

Table S1. Physicochemical properties, protein secondary structure, and subcellular localization prediction analysis of ‘duli’ PHT proteins.

Protein ID	Gene ID	Rename	CDs (bp)	Length (aa)	MW (kDa)	PI	Instability index	Aliphatic index	Alpha helix	Extended strand	Bete turn	Random coil	Subcellular location
GWHPAA YT058550	<i>Scaffold21.g58893.ml</i>	<i>PbPHT1.1</i>	1533	510	56.29	8.91	29.55	111.61	57.65	12.16	0.00	30.20	Cell membrane.
GWHPAA YT044434	<i>Chr6.g53454.ml</i>	<i>PbPHT1.2</i>	1548	515	57.22	8.91	30.52	98.99	52.62	15.73	0.00	31.65	Cell membrane.
GWHPAA YT059202	<i>Scaffold5.g21011.ml</i>	<i>PbPHT1.3</i>	1491	496	53.79	5.71	39.26	105.36	46.37	16.94	0.00	36.69	Cell membrane.
GWHPAA YT010102	<i>Chr12.g37767.ml</i>	<i>PbPHT1.4</i>	1635	544	59.36	8.97	37.81	106.10	48.35	14.71	0.00	36.95	Cell membrane.
GWHPAA YT031465	<i>Chr2.g41484.ml</i>	<i>PbPHT1.5</i>	3285	1094	120.77	8.11	42.27	90.12	43.42	11.79	0.00	44.79	Cell membrane.
GWHPAA YT031485	<i>Chr2.g41504.ml</i>	<i>PbPHT1.6</i>	1509	502	54.01	8.93	36.40	110.14	46.81	15.14	0.00	38.05	Cell membrane.
GWHPAA YT047531	<i>Chr7.g34511.ml</i>	<i>PbPHT1.7</i>	1680	559	61.29	9.14	30.28	93.26	52.95	12.16	0.00	34.88	Cell membrane.
GWHPAA YT037885	<i>Chr4.g38433.ml</i>	<i>PbPHT1.8</i>	1500	499	53.51	5.12	37.93	112.93	44.29	19.64	0.00	36.07	Cell membrane.
GWHPAA YT006388	<i>Chr11.g09980.ml</i>	<i>PbPHT1.9</i>	1578	525	57.52	8.55	40.69	96.82	56.00	11.43	0.00	32.57	Cell membrane.
GWHPAA YT028850	<i>Chr17.g25629.ml</i>	<i>PbPHT1.10</i>	1641	546	59.47	6.04	30.84	108.53	45.42	13.74	0.00	40.84	Cell membrane.
GWHPAA YT003164	<i>Chr10.g16543.ml</i>	<i>PbPHT1.11</i>	1563	520	56.55	9.30	35.01	105.98	48.85	15.96	0.00	35.19	Cell membrane.
GWHPAA YT003168	<i>Chr10.g16539.ml</i>	<i>PbPHT1.12</i>	1458	485	52.84	9.30	38.43	110.97	50.10	16.29	0.00	33.61	Cell membrane.
GWHPAA YT003171	<i>Chr10.g16536.ml</i>	<i>PbPHT1.13</i>	1587	528	57.59	9.07	37.10	108.41	47.54	17.05	0.00	25.42	Cell membrane.
GWHPAA YT003175	<i>Chr10.g16532.ml</i>	<i>PbPHT1.14</i>	1581	526	57.37	9.03	35.47	103.97	47.72	15.02	0.00	37.26	Cell membrane.
GWHPAA YT003176	<i>Chr10.g16531.ml</i>	<i>PbPHT1.15</i>	1890	629	68.27	8.63	38.06	100.76	41.34	12.88	0.00	45.79	Cell membrane.
GWHPAA YT003178	<i>Chr10.g16529.ml</i>	<i>PbPHT1.16</i>	1614	537	57.92	8.99	34.13	104.26	50.09	11.73	0.00	38.18	Cell membrane.

Protein ID	Gene ID	Rename	CDs (bp)	Length (aa)	MW (kDa)	PI	Instability index	Aliphatic index	Alpha helix	Extended strand	Bete turn	Random coil	Subcellular location
GWHPAA YT003181	<i>Chr10.g16 526.m1</i>	<i>PbPHT1.17</i>	1566	521	56.70	9.23	28.32	109.12	50.29	12.48	0.00	37.24	Cell membrane.
GWHPAA YT041150	<i>Chr5.g088 36.m1</i>	<i>PbPHT1.18</i>	1578	525	56.99	9.00	36.37	107.54	52.57	13.33	0.00	34.10	Cell membrane.
GWHPAA YT041152	<i>Chr5.g088 34.m1</i>	<i>PbPHT1.19</i>	1476	491	53.25	6.76	31.76	107.60	42.77	16.29	0.00	40.94	Cell membrane.
GWHPAA YT041156	<i>Chr5.g088 30.m1</i>	<i>PbPHT1.20</i>	1179	392	42.86	9.34	45.48	107.45	46.68	18.11	0.00	35.20	Cell membrane.
GWHPAA YT032421	<i>Chr2.g424 40.m1</i>	<i>PbPHT1.21</i>	1515	504	54.34	9.31	30.88	112.22	47.62	14.88	0.00	37.50	Cell membrane.
GWHPAA YT054933	<i>Chr9.g458 48.m1</i>	<i>PbPHT1.22</i>	1482	493	53.35	5.71	39.83	110.12	40.16	17.85	0.00	41.99	Cell membrane.
GWHPAA YT041368	<i>Chr5.g086 18.m1</i>	<i>PbPHT1.23</i>	1584	527	57.50	8.78	36.85	108.79	44.21	17.46	0.00	38.33	Cell membrane.
GWHPAA YT041376	<i>Chr5.g086 10.m1</i>	<i>PbPHT1.24</i>	1161	386	41.99	7.59	34.05	104.79	46.37	13.47	0.00	40.16	Cell membrane.
GWHPAA YT021192	<i>Chr15.g03 221.m1</i>	<i>PbPHT1.25</i>	1503	500	53.86	8.86	38.05	107.06	59.20	9.40	0.00	31.40	Cell membrane.
GWHPAA YT021216	<i>Chr15.g03 197.m1</i>	<i>PbPHT1.26</i>	1548	515	55.55	7.70	39.16	111.59	48.74	13.79	0.00	37.48	Cell membrane.
GWHPAA YT032811	<i>Chr2.g428 30.m1</i>	<i>PbPHT1.27</i>	1548	515	55.94	9.29	34.05	103.36	58.45	9.51	0.00	32.04	Cell membrane.
GWHPAA YT041495	<i>Chr5.g084 91.m1</i>	<i>PbPHT1.28</i>	1545	514	55.83	9.32	31.59	102.63	57.59	9.34	0.00	33.07	Cell membrane.
GWHPAA YT001633	<i>Chr1.g570 06.m1</i>	<i>PbPHT1.29</i>	1326	441	48.05	5.48	31.40	96.44	39.46	17.23	0.00	43.31	Cell membrane.
GWHPAA YT001638	<i>Chr1.g570 01.m1</i>	<i>PbPHT1.30</i>	1338	445	48.70	5.97	32.03	96.25	40.90	18.43	0.00	40.67	Cell membrane.
GWHPAA YT052404	<i>Chr8.g553 72.m1</i>	<i>PbPHT1.31</i>	1578	525	57.53	8.54	40.63	94.59	52.95	10.29	0.00	36.76	Cell membrane.
GWHPAA YT026521	<i>Chr16.g29 366.m1</i>	<i>PbPHT1.32</i>	885	294	33.07	8.39	32.43	90.37	61.90	11.90	0.00	26.19	Cell membrane.
GWHPAA	<i>Chr16.g29</i>	<i>PbPHT1.33</i>	2187	728	82.18	8.06	43.95	81.04	41.35	11.81	0.00	46.84	Cell

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Protein ID	Gene ID	Rename	CDs (bp)	Length (aa)	MW (kDa)	PI	Instability index	Aliphatic index	Alpha helix	Extended strand	Bete turn	Random coil	Subcellular location
GWHPAA YT030599	<i>Chr17.g27 378.ml</i>	<i>PbPHT1.50</i>	1602	533	57.27	5.60	39.40	110.64	42.78	18.76	0.00	38.46	Cell membrane.
GWHPAA YT012580	<i>Chr12.g35 289.ml</i>	<i>PbPHT1.51</i>	1416	471	50.59	5.21	40.54	103.76	48.20	19.75	0.00	32.06	Cell membrane.
GWHPAA YT030613	<i>Chr17.g27 392.ml</i>	<i>PbPHT1.52</i>	1476	491	51.35	9.41	32.62	113.44	55.40	10.39	0.00	34.22	Cell membrane.
GWHPAA YT040048	<i>Chr4.g405 96.ml</i>	<i>PbPHT1.53</i>	1584	527	57.38	9.00	35.77	108.05	47.63	15.56	0.00	36.81	Cell membrane.
GWHPAA YT040050	<i>Chr4.g405 98.ml</i>	<i>PbPHT1.54</i>	1590	529	57.65	9.12	36.33	106.52	45.75	16.26	0.00	38.00	Cell membrane.
GWHPAA YT040051	<i>Chr4.g405 99.ml</i>	<i>PbPHT1.55</i>	1590	529	57.63	9.00	36.64	107.64	48.39	14.93	0.00	36.67	Cell membrane.
GWHPAA YT050284	<i>Chr7.g317 58.ml</i>	<i>PbPHT1.56</i>	1587	528	58.48	8.92	27.77	88.52	49.81	14.58	0.00	35.61	Cell membrane.
GWHPAA YT042887	<i>Chr5.g070 99.ml</i>	<i>PbPHT1.57</i>	1554	517	56.81	9.12	29.11	93.62	59.57	8.32	0.00	32.11	Cell membrane.
GWHPAA YT042888	<i>Chr5.g070 98.ml</i>	<i>PbPHT1.58</i>	1617	538	59.29	8.32	35.07	89.83	55.39	8.74	0.00	35.87	Cell membrane.
GWHPAA YT030796	<i>Chr17.g27 575.ml</i>	<i>PbPHT1.59</i>	1590	529	57.68	8.99	38.86	109.68	50.09	14.74	0.00	35.16	Cell membrane.
GWHPAA YT037308	<i>Chr3.g177 64.ml</i>	<i>PbPHT1.60</i>	1167	388	42.17	7.48	36.80	116.55	48.71	22.16	0.00	29.12	Cell membrane.
GWHPAA YT005578	<i>Chr10.g14 129.ml</i>	<i>PbPHT1.61</i>	1620	539	57.40	5.17	29.70	110.69	44.71	15.77	0.00	39.52	Cell membrane.
GWHPAA YT005982	<i>Chr10.g13 725.ml</i>	<i>PbPHT1.62</i>	1737	578	62.40	8.79	34.79	97.39	43.25	15.05	0.00	41.70	Cell membrane.
GWHPAA YT009642	<i>Chr11.g13 234.ml</i>	<i>PbPHT1.63</i>	1359	452	48.55	7.53	33.20	120.15	53.76	18.36	0.00	27.88	Cell membrane.
GWHPAA YT009643	<i>Chr11.g13 235.ml</i>	<i>PbPHT1.64</i>	1374	457	48.81	8.33	31.13	112.45	53.83	14.22	0.00	31.95	Cell membrane.
GWHPAA YT009644	<i>Chr11.g13 236.ml</i>	<i>PbPHT1.65</i>	1431	476	51.60	8.58	35.48	109.98	49.37	18.91	0.00	31.72	Cell membrane.
GWHPAA	<i>Chr11.g13</i>	<i>PbPHT1.66</i>	1512	503	53.82	6.01	34.97	116.18	56.62	13.52	0.00	30.22	Cell

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GWHPAA YT031376	<i>Chr2.g413 95.ml</i>	<i>PbPHT3.11</i>	1233	410	44.13	9.45	46.95	93.05	48.78	12.20	0.00	39.02	Mitochondri on.
GWHPAA YT013295	<i>Chr13.g24 237.ml</i>	<i>PbPHT3.12</i>	1125	374	40.46	9.73	35.92	85.80	44.65	12.30	0.00	43.05	Mitochondri on.
GWHPAA YT024762	<i>Chr16.g31 125.ml</i>	<i>PbPHT3.13</i>	1107	368	39.85	9.65	34.25	85.90	43.48	15.49	0.00	41.03	Mitochondri on.
GWHPAA YT037870	<i>Chr4.g384 18.ml</i>	<i>PbPHT3.14</i>	975	324	34.73	9.69	27.17	92.78	48.46	14.51	0.00	37.04	Mitochondri on.
GWHPAA YT044754	<i>Chr6.g531 34.ml</i>	<i>PbPHT3.15</i>	690	229	23.34	9.34	33.83	88.69	48.91	12.23	0.00	38.86	Mitochondri on.
GWHPAA YT019973	<i>Chr15.g04 440.ml</i>	<i>PbPHT3.16</i>	2157	718	80.42	9.29	41.22	88.43	40.11	17.69	0.00	42.20	Mitochondri on.
GWHPAA YT040727	<i>Chr5.g092 59.ml</i>	<i>PbPHT3.17</i>	933	310	32.89	9.35	31.28	96.97	55.81	9.35	0.00	34.84	Mitochondri on.
GWHPAA YT000287	<i>Chr1.g583 52.ml</i>	<i>PbPHT3.18</i>	972	323	34.47	10.0 4	27.73	90.59	56.97	5.57	0.00	37.46	Mitochondri on.
GWHPAA YT025066	<i>Chr16.g30 821.ml</i>	<i>PbPHT3.19</i>	912	303	33.43	9.80	44.14	88.48	53.47	8.91	0.00	37.62	Mitochondri on.
GWHPAA YT028446	<i>Chr17.g25 225.ml</i>	<i>PbPHT3.20</i>	945	314	33.78	9.61	20.02	92.29	47.13	14.65	0.00	38.22	Mitochondri on.
GWHPAA YT054027	<i>Chr9.g467 54.ml</i>	<i>PbPHT3.21</i>	1242	413	44.36	9.75	26.59	94.99	47.22	15.52	0.00	37.53	Mitochondri on.
GWHPAA YT051194	<i>Chr8.g541 62.ml</i>	<i>PbPHT3.22</i>	1038	345	38.00	9.72	32.51	90.17	43.77	14.02	0.00	42.03	Mitochondri on.
GWHPAA YT034637	<i>Chr3.g204 35.ml</i>	<i>PbPHT3.23</i>	843	280	30.01	9.04	19.08	74.96	48.21	9.29	0.00	42.50	Mitochondri on.
GWHPAA YT006539	<i>Chr11.g10 131.ml</i>	<i>PbPHT3.24</i>	999	332	35.82	8.94	24.96	74.70	43.07	12.35	0.00	44.58	Mitochondri on.
GWHPAA YT006561	<i>Chr11.g10 153.ml</i>	<i>PbPHT3.25</i>	999	332	35.85	8.94	24.96	74.70	44.28	11.75	0.00	43.98	Mitochondri on.
GWHPAA YT034846	<i>Chr3.g202 26.m2</i>	<i>PbPHT3.26</i>	948	315	34.16	9.23	44.34	108.16	49.52	15.87	0.00	34.60	Mitochondri on.
GWHPAA	<i>Chr11.g10</i>	<i>PbPHT3.27</i>	903	300	32.35	9.15	34.74	105.07	57.67	9.33	0.00	33.00	Mitochondri

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GWHPAA YT002088	<i>Chr1.g565 51.m2</i>	<i>PbPHT3.44</i>	1206	401	43.33	9.57	39.72	88.60	49.13	12.22	0.00	38.65	Mitochondri on.
GWHPAA YT046076	<i>Chr6.g518 12.m1</i>	<i>PbPHT3.45</i>	1011	336	37.67	8.49	46.68	87.11	32.44	15.48	0.00	50.08	Mitochondri on.
GWHPAA YT046126	<i>Chr6.g517 62.m1</i>	<i>PbPHT3.46</i>	1134	377	40.10	9.54	29.43	91.86	41.64	12.47	0.00	45.89	Mitochondri on.
GWHPAA YT018391	<i>Chr14.g49 544.m2</i>	<i>PbPHT3.47</i>	1542	513	56.86	6.48	32.68	93.59	44.25	12.28	0.00	43.47	Mitochondri on.
GWHPAA YT052815	<i>Chr8.g557 83.m1</i>	<i>PbPHT3.48</i>	954	317	33.70	9.96	26.25	95.43	46.69	13.56	0.00	39.75	Mitochondri on.
GWHPAA YT004062	<i>Chr10.g15 645.m1</i>	<i>PbPHT3.49</i>	930	309	34.02	9.18	42.21	91.78	39.81	18.45	0.00	41.75	Mitochondri on.
GWHPAA YT011750	<i>Chr12.g36 119.m1</i>	<i>PbPHT3.50</i>	1044	347	37.87	9.76	38.50	89.42	45.82	16.14	0.00	38.04	Mitochondri on.
GWHPAA YT049342	<i>Chr7.g327 00.m1</i>	<i>PbPHT3.51</i>	2484	827	90.46	8.58	42.00	80.41	39.06	13.78	0.00	47.16	Mitochondri on.
GWHPAA YT029996	<i>Chr17.g26 775.m1</i>	<i>PbPHT3.52</i>	897	298	32.45	9.19	37.90	93.56	54.03	9.06	0.00	36.91	Mitochondri on.
GWHPAA YT039332	<i>Chr4.g398 80.m1</i>	<i>PbPHT3.53</i>	831	276	30.32	9.20	37.10	91.96	43.84	17.03	0.00	39.13	Mitochondri on.
GWHPAA YT039353	<i>Chr4.g399 01.m1</i>	<i>PbPHT3.54</i>	1044	347	37.58	9.74	40.97	91.99	46.69	14.70	0.00	38.62	Mitochondri on.
GWHPAA YT011870	<i>Chr12.g35 999.m1</i>	<i>PbPHT3.55</i>	1143	380	41.48	9.38	28.52	97.87	53.68	15.00	0.00	31.32	Mitochondri on.
GWHPAA YT011909	<i>Chr12.g35 960.m1</i>	<i>PbPHT3.56</i>	828	275	29.83	10.2 4	32.32	92.62	49.45	9.09	0.00	41.45	Mitochondri on.
GWHPAA YT039415	<i>Chr4.g399 63.m1</i>	<i>PbPHT3.57</i>	921	306	32.65	9.38	31.77	97.88	50.65	11.11	0.00	38.24	Mitochondri on.
GWHPAA YT011962	<i>Chr12.g35 907.m1</i>	<i>PbPHT3.58</i>	921	306	32.65	9.38	31.77	97.88	50.65	11.11	0.00	38.24	Mitochondri on.
GWHPAA YT039483	<i>Chr4.g400 31.m1</i>	<i>PbPHT3.59</i>	1143	380	41.49	9.38	32.94	96.58	56.84	12.89	0.00	30.26	Mitochondri on.
GWHPAA	<i>Chr7.g324</i>	<i>PbPHT3.60</i>	1059	352	38.27	9.81	38.07	91.14	37.50	22.16	0.00	40.34	Mitochondri

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GWHPAA YT006851	<i>Chr11.g10443.m1</i>	<i>PbPHT4.7</i>	1581	526	57.38	9.74	41.73	101.39	47.91	13.69	0.00	38.40	Cell membrane.
GWHPAA YT000651	<i>Chr1.g57988.m2</i>	<i>PbPHT4.8</i>	1833	610	67.41	9.35	42.61	97.97	40.00	17.70	0.00	42.30	Cell membrane.
GWHPAA YT006916	<i>Chr11.g10508.m1</i>	<i>PbPHT4.9</i>	1581	526	57.38	9.74	41.73	101.39	47.91	13.69	0.00	38.40	Cell membrane.
GWHPAA YT020991	<i>Chr15.g03422.m1</i>	<i>PbPHT4.10</i>	1596	531	57.35	6.72	46.48	94.76	37.66	15.07	0.00	47.27	Cell membrane.
GWHPAA YT048775	<i>Chr7.g33267.m1</i>	<i>PbPHT4.11</i>	1722	573	63.17	9.44	46.18	103.63	44.15	18.50	0.00	37.35	Cell membrane.
GWHPAA YT039432	<i>Chr4.g39980.m1</i>	<i>PbPHT4.12</i>	1563	520	55.85	9.92	37.86	97.02	49.42	12.31	0.00	38.27	Cell membrane.
GWHPAA YT056605	<i>Contig11.g40913.m1</i>	<i>PbPHT5.1</i>	2100	699	77.83	8.30	37.23	106.55	55.22	15.16	0.00	29.61	Vacuole
GWHPAA YT038300	<i>Chr4.g38848.m1</i>	<i>PbPHT5.2</i>	2211	736	82.19	5.97	38.37	109.52	54.48	14.95	0.00	30.57	Cell membrane.
GWHPAA YT045361	<i>Chr6.g52527.m1</i>	<i>PbPHT5.3</i>	2100	699	78.44	6.78	39.00	109.18	57.22	14.02	0.00	28.76	Cell membrane.
GWHPAA YT032954	<i>Chr2.g42973.m1</i>	<i>PbPHT5.4</i>	2100	699	77.82	8.30	37.62	105.99	5.36	15.16	0.00	29.47	Vacuole