



Table S1. Basic characteristics of proteins encoded by *pfGRASs*.

Gene	Accession number	Peptide length(aa)	pI	MW(D)	Atomic composition	Instability Index	Aliphatic index	Subcellular location
PfGRAS1	Pfo02g003840.1	801	5.85	86249.06	C ₃₈₂₀ H ₅₉₅₂ N ₁₀₆₀ O ₁₁₇₄ S ₂₃	59.38	80.24	Nucleus
PfGRAS2	Pfo03g010120.1	454	5.74	50216.4	C ₂₂₃₀ H ₃₅₀₁ N ₆₁₁ O ₆₆₃ S ₂₃	43.87	93.18	Chloroplast
PfGRAS3	Pfo03g013780.1	761	7.65	86379.74	C ₃₈₃₄ H ₅₉₇₄ N ₁₀₇₄ O ₁₁₅₀ S ₂₇	41.42	75.45	Nucleus
PfGRAS4	Pfo04g009860.1	474	5.91	53072.15	C ₂₃₆₅ H ₃₇₄₉ N ₆₃₉ O ₆₉₆ S ₂₅	59.8	95.9	Nucleus
PfGRAS5	Pfo04g012510.1	789	5.65	85326.27	C ₃₇₈₇ H ₅₈₇₈ N ₁₀₃₈ O ₁₁₅₅ S ₂₈	55.6	80.7	Nucleus
PfGRAS6	Pfo05g004830.1	477	6.05	53127.13	C ₂₃₅₄ H ₃₆₅₃ N ₆₆₅ O ₇₀₁ S ₂₀	45.78	83.21	Endoplasmic reticulum
PfGRAS7	Pfo05g007100.1	471	5.95	53050.12	C ₂₃₆₃ H ₃₇₃₉ N ₆₄₁ O ₆₉₃ S ₂₆	58.43	91.96	Cytoplasm
PfGRAS8	Pfo05g008820.1	336	5.36	37553.59	C ₁₆₈₅ H ₂₆₇₄ N ₄₄₄ O ₄₈₇ S ₁₉	49.21	108.3	Chloroplast
PfGRAS9	Pfo05g010890.1	591	8.91	67380.34	C ₂₉₈₆ H ₄₆₇₆ N ₈₄₂ O ₈₉₆ S ₂₁	44.25	70.92	Nucleus
PfGRAS10	Pfo05g010900.1	719	6.55	81560.98	C ₃₅₆₉ H ₅₅₅₅ N ₁₀₂₅ O ₁₀₉₁ S ₄₀	56.63	66.84	Nucleus
PfGRAS11	Pfo05g010910.1	756	5.07	85015.49	C ₃₇₇₀ H ₅₈₄₄ N ₁₀₁₈ O ₁₁₇₄ S ₂₅	52.08	77.22	Nucleus
PfGRAS12	Pfo06g003490.1	582	4.92	63212.32	C ₂₇₆₈ H ₄₃₅₅ N ₇₆₇ O ₈₇₁ S ₂₈	34.94	82.98	Nucleus
PfGRAS13	Pfo06g007940.1	606	5.14	66552.01	C ₂₉₆₈ H ₄₆₀₇ N ₇₉₃ O ₉₁₃ S ₁₇	54.69	80.23	Nucleus
PfGRAS14	Pfo06g008150.1	554	5.79	61474.81	C ₂₇₅₈ H ₄₃₀₃ N ₇₄₉ O ₈₁₉ S ₁₃	44.7	90.63	Chloroplast
PfGRAS15	Pfo06g010090.1	505	5.63	57037.9	C ₂₅₀₅ H ₃₈₇₀ N ₇₁₀ O ₇₇₅ S ₂₂	50.92	72.02	Nucleus
PfGRAS16	Pfo06g010290.1	452	5.68	50464.72	C ₂₂₅₁ H ₃₅₁₇ N ₆₁₃ O ₆₆₂ S ₂₂	42.98	89.98	Chloroplast
PfGRAS17	Pfo06g012740.1	420	6.57	46705.47	C ₂₀₆₆ H ₃₂₇₂ N ₅₈₆ O ₆₀₉ S ₂₀	36.52	89.64	Chloroplast
PfGRAS18	Pfo07g006000.1	586	5.12	64178.3	C ₂₈₃₃ H ₄₄₀₂ N ₇₇₈ O ₈₇₆ S ₂₅	48.95	79.71	Nucleus
PfGRAS19	Pfo07g009710.1	736	5.57	80472.42	C ₃₅₉₃ H ₅₅₆₇ N ₉₆₇ O ₁₀₇₃ S ₃₁	44.68	87.18	Cytoplasm
PfGRAS20	Pfo07g011240.1	674	6.13	75003.88	C ₃₂₉₄ H ₅₂₀₁ N ₉₄₅ O ₁₀₀₆ S ₂₇	61.6	80.42	Nucleus
PfGRAS21	Pfo08g007560.1	424	5.54	46786.48	C ₂₀₈₁ H ₃₂₈₃ N ₅₆₉ O ₆₂₁ S ₁₈	50.25	97.73	Cytoplasm
PfGRAS22	Pfo08g014150.1	554	6.38	61385.63	C ₂₆₉₁ H ₄₁₉₅ N ₇₇₇ O ₈₃₈ S ₁₇	43.88	72.37	Nucleus
PfGRAS23	Pfo09g008150.1	553	5.51	61286.71	C ₂₆₈₉ H ₄₁₇₈ N ₇₅₀ O ₈₄₄ S ₂₄	50.89	76.5	Nucleus
PfGRAS24	Pfo09g009840.1	426	6.44	47956.5	C ₂₁₄₈ H ₃₃₅₀ N ₆₁₂ O ₆₂₀ S ₉	57.33	96	Cytoplasm
PfGRAS25	Pfo09g012760.1	584	6.04	65429.43	C ₂₈₇₆ H ₄₄₇₆ N ₈₂₄ O ₈₈₅ S ₂₁	56.98	76.5	Nucleus
PfGRAS26	Pfo09g019200.1	343	6.45	37467.84	C ₁₆₅₆ H ₂₆₄₇ N ₄₆₇ O ₄₉₇ S ₁₃	46.2	99.04	Chloroplast
PfGRAS27	Pfo09g020030.1	547	5.51	61065.1	C ₂₆₈₇ H ₄₁₈₄ N ₇₄₀ O ₈₂₆ S ₃₁	49.92	81.3	Chloroplast
PfGRAS28	Pfo10g000470.1	728	5.59	80700.04	C ₃₅₄₈ H ₅₅₅₉ N ₉₉₅ O ₁₀₉₇ S ₃₁	54.44	80.91	Nucleus
PfGRAS29	Pfo10g003570.1	568	6.25	61865.8	C ₂₇₀₀ H ₄₃₀₈ N ₇₆₈ O ₈₅₄ S ₂₁	57.74	79.47	Chloroplast
PfGRAS30	Pfo10g009350.1	746	5.94	84404.66	C ₃₇₃₃ H ₅₈₂₃ N ₁₀₂₇ O ₁₁₃₅ S ₃₆	47.23	74.46	Nucleus
PfGRAS31	Pfo10g009370.1	746	5.94	84404.66	C ₃₇₃₃ H ₅₈₂₃ N ₁₀₂₇ O ₁₁₃₅ S ₃₆	47.23	74.46	Nucleus
PfGRAS32	Pfo11g000660.1	324	5.12	35874.89	C ₁₅₇₈ H ₂₅₁₄ N ₄₁₆ O ₄₉₉ S ₁₈	52.68	82.41	Nucleus
PfGRAS33	Pfo11g000670.1	658	8.22	74888.78	C ₃₃₄₀ H ₅₂₈₆ N ₉₁₄ O ₉₅₆ S ₄₂	47.24	91.13	Cytoplasm
PfGRAS34	Pfo11g000680.1	447	7.85	50853.79	C ₂₂₅₄ H ₃₆₀₁ N ₆₁₅ O ₆₆₅ S ₂₈	36.11	92.04	Nucleus
PfGRAS35	Pfo11g000690.1	487	6.01	55157.38	C ₂₄₇₂ H ₃₈₇₈ N ₆₅₆ O ₇₂₅ S ₂₄	38.43	90.51	Nucleus
PfGRAS36	Pfo11g006510.1	453	5.34	50925.71	C ₂₂₂₉ H ₃₅₂₀ N ₆₂₀ O ₆₉₅ S ₂₅	50.36	79.38	Nucleus
PfGRAS37	Pfo11g013890.1	567	5.05	63406.97	C ₂₇₆₃ H ₄₃₂₀ N ₇₇₄ O ₈₈₅ S ₂₇	52.04	78.59	Nucleus
PfGRAS38	Pfo11g015060.1	462	6.16	52755.26	C ₂₃₅₉ H ₃₆₇₇ N ₆₂₉ O ₇₀₆ S ₂₂	42.01	82.28	Nucleus

PfGRAS39	Pfo12g000210.1	579	5.3	65041.27	C2883H4525N781O868S32	43.33	86.07	Cytoplasm
PfGRAS40	Pfo12g004460.1	470	5.65	52950.02	C2354H3731N633O697S28	53.26	93.2	Endoplasmic reticulum
PfGRAS41	Pfo13g002280.1	407	5.57	44455.69	C1976H3095N545O587S18	33.49	90.64	Cytoplasm
PfGRAS42	Pfo13g005740.1	602	5.21	66028.23	C2943H4542N784O909S18	49.8	77.62	Nucleus
PfGRAS43	Pfo13g005930.1	552	5.64	61135.22	C2736H4238N746O815S16	49.9	85.34	Chloroplast
PfGRAS44	Pfo13g007670.1	505	5.63	56864.79	C2498H3843N701O771S26	51.55	68.55	Nucleus
PfGRAS45	Pfo13g012150.1	539	6.64	60368.51	C2671H4192N748O805S22	58.25	83.81	Nucleus
PfGRAS46	Pfo14g005090.1	510	6.13	56216.55	C2505H3956N684O737S24	52.67	95.99	Cytoplasm
PfGRAS47	Pfo14g007210.1	176	4.81	19777.53	C879H1373N235O266S9	39.15	92.51	Nucleus
PfGRAS48	Pfo15g001820.1	461	7.58	52682.36	C2349H3690N636O694S23	38.52	81.59	Nucleus
PfGRAS49	Pfo15g002590.1	487	5.62	54178.94	C2378H3690N678O729S23	38.2	80.33	Nucleus
PfGRAS50	Pfo15g003740.1	576	5.16	64517.12	C2816H4399N785O904S25	49.37	77.53	Nucleus
PfGRAS51	Pfo16g000130.1	411	5.58	46240.19	C2072H3237N557O399S22	43.1	94.02	Cytoskeleton
PfGRAS52	Pfo16g000660.1	537	6.39	59135.51	C2648H4152N726O777S17	61.94	90.5	Chloroplast
PfGRAS53	Pfo16g006870.1	583	5.59	65180.26	C2876H4457N803O885S23	54.24	78.81	Chloroplast
PfGRAS54	Pfo16g008010.1	539	4.64	59853.69	C2634H4122N716O821S28	45.29	90.99	Cytoplasm
PfGRAS55	Pfo16g008480.1	427	6.31	47895.51	C2146H3351N607O620S10	62.78	96.95	Cytoplasm
PfGRAS56	Pfo16g009370.1	538	5.39	59352.32	C2601H4103N719O809S30	51.62	89.74	Nucleus
PfGRAS57	Pfo16g010020.1	552	5.94	61825.67	C2701H4212N770O835S31	54.65	78.04	Nucleus
PfGRAS58	Pfo17g000310.1	563	5.24	61714.8	C2721H4259N745O842S26	49.33	82.9	Nucleus
PfGRAS59	Pfo19g001000.1	587	5.11	65750.68	C2907H4524N770O896S36	44.29	78.4	Nucleus
PfGRAS60	Pfo19g001010.1	565	5.11	63770.46	C2844H4466N752O871S20	48.8	89.2	Nucleus
PfGRAS61	Pfo19g001020.1	556	5.65	63332.24	C2814H4440N762O851S24	52.99	87.51	Nucleus
PfGRAS62	Pfo19g001030.1	579	6.31	64383.77	C2853H4558N778O864S25	44.07	95.19	Cytoplasm
PfGRAS63	Pfo19g001040.1	451	5.53	50852.25	C2236H3554N612O682S29	42.18	89.71	Nucleus
PfGRAS64	Pfo19g008150.1	403	5.42	45037.2	C1984H3170N548O616S15	41.6	92.86	Cytoplasm
PfGRAS65	Pfo20g004210.1	747	6.39	84028.06	C3715H5799N1039O1126S31	44.54	75.29	Nucleus
PfGRAS66	Pfo20g008370.1	625	6.78	67856.72	C2950H4728N846O934S27	55.48	79.04	Chloroplast
PfGRAS67	Pfoxxg000700.1	680	5.83	73398.44	C3226H5084N904O1016S19	52.62	82.68	Chloroplast
PfGRAS68	Pfoxxg009460.1	209	5.55	23455.2	C1046H1595N287O319S5	65.25	66.25	Nucleus
PfGRAS69	Pfoxxg009470.1	765	6.32	87157.81	C3865H6013N1075O1158S34	45.9	76.61	Nucleus
PfGRAS70	Pfoxxg010850.1	386	5.08	44663.19	C2000H2983N529O395S22	43.95	69.38	Nucleus
PfGRAS71	Pfoxxg010860.1	522	4.73	58963.64	C2585H4031N693O816S34	55.8	77.5	Nucleus
PfGRAS72	Pfoxxg011760.1	425	5.78	46540.32	C2050H3240N580O640S9	52.05	86.6	Nucleus
PfGRAS73	Pfoxxg012780.1	792	6.06	85114.36	C3721H5861N1059O1180S25	50.81	78.62	Nucleus
PfGRAS74	Pfoxxg014180.1	755	6.41	86196.66	C3828H5957N1065O1146S30	45.36	77.49	Nucleus
PfGRAS75	Pfoxxg014190.1	465	9.18	52896.73	C2380H3724N660O675S16	45.95	82.22	Cytoplasm
PfGRAS76	Pfoxxg020540.1	512	4.74	57715.28	C2527H3950N680O798S34	56.33	78.45	Nucleus
PfGRAS77	Pfoxxg021460.1	527	8.07	56156.67	C2417H3854N710O791S20	52.93	71.33	Nucleus
PfGRAS78	Pfoxxg024740.1	792	6.06	85114.36	C3721H5861N1059O1180S25	50.81	78.62	Nucleus
PfGRAS79	Pfoxxg025380.1	530	4.87	61051.65	C2733H4093N713O822S30	47.66	71.47	Peroxisome

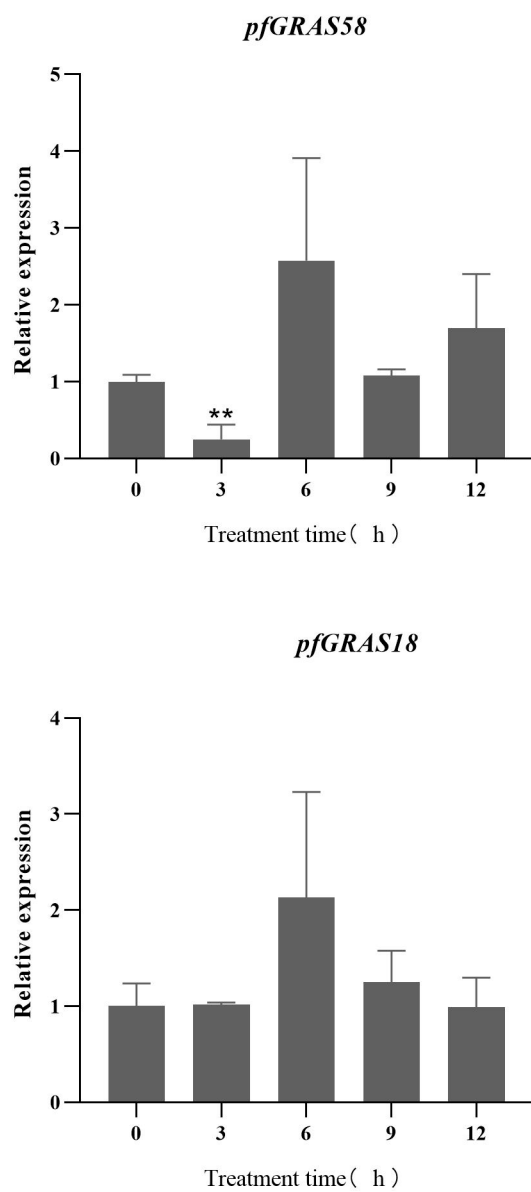


Figure S1. Expression patterns of *PfGRAS18/58* under GA3 treatment.

Table S2. Primer sequence information.

Gene	Forward primer (5'-3')	Reverse primer (5'-3')
PfGRAS9	TGGAGCAACCACACTTCACA	GAATCCCGGTTGGGGGAAAT
PfGRAS12	TTCGAGTTCCGTGGCTTTGT	CAGCACTTTGTGCATGGCAC
PfGRAS15	GGACTATGTTCCGGGCACGTT	CAAAATGCGGGGTTTCATCGG
PfGRAS18	AGTGAGGTTTACTTGGGGCG	TATACCCATCCCCACCAGCA
PfGRAS19	AGCCTCCTGCGGATCTTTTT	TGCTGCTGGATACTCACACC
PfGRAS23	AGACAGGTTGCAGTATCGGC	GGATAACAACCTCGCCCTGA
PfGRAS41	AGCTTCACCGCTGTTATCC	TTCGCCTCCTGCTCAACAAT
PfGRAS58	TGGTTGACTCGCAGGAGAAC	TCTCATAGCTCCTGCTTGCG
PfActin	AATGGAATCTGCTGGAAT	ACTGAGGACAATGTTACC
PfGRAS12-PSAK277	GTGGATCCAAAGAATTCATGAAAAGAGATCGTGATCG	CTCCTTTACCCATGAATTCTTCCCCTGCCGTGAGCCGCC
PfGRAS12-ECN	AGTGGTCTCTGTCCAGTCCTATGAAAAGAGATCGTGATCG	GGTCTCAGCAGACCACAAGTTTCCCCTGCCGTGAGCCGCC
PfIAZ3-ENN	AGTGGTCTCTGTCCAGTCCTTGGAGAGAGATTTCATGGG	GGTCTCAGCAGACCACAAGTATTGATTGCTGGAACAGGAC
PfGRAS12-BD	GAGGAGGACCTGCATATGATGAAAAGAGATCGTGATCG	ACGGATCCCCGGGAATTCTTCCCCTGCCGTGAGCCGCC
PfIAZ3-AD	GCCATGGAGGCCAGTGAATTCATGGAGAGAGATTTCATGGG	CAGCTCGAGCTCGATGGATCCATTGATTGCTGGAACAGGAC