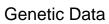
Pea Lodging Final Report

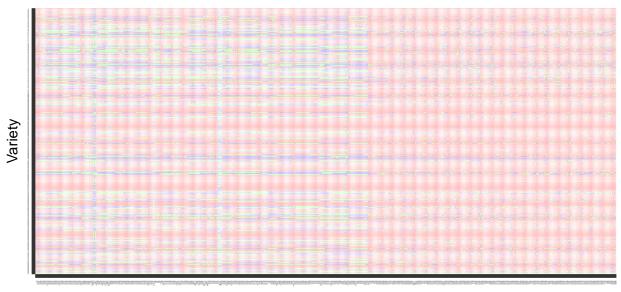
Paul Harmon, Nnamdi Ekeiki, and Andrea Mack

December 16, 2016

1 Visualizing Missing Data

1.1 All Markers





Genetic Marker



	A2594	A1617	A1621	A1619	A1618	A1624	A1615	A1622	A7578	C20B	AD51.ba	A6734	A6726	A6730	A6732	A6733	A6731	A6737	A6724	A6729
Count	164.00	194.00	199.00	202.00	195.00	199.00	185.00	163.00	163.00	170.00	166.00	209.00	162.00	161.00	161.00	210.00	166.00	190.00	163.00	182.00
Percent	0.27	0.32	0.33	0.33	0.32	0.33	0.30	0.27	0.27	0.28	0.27	0.34	0.27	0.26	0.26	0.34	0.27	0.31	0.27	0.30

	A6738	A6725	A6728	A004s	A1623	A1620	A1303	A1616	A1331	A1325	A1327	A1329	A1330	A1332	A1409	A1408	A2407	A1405	A1404	A1402
Count	193.00	163.00	165.00	173.00	185.00	162.00	161.00	168.00	164.00	161.00	161.00	161.00	161.00	161.00	161.00	161.00	161.00	187.00	169.00	193.00
Percent	0.32	0.27	0.27	0.28	0.30	0.27	0.26	0.28	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.31	0.28	0.32

Missing Data and LOD

Paul Harmon, Nnamdi Ekeiki, and Andrea Mack

	A1403	A1024	ad147.l	A7384	A7380	A7302	A7302.1	A2197	A6889	A6891	A2259	A2257	A2256	A2521	A5967	A2340	A26	A26.dpn	A26.dpn.1	Ab56D
Count	176.00	162.00	163.00	162.00	163.00	163.00	211.00	226.00	164.00	163.00	187.00	170.00	201.00	161.00	162.00	162.00	161.00	165.00	165.00	182.00
Percent	0.29	0.27	0.27	0.27	0.27	0.27	0.35	0.37	0.27	0.27	0.31	0.28	0.33	0.26	0.27	0.27	0.26	0.27	0.27	0.30

	Afila.2	Afila.l	Afila.1	AA258.1	AD51.ba.1	A6953	A5189	A6757	A6755	A6648	AA473.L	A6762	A6758	AA332.L	A4834	A4832	AA5.Mid	AA372.L	white.f	white.f.1
Count	16.00	163.00	5.00	129.00	166.00	218.00	192.00	171.00	161.00	161.00	164.00	162.00	162.00	162.00	161.00	163.00	171.00	166.00	5.00	161.00
Percent	0.03	0.27	0.01	0.21	0.27	0.36	0.32	0.28	0.26	0.26	0.27	0.27	0.27	0.27	0.26	0.27	0.28	0.27	0.01	0.26

	A6085	A6086	A6087	A854	A853	A4507	A4500	A337	A4495	A4496	A7738	A7732	A4497	A298	A7055	A4292	A6470	A5495	A5502	A220
Count	163.00	167.00	163.00	162.00	162.00	171.00	163.00	172.00	173.00	195.00	208.00	215.00	205.00	162.00	169.00	161.00	162.00	199.00	166.00	171.00
Percent	0.27	0.27	0.27	0.27	0.27	0.28	0.27	0.28	0.28	0.32	0.34	0.35	0.34	0.27	0.28	0.26	0.27	0.33	0.27	0.28

	A5501	A5494	A5499	A5491	A5498	A299	A1561	A7736	A4494	A4508	A4502	A4501	A7729	A7734	A7733	A4499	A7740	A7258	A7257	AD51.Ba
Count	184.00	166.00	190.00	169.00	198.00	202.00	181.00	180.00	163.00	162.00	162.00	161.00	166.00	165.00	161.00	219.00	163.00	164.00	167.00	171.00
Percent	0.30	0.27	0.31	0.28	0.33	0.33	0.30	0.30	0.27	0.27	0.27	0.26	0.27	0.27	0.26	0.36	0.27	0.27	0.27	0.28

	A5204	A5213	A5165	A5193	A5191	Brown.m	A60	A56	A61	A55	A57	A59	A5226	A58	A5229	LKA.F5.	A7184	A7183	A7181	A7185
Count	223.00	224.00	206.00	217.00	227.00	16.00	190.00	182.00	190.00	168.00	165.00	193.00	220.00	208.00	189.00	186.00	162.00	192.00	164.00	164.00
Percent	0.37	0.37	0.34	0.36	0.37	0.03	0.31	0.30	0.31	0.28	0.27	0.32	0.36	0.34	0.31	0.31	0.27	0.32	0.27	0.27

	A7182	A2446	A7188	A7186	A7187	A7356	A7357	A7298	A4307	AA107	A6492	A7814	A7814.1	A5160	A7346	A7339	A7371	A7340	A7359	A7369
Count	163.00	162.00	161.00	169.00	200.00	207.00	178.00	166.00	196.00	164.00	163.00	161.00	191.00	216.00	196.00	213.00	220.00	216.00	216.00	217.00
Percent	0.27	0.27	0.26	0.28	0.33	0.34	0.29	0.27	0.32	0.27	0.27	0.26	0.31	0.35	0.32	0.35	0.36	0.35	0.35	0.36

	A7348	A2431	A6253	A6252	A6254	A6622	A4829	AD73.f.	AB111.L	A6075	A6995	A4460	AA5Lo	A4461	A6994	A2246	A1025	AD174.L	CDC.27.	A836
Count	217.00	218.00	164.00	164.00	162.00	163.00	164.00	164.00	162.00	163.00	181.00	162.00	162.00	165.00	199.00	169.00	162.00	164.00	170.00	161.00
Percent	0.36	0.36	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.30	0.27	0.27	0.27	0.33	0.28	0.27	0.27	0.28	0.26

	A836.1	NCPA.F2	A5200	A430	A420	A413	A145	A422	A428	A432	A421	A423	A425	np.neo.	Np.upda	AD270.L	tall.dw	A1063	A1066	A1064
Count	213.00	219.00	198.00	186.00	200.00	166.00	201.00	163.00	203.00	184.00	189.00	207.00	186.00	18.00	17.00	169.00	8.00	161.00	163.00	162.00
Percent	0.35	0.36	0.33	0.31	0.33	0.27	0.33	0.27	0.33	0.30	0.31	0.34	0.31	0.03	0.03	0.28	0.01	0.26	0.27	0.27

	A1065	AA285.D	A6802	A6800	A6801	A6160	P628.Hi	A7837	A2100	A5640	A783	A5896	A2004	A2342	A9.lg.4	A2343	A1996	A2002	A2006	A1221
Count	179.00	164.00	162.00	162.00	166.00	162.00	182.00	171.00	200.00	206.00	220.00	226.00	187.00	208.00	162.00	202.00	183.00	190.00	163.00	164.00
Percent	0.29	0.27	0.27	0.27	0.27	0.27	0.30	0.28	0.33	0.34	0.36	0.37	0.31	0.34	0.27	0.33	0.30	0.31	0.27	0.27

	A1224	A2012	A2008	A1223	A2007	A2341	A2001	A7189	A7192	A7193	A7197	A7196	A296	AGAT.Hi	A2181	A4598	A7749	A4852	A6542	A1785
Count	166.00	176.00	162.00	163.00	163.00	162.00	161.00	161.00	163.00	163.00	164.00	168.00	162.00	185.00	185.00	162.00	162.00	228.00	194.00	161.00
Percent	0.27	0.29	0.27	0.27	0.27	0.27	0.26	0.26	0.27	0.27	0.27	0.28	0.27	0.30	0.30	0.27	0.27	0.37	0.32	0.26

	A1788	A1783	A1787	A1782	A1786	A30	A37	A5406	A5399	A5402	A5404	A5400	A5398	AA315.L	A5517	A4825	A4826	A4824	AB23.lg	AA81
Count	161.00	161.00	161.00	169.00	167.00	164.00	161.00	183.00	167.00	166.00	169.00	165.00	194.00	163.00	183.00	227.00	227.00	205.00	161.00	165.00
Percent	0.26	0.26	0.26	0.28	0.27	0.27	0.26	0.30	0.27	0.27	0.28	0.27	0.32	0.27	0.30	0.37	0.37	0.34	0.26	0.27

	A4808	A4804	A4806	A1822	A4337	A4807	A4809	A4805	A1821	A4827	A2144	PYDC.UN	A5227	A5157	A7606	A7611	A7618	A7613	A7621	A7610
Count	161.00	162.00	175.00	162.00	163.00	162.00	162.00	162.00	162.00	168.00	195.00	205.00	222.00	207.00	162.00	165.00	164.00	164.00	164.00	170.00
Percent	0.26	0.27	0.29	0.27	0.27	0.27	0.27	0.27	0.27	0.28	0.32	0.34	0.36	0.34	0.27	0.27	0.27	0.27	0.27	0.28

	A7604	A7608	A7607	A7602	A7601	A7615	A7614	A7603	A7619	A446	A2518	A448	A451	A452	A449	A447	A445	A444	A4546	AA374.1
Count	164.00	162.00	162.00	162.00	162.00	163.00	163.00	163.00	162.00	161.00	164.00	163.00	163.00	163.00	161.00	163.00	194.00	204.00	192.00	163.00
Percent	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.26	0.27	0.27	0.27	0.27	0.26	0.27	0.32	0.33	0.32	0.27

	AA224.1	A7224	A7223	A1580	A5439	A5420	A7133	A7134	A7132	A7131	AA335.L	A1006	A1004	A1002	A1007	A995	A996	A1003	A1008	A999
Count	161.00	165.00	163.00	161.00	161.00	161.00	162.00	162.00	161.00	161.00	161.00	188.00	188.00	176.00	162.00	187.00	172.00	173.00	166.00	161.00
Percent	0.26	0.27	0.27	0.26	0.26	0.26	0.27	0.27	0.26	0.26	0.26	0.31	0.31	0.29	0.27	0.31	0.28	0.28	0.27	0.26

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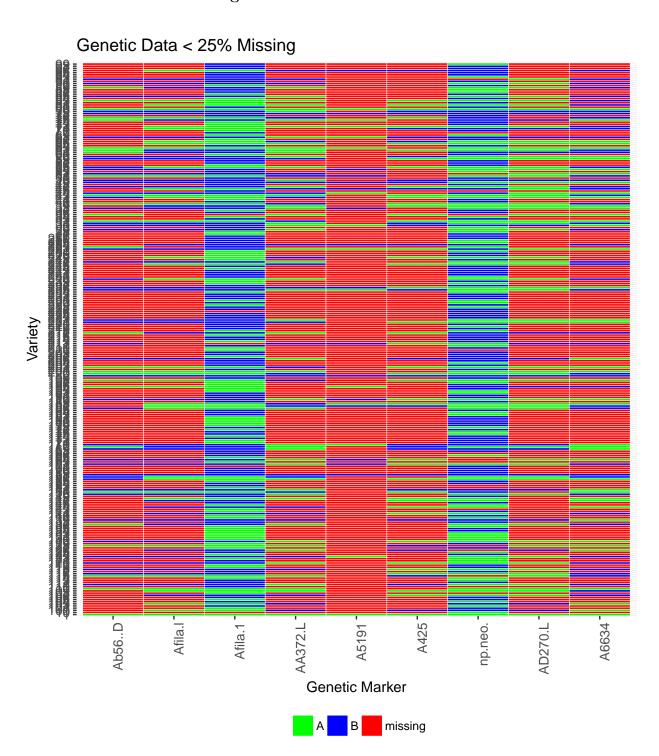
	A998	ta aı			A1000 .	A6634 1	olack.h	A4409	AC76b.1	A1555	A6561	A1915	A1916	Inan A6560	A6563	A1912	RPL15S	A641	A642	2 A
Count 1 Percent						162.00 0.27	7.00 0.01	162.00 0.27	163.00 0.27	226.00 0.37	167.00 0.27	165.00 0.27	201.00	163.00 0.27	162.00 0.27	203.00 0.33	172.00 0.28	161.00	166.00) 16
Count Percent	A645 171.00 0.28	A640 162.00 0.27	A638 161.00 0.26	A647 161.00 0.26	A7763 163.00 0.27	A4828 206.00 0.34	aa456 161.00 0.26		A1980 166.00 0.27	aa416 164.00 0.27	A258 215.00 0.35	A260 222.00 0.36	A246 224.00 0.37	A66 219.00 0.36		224.00	A236 221.00 0.36	A250 221.00 0.36	A5553 224.00 0.37	A55 222 0
Count Percent	A5562 223.00 0.37	A5582 222.00 0.36	217.00	220.00	224.00	A5550 220.00 0.36	A5545 218.00 0.36	215.00	A5547 217.00 0.36	A1434 206.00 0.34	A1551 209.00 0.34	A6408 184.00 0.30	A470 230.00 0.38	A474 226.00 0.37	A6451 219.00 0.36	A6449 221.00 0.36	A6454 219.00 0.36	A846 222.00 0.36	A6751 215.00 0.35	A8 213. 0.
Count Percent	A2680 222.00 0.36	A3067 220.00 0.36	A3050 217.00 0.36	A635 205.00 0.34	A3598 199.00 0.33	A5728 211.00 0.35	A5477 208.00 0.34	A5478 209.00 0.34	A5479 206.00 0.34					A6297 198.00 0.33	A4690 206.00 0.34	A791 220.00 0.36	A6751.1 215.00 0.35	A846.1 222.00 0.36	A850.1 213.00 0.35	A5
Count Percent	A5895 223.00 0.37	A6329 193.00 0.32	224.00	191.00		A244 216.00 0.35	A257 220.00 0.36		A243 219.00 0.36	A237 213.00 0.35	A240 215.00 0.35	A6955 219.00 0.36	A6934 217.00 0.36	A4750 217.00 0.36	A4734 216.00 0.35	A4757 225.00 0.37	A2714 180.00 0.30	A6947 214.00 0.35	A938 203.00 0.33	A47 220. 0.
Count Percent	A4786 223.00 0.37	A4783 224.00 0.37	A4779 222.00 0.36	A2316 220.00 0.36	A2303 222.00 0.36	A2319 225.00 0.37	A2317 214.00 0.35	A2672 165.00 0.27	A2672.1 224.00 0.37	A6484 223.00 0.37	A5008 215.00 0.35	A7378 215.00 0.35	A7075 189.00 0.31	A6222 224.00 0.37	230.00	231.00	A1185 189.00 0.31	A4855 205.00 0.34	A5951 215.00 0.35	A6
Count Percent	A6574 224.00 0.37	A6554 225.00 0.37		222.00	220.00	A5124 208.00 0.34	A5063 228.00 0.37		A948 208.00 0.34	A6573 221.00 0.36	A6550 223.00 0.37	A6532 214.00 0.35	A5654 216.00 0.35	A5623 231.00 0.38	A3512 224.00 0.37	A1461 205.00 0.34	A1070 191.00 0.31	A3634 219.00 0.36	A790 219.00 0.36	A' 218
Count Percent	A786 215.00 0.35	A6511 213.00 0.35		212.00	214.00	A7660 180.00 0.30	A5131 207.00 0.34	A5638 199.00 0.33	A7242 218.00 0.36	A7252 225.00 0.37	A7245 223.00 0.37	A653 222.00 0.36	A660 223.00 0.37	A661 227.00 0.37	A657 217.00 0.36	A652 219.00 0.36	A5987 222.00 0.36	A5988 197.00 0.32	A6817 210.00 0.34	A68 213 0
Count Percent	A6819 212.00 0.35	A2747 225.00 0.37	A1044 190.00 0.31	223.00	231.00	A7144 225.00 0.37	A7146 227.00 0.37	223.00	A6512 226.00 0.37	A6506 220.00 0.36	A6496 219.00 0.36	A6127 226.00 0.37	A6123 224.00 0.37	A6120 229.00 0.38	A6122 221.00 0.36	A6125 223.00 0.37	A6124 221.00 0.36	A6121 217.00 0.36	A4028 195.00 0.32	A40 207 0
Count Percent	A340 193.00 0.32	226.00	226.00	230.00	226.00	226.00	A5147 231.00 0.38	226.00		A4766 222.00 0.36	A5826 219.00 0.36	A5815 223.00 0.37	A5814 226.00 0.37	A5830 221.00 0.36	A5816 216.00 0.35		A5811 212.00 0.35	A5817 221.00 0.36	A780 227.00 0.37	A0 218 0
Count Percent	A771 219.00 0.36	214.00	204.00	214.00	215.00			227.00		A1095 219.00 0.36	A1092 220.00 0.36	A1096 227.00 0.37	A5750 217.00 0.36	A1452 224.00 0.37	A6363 192.00 0.32				A5972 226.00 0.37	A: 222
Count Percent	A393 218.00 0.36	A392 210.00 0.34	227.00	223.00	223.00	A6403 221.00 0.36		217.00		A3935 226.00 0.37	A2556 213.00 0.35	A5188 217.00 0.36	A4079 230.00 0.38	A4101 225.00 0.37	A7222 226.00 0.37		A7220 229.00 0.38	A1868 218.00 0.36	A1867 203.00 0.33	A16 214 0
Count Percent		196.00	225.00	217.00	227.00					A7276 229.00 0.38	A6789 198.00 0.33	A7274 222.00 0.36	A7148 227.00 0.37	A7147 228.00 0.37	A7139 218.00 0.36			A6219 223.00 0.37	A5752 223.00 0.37	A5' 225
Count Percent		219.00	223.00	224.00	229.00		A1038 224.00 0.37	209.00		A1348 227.00 0.37	A1349 216.00 0.35	A1350 222.00 0.36	A1343 215.00 0.35	A5228 190.00 0.31	A5259 224.00 0.37	A1123 222.00 0.36	A1109 226.00 0.37	A20 176.00 0.29	A927 221.00 0.36	A9 227 0

	A926	A930	A925	A6359	A6360	A6357	A6060	A6058	A6056
Count	214.00	222.00	223.00	227.00	218.00	225.00	224.00	217.00	210.00
Percent	0.35	0.36	0.37	0.37	0.36	0.37	0.37	0.36	0.34

	X1	X2	Х3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20
Coun Percen		2.00 0.01	600.00 2.33	172.00 0.67	266.00 1.04	226.00 0.88	605.00 2.35	203.00 0.79	600.00 2.33	603.00 2.35	241.00 0.94	600.00	230.00 0.89	600.00 2.33	223.00 0.87	600.00	181.00 0.70	600.00 2.33	221.00 0.86	294.00 1.14
Count Percent	X21 602.00 2.34	X22 603.00 2.35	X23 601.00 2.34	X24 261.00 1.02	X25 602.00 2.34	X26 600.00 2.33	X27 603.00 2.35	600.00	246.00	X30 190.00 0.74	238.00	212.00	600.00	X34 600.00 2.33		X36 600.00 2.33	600.00	195.00	224.00	X40 600.00 2.33
Count	X41 600.00 2.33	X42 184.00 0.72	X43 210.00 0.82	195.00	X45 601.00 2.34	X46 213.00 0.83	X47 177.00 0.69	602.00	165.00	X50 599.00 2.33	194.00	238.00		X54 292.00 1.14	233.00	X56 600.00 2.33	600.00	600.00	224.00	X60 600.00
Percent	2.33	0.72	0.82	0.76	2.34	0.83	0.08	2.34	0.04	2.33	0.70	0.93	2.34	1.14	0.91	2.33	2.33	2.33	0.87	2.33
Count	X61 269.00	X62 308.00	X63 252.00		X65 209.00	X66 291.00	X67			X70 600.00				X74 600.00						X80 600.00
Percent	1.05	1.20	0.98	2.33	0.81	1.13	2.33	0.74	2.33	2.33	0.94	0.84	2.33	2.33	0.68	0.91	2.33	0.64	0.72	2.33
Count	X81	X82	X83	X84	X85	X86	X87			X90			X93	X94	X95	X96	X97			X100
Count Percent	244.00 0.95	600.00 2.33	248.00 0.96	600.00 2.33	280.00 1.09	600.00 2.33	600.00 2.33			267.00 1.04			600.00 2.33	600.00 2.33		173.00 0.67				182.00 0.71
	X101	X102	X103	X104	X105	X106	X107	' X108	X109	X110	X111	X112	X113	X114	X115	X116	X117	X118	X119	X120
Count Percent	601.00 2.34	601.00 2.34	170.00 0.66	601.00 2.34	601.00 2.34	603.00 2.35	164.00 0.64			603.00 2.35			600.00 2.33	603.00 2.35	187.00 0.73	205.00 0.80				158.00 0.61
	X121	X122	X123	X124	X125	X126	X127	' X128	X129	X130	X131	X132	X133	X134	X135	X136	X137	X138	X139	X140
Count Percent	601.00 2.34	603.00 2.35	174.00 0.68		601.00 2.34	226.00 0.88	601.00	227.00	601.00	601.00 2.34	601.00	601.00		601.00 2.34		601.00 2.34	209.00	601.00	219.00	601.00 2.34
Count Percent	X141 207.00 0.81	X142 601.00 2.34	X143 603.00 2.35		X145 601.00 2.34	X146 601.00 2.34	X147 209.00 0.81	178.00	601.00	X150 185.00 0.72	178.00	603.00		X154 601.00 2.34				209.00		X160 601.00 2.34
Tercone	0.01	2.01	2.00	0.72	2.01	2.01	0.02	0.00	2.01	0.12	0.00	2.00	2.00	2.01	2.01	0.01	0.11	0.01	2.01	2.01
Count	X161 602.00	X162 195.00	X163 603.00		X165 604.00	X166 601.00	X167			X170 178.00				X174 601.00		X176 601.00				X180 602.00
Percent	2.34	0.76	2.35	0.67	2.35	2.34	2.35			0.69			2.34	2.34	2.34	2.34	2.34			2.34
	X181	X182	X183		X185	X186	X187			X190				X194		X196		X198		X200
Count	601.00 2.34	601.00 2.34	601.00 2.34	602.00 2.34	602.00	186.00 0.72	167.00 0.65			601.00 2.34			601.00 2.34	601.00 2.34	187.00 0.73	601.00 2.34	601.00 2.34			196.00 0.76
	X201	X202	X203	X204	X205	X206	X207	X208	X209	X210	X211	X212	X213	X214	X215	X216	X217	X218	X219	X220
Count Percent	601.00 2.34	209.00 0.81	601.00 2.34		601.00 2.34	200.00	601.00	602.00	601.00		601.00	192.00	601.00	601.00 2.34	601.00		178.00	601.00	601.00	
	Week.	W-0-2-	1100-	1100:	Waa-	Waa-	3700	7700	1500-	3700-	3500	3500-	1100-	3500	3500-	3500	Trac	Troc	37.00-	W0.10
Count Percent	X221 172.00 0.67	X222 186.00 0.72	X223 602.00 2.34	601.00	X225 601.00 2.34	X226 602.00 2.34	X227 601.00 2.34	602.00	603.00	X230 602.00 2.34	601.00	601.00	601.00	X234 601.00 2.34	173.00		601.00	601.00	602.00	X240 601.00 2.34

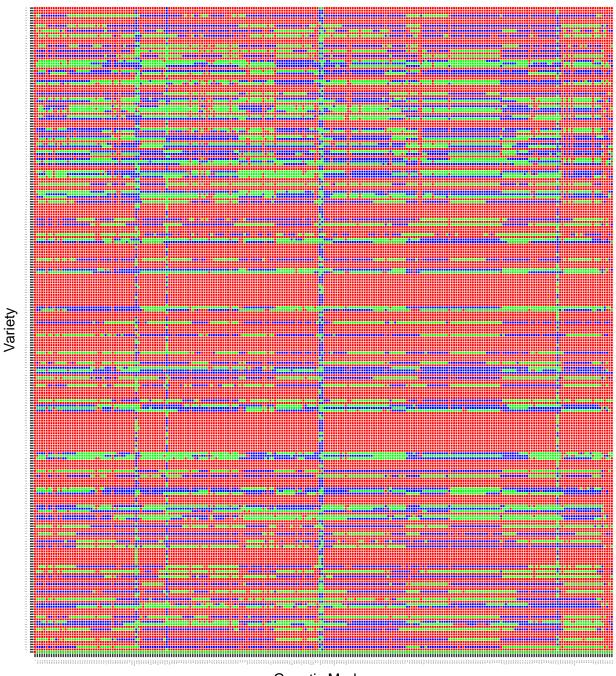
	X241	X242	X243	X244	X245	X246	X247	X248	X249	X250	X251	X252	X253	X254	X255	X256	X257
Count	601.00	602.00	601.00	601.00	601.00	179.00	219.00	601.00	249.00	601.00	602.00	189.00	602.00	186.00	601.00	601.00	601.00
Percent	2.34	2.34	2.34	2.34	2.34	0.70	0.85	2.34	0.97	2.34	2.34	0.74	2.34	0.72	2.34	2.34	2.34

1.2 Less than 25% Missing



1.3 Less than 30% Missing

Genetic Data 25 % < 30% Missing

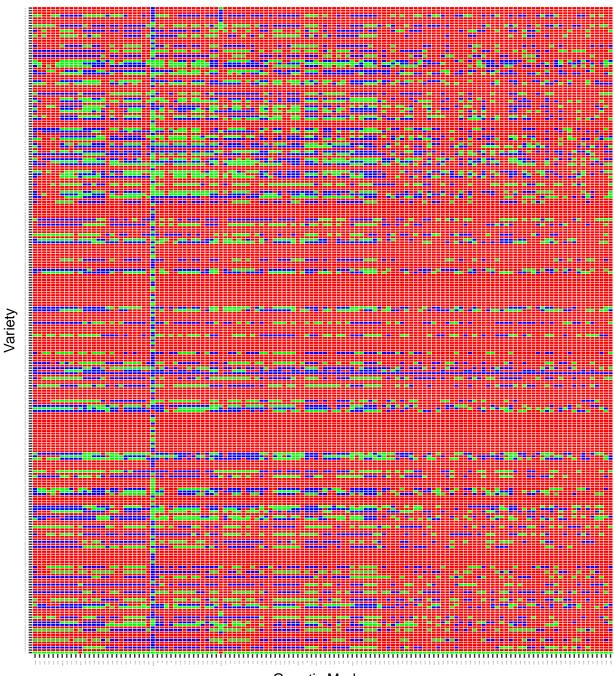


Genetic Marker



1.4 Less than 35% Missing

Genetic Data 30 % < 35% Missing



Genetic Marker

A B missing

1.5 Less than 40% Missing

Genetic Data 35 % < 40% Missing



Genetic Marker



$\frac{\text{Missing Data and LOD}}{\mathbf{2}\quad\mathbf{Missing\text{-}ness}}$