



Supplement

The following supplementary materials are available for this article: Chen, H.-C., Lee, C.-H., Liao, T.-Y., Lu, P.-L. 2026 Evaluating the discriminatory power of CBOL-Recommended DNA barcodes in the genus *Setaria* (Poaceae) from Taiwan. *Taiwania* 71(2): 247-262. doi: 10.6165/tai.2026.71.247

Table S1. DNA barcodes for grasses.

Previous studies	Markers used	Taxa studied	Brief Result and Conclusion
Drumwright <i>et al.</i> (2011)	<i>matK</i> , <i>rbcl</i> , <i>psbA-trnH</i> .	Grass species from Natural Area in Tennessee	1. Both <i>matK</i> and <i>rbcl</i> could enable Poaceae species identification with 95% accuracy.
Liu <i>et al.</i> (2014)	<i>matK</i> , <i>atpB-rbcl</i> , <i>rbcl</i> , <i>trnL-F</i> , <i>rps11</i> , <i>rps16</i>	30 species of <i>Leymus</i> .	1. Very few species were resolved. 2. Concluding that the barcode of <i>Leymus</i> remains to be discovered.
Loera-Sánchez <i>et al.</i> (2020)	<i>rbcl</i> a, <i>matK</i> , <i>psbA-trnH</i>	Subalpine grassland species.	1. Plastid <i>psbA-trnH</i> had a 100% correct identification in the grasses <i>Cynosurus cristatus</i> , <i>Dactylis glomerata</i> and <i>Trisetum flavescens</i> . 2. Closely related <i>Festuca</i> , <i>Lolium</i> and <i>Poa</i> species were not always correctly identified, resulting in low identification success.
Lopez-Alvarez <i>et al.</i> (2012)	<i>trnL-F</i> , ITS, GI	Model plant <i>Brachypodium distachyon</i> and its close relatives.	<i>trnL-F</i> and nuclear (ITS, GI) combine well for <i>Brachypodium</i> .
Raveendar <i>et al.</i> (2019)	ITS2, <i>matK</i> , <i>psbA-trnH</i> , <i>rbcl</i>	<i>Triticum</i> species and subspecies	1. No single locus could distinguish <i>Triticum</i> species completely but combining them improved discrimination. 2. The closely related species, <i>T. aestivum</i> and <i>T. turgidum</i> , had no DNA barcode to separate them.
Saadullah <i>et al.</i> (2016)	<i>rbcl</i> , <i>matK</i>	Grasses in a not well studied flora in Pakistan	Both <i>rbcl</i> and <i>matK</i> totally failed in discrimination of congeneric species.
Skuzza <i>et al.</i> (2019)	<i>rbcl</i> , <i>matK</i> , <i>psbA-trnH</i>	10 <i>Secale</i> species and subspecies	1. None of the regions alone could differentiate <i>Secale</i> species and subspecies. 2. Suggesting the need for combining regions or exploring alternatives for better discrimination.
Ragupathy <i>et al.</i> (2009)	<i>matK</i> , <i>psbA-trnH</i>	<i>Tripogon</i> species.	Confirmed a cryptic species of the grass genus <i>Tripogon</i> with the support of DNA barcoding and morphometric analysis
Syme <i>et al.</i> (2013)	<i>rbcl</i> , <i>matK</i> , ITS	Native Australian and exotic stipoid grasses.	The highest accuracy was achieved using ITS and the BLAST algorithm. The poorest were <i>rbcl</i> and the Bayesian Likelihood analysis.
Wang <i>et al.</i> (2014)	18 chloroplast and nuclear genes	Introduced grass species in eastern Australia.	Three chloroplast genes, <i>matK</i> , <i>ndhK</i> , and <i>petL</i> as promising markers.
Wang <i>et al.</i> (2017)	<i>atpF</i> intron, <i>matK</i> , <i>ndhK-ndhC</i> , <i>psbE-petL</i> , ETS, ITS	Invasive grass species in eastern Australia.	1. No single locus was universally effective. 2. Two plastid loci (<i>atpF</i> and <i>matK</i>) successfully distinguished most species. 3. Nuclear loci (ETS and ITS) had low PCR success, though ETS could differentiate the invasive <i>Nassella</i> species.
Wang <i>et al.</i> (2022)	<i>rbcl</i> , <i>matK</i> , <i>trnL-F</i> , ITS	Seven grass genera of 14 accessions.	1. Both <i>matK</i> and ITS had the best discriminatory power, identifying 11 accessions each. 2. While <i>rbcl</i> and <i>trnL-F</i> were less effective.

Table S2. Primer sequences used in this study.

Primers	Sequences (5'–3')	Source or reference
ITS		
F	TCGTAACAAGGTTTCCGTAGGT	Chen <i>et al.</i> (2009); Chen <i>et al.</i> (2011)
R	GTAAGTTTCTTCTCCGCT	Chen <i>et al.</i> (2009); Chen <i>et al.</i> (2011)
<i>trnL-F</i>		
<i>trnL-F-C</i>	CGAAATCGGTAGACGCTACG	Chiang <i>et al.</i> (1998); Taberlet <i>et al.</i> (2007)
<i>trnL-F-F</i>	ATTGAACTGGTGACACGAG	Chiang <i>et al.</i> (1998)
<i>rbcl</i>		
<i>rbcl-F0115</i>	GCATTCCGAGTAACTCCTCAGC	Modified from NCBI KJ001642.1
<i>rbcl-R1314</i>	CAAGATCGCGCCCTTCGTTACG	Modified from NCBI KJ001642.1
<i>matK</i>		
19F	TGTTCTGACCATATTGCACTATG	Lindberg (2016)
<i>matK3 R</i>	AACTAGTCGGATGGAGTAG	Zhang <i>et al.</i> (2014)
<i>trnH-psbA</i>		
<i>psbA3_F</i>	GTTATGCATGAACGTAATGCTC	Vijayan and Tsou (2010)
<i>trnHf_05</i>	CGCGCATGGTGGATTACAATCC	Vijayan and Tsou (2010)



Table S3. Genebank accession number were used in this study.

Taxa	Voucher or reference	Locality	Accession numbers				
			ITS	matK	rbcl	psbA-trnH	trnL-F
<i>Setaria barbata</i>	Chih-Hui Chen 7325	Taipei, Taiwan	PV562248	PV609811	PV609936	PV609870	PV610001
<i>Setaria faberi</i>	Chih-Hui Chen 7496	New Taipei, Taiwan	PV562249	PV609812	PV609937	PV609871	PV610002
	Chih-Hui Chen 7497	New Taipei, Taiwan	PV562250	PV609813	PV609938	PV609872	PV610003
	Chih-Hui Chen 7498	Taipei, Taiwan	PV562251	PV609814	PV609939	PV609873	PV610004
<i>Setaria italica</i>	Chih-Hui Chen 7461	Taipei, Taiwan	PV562252	PV609815	PV609940	PV609874	PV610005
	Chih-Hui Chen 7462	Taipei, Taiwan	PV562253	PV609816	PV609941	PV609875	PV610006
<i>Setaria pallidifusca</i>	Chih-Hui Chen 5351	New Taipei, Taiwan	PV562262	-	PV609950	PV609884	-
	Chih-Hui Chen 5794	Nantou, Taiwan	PV562263	-	PV609951	-	PV610016
	Chih-Hui Chen 6355	Taiwan, Green Island	PV562264	PV609825	PV609952	PV609885	PV610017
	Chih-Hui Chen 7329	New Taipei, Taiwan	PV562254	PV609817	PV609942	PV609876	PV610007
	Chih-Hui Chen 7337	Miaoli, Taiwan	PV562255	PV609818	PV609943	PV609877	PV610008
	Chih-Hui Chen 7388	Miaoli, Taiwan	PV562256	PV609819	PV609944	PV609878	PV610009
	Chih-Hui Chen 7397	Pingtung, Taiwan	PV562257	PV609820	PV609945	PV609879	PV610010
<i>Setaria palmifolia</i>	Chih-Hui Chen 4342	Hsinchu, Taiwan	-	-	-	PV609880	-
	Chih-Hui Chen 6254	Kaohsiung, Taiwan	PV562258	PV609821	PV609946	PV609881	PV610011
	Chih-Hui Chen 6425	Taipei, Taiwan	PV562259	PV609822	PV609947	PV609882	PV610012
	Chih-Hui Chen 7049	New Taipei, Taiwan	PV562260	PV609823	PV609948	PV609883	PV610013
	Chih-Hui Chen 7060	Taitung, Taiwan	PV562261	PV609824	PV609949	-	PV610014
<i>Setaria parviflora</i>	Chih-Hui Chen 7233	Hsinchu, Taiwan	-	-	-	-	PV610015
	Chih-Hui Chen 7234	Hsinchu, Taiwan	PV562265	PV609826	PV609953	PV609886	PV610018
	Chih-Hui Chen 7294	Nantou, Taiwan	PV562266	PV609827	PV609954	PV609887	PV610019
	Chih-Hui Chen 7317	Taichung, Taiwan	PV562267	PV609828	PV609955	PV609888	PV610020
	Chih-Hui Chen 7330	New Taipei, Taiwan	PV562268	PV609829	PV609956	PV609889	PV610021
	Chih-Hui Chen 6093	Kaohsiung, Taiwan	PV562269	PV609830	PV609957	PV609890	PV610023
<i>Setaria plicata</i>	Chih-Hui Chen 6874	Nantou, Taiwan	PV562270	-	PV609958	PV609891	PV610022
	Chih-Hui Chen 6888	Pingtung, Taiwan	PV562271	PV609831	PV609959	-	-
	Chih-Hui Chen 7443	Kaohsiung, Taiwan	PV562272	PV609832	PV609960	PV609892	-
	Chih-Hui Chen 4347	Hsinchu, Taiwan	PV562273	-	PV609961	PV609893	PV610024
<i>Setaria pumila</i>	Chih-Hui Chen 4736	Kaohsiung, Taiwan	PV562274	-	PV609962	PV609894	PV610025
	Chih-Hui Chen 5062	Taoyuan, Taiwan	PV562275	PV609833	PV609963	PV609895	PV610026
	Chih-Hui Chen 5812	Chiayi, Taiwan	PV562276	PV609834	PV609964	PV609896	PV610027
	Chih-Hui Chen 6462	Keelung, Taiwan	PV562277	PV609835	PV609965	PV609897	PV610028
	Chih-Hui Chen 6683	Miaoli, Taiwan	PV562278	-	-	PV609898	-
	Chih-Hui Chen 7062	Taitung, Taiwan	PV562279	-	PV609966	PV609899	-
	Chih-Hui Chen 7151	Nantou, Taiwan	PV562280	-	PV609967	PV609900	-
	Chih-Hui Chen 7256	Hualien, Taiwan	PV562281	PV609836	PV609968	PV609901	PV610029
	Chih-Hui Chen 5820	Yilan, Taiwan	PV562282	PV609837	PV609969	PV609902	PV610030
<i>Setaria sphacelata</i>	Chih-Hui Chen 6556	Taitung, Taiwan	PV562283	-	PV609970	PV609903	-
	Chih-Hui Chen 6741	Taichung, Taiwan	PV562284	PV609838	PV609971	PV609904	PV610031
<i>Setaria verticillata</i>	Chih-Hui Chen 6182	Pingtung, Taiwan	PV562285	PV609839	PV609972	PV609905	PV610035
	Chih-Hui Chen 6832	Ryukyu, Taiwan	PV562287	PV609840	PV609974	PV609907	PV610036
	Chih-Hui Chen 7228	Yilan, Taiwan	PV562288	PV609841	PV609975	PV609908	PV610037
	Chih-Hui Chen 7237	Tainan, Taiwan	PV562301	PV609854	PV609988	PV609921	PV610051
	Chih-Hui Chen 7239	Chiayi, Taiwan	PV562289	PV609842	PV609976	PV609909	PV610038
	Chih-Hui Chen 7250	Hualien, Taiwan	PV562290	PV609843	PV609977	PV609910	PV610033
	Chih-Hui Chen 7252	Hualien, Taiwan	PV562291	PV609844	PV609978	PV609911	PV610039
	Chih-Hui Chen 7254	Hualien, Taiwan	PV562292	PV609845	PV609979	PV609912	PV610040
	Chih-Hui Chen 7273	New Taipei, Taiwan	PV562293	PV609846	PV609980	PV609913	PV610034
	Chih-Hui Chen 7285	New Taipei, Taiwan	PV562294	PV609847	PV609981	PV609914	PV610041
	Chih-Hui Chen 7286	Nantou, Taiwan	PV562295	PV609848	PV609982	PV609915	PV610042
	Chih-Hui Chen 7495	Nantou, Taiwan	PV562296	PV609849	PV609983	PV609916	PV610043
	Chih-Hui Chen 7523	Hualien, Taiwan	PV562297	PV609850	PV609984	PV609917	PV610044
Chih-Hui Chen 7537	Taitung, Taiwan	PV562298	PV609851	PV609985	PV609918	PV610045	
<i>Setaria viridis</i>	Chih-Hui Chen 6340	Green Island, Taiwan	PV562286	-	PV609973	PV609906	PV610032
	Chih-Hui Chen 6571	Taitung, Taiwan	PV562299	PV609852	PV609986	PV609919	PV610050



	Chih-Hui Chen 7231	Mazu, Taiwan	PV562300	PV609853	PV609987	PV609920	PV610046
	Chih-Hui Chen 7240	Chiayi, Taiwan	PV562302	PV609855	PV609989	PV609922	PV610052
	Chih-Hui Chen 7248	Taitung, Taiwan	PV562303	PV609856	PV609990	PV609923	PV610047
	Chih-Hui Chen 7263	Kinmen, Taiwan	PV562304	PV609857	PV609991	PV609924	PV610048
	Chih-Hui Chen 7264	Penghu, Taiwan	PV562305	PV609858	PV609992	PV609925	PV610049
	Chih-Hui Chen 7265	Penghu, Taiwan	PV562306	PV609859	PV609993	PV609926	PV610053
	Chih-Hui Chen 7268	Penghu, Taiwan	PV562307	PV609860	PV609994	PV609927	PV610054
	Chih-Hui Chen 7277	Green Island, Taiwan	PV562308	PV609861	PV609995	PV609928	PV610055
	Chih-Hui Chen 7280	Green Island, Taiwan	PV562309	PV609862	PV609996	PV609929	PV610056
	Chih-Hui Chen 7513	Okinawa, Japan	PV562310	PV609863	PV609997	PV609930	PV610057
	Chih-Hui Chen 7517	Okinawa, Japan	PV562311	PV609864	PV609998	PV609931	PV610058
	Chih-Hui Chen 7536	Taitung, Taiwan	PV562312	PV609865	PV609999	PV609932	PV610059
<i>Cenchrus echinatus</i>	Chih-Hui Chen 6869	Nantou, Taiwan	-	-	-	PV609866	-
<i>Eriochloa procera</i>	Chih-Hui Chen 6829	Ryukyu, Taiwan	PV562245	-	PV609933	-	PV610000
<i>Panicum maximum</i>	Chih-Hui Chen 7210	Pingtung, Taiwan	-	-	-	PV609867	-
<i>Pennisetum alopecuroides</i>	Chih-Hui Chen 7177	New Taipei, Taiwan	PV562246	-	PV609934	PV609868	-
<i>Pennisetum purpureum</i>	Chih-Hui Chen 6813	Ryukyu, Taiwan	PV562247	PV609810	PV609935	PV609869	-