

**Suppl. table 1A: Data sources for published Cassandra sequences**

plant order	plant family	species	accession number	reference	DOI
Polypodiales	Didymochlaenaceae	<i>Didymochlaena trunculata</i>	AY860311.1	Kalendar et al., 2008,	10.1073/pnas.0709698105
Polypodiales	Nephrolepidaceae	<i>Nephrolepis exaltata</i>	AY860313.1	Kalendar et al., 2008	10.1073/pnas.0709698105
Cyatheales	Cyatheaceae	<i>Sphaeropteris cooperi</i>	AY860310.1	Kalendar et al., 2008	10.1073/pnas.0709698105
Piperales	Aristolochiaceae	<i>Saruma henryi</i>	EF125873.1	Kalendar et al., 2008	10.1073/pnas.0709698105
Poales	Poaceae	<i>Amblyopyrum muticum</i>	AY603371.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Avena sativa</i>	AY271960.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Brachypodium distachyon</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Poaceae	<i>Bromus sterilis</i>	AY271957	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Colpodium drakensbergense</i>	FJ975775.1	Kalendar et al., 2020	10.3390/ijms21082931
	Poaceae	<i>Colpodium versicolor</i>	FJ975776.1	Kalendar et al., 2020	10.3390/ijms21082931
	Poaceae	<i>Deschampsia antarctica</i>	EU867815	Kalendar et al., 2020	10.3390/ijms21082931
	Poaceae	<i>Eremopyrum distans</i>	AY603372.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Henrardia persica</i>	AY603374.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Hordeum brachyantherum</i>	AY603373.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Hordeum marinum</i>	AY603375.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Hordeum vulgare</i>	AY164585.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Oryza brachyantha</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Poaceae	<i>Oryza glaberrima</i>	HM481419.1	Kalendar et al., 2020	10.3390/ijms21082931
	Poaceae	<i>Oryza minuta</i>	HM481420.1	Kalendar et al., 2020	10.3390/ijms21082931
	Poaceae	<i>Oryza sativa indica</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Poaceae	<i>Oryza sativa japonica</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Poaceae	<i>Panicum virgatum</i>	KM262797.1	Kalendar et al., 2020	10.3390/ijms21082931
	Poaceae	<i>Peridictyon sanctum</i>	AY603376.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Phleum pratense</i>	AF538613.1	unpublished	
	Poaceae	<i>Psathyrostachys fragilis</i>	AY271962.2	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Saccharum hybrid</i>	KC686839.1	Kalendar et al., 2020	10.3390/ijms21082931
	Poaceae	<i>Secale cereale</i>	AY359471.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Setaria italica</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Poaceae	<i>Spartina alterniflora</i>	AY603377.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Sorghum bicolor</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y

	Poaceae	<i>Triticum aestivum</i>	AY271963.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Zea mays</i>	AY271958.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Poaceae	<i>Zingeria biebersteiniana</i> ssp. <i>trichopoda</i>	FJ975780.1	Kalendar et al. 2020	10.3390/ijms21082931
	Poaceae	<i>Zingeria biebersteiniana</i>	FJ975777.1	Kalendar et al. 2020	10.3390/ijms21082931
	Poaceae	<i>Zingeria kochii</i>	FJ975778.1	Kalendar et al. 2020	10.3390/ijms21082931
	Poaceae	<i>Zingeria pisdica</i>	FJ975779.1	Kalendar et al. 2020	10.3390/ijms21082931
Malpighiales	Clusiaceae	<i>Garcinia mangostana</i>	EU140956.1	Kalendar et al., 2020	10.3390/ijms21082931
	Linaceae	<i>Linum usitatissimum</i>	DQ767972.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Euphorbiaceae	<i>Jatropha curcas</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
Fabales	Fabaceae	<i>Cajanus cajan</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Fabaceae	<i>Glycine max</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Fabaceae	<i>Lens culinaris</i>	KX889392	Rey-Banos et al., 2016,	10.1371/journal.pone.0176728
	Fabaceae	<i>Lotus japonicus</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Fabaceae	<i>Medicago truncatula</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Fabaceae	<i>Pisum sativum</i>	DQ788719.1	Kalendar et al., 2008	10.1073/pnas.0709698105
Rosales	Cannabaceae	<i>Cannabis sativa</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Rosaceae	<i>Chaenomeles japonica</i>	AY860309.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Rosaceae	<i>Fragaria x ananassa</i>	AY860312.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Rosaceae	<i>Malus domestica</i>	AY603366.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Rosaceae	<i>Prunus domestica</i>	AY860314.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Rosaceae	<i>Rosa hybrid</i>	AY860315.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Rosaceae	<i>Rosa rugosa</i>	AY860316.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Rosaceae	<i>Rubus idaeus</i>	AY860317.1	Kalendar et al., 2008	10.1073/pnas.0709698105
Brassicales	Brassicaceae	<i>Arabidopsis lyrata</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Brassicaceae	<i>Arabidopsis thaliana</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Brassicaceae	<i>Brassica oleracea</i>	AY860307.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Brassicaceae	<i>Brassica rapa</i>	AY860308.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Brassicaceae	<i>Thellungiella parvula</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
	Brassicaceae	<i>Thellungiella salsuginea</i>	Supplemental material from reference	Gao et al., 2016	10.1186/s13059-015-0867-y
Caryophyllales	Aioaceae	<i>Mesembryanthemum crystallinum</i>	AY603370.1	Kalendar et al., 2008	10.1073/pnas.0709698105
	Amaranthaceae	<i>Amaranthus palmeri</i>	MT230479.1	Kalendar et al., 2020	10.3390/ijms21082931

	Amaranthaceae	<i>Beta vulgaris</i>	MK216566.1	Maiwald et al., 2021	10.1093/aob/mcaa176
	Amaranthaceae	<i>Chenopodium quinoa</i>	–	Maiwald et al., 2021	10.1093/aob/mcaa176
	Caryophyllaceae	<i>Colobanhus quitensis</i>	EU882730.1	Kalendar et al., 2020	10.3390/ijms21082931
	Caryophyllaceae	<i>Silene latifolia</i>	KC686837.1	Kalendar et al., 2020	10.3390/ijms21082931
Ericales	Ericaceae	<i>Vaccinium corymbosum</i>	DQ673669.1	Kalendar et al., 2008	10.1073/pnas.0709698105

**Suppl. table 1B: Data sources for published Asteraceae genomes**

plant family	lineage	species	accession number	platform	reference	DOI
Asteraceae	Asteroideae	<i>Artemisia annua</i>	PKPP00000000	ENA	Shen <i>et al.</i> , 2018	10.1016/j.molp.2018.03.015
		<i>Bidens hawaiiensis</i>	GCA_021521975.1	ENA	Bellinger <i>et al.</i> , 2022	10.1093/jhered/esab077
		<i>Chrysanthemum indicum</i>	GWHBHNH00000000	genome warehouse	–	
		<i>Conyza (Erigeron) canadensis</i>	JSWR01000000	ENA	Peng <i>et al.</i> , 2014	10.1104/pp.114.247668
		<i>Glebionis cornaria</i>	JANFOE000000000.1	ENA	Wang <i>et al.</i> , 2022	10.1093/dnares/dsac036
		<i>Helianthus anuus</i>	GCF_002127325.2	ENA	Badouin <i>et al.</i> , 2017	10.1038/nature22380
		<i>Helichrysum umbraculigerum</i>	CATIUR010000000	ENA	Berman <i>et al.</i> , 2023	10.1038/s41477-023-01402-3
		<i>Mikania micrantha</i>	GCA_009363875.1	ENA	Liu <i>et al.</i> , 2020	10.1038/s41467-019-13926-4
		<i>Pluchea indica</i>	GWHBCJV00000000	genome warehouse	He <i>et al.</i> , 2022	10.1038/s41559-022-01744-9
		<i>Scalesia atractyloides</i>	<a href="https://doi.org/10.5061/dryad.8gtht76rh">https://doi.org/10.5061/dryad.8gtht76rh</a>	dryad	Cerca <i>et al.</i> , 2022	10.1038/s41467-022-31280-w
		<i>Smallanthus sonchifolius</i>	JAKNSE010000000	ENA	Fan <i>et al.</i> , 2022	10.1111/1755-0998.13675
		<i>Stevia rebaudiana</i>	GCA_009936405	ENA	Xu <i>et al.</i> , 2021	10.1038/s41438-021-00565-4
		<i>Tanacetum cinerariifolium</i>	BKCI000000000.1	ENA	Yamashiro <i>et al.</i> , 2019	10.1038/s41598-019-54815-6
		Cichorioideae		<i>Cichorium endivia</i>	GCA_023376185.1	ENA
<i>Cichorium intybus</i>	JAKNSD000000000			ENA	Fan <i>et al.</i> , 2022	10.1111/1755-0998.13675
<i>Lactuca sativa</i>	GCF_002870075.4			ENA	Reyes-Chin-Wo <i>et al.</i> , 2017	10.1038/ncomms14953
<i>Taraxakum kok-saghyz</i>	GWHBCHF000000000			genome warehouse	Lin <i>et al.</i> , 2021	10.1007/s11427-021-2033-2
<i>Taraxacum mongolicum</i>	GWHBCHG000000000			genome warehouse	Lin <i>et al.</i> , 2021	10.1007/s11427-021-2033-2
Carduoideae		<i>Arctium lappa</i>	GCA_023525745.1	ENA	Fan <i>et al.</i> , 2022	10.1111/1755-0998.13675
		<i>Carthamus tinctorius</i>	GCA_001633085.1	ENA	Wu <i>et al.</i> , 2021	10.1111/pbi.13586
		<i>Cynara cardunculus</i>	GCA_001531365.2	ENA	Scaglione <i>et al.</i> , 2016	10.1038/srep19427

**Suppl. table 1C: Data sources for published 5S rRNA genes**

species	accession number	repository	reference	DOI
<i>Ambylopyrum muticum</i>	EU924818	NCBI	Baum et al., 2009	10.1139/g03-146
<i>Arabidopsis lyrata</i>	E02158	5S rRNAdb	Szymanski et al., 2016	10.1093/nar/gkv1081
<i>Arabidopsis thaliana</i>	E00006	5S rRNAdb	Szymanski et al., 2016	10.1093/nar/gkv1081
<i>Avena sativa</i>	EF071696	NCBI	Peng et al., 2008	10.1104/pp.114.247668
<i>Beta vulgaris</i>	Z25804	NCBI	Schmidt et al., 1994	10.1007/BF01253964
<i>Brachypodium distachyon</i>	XR_002960580	NCBI	Thibaud-Nissen et al., 2016	10.2527/jas2016.94supplement4184x
<i>Brassica rapa</i>	E02489	5S rRNAdb	Szymanski et al., 2016	10.1093/nar/gkv1081
<i>Cannabis sativa</i>	XR_004008092	NCBI	Thibaud-Nissen et al., 2016	10.2527/jas2016.94supplement4184x
<i>Cajanus cajan</i>	XR_003803880	NCBI	Thibaud-Nissen et al., 2016	10.2527/jas2016.94supplement4184x
<i>Chrysanthemum indicum</i>	OK181863	NCBI	-	
<i>Cynara cardunculus</i>	XR_003070488	NCBI	Thibaud-Nissen et al., 2016	10.2527/jas2016.94supplement4184x
<i>Eremopyrum distans</i>	KC188473	NCBI	Baum et al., 2013	10.1139/gen-2012-0195
<i>Fragaria x ananassa</i>	E00852	5S rRNAdb	Szymanski et al., 2016	10.1093/nar/gkv1081
<i>Glycine max</i>	XR_005890139	NCBI	Thibaud-Nissen et al., 2016	10.2527/jas2016.94supplement4184x
<i>Henrardia persica</i>	KC188485	NCBI	Baum et al., 2013	10.1139/gen-2012-0195
<i>Hordeum brachyantherum</i>	AY034775	NCBI	Baum & Johnson, 2011	10.1139/b02-057
<i>Hordeum marinum</i>	AF027583	NCBI	Baum & Johnson, 1998	PMID: 9809436
<i>Hordeum vulgare</i>	HVU07378	NCBI	Baum & Johnson, 1994	10.1139/g94-140
<i>Jatropha curcas</i>	E00420	5S rRNAdb	Szymanski et al., 2016	10.1093/nar/gkv1081
<i>Lactuca sativa</i>	E00211	5S rRNAdb	Szymanski et al., 2016	10.1093/nar/gkv1081
<i>Linum usitatissimum</i>	X01531	NCBI	Goldsbrough et al., 1982	10.3390/ijms22031302
<i>Lotus japonicus</i>	AY040715	NCBI	Pedrosa et al., 2002	10.1093/genetics/161.4.1661
<i>Malus domestica</i>	XR_003771672	NCBI	Thibaud-Nissen et al., 2016	10.2527/jas2016.94supplement4184x
<i>Medicago truncatula</i>	XR_005644521	NCBI	Thibaud-Nissen et al., 2016	10.2527/jas2016.94supplement4184x
<i>Oryza brachyantha</i>	XR_005812828	NCBI	Thibaud-Nissen et al., 2016	10.2527/jas2016.94supplement4184x
<i>Oryza sativa</i>	E00234	5S rRNAdb	Szymanski et al., 2016	10.1093/nar/gkv1081
<i>Panicum virgatum</i>	XR_005680461	NCBI	Thibaud-Nissen et al., 2016	10.2527/jas2016.94supplement4184x
<i>Pisum sativum</i>	AY499178	NCBI	Ellis et al., 1988	10.1007/BF00337732
<i>Pyrus breitschneiderii</i>	E02495	5S rRNAdb	Szymanski et al., 2016	10.1093/nar/gkv1081
<i>Secale cereale</i>	AJ307365	NCBI	Fulnecek et al., 2002	10.1007/s00438-002-0761-7
<i>Setaria italica</i>	KC525411	NCBI	Zhao et al., 2013	10.1186/1471-2164-14-244
<i>Silene latifolia</i>	AB027248	NCBI	-	
<i>Triticum aestivum</i>	E00299	5S rRNAdb	Szymanski et al., 2016	10.1093/nar/gkv1081
<i>Zea mays</i>	E00011	5S rRNAdb	Szymanski et al., 2016	10.1093/nar/gkv1081

**Suppl. table 1D: Data sources for used plant read data**

**data for Asteraceae species**

species	read accession	platform	library layout	library strategy	library source	read length
<i>Arctium lappa</i>	ERR5554584	illumina HiSeq 2500	paired	WGS	genomic	101
<i>Artemisia annua</i>	ERR11535563	illumina NovaSeq 6000	paired	WGS	genomic	150
<i>Bidens hawaiiensis</i>	SRR14191093	pacBIO SMRT	single	WGS	genomic	-
<i>Carthamus tinctorius</i>	SRR2154065	illumina HiSeq 1500	paired	WGS	genomic	101
<i>Chrysanthemum indicum</i>	CRR389876 (genome warehouse)	illumina NovaSeq 6000	paired	WGS	genomic	150
<i>Conyza canadensis</i>	NA	NA	NA	NA	NA	NA
<i>Glebionis coronaria</i>	SRR20302831	illumina NovaSeq 6000	paired	WGS	genomic	150
<i>Helianthus annuus</i>	SRR2919251	illumina HiSeq 2000	paired	WGS	genomic	100
<i>Helichrysum umbraculigerum</i>	ERR10735438	pacBIO SMRT	single	WGS	genomic	-
<i>Mikania micrantha</i>	SRR8835137	illumina HiSeq X Ten	paired	WGS	genomic	150
<i>Pluchea indica</i>	SRR18449574	illumina NovaSeq 6000	paired	RNA-Seq	transcriptomic	150
<i>Scalesia atractyloides</i>	ERR9715097	pacBIO SMRT	single	WGS	genomic	-
<i>Smallanthus sonchifolius</i>	SRR18215734	illumina NovaSeq 6000	paired	WGS	genomic	150
<i>Stevia rebaudiana</i>	SRR6792730	illumina HiSeq X Ten	paired	WGS	genomic	151
<i>Tagetes patula</i>	SRR19579335	illumina HiSeq X Ten	paired	WGS	genomic	150
<i>Tanacetum cinerariifolium</i>	SRR17714824	illumina NovaSeq 6000	paired	WGS	genomic	151

**data for outgroups**

species	read accession	platform	library layout	library strategy	library source	read length
<i>Beta vulgaris</i>	SRR868931	Roche 454 GS FLX Titanium	paired	WGA	genomic	100
<i>Fragaria x ananassa</i>	SRR8358385	illumina HiSeq 4000	paired	WXS	genomic	150
<i>Lotus japonicus</i>	DRR014730	illumina HiSeq 2000	paired	WGS	genomic	100
<i>Hordeum vulgare</i>	SRR1804518	illumina HiSeq 2000	paired	WGS	genomic	90

**Suppl. table 1E: Data sources and metadata for linkage vizualisation**

**data for Asteraceae species**

species	genome_size* [Gbp]	genome_size_ref	DOI	read_accession	cov_used	seq_technique
<i>Arctium lappa</i>	1.79	Song et al., 2023	0.1186/s12870-023-04092-3	ERR5554584	0.5x	illumina
<i>Artemisia annua</i>	1.74	Shen et al., 2018	10.1016/j.jp1ph.2018.11.007	(Upload needed)	1x	illumina
<i>Bidens hawaiiensis</i>	7.56	Bellinger et al, 2022	10.1093/jhered/esab077	SRR14191093	1x	PacBio HiFi
<i>Carthamus tinctorius</i>	1.32	Nasab et al., 2023	10.1038/s41598-023-33347-0	SRR2154065	1x	illumina
<i>Chrysanthemum indicum</i>	3.02	Li et al., 2012	10.1111/j.1759-6831.2012.00241.x	CRR389876	1x	ONT
<i>Glebionis coronaria</i>	6.80	Wang et al., 2022	10.1093/dnares/dsac036	SRR20302831	1x	illumina
<i>Helianthus annuus</i>	3.60	Staton et al., 2012	10.1111/j.1365-313X.2012.05072.x	SRR2919251	0.3x	illumina
<i>Helichrysum umbraculigerum</i>	1.30	CATIUR000000000.1	NA	ERR10735438	1x	illumina
<i>Mikania micrantha</i>	1.87	Liu et al., 2020	10.1186/s12864-019-6361-7	SRR8835137	1x	illumina
<i>Scalesia atractyloides</i>	3.2	Cerca, 2022	10.5061/dryad.8gtht76rh	ERR9715097	1x	PacBio HiFi
<i>Smallanthus sonchifolius</i>	2.72	Fan et al., 2022	10.1111/1755-0998.13675	SRR18215734	1x	illumina
<i>Stevia rebaudiana</i>	0.40	O'Neill and Pirro, 2020	10.12688/f1000research.24396.1	SRR6792730	1x	illumina
<i>Tagetes patula</i>	0.43	JAOYNQ000000000.1	NA	SRR19579335	1x	illumina
<i>Tanacetum cinerariifolium</i>	7.10	Yamashiro et al 2019	10.1038/s41598-019-54815-6	SRR17714824	1x	illumina

**data for outgroups**

<i>Beta vulgaris</i>	0.75	Dohm et al., 2014	10.1038/nature12817	SRR952964	1x	illumina
<i>Fragaria x ananassa</i>	0.70	Isobe et al., 2018	0.1007/978-3-319-76020-9_10	SRR16002690	1x	illumina
<i>Lotus japonicus</i>	0.50	Mun et al., 2016	10.1038/srep39447	DRR014730	1x	illumina
<i>Hordeum vulgare</i>	5.10	Hisano et al., 2016	10.1186/s12864-016-3159-3	SRR21763618	1x	illumina

**\* *measured or assembled genome size as used for coverage calculation***