

**Supplementary File S1.** List of 65 specimens examined taxonomically of the species under study [*Festuca* subgen. *Erosiflorae*, *F.* subgen. *Drymanthele* sect. *Ruprechtia*, *F.* subgen. *Subulatae* sect. *Glabricarpae*, *F.* subgen. *Asperifolia* and *F.* subgen. *Mallopetalon* sensu Alexeev, plus the newly described *F.* subgen. *Coironhuecu* subgen. nov. (*F. argentina*) and *F.* subgen. *Drymanthele* sensu lato (*F. superba*)], ranked in alphabetical order.

***Festuca amplissima* Rupr.** MEXICO. México: 3.1 mi SE Plan de Vegas [Vigas], 11 October 2001, Peterson P.M. 16150 & Herrera-Arrieta Y. (US). ***Festuca argentina* (Speg.) Parodi.** ARGENTINA. Chubut: Escalante, Canadon Pilar, Estancia Los Manantiales, 60 km N of Comodoro Rivadavia; 24 December 1938, Eyerdam W. J. s.n., Beetle A.A., Grondona E. (SI). Neuquén: Ruta 237, next to Estancia La Lonja, 28 November 1963, Vallerini J. 376 (SI). Río Negro: Bariloche, río Lemay, 19 February 2010, Catalán P. s.n. (UZ); Pilcaniyeu, 20 km al S de Paso Flores, 10 December 1981, Cabrera A.L. 33017 with Botta S., Ezcurra C. & Kiesling R. (SI). Santa Cruz: Lago Argentino, south shore near Calafate, 10 January 1939, Eyerdam W. J. s.n. with Beetle A.A. & Grondona E. (SI). San Julian and [unreadable], 1915, Carette E. 15 (SI). Catalán, P., no Lemey, 19 febr 2010, (UZ). ***Festuca asperella* E.B. Alexeev.** MEXICO. México: Along Hwy. 95, south of Mexico City, just S of El Gordo, 21 August 1972, Dziekanowski C. T, Dunn D. B. & Bolingbroke 2022 (MO, isotype). ***Festuca breviglumis* Swallen.** MEXICO. Jalisco: 11.7 mi SW of Ciudad Guzman, 5 October 2001, Peterson P.M. & Rosales O. 16078 (US); 6.3 mi SW of Mazamitla along Hwy 110 towards Colima, 7 October 2001, Peterson P. M. & Rosales O. 16117 (US). ***Festuca caldasii* (Kunth) Kunth.** ECUADOR. Chimborazo: Sipambe - Huigra ca km 10, 16 June 1999, Laegaard S. 20405 (AAU). Loja: Catacocha - La Toma km 28, 29 April 1992, Laegaard S. 102535 (AAU); Km 6 above Jimbura along Zumba road, 27 March 1994, Laegaard S. 105256 (AAU); Catamayo, Chinchas-Tambara, fecha, colectores Moreno-Aguilar M. F. F98\_iii, Medina I. & Cango G. (HUTPL). ***Festuca carrascani* Stančík & Renvoize.** BOLIVIA. Cochabamba: José Carrasco Torrico, 10-15 km south of Totora along the road to Aiquile, 1 March 2005, Wood J. R. I. 21684 & Haigh A. (LPB, isotype). ***Festuca chiriquensis* Swallen.** PANAMA. Chiriqui: Chiriqui volcano, 29-30 September 1911, Hitchcock A. S. 8197 (US, holotype). ***Festuca chuquisacae* Stančík & Renvoize.** BOLIVIA. Chuquisaca: Tipoyo, cerro Obispo-San Juan, 24 April 1994, Wood J. R. I. 8337 (LPB, isotype). ***Festuca dentiflora* E.B. Alexeev ex Stančík & P.M. Peterson.** PERU. Huanuco: Baños, 1838, Wilkes Explor. Exped. 5 (US, holotype). ***Festuca dichoclada* Pilg.** PERU. Ancash: Huascarán National park, Quebrada Llaca, 24 May 1985, Smith N. 10782 (AAU). Cajamarca: Sais, José Carlos Mariátegui, km 20-40 on Suchubamba-San Juan road, 5 June 1984, Smith D. N. 7534 & Sánchez-Vega I. (MO). ***Festuca fimbriata* Nees.** ARGENTINA. Corrientes: Santo Tome, Arroyo Chimiray and Ruta 40, 8 October 1976, Quarín 3409 (CTES); Garruchos, 22 October 1954, Buikart A. 19659 (BAA, SI); estancia "Garruchos", 1 November 1950 Pedersen T. M. 819 (C, K, MO); Ruta 37, 5 km E of Gobernador Virasoro, 14 November 1974, Schini A. & Carnevali R. C. 10523 (SI, US); Timbo, costa Río Uruguay, 26 km SE of Colina Garabi, 16 September 1980, Ahumado & Schinini 4085 (CTES). Misiones: Apóstoles, Est. Agrotécnica, October 1977, Cabrera A. 28766, Botta S. M., Kiesling R., Rotman A. D., Tur N. & Zuloaga F. O. (SI); Ruta Prov. 40 and Ayo. Chimiray, 16 October 2000, Zuloaga F. O. & Morrone O. 7155 (SI); Capital, Ruta provinc. no. 1, 12 km S of Posadas, 16 November 1974, Schinini & Carnevali 10687 (CTES). ***Festuca horridula* Pilg.** PERU. Huancavelica: Huilca-orocon, 5 km NW of Conayca, 16 April 1955, Tovar O. 2431 (US). Lima: Salta Cuna, March 1943, Soukup J. 1944 (US); Huarochiri, 107 km W of Lima on Hwy 20 towards La Oroya [Oroya] at Chicla, 5 April 1997, Peterson P. M. & Tovar O. 14019 (MO). ***Festuca jaliscana* E.B. Alexeev.** MEXICO. Jalisco: NE slopes of the Nevado de Colima, below Canoa de Leoncito, Barranca de la Rosa, 10 October 1952, McVaugh R. 13409 (US, holotype). ***Festuca lugens* (E. Fourn.) Hitchc. ex Hern.-Xol.** MEXICO. Oaxaca: Cumbre de Estepa, September 1842,

Liebmann F. M. 6247, 502 (C, type). *Festuca quadridentata* **Kunth**. ECUADOR. Cañar: S of El Tambo ca 1.5 - 3 km along road to Carshao, 10 June 1999, Laegaard S. 20287 & Sklenář P. (AAU). Chimborazo: Near Alao, along Río Alao, 21 September 1985, Laegaard S. 55290 (AAU); *idem*, Llactapamba, 1 March 1944, Acosta-Solis M. 7581 (US). Chimborazo/Morona Santiago: Hda. Huargualla - Hda. San Eduardo, way to NP Sangay, 20 July 1999 (AAU). *Festuca steinbachii* **E.B. Alexeev**. BOLIVIA. Cochabamba, Cejawald bei "La Aduana", 7 March 1929, Steinbach J. 9533 (LIL, isotype). *Festuca superba* **Parodi ex Tūrpe**. ARGENTINA. Jujuy: Lagunas de Yala, 30 January 1975, Zuloaga F. O. 383 & Deginani N. B. (SI); *idem*, 16 February 1987, Nicora E. 8740, Gómez-Sosa E., Palasi C., Pensiero J. & Rúgolo Z. (SI); *idem*, 16 January 1988, Zuloaga F. O. 3545 & N. B. Deginani (SI); slope of Yala, 29 March 1992, Cabrera A. L. 34886, Deginani A. M., Tur N. & Ulibarri E. (SI); quebrada de Yala, 19 January 1976, Cabrera A. L. 27380, S. Arroyo, N. Bacigalupo, E. Nicora, E. Ulibarri (SI); from San Salvador de Jujuy to Termas de Reyes, 05 March 1987, Zuloaga F. O. 3008, Morrone O. (SI); Termas de Reyes, 5 February 1943, Parodi L. R. 14552 (BAA); *idem*, 07 January 1968, Cabrera A. L. 18879, Deferrari A. M., Frangi J., Marrone M. T., Petriella B. (SI); *idem*, entrada al Balneario, 25 November 2008, Catalan P. 360.08 & Müller J. (UZ); Yala, Laguna Rodeo, 24 November 2008, Catalan P. 356.08 & Müller J. (UZ). *Festuca tancitaroensis* **Gonz.-Led. & S.D. Koch**. MEXICO. Michoacan: Mt. Tancitaro, 25 July 1941, Leavenworth W.C. & Leavenworth Mrs. W.C. 1213 (US, holotype). *Festuca urubambana* **Stančík**. PERU. Cuzco: Urubamba, lower end of Quebrada Pumahuanca, a deep side-valley of R. Urubamba ca. 2-4km NW of Urubamba, 31 December 1962, Iltis H. H.-C. M. 853 & Ugent D. – V. (K, holotype). *Festuca valdesii* **Gonz.-Led. & S.D. Koch**. MEXICO. Coahuila de Zaragoza: Arteaga, Sierra Zapalinamé, 19 May 1990, Hinton G.S. 20278 & al. (IEB, isotype). *Festuca woodii* **Stančík**. COLOMBIA. Boyaca: Sierra Nevada del Cocuy, hacienda La Esperanza, 29 December 1985, Wood J. 5254 (COL, holotype). *Festuca venezuelana* **Stančík**. VENEZUELA. Tachira: La Grita, La Negra, cross of the two roads to La grita and Pogonero, 10-11 November 2000, Stančík D. 4262 (AAU, isotype).

**Supplementary Table S1.** Genome proportion of repeats estimated by Repeat Explorer2 for individual Loliinae samples (estimated percentages per holoploid genome, 1C). Values in bold correspond to new data generated in this study.

Loliinae taxon	Class I/LTR/Ty1_copia								Class I/LTR/Ty3_gypsy								Class II/TIR								Ty1_copia	Ty3_gypsy	LTR	LINE	satellite	rDNA (5S-45S)	Mobile element	Repeat (conflicting evidences)	Unclassified (No evidence)	Total
	Ale	Angela	Ikeros	Ivana	SIRE	TAR	Tork	OTA	Athila	Tat	Ogre	Tekay	Retand	Reina	CRM	chromovirus	MuDR_	Mutator	EnSpm_	CACTA	hAT	PIF_	Harbinger											
Broad Leaved (BL) Loliinae																																		
<i>Festuca asperella</i>	0.00	9.47	0.00	0.21	1.01	0.42	0.01	0.00	0.06	0.00	0.00	3.93	6.14	0.00	0.21	0.02	0.24	0.49	0.00	0.00	0.79	0.00	8.16	0.00	0.27	0.19	0.00	0.00	20.38	52.000				
<i>Festuca breviglumis</i>	0.00	16.98	0.00	0.71	0.41	0.34	0.00	0.00	0.00	0.00	0.01	2.68	18.65	0.00	0.02	0.00	0.20	0.65	0.00	0.00	0.00	0.00	5.59	0.00	1.37	0.02	0.00	1.51	6.47	55.610				
<i>Festuca chiriquensis</i>	0.00	38.63	0.00	0.30	0.86	0.27	0.09	0.00	0.53	0.00	0.00	6.36	6.76	0.00	0.22	0.00	0.32	0.58	0.02	0.00	0.00	0.40	6.82	0.00	0.64	0.15	0.00	0.02	4.53	67.500				
<i>Festuca caldasii</i>	0.03	27.45	0.00	0.33	0.82	0.48	0.02	0.00	0.26	0.00	0.13	7.32	6.03	0.00	0.17	0.00	0.11	0.49	0.00	0.00	0.00	0.00	9.64	0.00	0.88	0.06	0.00	0.00	7.40	61.597				
<i>Festuca superba</i>	0.03	21.07	0.00	0.90	0.68	0.49	0.01	0.00	0.00	0.00	0.01	1.54	20.31	0.00	0.05	0.00	0.51	0.92	0.00	0.00	0.00	0.00	11.01	0.00	1.40	0.26	0.00	0.00	5.71	64.879				
<i>Festuca venezuelana</i>	0.00	15.44	0.00	0.14	0.38	0.15	0.00	0.00	0.00	0.00	0.00	4.94	4.85	0.00	0.06	0.00	0.05	0.09	0.00	0.00	0.31	0.00	10.50	0.00	0.90	0.25	0.00	0.00	26.22	64.280				
<i>Festuca dichoclada</i>	0.00	7.89	0.00	0.59	1.62	0.71	0.03	0.00	0.04	0.00	0.00	1.30	13.81	0.00	2.01	0.00	1.73	2.70	0.05	0.00	0.00	0.00	7.12	0.00	1.61	0.15	0.00	1.16	8.75	51.270				
<i>Festuca horridula</i>	0.00	8.97	0.01	0.80	1.06	0.19	0.00	0.00	0.33	0.00	0.28	2.89	13.92	0.00	1.83	0.00	1.27	0.72	0.02	0.05	0.05	0.00	8.02	0.05	3.51	0.35	0.00	0.02	6.83	51.170				
<i>Festuca quadridentata</i>	0.00	8.56	0.01	0.35	1.64	0.25	0.00	0.00	0.43	0.00	0.10	1.75	5.83	0.00	1.88	0.00	0.10	0.69	0.00	0.00	0.00	0.00	2.37	0.09	2.41	0.27	0.00	0.00	22.24	48.970				
<i>Festuca amplissima</i>	0.00	12.43	0.05	0.11	3.04	0.71	0.23	0.00	0.26	0.00	0.02	2.05	7.87	0.00	0.67	0.00	0.79	1.54	0.00	0.00	0.00	0.00	6.89	0.16	2.72	0.12	0.00	0.00	12.58	52.254				
<i>Festuca valdesii</i>	0.00	11.38	0.00	0.75	1.82	0.66	0.06	0.00	0.22	0.00	0.00	1.39	9.65	0.00	3.40	0.00	0.24	0.68	0.00	0.00	0.00	0.00	11.07	0.04	2.94	0.41	0.00	1.04	10.17	55.920				
<i>Festuca argentina</i>	0.00	6.77	0.04	0.41	8.84	0.70	0.05	0.00	0.43	0.00	0.20	3.23	16.33	0.00	1.41	0.00	0.75	2.33	0.00	0.00	0.00	0.00	4.67	0.10	2.66	0.29	0.00	1.45	6.04	56.700				
<i>Festuca kingii</i>	0.11	6.72	0.01	0.37	1.42	0.26	0.00	0.00	0.04	0.00	0.00	0.65	12.77	0.00	0.27	0.00	0.27	0.63	0.00	0.00	0.00	0.00	6.37	0.01	4.72	0.45	0.00	0.00	18.67	53.630				
<i>Festuca spectabilis</i>	0.00	8.94	0.00	0.00	2.47	0.73	0.10	0.00	0.07	0.00	0.12	3.54	10.48	0.00	2.38	0.00	0.35	4.13	0.00	0.05	0.00	0.00	7.32	0.20	2.04	0.77	0.00	0.00	7.71	51.406				
<i>Festuca africana</i>	0.00	8.42	0.00	0.00	0.46	0.06	0.00	0.00	0.30	0.00	4.63	4.75	1.32	0.00	0.14	0.00	0.13	1.14	0.00	0.00	0.00	0.00	5.74	0.00	1.70	0.04	0.00	0.00	32.26	61.096				
<i>Festuca mekiste</i>	0.00	8.79	0.00	0.01	3.08	0.24	0.00	0.00	2.77	0.00	7.92	11.14	1.91	0.00	0.35	0.00	0.27	2.86	0.00	0.00	0.00	0.00	2.68	0.00	3.01	0.03	0.00	0.00	6.50	51.573				
<i>Festuca durandoi</i>	0.00	6.81	0.00	0.00	3.60	0.47	0.00	0.00	0.17	0.00	0.16	3.87	18.20	0.00	1.84	0.00	0.19	4.04	0.00	0.09	0.00	0.00	4.90	0.02	0.96	0.10	0.00	0.87	7.81	54.121				
<i>Festuca paniculata</i>	0.00	7.51	0.00	0.00	3.75	0.43	0.02	0.00	0.45	0.00	0.00	2.30	14.83	0.00	0.81	0.00	0.02	0.51	0.00	0.03	0.00	0.00	5.82	0.03	0.82	0.89	2.77	0.00	13.16	54.140				
<i>Festuca lasto</i>	0.00	11.83	0.09	0.00	2.73	0.59	0.02	0.00	3.42	0.00	0.00	8.51	6.85	0.00	1.76	0.00	0.03	1.72	0.00	0.00	0.00	0.00	1.76	0.01	0.84	0.17	0.00	0.00	14.11	54.461				
<i>Festuca triflora</i>	0.00	15.24	0.00	0.00	1.34	0.33	0.14	0.00	5.98	0.00	0.11	7.71	7.15	0.00	0.78	0.00	0.13	0.85	0.00	0.00	0.00	0.00	0.00	0.00	1.78	0.51	0.00	0.00	14.93	56.981				

<i>Festuca pratensis</i>	0.04	5.41	0.01	0.00	3.77	0.19	0.00	0.00	7.18	0.00	0.66	4.89	14.88	0.00	4.26	0.00	0.01	2.02	0.00	0.00	0.00	0.00	2.17	0.01	1.81	0.69	0.00	0.40	10.29	58.684
<i>Festuca atlantigena</i>	0.00	2.84	0.02	0.00	0.60	0.08	0.01	0.00	0.14	0.00	0.00	7.50	11.16	0.00	1.49	0.00	0.06	1.62	0.00	0.03	0.00	0.00	6.42	0.08	2.13	0.37	0.00	0.09	11.43	46.088
<i>Festuca molokaiensis</i>	0.00	5.94	0.03	1.26	9.96	0.03	0.00	0.00	0.01	0.00	1.55	5.71	21.35	0.00	0.26	0.00	1.37	4.95	0.00	0.00	0.00	0.00	1.49	0.02	1.12	0.25	0.00	1.49	7.09	63.853
Fine leaved (FL) Loliinae																														
<i>Festuca fimbriata</i>	0.01	4.47	0.15	0.04	1.60	1.18	0.12	0.00	0.04	0.00	0.34	0.21	1.66	0.00	0.09	0.00	0.20	1.18	0.00	0.00	0.43	0.00	1.62	0.02	3.91	0.05	0.00	0.00	21.54	38.855
<i>Festuca asplundii</i>	0.00	9.97	0.52	0.00	8.17	0.53	0.13	0.00	1.31	0.00	0.82	0.02	1.96	0.00	0.67	0.00	0.93	5.52	0.00	0.01	0.00	0.00	3.27	0.00	1.83	0.04	0.00	0.97	11.75	48.412
<i>Festuca procera</i>	0.00	10.88	0.36	0.00	7.10	0.60	0.12	0.01	0.87	0.00	0.34	0.21	4.32	0.00	1.48	0.00	0.80	4.67	0.00	0.00	0.00	0.00	0.00	0.00	2.66	0.05	0.00	2.09	11.66	48.212
<i>Festuca chimborazensis</i>	0.00	10.89	0.06	0.02	6.98	0.67	0.00	0.01	1.06	0.00	0.06	0.00	4.17	0.00	1.16	0.00	0.65	5.04	0.00	0.09	0.00	0.00	2.15	0.00	4.09	0.30	0.00	1.07	8.99	47.449
<i>Festuca holubii</i>	0.00	10.87	0.07	0.00	6.86	0.76	0.00	0.00	0.61	0.00	0.02	0.01	3.52	0.00	1.10	0.00	0.54	4.54	0.00	0.01	0.00	0.00	0.90	0.01	5.96	0.42	0.00	0.99	13.32	50.518
<i>Festuca pampeana</i>	0.00	0.52	0.00	0.06	0.63	0.10	0.06	0.00	0.00	0.00	0.33	0.00	6.47	0.00	0.03	0.00	0.19	0.85	0.00	0.00	0.00	0.00	2.85	0.00	4.77	1.02	0.00	0.00	23.59	41.481
<i>Festuca gracillima</i>	0.00	4.50	0.15	0.02	1.74	0.61	0.00	0.00	0.87	0.00	1.22	0.01	6.05	0.00	1.54	0.00	0.92	0.76	0.00	0.00	0.00	0.00	8.23	0.00	1.45	0.61	0.00	6.04	13.95	48.684
<i>Festuca abyssinica</i>	0.00	3.65	0.00	0.07	0.96	0.08	0.00	0.00	0.15	0.00	1.85	1.78	3.83	0.00	0.34	0.00	0.41	1.56	0.00	0.00	0.00	0.00	3.45	0.00	4.93	0.31	0.00	0.00	26.92	50.267
<i>Festuca rubra</i>	0.00	0.08	0.00	0.00	0.96	0.30	0.01	0.00	8.55	0.00	0.61	1.24	2.11	0.00	0.69	0.00	0.01	0.95	0.00	0.00	0.00	0.00	0.76	0.00	6.56	0.70	0.00	0.32	22.79	46.646
<i>Festuca ovina</i>	0.03	0.26	0.02	0.00	3.16	0.33	0.00	0.00	7.18	0.00	0.59	2.04	4.26	0.00	1.04	0.00	0.00	2.01	0.00	0.01	0.00	0.00	2.75	0.03	5.22	0.28	0.00	7.10	12.28	48.550
<i>Festuca capillifolia</i>	0.00	0.75	0.00	0.00	2.32	0.14	0.01	0.00	1.58	0.00	0.22	4.87	4.03	0.00	1.41	0.00	0.00	1.86	0.00	0.00	0.00	0.00	9.77	0.00	5.16	0.65	0.00	0.00	24.23	57.019
<i>Vulpia ciliata</i>	0.14	3.81	0.00	0.00	0.78	0.49	0.16	0.01	0.22	0.00	0.08	0.56	16.79	0.00	0.86	0.00	0.11	1.60	0.00	0.00	0.00	0.00	8.45	0.33	2.76	0.70	0.00	2.33	11.74	51.766
<i>Festuca gautieri</i>	0.00	4.85	0.04	0.11	4.41	0.41	0.00	0.00	0.14	0.00	0.21	1.25	13.15	0.00	1.09	0.00	0.21	2.14	0.00	0.04	0.00	0.00	7.35	0.02	1.35	0.86	0.00	0.00	10.71	48.340