Ecography

ECOG-02031
Atwater, D. Z., Sezen, U. U., Goff, V., Kong, W., Paterson, A. H. and Barney, J. N. 2015. Reconstructing changes in the genotype, phenotype, and climatic niche of an introduced species. – Ecography doi: 10.1111/ecog.02031

Supplementary material

Appendix 1: Tables and figures supporting the main text.

Table A1. Site information, showing site location (DD), habitat, and climate data (MAT: mean annual temperature; MAP: mean annual precipitation; PCA1 & 2: PCA scores), and number of accessions collected at each site.

ID	Lat.	Lon.	Elev. (m)	Habitat	MAT (C)	MAP (mm)	PCA1	PCA2	Num. Acc.
1	32.8917	-84.3272	225	Non-Ag.	17.1	1284	0.807	1.383	1
2	32.4773	-85.4523	168	Non-Ag.	17.2	1380	0.846	1.617	1
3	32.3815	-85.3033	122	Non-Ag.	17.6	1306	0.855	1.463	1
4	32.2332	-85.4465	110	Non-Ag.	17.8	1317	0.874	1.491	1
5	32.0827	-86.4453	101	Non-Ag.	18	1364	0.903	1.610	1
6	32.4152	-87.0397	41	Non-Ag.	18.2	1319	0.949	1.507	1
7	32.4430	-87.2203	65	Non-Ag.	17.7	1369	0.886	1.614	1
8	32.2247	-88.1582	47	Non-Ag.	17.7	1458	0.906	1.752	1
9	30.4317	-84.9918	54	Non-Ag.	19.4	1496	1.197	2.015	1
10	30.5520	-84.6770	93	Non-Ag.	19.2	1475	1.169	1.942	1
11	30.8367	-83.9430	88	Non-Ag.	19.3	1364	1.262	1.593	1
12	30.8367	-83.9443	88	Non-Ag.	19.3	1364	1.262	1.593	1
13	30.8367	-82.4560	46	Ag.	19.4	1321	1.272	1.600	1
14	32.2050	-82.3635	87	Non-Ag.	18.5	1170	1.130	1.179	1
15	32.9495	-81.4800	27	Non-Ag.	18.1	1192	1.005	1.217	1
16	33.1660	-81.3877	78	Non-Ag.	17.6	1209	0.945	1.234	1
17	34.0307	-81.5883	140	Non-Ag.	16.5	1211	0.651	1.231	1
18	34.1982	-81.4498	181	Non-Ag.	16.2	1211	0.605	1.249	1
19	33.8617	-80.8602	43	Non-Ag.	17.5	1168	0.873	1.216	1
20	33.6868	-80.7018	79	Non-Ag.	17.5	1181	0.881	1.245	1
21	33.2907	-81.3373	78	Non-Ag.	17.6	1205	0.936	1.214	1
22	33.5250	-83.4442	195	Ag.	16.7	1219	0.717	1.324	1
23	34.4483	-84.8368	227	Non-Ag.	15.1	1371	0.501	1.613	1
24	34.4655	-84.6995	240	Non-Ag.	15.1	1387	0.475	1.711	1
25	33.9632	-85.9392	166	Non-Ag.	15.9	1394	0.641	1.586	1
26	33.1750	-85.3868	224	Non-Ag.	16.2	1417	0.711	1.665	1
27	33.0333	-85.1038	221	Non-Ag.	16.6	1367	0.798	1.550	1
28	34.2778	-86.8898	296	Non-Ag.	15	1474	0.481	1.771	1
29	34.6483	-87.1055	176	Non-Ag.	15.5	1419	0.578	1.643	1
30	34.7522	-86.9590	207	Non-Ag.	15.3	1430	0.529	1.680	1

31	31.7653	-83.2453	99	Non-Ag.	18.6	1176	1.091	1.199	1
32	33.2685	-84.3082	284	Non-Ag.	16.2	1299	0.656	1.490	1
33	33.5380	-84.6333	316	Non-Ag.	15.8	1322	0.631	1.570	1
34	33.3847	-84.6732	287	Non-Ag.	16.1	1319	0.677	1.546	1
35	36.7230	-86.5770	218	Ag.	13.7	1286	0.245	1.328	9
36	37.2114	-80.4877		Ag.	15.3	1127	0.012	0.697	9
37	37.1940	-80.5739		Non-Ag.	15.3	1127	0.075	0.645	9
38	37.1699	-80.4296	608	Non-Ag.	11.3	1000	0.000	0.751	6
39	37.3185	-80.6513	546	Non-Ag.	11.5	929	0.049	0.603	3
40	31.0600	-97.3422	200	Ag.	19	874	0.916	0.491	31
41	30.0264	-94.3343	11	Ag.	18.7	1263	1.085	1.778	33
42	33.2797	-96.8927	171	Ag.	17.9	975	0.724	0.577	30
43	32.2637	-106.8059	1181	Non-Ag.	16.3	231	1.182	-1.282	1
44	32.3167	-106.8212	1185	Non-Ag.	16.1	232	1.168	-1.289	1
45	32.3169	-106.8212	1185	Non-Ag.	16.1	232	1.168	-1.289	1
46	32.1852	-106.7097	1168	Non-Ag.	16.6	226	1.212	-1.260	1
47	32.2975	-106.8012	1185	Non-Ag.	16.2	232	1.168	-1.289	1
48	32.2976	-106.8010	1185	Non-Ag.	16.2	232	1.168	-1.289	1
49	32.2776	-106.8266	1182	Non-Ag.	16.2	231	1.182	-1.282	1
50	32.2627	-106.8043	1181	Ag.	16.3	231	1.182	-1.282	1
51	32.2135	-106.7482	1173	Ag.	16.5	228	1.193	-1.264	1
52	32.2746	-106.8022	1180	Ag.	16.3	231	1.182	-1.282	1
53	32.2749	-106.8024	1180	Ag.	16.3	231	1.182	-1.282	1
54	33.8829	-83.1546	235	Non-Ag.	16.2	1248	0.629	1.414	9
55	33.9600	-83.3700	195	Non-Ag.	16.3	1245	0.607	1.474	4
56	34.3560	-103.0618	1262	Ag.	13.9	419	0.665	-0.862	10
57	34.3309	-102.9762	1240	Non-Ag.	13.9	422	0.663	-0.871	24
58	34.3156	-102.7736	1196	Non-Ag.	13.9	434	0.652	-0.877	22
59	38.8833	-97.7344	408	Non-Ag.	12.8	736	0.076	-0.242	7
60	38.8917	-97.5475	367	Non-Ag.	13	749	0.088	-0.199	5
61	38.5658	-97.4664	409	Non-Ag.	12.9	806	0.049	-0.051	5
62	38.7061	-97.4278	378	Ag.	13	795	0.062	-0.066	24
63	40.4942	-96.5573	390		10.7	787	-0.234	-0.221	35
64	36.1990	-119.2519	92	Ag.	17.2	253	1.398	-1.133	23
65	36.3088	-119.3806	92	Non-Ag.	17	250	1.369	-1.104	18
66	36.2337	-119.3121	94	Non-Ag.	17.1	248	1.380	-1.119	23
67	32.2734	-110.9031	731	Non-Ag.	20.6	305	1.698	-0.946	15
68	32.2511	-111.0064	703	Non-Ag.	20.5	300	1.684	-0.995	23
69	33.1033	-111.9743	353	Non-Ag.	21.1	201	1.698	-1.377	34
70	32.9997	-112.0869	375	Ag.	21.1	196	1.714	-1.345	23

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Table A2. Rotated component scores calculated by principal components analysis. Blank cells indicate loadings < 0.3. Communalities for each variable are shown on the right. Rotated Eigenvalues and cumulative variance are shown at bottom. Principal components analyses were performed separately for Georgia and Virginia.

Georgia	RC1	RC2	RC3	RC4	RC5	RC6	RC7	Comm.
Mean leaf wid.	0.839			0.404				0.964
Mean leaf len.	0.804							0.967
Mean culm dia.	0.694		0.464					0.744
Rhizome max dia.		0.912						0.887
Num. of rhizomes		0.897						0.876
Height	0.398		0.849					0.913
Total biomass			0.750		0.436			0.911
Leaf width / len.				0.985				0.993
Num. of tillers					0.912			0.968
Crown diameter						0.946		0.988
Days to flowering							0.971	0.996
Eigenvalue	2.11	1.74	1.7	1.43	1.15	1.05	1.03	
Cumulative Var.	0.19	0.35	0.5	0.63	0.74	0.83	0.93	

Virginia	RC1	RC2	RC3	RC4	RC5	RC6		Comm.
Num. of tillers	0.934							0.903
Num. flowering till.	0.872		0.303					0.886
Vegetative biomass	0.841	0.453						0.961
Total biomass	0.837	0.450						0.966
Flowering biomass	0.756	0.354	0.480					0.963
Height	0.320	0.893						0.953
Flower / total biomass			0.960					0.988
Mean culm dia.				0.976				0.999
Dist. farthest ramet					0.967			0.999
Days to flowering						0.993		0.999
Eigenvalue	3.83	1.39	1.28	1.07	1.03	1.02		
Cumulative Var.	0.38	0.52	0.65	0.76	0.86	0.96		

Table A3. Total number of agricultural and non-agricultural accessions in each genetic cluster. Results of X^2 contingency test are shown below. Clusters 4, 6, and 13, which had expected counts < 4 in either or both categories, were not included in the contingency analysis.

	Ag.	Non-Ag.
Cluster 1	6	11
Cluster 2	26	8
Cluster 3	15	3
Cluster 4	0	1
Cluster 5	7	37
Cluster 6	2	3
Cluster 7	57	20
Cluster 8	9	27
Cluster 9	3	8
Cluster 10	12	30
Cluster 11	11	19
Cluster 12	18	21
Cluster 13	0	3
Cluster 14	1	9
Cluster 15	10	23
$X^2 = 86.76$; df = 11; $P < 0.0001$		

Table A4. Results of multiple ANOVAs of each response variable (e.g., biomass) against genetic cluster and home habitat. Tests were performed separately for data from each common garden.

			SS	Error SS	df	Error df	*F*	*P*
Genetic Cluster	GA	Biomass	48.99	1162.50	4	541	5.700	0.0002
		Height	25775.72	560158.70	4	544	6.258	0.0001
		Total tillers	7.46	630.63	4	542	1.604	0.1719
		Mean culm dia.	2.49	29.82	4	540	11.270	< 0.0001
		Days to flower	4.41E-04	1.16E-02	4	544	5.177	0.0004
		Leaf shape	0.07	3.92	4	537	2.486	0.0427
		Rhizome max dia.	6.78	1346.60	4	542	0.683	0.6042
		Crown dia.	1.18	180.05	4	542	0.891	0.4691
	VA	Biomass	166.35	2238.04	4	474	8.808	< 0.0001
		Height	27943.88	585912.33	4	496	5.914	0.0001
		Total tillers	139.40	1457.28	4	496	11.861	< 0.0001
		Mean culm dia.	1.57	42.63	4	500	4.614	0.0011
		Days to flower	1.49E-04	1.23E-03	4	476	14.438	< 0.0001
		Ramet distance	40.17	842.53	4	500	5.960	0.0001
		Flower production	0.03	1.89	4	465	1.714	0.1458
Habitat	GA	Biomass	26.05	1190.24	1	546	11.951	0.0006
		Height	12985.29	574628.18	1	549	12.406	0.0005
		Total tillers	2.34	639.67	1	547	1.999	0.1580
		Mean culm dia.	0.67	31.65	1	545	11.611	0.0007
		Days to flower	2.40E-04	1.18E-02	1	549	11.204	0.0009
		Leaf shape	0.03	3.98	1	542	4.373	0.0370
		Rhizome max dia.	7.90	1361.25	1	547	3.175	0.0753
		Crown dia.	0.12	181.95	1	547	0.358	0.5498
	VA	Biomass	115.04	2497.41	1	520	23.953	< 0.0001
		Height	12859.15	643159.34	1	543	10.857	0.0010
		Total tillers	69.01	1680.36	1	544	22.340	< 0.0001
		Mean culm dia.	0.16	47.12	1	548	1.915	0.1670
		Days to flower	6.42E-05	1.43E-03	1	522	23.398	< 0.0001
		Ramet distance	11.84	956.28	1	548	6.783	0.0095
		Flower production	0.06	2.01	1	511	14.898	0.0001

Table A5. Schoener's D values comparing the bias-corrected kernel-smoothed relative probability distribution of each genetic cluster in two-dimensional climate space. Each cluster is compared to the overall distribution of all clusters. For each comparison, Schoener's D is given along with a *P* value calculated via Monte Carlo simulation. Schoener's D was not estimated for clusters with $n < 10$. The proportion of agricultural accessions belonging to each cluster is also shown.

	Genetic Cluster														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
n	17	34	37	1	44	5	77	44	11	44	31	41	3	10	34
D	0.498	0.475	0.030	n/a	0.676	n/a	0.418	0.756	0.179	0.581	0.685	0.536	n/a	0.342	0.684
P	0.203	0.001	0.000	n/a	0.252	n/a	0.000	0.896	0.007	0.019	0.701	0.005	n/a	0.074	0.573
% Ag.	35%	76%	83%	0%	16%	40%	74%	25%	27%	29%	37%	46%	0%	10%	30%

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62 **Fig. A4.** Correlations among phenotypic traits in Georgia.

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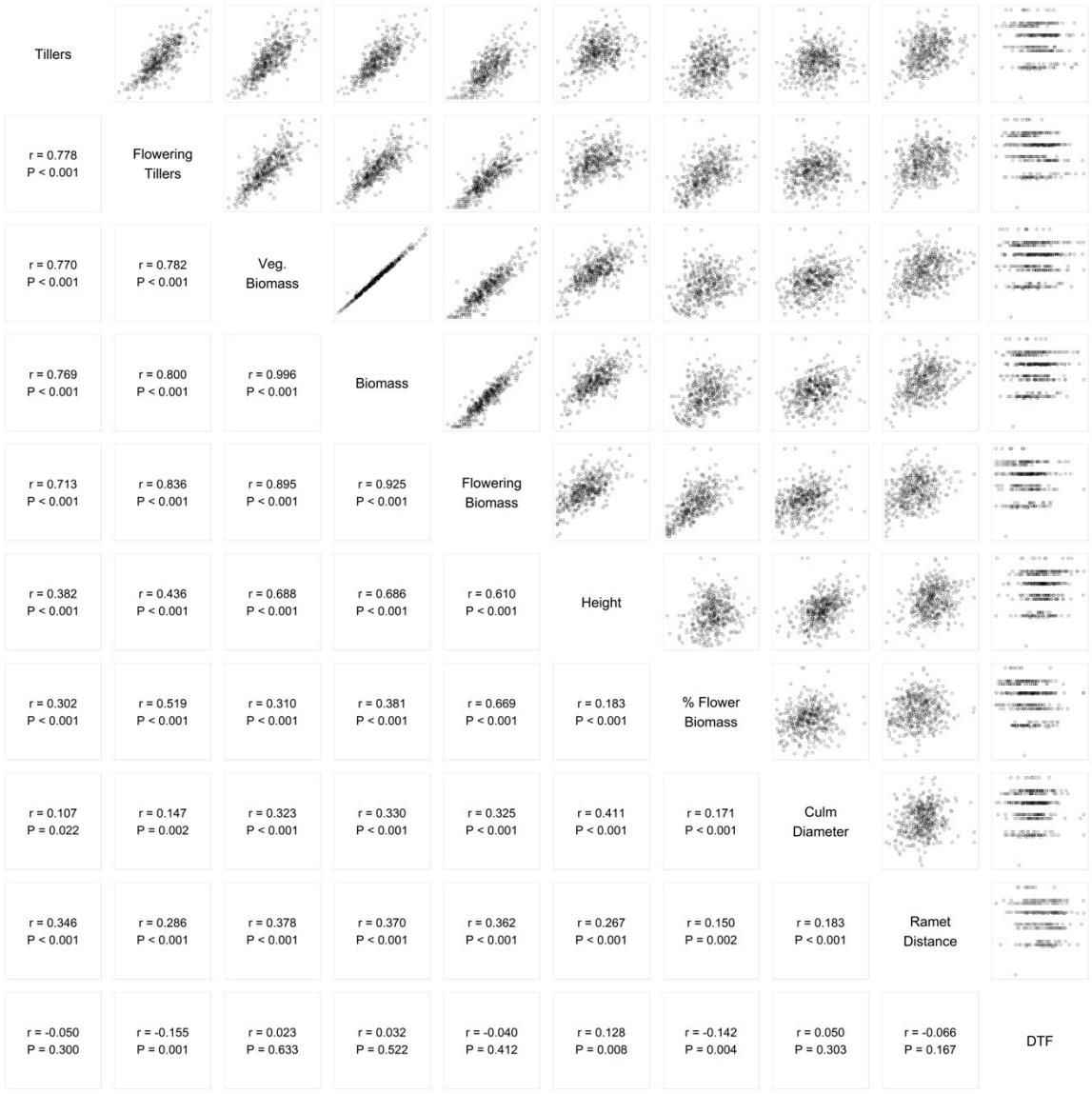
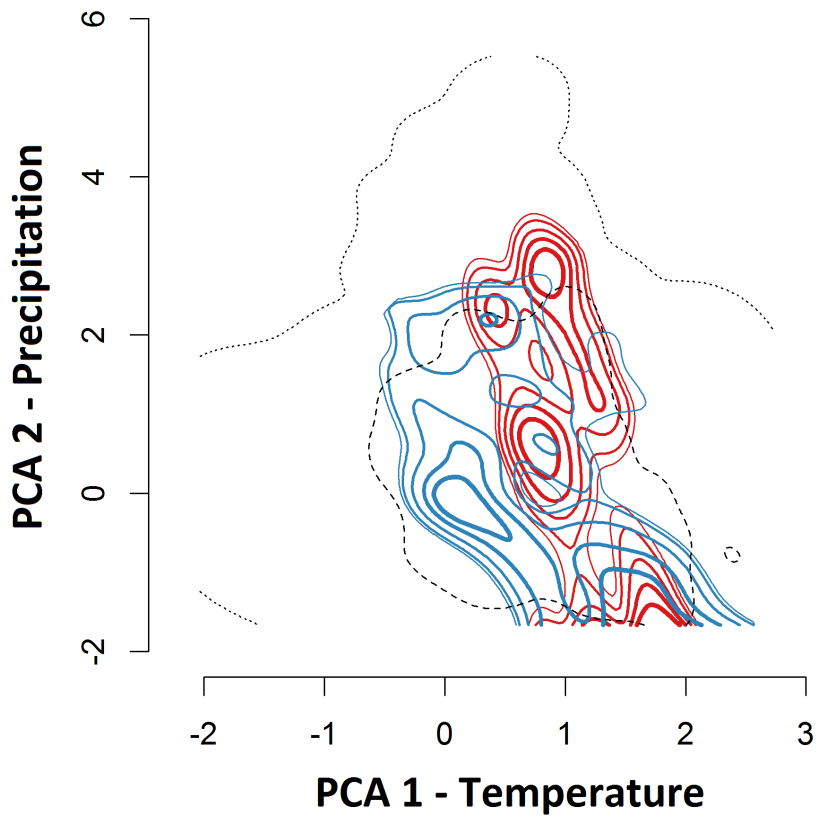


Fig. A5. Correlations among phenotypic traits in Virginia.



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75 **Fig. A6.** Results of climate niche modelling. Ordination-based kernel density estimates of the
76 climatic distribution of early (red) and late-phase (blue) accessions are also shown with 25%
77 (thick line), 50%, 75%, 90%, and 95% (thin line) contours. The black dotted line shows the 95%
78 contour for a kernel density estimate of the entire US Johnsongrass population. The outer dotted
79 line represents the 99.99% envelope of available climate space.