

Grasses of the Northern Plains According to Phylogenetic Classification

Llewellyn L. Manske PhD
Scientist of Rangeland Research
North Dakota State University
Dickinson Research Extension Center
Report DREC 22-3099

Recently, the worldwide phylogenetic classification of grasses (Family=Poaceae) based on molecular DNA was updated (Soreng et al. 2017). Phylogenetic classification determines the relationships of the genetic structure in grasses using the matK and ndhF plastid DNA markers which permits the arrangement of grass genera into a graded series based on the degrees of closeness to a common ancestor and in the possession of a combination of derived traits that are in conformity with evolutionary history. The updated classification technology has determined that the world has 11,506 grass species in 768 genera, with 90 subtribes, 52 tribes, and 12 subfamilies in 3 clades (table 1).

As of yet, there are no flora treatises for the Northern Plains that include the updated phylogenetic classification of the grasses. This report arranges the grasses of the Northern Plains by clade, subfamily, tribe, subtribe, current genus and species according to the updated phylogenetic classification criteria, and includes a common name. The grasses are also separated into categories of, native, domesticated, introduced weedy, and cereal grasses of the Northern Plains. Using this classification system, the Northern Plains has 150 grass species in 66 genera, with 31 subtribes, 14 tribes, and 7 subfamilies in parts of 2 clades. The Northern Plains has no grasses from the subfamilies of Anomochlooideae, Pharoideae, and Puelioideae in the APP clade, Bambusoideae in the BOP clade, and Micrairoideae in the PACMAD clade. The Northern Plains does have grasses from the subfamilies of Oryzoideae consisting of 2 species in 2 genera with 2 subtribes and 1 tribe, and Pooideae consisting of 99 species in 40 genera with 14 subtribes and 5 tribes in the BOP clade, and Aristidoideae consisting of 1 species in 1 genus with 1 tribe, Panicoideae consisting of 18 species in 10 genera with 8 subtribes and 2 tribes, Arundinoideae consisting of 1 species in 1 genus with 1 subtribe and 1 tribe, Danthonioideae consisting of 3 species in 1 genus with 1 tribe, and Chloridoideae consisting of 26 species in 11 genera with 6 subtribes and 3 tribes in the PACMAD clade.

The native grasses of the Northern Plains are comprised of 104 species in 52 genera with 27 subtribes, 14 tribes, and 7 subfamilies in 2 clades (table 2). The domesticated grasses of the Northern Plains are comprised of 21 species in 13 genera with 6 subtribes, 3 tribes, and 1 subfamily in 1 clade (table 3). The introduced weedy grasses of the Northern Plains are comprised of 17 species in 11 genera with 9 subtribes, 5 tribes, and 3 subfamilies in 2 clades (table 4). The cereal grasses of the Northern Plains are comprised of 8 species in 5 genera with 2 subtribes, 3 tribes, and 2 subfamilies in 2 clades (table 5). Regional flora guidebooks from Stevens 1963, Looman and Best 1979, GPFA 1986, Barkworth et al. 2003, 2007, Johnson and Larson 2007, and Larson and Johnson 2007 were consulted to verify that each grass entry had documented existence in the Northern Plains, albeit, under different scientific names and classification descriptions.

Acknowledgment

I am grateful to Sheri Schneider for assistance in production of this manuscript and for development of the tables.

Table 1. Classification of the worldwide family Poaceae (Gramineae), the Grasses.

Clade	Subfamily	Tribe	Subtribe	Genera	Species
	Chloridoideae	5	26	124	1602
	Danthonioideae	1	0	19	292
	Micrairoideae	3	0	8	184
PACMAD					
	Arundinoideae	2	2	14	40
	Panicoideae	13	19	247	3241
	Aristidoideae	1	0	3	367
	Pooideae	15	26	202	3968
BOP	Bambusoideae	3	15	125	1670
	Oryzoideae	4	2	19	115
	Puelioideae	2	0	2	11
APP	Pharoideae	1	0	3	12
	Anomochlooideae	2	0	2	4
3	12	52	90	768	11,506

Data from Soreng et al. 2017. Oldest to Youngest, Bottom to Top.

Table 2. Northern Plains Native Grasses.

BOP Clade			
Oryzoideae	C ₃	subfamily	
Oryzeae		tribe	
Oryzinae		subtribe	
Leersia		oryzoides	Rice cutgrass
Zizaniinae		subtribe	
Zizania		aquatica	Wildrice
Pooideae	C ₃	subfamily	
Meliceae		tribe	
Glyceria		grandis	Tall mannagrass
		striata	Fowl mannagrass
		borealis	Boreal mannagrass
Schizachne		purpurascens	False melic
Stipeae		tribe	
Achnatherum		nelsonii	Nelson's needlegrass
		richardsonii	Richardson's needlegrass
		hymenoides	Indian ricegrass
Piptatherum		canadense	Canada ricegrass
		pungens	Northern ricegrass
		micrantherum	Little ricegrass
		racemosum	Blackseed ricegrass
Hesperostipa		comata	Needle and Thread
		curtiseta	Western needlegrass
		spartea	Porcupinegrass
Oryzopsis		asperifolia	Roughleaf ricegrass
Nassella		viridula	Green needlegrass
Bromeae		tribe	
Bromus		porteri	Nodding brome
		pubescens	Canada brome
		ciliatus	Fringed brome
Triticeae		tribe	
Hordeum		pusillum	Little barley
		jubatum	Foxtail barley
Pseudoroegneria		spicata	Bluebunch wheatgrass
Elymus		virginicus	Virginia wildrye
		villosus	Hairy wildrye
		canadensis	Canada wildrye
		hystrix	Bottlebrush grass
		elymoides	Squirreltail
		trachycaulus, trachycaulus	Slender wheatgrass

Table 2 cont. Northern Plains Native Grasses.

Pooideae (cont)		
Triticeae (cont)		
Elymus	trachycaulus, subsecundus	Bearded wheatgrass
	lanceolatus	Thickspike wheatgrass
Pascopyram	smithii	Western wheatgrass
Poeae	tribe	
Aveninae	subtribe	
Sphenopholis	obtusata	Prairie wedgegrass
	intermedia	Slender wedgegrass
Koeleria	macrantha	Prairie Junegrass
Phalaridinae	subtribe	
Phalaris	arundinacea	Reed canarygrass
Anthoxanthinae	subtribe	
Anthoxanthum	hirtum	Hairy sweetgrass
Agrostidinae	subtribe	
Agrostis	gigantea	Redtop
	stolonifera	Creeping bent
	scabra	Ticklegrass
Calamagrostis	montanensis	Plains reedgrass
	canadensis	Bluejoint reedgrass
	stricta, inexpansa	Northern reedgrass
Scolochloinae	subtribe	
Scolochloa	festucea	Whitetop
Aristaveninae	subtribe	
Deschampsia	cespitosa	Tufted hairgrass
Loliinae	subtribe	
Festuca	hallii	Plains rough fescue
	idahoensis	Idaho fescue
Vulpia	octoflora	Sixweeks fescue
Coleanthinae	subtribe	
Puccinellia	nuttaliana	Nuttall's alkali grass
Catabrosa	aquatica	Brookgrass
incertae sedis		
Avenula	hookeri	Spike oatgrass
Poinae	subtribe	
Poa	cusickii	Cusick's bluegrass
	palustris	Fowl bluegrass
	interior	Inland bluegrass
	compressa	Canada bluegrass
	secunda	Sandberg bluegrass
	arida	Plains bluegrass
Beckmanniinae	subtribe	
Beckmannia	syzigachne	American sloughgrass

Table 2 cont. Northern Plains Native Grasses.

Poeae (cont)		
Cinninae	subtribe	
Cinna	latifolia	Drooping woodreed
Alopecurinae	subtribe	
Alopecurus	aequalis	Shortawn foxtail
	geniculatus	Marsh foxtail
	carolinanus	Tufted foxtail
PACMAD Clade		
Aristidoideae	subfamily	
Aristideae	tribe	
Aristida	purpurea, longiseta	Red Threeawn
Panicoideae	subfamily	
Paniceae	tribe	
Dichantheiinae	subtribe	
Dichanthelium C ₃	leibergii	Leiberg's panicgrass
	oligosanthes, scribnerianum	Scribner's panicgrass
	wilcoxianum	Wilcox's panicgrass
Boivinellinae	subtribe	
Echinochloa	muricata	American barnyardgrass
Panicinae	subtribe	
Panicum	capillare	Witchgrass
	virgatum	Switchgrass
Cenchrinae	subtribe	
Cenchrus	longispinus	Mat sandbur
Andropogoneae C ₄	tribe	
Saccharinae	subtribe	
Sorghastrum	nutans	Indiangrass
Andropogoninae	subtribe	
Andropogon	gerardii	Big bluestem
	hallii	Sand bluestem
Schizachyrium	scoparium	Little bluestem
Arundinoideae C ₃	subfamily	
Molinieae	tribe	
Moliniinae	subtribe	
Phragmites	australis	Common reed
Danthonioideae C ₃	subfamily	
Danthoniae	tribe	
Danthonia	spicata	Poverty oatgrass
	intermedia	Timber oatgrass
	parryi	Parry's oatgrass

Table 2 cont. Northern Plains Native Grasses.

Chloridoideae		subfamily	
Eragrostideae	C ₄	tribe	
Eragrostidinae		subtribe	
Eragrostis		hypnoides	Creeping lovegrass
		pectinacea	Tufted lovegrass
		spectabilis	Purple lovegrass
Zoysieae	C ₄	tribe	
Sporobolinae		subtribe	
Sporobolus		neglectus	Small dropseed
		compositus	Tall dropseed
		airoides	Alkali dropseed
		cryptandrus	Sand dropseed
		heterolepis	Prairie dropseed
Calamovilfa		longifolia	Prairie sandreed
Spartina		gracilis	Alkali cordgrass
		pectinata	Prairie cordgrass
Cynodonteae	C ₄	tribe	
Boutelouinae		subtribe	
Bouteloua		curtipendula	Sideoats grama
		gracilis	Blue grama
		hirsuta	Hairy grama
Buchloe		dactyloides	Buffalograss
Monanthochloinae		subtribe	
Distichlis		spicata	Inland saltgrass
Muhlenbergiinae		subtribe	
Muhlenbergia		racemosa	Green muhly
		glomerata	Spike muhly
		cuspidata	Plains muhly
		richardsonis	Mat muhly
		asperifolia	Scratchgrass
		pungens	Sandhill muhly
Redfieldia		flexuosa	Blowout grass
Schedonnardus		paniculatus	Tumble grass
Scleropogoninae		subtribe	
Munroa		squarrosa	False buffalograss

Table 3. Northern Plains Domesticated Grasses.

BOP clade			
Pooideae	C ₃	subfamily	
Bromeae		tribe	
Bromus		inermis	Smooth brome
		riparius	Meadow brome
Triticeae		tribe	
Agropyron		cristatum	Crested wheatgrass
		fragile	Siberian wheatgrass
		desertorum	Desert wheatgrass
Leymus		angustus	Altai wildrye
		cinereus	Great Basin wildrye
Psathyrostachys		juncea	Russian wildrye
Thinopyrum		intermedium, intermedium	Intermediate wheatgrass
		intermedium, barbulatum	Pubescent wheatgrass
		ponticum	Tall wheatgrass
Poae		tribe	
Phalaridinae		subtribe	
Phalaris		canariensis	Annual canarygrass
Loliinae		subtribe	
Festuca		rubra	Red fescue
		trachyphylla	Hard fescue
Lolium		perenne	Perennial ryegrass
		multiflorum	Italian ryegrass
Schedonorus		pratensis	Meadow fescue
Dactylidinae		subtribe	
Dactylis		glomerata	Orchardgrass
Poinae		subtribe	
Poa		pratensis	Kentucky bluegrass
Phleinae		subtribe	
Phleum		pratensis	Timothy
Alopecurinae		subtribe	
Alopecurus		arundinaceus	Creeping meadow foxtail

Table 4. Northern Plains Introduced Weedy Grasses

BOP Clade			
Pooideae	C ₃	subfamily	
Bromeae		tribe	
Bromus		tectorum	Cheatgrass
		japonicus	Japanese brome
		squarrosus	Squarrose brome
Triticeae		tribe	
Elymus		repens	Quackgrass
Poeae		tribe	
Aveninae		subtribe	
Avena		fatua	Wild oats
Loliinae		subtribe	
Lolium		persicum	Persian darnel
Coleanthinae		subtribe	
Puccinellia		distanis	European alkali grass
Poinae		subtribe	
Poa		annua	Annual bluegrass
		bulbosa	Bulbous bluegrass
Alopecurinae		subtribe	
Alopecurus		pratensis	Meadow foxtail
PACMAD clade			
Panicoideae		subfamily	
Paniceae		tribe	
Anthephorinae		subtribe	
Digitaria		ischaemum	Smooth crabgrass
Boivineliinae		subtribe	
Echinochloa		crus-galli	Barnyardgrass
Cenchrinae		subtribe	
Setaria		viridus	Green foxtail
		verticillate	Bristly foxtail
		pumila	Yellow foxtail
		italica	Foxtail millet
Chloridoideae		subfamily	
Eragrostideae		tribe	
Eragrostidinae		subtribe	
Eragrostis		cilianensis	Stinkgrass

Table 5. Northern Plains Cereal Grasses.

BOP clade			
Pooideae	C ₃	subfamily	
Triticeae		tribe	
Hordeum		valgaria	Barley
Secale		cereale	Rye
Triticum		dicoccum	Emmer wheat
		durum	Durum wheat
		aestivum	Wheat
		spelta	Spelt
Poeae		tribe	
Aveninae		subtribe	
Avena		sativa	Oats
PACMAD clade			
Panicoidae			
Andropogoneae	C ₄	subfamily	
Tripsacinae		tribe	
Zea		subtribe	
		mays	Corn

Literature Cited

- Barkworth, M.E., K.M. Capels, S. Long, L.K. Anderton, and M.B. Piep, eds. 2003, 2007.** Magnoliophyta: Commelinidae: Poaceae, part 1 & 2. Flora of North America North of Mexico, volume 24 & 25. Oxford University Press, New York and Oxford.
- Great Plains Flora Association. 1986.** Flora of the Great Plains. University of Kansas, Lawrence, KS.
- Johnson, J.R., and G.E. Larson. 2007.** Grassland plants of South Dakota and the Northern Great Plains. South Dakota State University, B566 (rev.). Brookings, SD.
- Larson, G.E. and J.R. Johnson. 2007.** Plants of the Black Hills and Bear Lodge Mountains. 2nd Edition. South Dakota State University, B732. Brookings, SD.
- Looman, J., and K.F. Best. 1979.** Budd's flora of the Canadian prairie Provinces. Agriculture Canada. Publication 1662. Hull, Quebec, Canada.
- Soreng, R.J. and 8 coauthors. 2017.** A worldwide phylogenetic classification of the Poaceae (Gramineae) II: An update and a comparison of two 2015 classifications. *Journal of Systematics and Evolution* 55(4):259-290.
- Stevens, O.A. 1963.** Handbook of North Dakota plants. North Dakota Institute for Regional Studies. Fargo, ND.