.447	0 to 1, value of 0 suggest the models are completely inaccurate, and 1 revealed presence–absence is perfectly predicted (Forbes, 1995)	Good prediction
True Skill Statistic (TSS)	0.906	-1 to +1, where +1 indicates perfect agreement and values of zero or less indicates performance no better than random (Allouche et al. 2006)	Performance is better than the random model

Table S5. Estimated area under *Yushania anceps* in Uttarakhand Himalayas through MaxEnt Modelling

Sl. No.	Districts	Geographical area (km^2)	Forest cover (km^2)	Estimated area (km^2)	Estimated area % in respect to total geographical area	Estimated area % in respect to total forest cover
1.	Almora	3,144	1,718	-	-	-
2.	Bageshwar	2,241	1,261	38.29	1.71	3.04
3.	Chamoli	8,030	2,709	120.73	1.50	4.46
4.	Champawat	1,766	1,224	-	-	-
5.	Dehradun	3,088	1,605	-	-	-
6.	Haridwar	2,360	588	-	-	-
7.	Nainital	4,251	3,048	-	-	-
8.	Pauri	5,329	3,394	-	-	-
9.	Pithoragarh	7,090	2,078	52.57	0.77	2.53
10.	Rudraprayag	1,984	1,141	-	-	-
11.	Tehri	3,642	2,065	-	-	
12.	Udham Singh Nagar	2,542	436	-	-	
13.	Uttarkashi	8,016	3,028	-	-	-
	Total	53,483	24,295	211.59	0.40	0.87

Source: Geographical Area and Forest Cover, Forest Survey of India Report (ISFR, 2019)

Table S6. Estimated distribution of *Yushania anceps* in forest cover and altitudinal classes under Uttarakhand Himalayas

Altitudinal range (m)	Forest classes	Area under forest classes (km^2)	Total area (km^2)
<2250	Very dense	3.80	34.63
	Moderately dense	20.95	
	Open	9.88	
2251–2500	Very dense	16.70	46.60
	Moderately dense	22.70	
	Open	7.21	
2501-2750	Very dense	17.63	63.61
	Moderately dense	34.91	
	Open	11.07	
2751-3000	Very dense	12.62	48.29
	Moderately dense	28.71	
	Open	6.96	
>3001	Very dense	5.53	18.46
	Moderately dense	10.56	
	Open	2.37	
Total Area		211.59	211.59

Source: ASTER GDEM (Altitudinal Range)

Table S7. Estimated area of *Yushania anceps* in different forest cover classes of Uttarakhand Himalayas

Sl. No.	Districts	Area (km^2)			
		Density			Total
		Very Dense	Moderate	Open	
1.	Bageshwar	9.50	19.55	9.24	38.29
2.	Chamoli	33.70	66.93	20.10	120.73
3.	Pithoragarh	16.32	29.46	6.79	52.57
	Total	59.52	115.94	36.13	211.59

Table S8. Analysis of molecular variance (AMOVA) for five populations of *Yushania anceps*

Source of variation	Degree of freedom	Sum of Square	Estimated variance	Percent variation	Genetic differentiation
Among populations	4	43.081	0.188	6.23	F_{ST} = 0.062
Within populations	215	608.119	2.828	93.77	
Total	219	651.200	3.016	100	

Note: The variance estimated with 1023 permutations between the individuals within populations were statistically significant (P<0.001)

Table S9. Proportional membership coefficient of the inferred cluster in STRUCTURE analysis

Sl. No.	Pop Id	Inferred Clusters			No. of Individuals
		1	2	3	
1.	YA01	0.312	0.153	0.535	30
2.	YA02	0.446	0.205	0.349	27
3.	YA03	0.313	0.419	0.268	9
4.	YA04	0.283	0.513	0.204	14
5.	YA05	0.230	0.577	0.193	30