

(A)

			20		40		60	
TexomaMaxQII_ccsA	ATGCTATTTG	CAACTTTAGA	ACATATATTA	AATCATATCT	CCTTCTCAAC	CATTTCATT	60	
Torpedo_ccsA	ATGCTATTTG	CAACTTTAGA	ACATATATTA	AATCATATCT	CCTTCTCAAC	CATTTCATT	60	
Resolute_ccsA	ATGCTATTTG	CAACTTTAGA	ACATATATTA	AATCATATCT	CCTTCTCAAC	CATTTCATT	60	
		80		100		120		
TexomaMaxQII_ccsA	GTGATTACGA	TTCATTTGAT	AACCTTATTA	GTTTCATGAAC	TTGGGGGATT	ACGTGATTCCG	120	
Torpedo_ccsA	GTGATTACGA	TTCATTTGAT	AACCTTATTA	GTTTCATGAAC	TTGGGGGATT	ACGTGATTCCG	120	
Resolute_ccsA	GTGATTACGA	TTCATTTGAT	AACCTTATTA	GTTTCATGAAC	TTGGGGGATT	ACGTGATTCCG	120	
		140		160		180		
TexomaMaxQII_ccsA	TCAGAAAAAG	GAATGATAGT	TACTTTTTTC	TCTATAACAG	GATTCCTAGT	TTCTCGCTGG	180	
Torpedo_ccsA	TCAGAAAAAG	GAATGATAGT	TACTTTTTTC	TCTATAACAG	GATTCCTAGT	TTCTCGCTGG	180	
Resolute_ccsA	TCAGAAAAAG	GAATGATAGT	TACTTTTTTC	TCTATAACAG	GATTCCTAGT	TTCTCGCTGG	180	
		200		220		240		
TexomaMaxQII_ccsA	GCTTCTTCGG	GACATTTTCC	ATTAAGTAAT	TTATATGAGT	CGTTGATCTT	CCTTTCATGG	240	
Torpedo_ccsA	GCTTCTTCGG	GACATTTTCC	ATTAAGTAAT	TTATATGAGT	CGTTGATCTT	CCTTTCATGG	240	
Resolute_ccsA	GCTTCTTCGG	GACATTTTCC	ATTAAGTAAT	TTATATGAGT	CGTTGATCTT	CCTTTCATGG	240	
		260		280		300		
TexomaMaxQII_ccsA	GCTCTGTATA	TTCTTCATAC	CATTCCCTAAG	ATACAGAACT	CTAAAAATGA	TTTAAAGCACA	300	
Torpedo_ccsA	GCTCTGTATA	TTCTTCATAC	CATTCCCTAAG	ATACAGAACT	CTAAAAATGA	TTTAAAGCACA	300	
Resolute_ccsA	GCTCTGTATA	TTCTTCATAC	CATTCCCTAAG	ATACAGAACT	CTAAAAATGA	TTTAAAGCACA	300	
		320		340		360		
TexomaMaxQII_ccsA	ATAACTACGC	CAAGTACTAT	TTTAAACGCAA	GGCTTTGGCCA	CATCGGGTCT	TTTAACTGAA	360	
Torpedo_ccsA	ATAACTACGC	CAAGTACTAT	TTTAAACGCAA	GGCTTTGGCCA	CATCGGGTCT	TTTAACTGAA	360	
Resolute_ccsA	ATAACTACGC	CAAGTACTAT	TTTAAACGCAA	GGCTTTGGCCA	CATCGGGTCT	TTTAACTGAA	360	
		380		400		420		
TexomaMaxQII_ccsA	ATGCATCAAT	CCACAATACT	AGTACCCGCT	CTCCAATCTC	AGTGGTTAAT	GATGCATGTC	420	
Torpedo_ccsA	ATGCATCAAT	CCACAATACT	AGTACCCGCT	CTCCAATCTC	AGTGGTTAAT	GATGCATGTC	420	
Resolute_ccsA	ATGCATCAAT	CCACAATACT	AGTACCCGCT	CTCCAATCTC	AGTGGTTAAT	GATGCATGTC	420	
		440		460		480		
TexomaMaxQII_ccsA	AGTATGATGT	TACTAAGCTA	TGCAACTCTT	TTGTGCGGAT	CCTTATTATC	TGCCGCTATT	480	
Torpedo_ccsA	AGTATGATGT	TACTAAGCTA	TGCAACTCTT	TTGTGCGGAT	CCTTATTATC	TGCCGCTATT	480	
Resolute_ccsA	AGTATGATGT	TACTAAGCTA	TGCAACTCTT	TTGTGCGGAT	CCTTATTATC	TGCCGCTATT	480	
		500		520		540		
TexomaMaxQII_ccsA	CTAATCATT	GATTTTCGAAA	TAATTTCTTT	TTCTTTTCTA	AAAAGAAAA	-----AAAT	534	
Torpedo_ccsA	CTAATCATT	GATTTTCGAAA	TAATTTCTTT	TTCTTTTCTA	AAAAGAAAA	-----AAAT	534	
Resolute_ccsA	CTAATCATT	GATTTTCGAAA	TAATTTCTTT	TTCTTTTCTA	AAAAGAAAA	GAAAA AAAT	540	
		560		580		600		
TexomaMaxQII_ccsA	GTTTTACTTA	AAACATTTT	CITTAGTGAT	TTCTATGTAA	AAAGAAGTTC	TTTTAAAAAGC	594	
Torpedo_ccsA	GTTTTACTTA	AAACATTTT	CITTAGTGAT	TTCTATGTAA	AAAGAAGTTC	TTTTAAAAAGC	594	
Resolute_ccsA	GTTTTACTTA	AAACATTTT	CITTAGTGAT	TTCTATGTAA	AAAGAAGTTC	TTTTAAAAAGC	600	
		620		640		660		
TexomaMaxQII_ccsA	ACCTCTGTT	CTTCATTGCC	AAATTATTAC	AAATATCAAT	TAACGGAGCG	TTTAGATTCT	654	
Torpedo_ccsA	ACCTCTGTT	CTTCATTGCC	AAATTATTAC	AAATATCAAT	TAACGGAGCG	TTTAGATTCT	654	
Resolute_ccsA	ACCTCTGTT	CTTCATTGCC	AAATTATTAC	AAATATCAAT	TAACGGAGCG	TTTAGATTCT	660	
		680		700		720		
TexomaMaxQII_ccsA	TGGAGTTATC	GTGTCATTAG	CCTAGGATTT	ACCCTTTTAA	CCATAGGTAT	TCTTTGTGGA	714	
Torpedo_ccsA	TGGAGTTATC	GTGTCATTAG	CCTAGGATTT	ACCCTTTTAA	CCATAGGTAT	TCTTTGTGGA	714	
Resolute_ccsA	TGGAGTTATC	GTGTCATTAG	CCTAGGATTT	ACCCTTTTAA	CCATAGGTAT	TCTTTGTGGA	720	
		740		760		780		
TexomaMaxQII_ccsA	GCAGTATGGG	CTAATGAGGC	GTGGGGATCC	TATTGGAATT	GGGATCCTAA	GGAAACTTGG	774	
Torpedo_ccsA	GCAGTATGGG	CTAATGAGGC	GTGGGGATCC	TATTGGAATT	GGGATCCTAA	GGAAACTTGG	774	
Resolute_ccsA	GCAGTATGGG	CTAATGAGGC	GTGGGGATCC	TATTGGAATT	GGGATCCTAA	GGAAACTTGG	780	
		800		820		840		
TexomaMaxQII_ccsA	GCATTTATTA	CTTGGACCAT	ATTTGCAATT	TATTTACATA	GTAGAACAAA	TCTAAATTGG	834	
Torpedo_ccsA	GCATTTATTA	CTTGGACCAT	ATTTGCAATT	TATTTACATA	GTAGAACAAA	TCTAAATTGG	834	
Resolute_ccsA	GCATTTATTA	CTTGGACCAT	ATTTGCAATT	TATTTACATA	GTAGAACAAA	TCTAAATTGG	840	
		860		880		900		
TexomaMaxQII_ccsA	AAGGGTACGA	ATTCGCGACT	TGTAGCTTCG	ATAGGATTTT	TTATAATTTG	GATCTGCTAT	894	
Torpedo_ccsA	AAGGGTACGA	ATTCGCGACT	TGTAGCTTCG	ATAGGATTTT	TTATAATTTG	GATCTGCTAT	894	
Resolute_ccsA	AAGGGTACGA	ATTCGCGACT	TGTAGCTTCG	ATAGGATTTT	TTATAATTTG	GATCTGCTAT	900	
		920		940		960		
TexomaMaxQII_ccsA	TTTGGTATCA	ATCTATTAGG	AATAGGTTTA	CATAGTTATG	GTTTCGTTTAT	ATTAACATCT	954	
Torpedo_ccsA	TTTGGTATCA	ATCTATTAGG	AATAGGTTTA	CATAGTTATG	GTTTCGTTTAT	ATTAACATCT	954	
Resolute_ccsA	TTTGGTATCA	ATCTATTAGG	AATAGGTTTA	CATAGTTATG	GTTTCGTTTAT	ATTAACA C CT	960	
TexomaMaxQII_ccsA	AAATGA	960						
Torpedo_ccsA	AAATGA	960						
Resolute_ccsA	AAATGA	966						

(B)

		20		40		60	
TexomaMaxQII_ccsA	MLFATLEHILNHISFSTISIVITIHLLITLLVHELGGLRDSSEKGMIVTFFSITGFLVSRW						60
Torpedo_ccsA	MLFATLEHILNHISFSTISIVITIHLLITLLVHELGGLRDSSEKGMIVTFFSITGFLVSRW						60
Resolute_ccsA	MLFATLEHILNHISFSTISIVITIHLLITLLVHELGGLRDSSEKGMIVTFFSITGFLVSRW						60
		80		100		120	
TexomaMaxQII_ccsA	ASSGHFPLSNLYESLIFLSWALYILHTIPKIQNSKNDLSTITTPSTILTQGFATSGLLTE						120
Torpedo_ccsA	ASSGHFPLSNLYESLIFLSWALYILHTIPKIQNSKNDLSTITTPSTILTQGFATSGLLTE						120
Resolute_ccsA	ASSGHFPLSNLYESLIFLSWALYILHTIPKIQNSKNDLSTITTPSTILTQGFATSGLLTE						120
		140		160		180	
TexomaMaxQII_ccsA	MHQSTILVPALQSQWLMMHVSMMLLSYATLLCGSLLSAAILIRFRNFFFFFFSKKKK--N						178
Torpedo_ccsA	MHQSTILVPALQSQWLMMHVSMMLLSYATLLCGSLLSAAILIRFRNFFFFFFSKKKK--N						178
Resolute_ccsA	MHQSTILVPALQSQWLMMHVSMMLLSYATLLCGSLLSAAILIRFRNFFFFFFSKKKK KK N						180
		200		220		240	
TexomaMaxQII_ccsA	VLLKTFFFSDFYVKRSSLKSTSVPSFPNYYKYQLTERLDSWSYRVISLGFTLLTIGILCG						238
Torpedo_ccsA	VLLKTFFFSDFYVKRSSLKSTSVPSFPNYYKYQLTERLDSWSYRVISLGFTLLTIGILCG						238
Resolute_ccsA	VLLKTFFFSDFYVKRSSLKSTSVPSFPNYYKYQLTERLDSWSYRVISLGFTLLTIGILCG						240
		260		280		300	
TexomaMaxQII_ccsA	AVWANEAWGSYWNWDPKETWAFITWTIFAIYLHSRTNLNWKGTNSALVASIGFLI IWICY						298
Torpedo_ccsA	AVWANEAWGSYWNWDPKETWAFITWTIFAIYLHSRTNLNWKGTNSALVASIGFLI IWICY						298
Resolute_ccsA	AVWANEAWGSYWNWDPKETWAFITWTIFAIYLHSRTNLNWKGTNSALVASIGFLI IWICY						300
		320					
TexomaMaxQII_ccsA	FGINLLGIGLHSYGSFILTSK						319
Torpedo_ccsA	FGINLLGIGLHSYGSFILTSK						319
Resolute_ccsA	FGINLLGIGLHSYGSFILT P K						321

(C)

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                20                40                60
TexomaMaxQII_rps18 ATGTATACATCTAAACAACCTTTTCTTAAATCTAAGCAACCCTTTTCGTAAATCCAAGCAA 60
Torpedo_rps18      ATGTATACATCTAAACAACCTTTTCTTAAATCTAAGCAACCCTTTTCGTAAATCCAAGCAA 60
Resolute_rps18     ATGTATACATCTAAACAACCTTTTCTTAAATCTAAGCAACCCTTTTCGTAAATCCAAGCAA 60

                80                100               120
TexomaMaxQII_rps18 CC-----T-----TTTTTCGTAAATTCAAAAAACCTTTTCGTAAATCTAAA 99
Torpedo_rps18      CC-----T-----TTTTTCGTAAATTCAAAAAACCTTTTCGTAAATCTAAA 99
Resolute_rps18     CCCCTTCGTAAATCCAAGCAACCTTTTTCGTAAATTCAAAAAACCTTTTCGTAAATCTAAA 120

                140               160               180
TexomaMaxQII_rps18 CAACCTTTTCGTAGGCGTCCTCGGATTGGCCCGGGAGATCGAATTGATTATAGAAACATG 159
Torpedo_rps18      CAACCTTTTCGTAGGCGTCCTCGGATTGGCCCGGGAGATCGAATTGATTATAGAAACATG 159
Resolute_rps18     CAACCTTTTCGTAGGCGTCCTCGGATTGGCCCGGGAGATCGAATTGATTATAGAAACATG 180

                200               220               240
TexomaMaxQII_rps18 AGTTTAATTAATAGATTTATTAGTGAACAAGGAAAAATATTATCTAGACGAATAAATAGA 219
Torpedo_rps18      AGTTTAATTAATAGATTTATTAGTGAACAAGGAAAAATATTATCTAGACGAATAAATAGA 219
Resolute_rps18     AGTTTAATTAATAGATTTATTAGTGAACAAGGAAAAATATTATCTAGACGAATAAATAGA 240

                260               280               300
TexomaMaxQII_rps18 TTAACCTTGAAACAACAACGATTAATTACTCTTGCTATAAAACAGGCTCGTATTTTATCT 279
Torpedo_rps18      TTAACCTTGAAACAACAACGATTAATTACTCTTGCTATAAAACAGGCTCGTATTTTATCT 279
Resolute_rps18     TTAACCTTGAAACAACAACGATTAATTACTCTTGCTATAAAACAGGCTCGTATTTTATCT 300

                320               340               360
TexomaMaxQII_rps18 TTCTTACCATTTTCGTAACTATGAGAACGAAAAGCAATTTCAAGCCCAGTCAATTTCAATA 339
Torpedo_rps18      TTCTTACCATTTTCGTAACTATGAGAACGAAAAGCAATTTCAAGCCCAGTCAATTTCAATA 339
Resolute_rps18     TTCTTACCATTTTCGTAACTATGAGAACGAAAAGCAATTTCAAGCCCAGTCAATTTCAATA 360

                380               400               420
TexomaMaxQII_rps18 ATTACTGGTTCAGACCCAGAAAAAATAGACATATTCCTCAATTAACGGAAAAGTACAAT 399
Torpedo_rps18      ATTACTGGTTCAGACCCAGAAAAAATAGACATATTCCTCAATTAACGGAAAAGTACAAT 399
Resolute_rps18     ATTACGGGTTCAGACCCAGAAAAAATAGACATATTCCTCAATTAACGGAAAAGTACAAT 420

                440               460
TexomaMaxQII_rps18 TCTAATCGAACTTAAGAAACAACAATCGGAACTTAAGTTCCGATTGTTGA 450
Torpedo_rps18      TCTAATCGAACTTAAGAAACAACAATCGGAACTTAAGTTCCGATTGTTGA 450
Resolute_rps18     TCTAATCGAACTTAAGAAACAACAATCGGAACTTAAGTTCCGATTGTTGA 471
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(D)

		20		40		60	
TexomaMaxQII_rps18	MYTSKQPFLKSKQPFRKSKQP		-----		FRKFKKPFRKSKQP	FRRRPRIGPGDRIDYRNM	53
Resolute_rps18	MYTSKQPFLKSKQPFRKSKQP		LRKSKQP		FRKFKKPFRKSKQP	FRRRPRIGPGDRIDYRNM	60
Torpedo_rps18	MYTSKQPFLKSKQPFRKSKQP		-----		FRKFKKPFRKSKQP	FRRRPRIGPGDRIDYRNM	53
		80		100		120	
TexomaMaxQII_rps18	SLINRFISEQGKILSRRINRLTLKQQLITLAIKQARILSFLPFRNYENEKQFQAQSI		SI		113		
Resolute_rps18	SLINRFISEQGKILSRRINRLTLKQQLITLAIKQARILSFLPFRNYENEKQFQAQSI		SI		120		
Torpedo_rps18	SLINRFISEQGKILSRRINRLTLKQQLITLAIKQARILSFLPFRNYENEKQFQAQSI		SI		113		
		140					
TexomaMaxQII_rps18	ITGSRPRKNRHIPQLTEKYNSNRNLRNNNRNLS		SSDC		149		
Resolute_rps18	ITGSRPRKNRHIPQLTEKYNSNRNLRNNNRNLS		SSDC		156		
Torpedo_rps18	ITGSRPRKNRHIPQLTEKYNSNRNLRNNNRNLS		SSDC		149		

(E)

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                20                40                60
TexomaMaxQII_accD ATGGGATCCATATTAGGTAAGATAATTTGCCCTTTGATTTTATTGATTCAATATAGTCTTTTT 60
Torpedo_accD      ATGGGATCCATATTAGGTAAGATAATTTGCCCTTTGATTTTATTGATTCAATATAGTCTTTTT 60
Resolute_accD     ATGGGATCCGATTAGGTAAGATAATTTGCCCTTTGATTTTATTGATTCAATATACTATTTTT 60

                80                100               120
TexomaMaxQII_accD CCGCCTTTACCACGCATTATTGTATGCGCTTCTATAGGAGTATATATACTAGAAGTAAAT 120
Torpedo_accD      CCGCCTTTACCACGCATTATTGTATGCGCTTCTATAGGAGTATATATACTAGAAGTAAAT 120
Resolute_accD     CCGCCTTTACCACGCATTATTGTATGCGCTTCTAGAGGAGTATATATACTAGAAGTAAAT 120

                140               160
TexomaMaxQII_accD TCTAGCCGTTTTCTTTTGAATCCTAAAATTTGA----- 153
Torpedo_accD      TCTAGCCGTTTTCTTTTGAATCCTAAAATTTGA----- 153
Resolute_accD     TCTAGCCGCTTTCTTTTGAATCCTCAAATTCGATTAGAAAGATAG 165
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(F)

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                20                40
TexomaMaxQII_accD MGSILGKIIC PLILIQYSLF PPLPRIIVCA SIGVYILEVN SSRFLLNPKI ---- 50
Torpedo_accD      MGSILGKIIC PLILIQYSLF PPLPRIIVCA SIGVYILEVN SSRFLLNPKI ---- 50
Resolute_accD     MGSVLGKIIC PLILIQYTIF PPLPRIIVCA SRGVYILEVN SSRFLLNPQI RLER 54
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(G)

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                                20                40                60
TexomaMaxQII_ndhH-p  ATGAGTCTACCGCTTACAAGAAAAGATCTCATGATAGTCAATATGGGCCCTCAACACCCA 60
Torpedo_ndhH-p      ATGAGTCTACCGCTTACAAGAAAAGATCTCATGATAGTCAATATGGGCCCTCAACACCCA 60
Resolute_ndhH-p     ATGAGTCTACCGCTTACAAGAAAAGATCTCATGATAGTCAATATGGGCCCTCAACACCCA 60

                                80                100               120
TexomaMaxQII_ndhH-p  TCAATGCATGGTGTTCCTTCGACTGATCGTTACTCTCGATGGTGAAGATGTTATTGATTGT 120
Torpedo_ndhH-p      TCAATGCATGGTGTTCCTTCGACTGATCGTTACTCTCGATGGTGAAGATGTTATTGATTGT 120
Resolute_ndhH-p     TCAATGCATGGTGTTCCTTCGACTGATCGTTACTCTCGATGGTGAAGATGTTATTGATTGT 120

                                140               160                180
TexomaMaxQII_ndhH-p  GAACCCATATTAGGCTATTTACACAGAGGAATGGAAAAAATCGCGGAAAACAGAAGG - - - 177
Torpedo_ndhH-p      GAACCCATATTAGGCTATTTACACAGAGGAATGGAAAAAATCGCGGAAAACAGAAGG - - - 177
Resolute_ndhH-p     GAACCCATATTAGGCTATTTACACAGAGGAATGGAAAAAATCGCGGAAAACAGTAGAGGA 180

TexomaMaxQII_ndhH-p  - - - - - TAG 180
Torpedo_ndhH-p      - - - - - TAG 180
Resolute_ndhH-p     AGTAGATAG 189
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(H)

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                                20                40                60
Resolute_ndhH-p     MSLPLTRKDL  MIVNMGPQHP  SMHGVLRLIV  TLDGEDVIDC  EPILGYLHRG  MEKIAENSRG SR 62
TexomaMaxQII_ndhH-p MSLPLTRKDL  MIVNMGPQHP  SMHGVLRLIV  TLDGEDVIDC  EPILGYLHRG  MEKIAENRR- - 59
Torpedo_ndhH-p     MSLPLTRKDL  MIVNMGPQHP  SMHGVLRLIV  TLDGEDVIDC  EPILGYLHRG  MEKIAENRR- - 59
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Additional file 14: Figure S2. Alignment of *ccsA* (A and B), *rps12* (C and D), *accD* (E and F), and *ndhH-p* (G and H) gene sequences of three tall fescue morphotypes. Figure A, C, E, and G are nucleotide sequences, and Figure B, D, F, and H are protein sequences.