**Table S2:** Bioinformatic analysis of tandem-duplicated in *P. tricornutum*.

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| --- | --- | --- | --- |
| Phatr3\_EG00043.p1 | Phatr3\_EG02206.p1 | Phatr3\_J44868.p1 | Phatr3\_J1884.p1 |
| Phatr3\_EG00092.p1 | Phatr3\_EG02209.p1 | Phatr3\_J38445.p1 | Phatr3\_J22166.p1 |
| Phatr3\_EG00123.p1 | Phatr3\_J55187.p1 | Phatr3\_J22166.p1 | Phatr3\_J52343.p1 |
| Phatr3\_EG00175.p1 | Phatr3\_EG00183.p1 | Phatr3\_J55090.p1 | Phatr3\_J23423.p1 |
| Phatr3\_EG00193.p1 | Phatr3\_EG00189.p1 | Phatr3\_J2418.p1 | Phatr3\_J46207.p1 |
| Phatr3\_EG00238.p1 | Phatr3\_J49759.p1 | Phatr3\_J25168.p1 | Phatr3\_J50705.p1 |
| Phatr3\_J40608.p1 | Phatr3\_EG00256.p1 | Phatr3\_J50705.p1 | Phatr3\_J25172.p1 |
| Phatr3\_J15913.p1 | Phatr3\_EG00262.p1 | Phatr3\_J25217.p1 | Phatr3\_J25218.p1 |
| Phatr3\_EG00471.p1 | Phatr3\_EG00477.p1 | Phatr3\_J25308.p1 | Phatr3\_J32747.p1 |
| Phatr3\_EG00536.p1 | Phatr3\_J48350.p1 | Phatr3\_J26077.p1 | Phatr3\_J33833.p1 |
| Phatr3\_EG00613.p1 | Phatr3\_EG02504.p1 | Phatr3\_J45592.p1 | Phatr3\_J27166.p1 |
| Phatr3\_EG00659.p1 | Phatr3\_EG00662.p1 | Phatr3\_J29658.p1 | Phatr3\_J29660.p1 |
| Phatr3\_EG00769.p1 | Phatr3\_J46478.p1 | Phatr3\_J29812.p1 | Phatr3\_J51157.p1 |
| Phatr3\_EG00826.p1 | Phatr3\_EG00847.p1 | Phatr3\_J51230.p1 | Phatr3\_J30648.p1 |
| Phatr3\_EG00841.p1 | Phatr3\_J36808.p1 | Phatr3\_J50500.p1 | Phatr3\_J31257.p1 |
| Phatr3\_EG00855.p1 | Phatr3\_J46705.p1 | Phatr3\_J31436.p1 | Phatr3\_J31437.p1 |
| Phatr3\_EG00890.p1 | Phatr3\_EG00869.p1 | Phatr3\_J31539.p1 | Phatr3\_J42528.p1 |
| Phatr3\_EG00993.p1 | Phatr3\_EG00998.p1 | Phatr3\_J32401.p1 | Phatr3\_J43232.p1 |
| Phatr3\_EG01050.p1 | Phatr3\_EG01067.p1 | Phatr3\_J32513.p1 | Phatr3\_J43325.p1 |
| Phatr3\_EG01067.p1 | Phatr3\_EG01054.p1 | Phatr3\_J32535.p1 | Phatr3\_J43342.p1 |
| Phatr3\_EG01121.p1 | Phatr3\_EG01070.p1 | Phatr3\_J33106.p1 | Phatr3\_J33107.p1 |
| Phatr3\_EG01278.p1 | Phatr3\_EG01275.p1 | Phatr3\_J33107.p1 | Phatr3\_J8543.p1 |
| Phatr3\_J1800.p1 | Phatr3\_EG01292.p1 | Phatr3\_J43818.p1 | Phatr3\_J33128.p1 |
| Phatr3\_EG01360.p1 | Phatr3\_EG01364.p1 | Phatr3\_J44029.p1 | Phatr3\_J33380.p1 |
| Phatr3\_EG01379.p1 | Phatr3\_J45068.p1 | Phatr3\_J33873.p1 | Phatr3\_J33874.p1 |
| Phatr3\_EG01477.p1 | Phatr3\_J9816.p1 | Phatr3\_J34208.p1 | Phatr3\_J34209.p1 |
| Phatr3\_EG01587.p1 | Phatr3\_EG02630.p1 | Phatr3\_J34521.p1 | Phatr3\_J34522.p1 |
| Phatr3\_EG01690.p1 | Phatr3\_EG01725.p1 | Phatr3\_J45006.p1 | Phatr3\_J34586.p1 |
| Phatr3\_J44226.p1 | Phatr3\_EG01690.p1 | Phatr3\_J34708.p1 | Phatr3\_J45099.p1 |
| Phatr3\_J10261.p1 | Phatr3\_EG01702.p1 | Phatr3\_J45099.p1 | Phatr3\_J34710.p1 |
| Phatr3\_EG01758.p1 | Phatr3\_EG01800.p1 | Phatr3\_J45112.p1 | Phatr3\_J34724.p1 |
| Phatr3\_J17914.p1 | Phatr3\_EG01786.p1 | Phatr3\_J45740.p1 | Phatr3\_J35518.p1 |
| Phatr3\_J32455.p1 | Phatr3\_EG01790.p1 | Phatr3\_J45834.p1 | Phatr3\_J35640.p1 |
| Phatr3\_J42953.p1 | Phatr3\_EG01804.p1 | Phatr3\_J35959.p1 | Phatr3\_J35960.p1 |
| Phatr3\_EG01809.p1 | Phatr3\_EG02479.p1 | Phatr3\_J36021.p1 | Phatr3\_J36022.p1 |
| Phatr3\_EG01821.p1 | Phatr3\_J31704.p1 | Phatr3\_J36221.p1 | Phatr3\_J46293.p1 |
| Phatr3\_EG01953.p1 | Phatr3\_EG01958.p1 | Phatr3\_J36443.p1 | Phatr3\_J36444.p1 |
| Phatr3\_EG01961.p1 | Phatr3\_EG01954.p1 | Phatr3\_J46621.p1 | Phatr3\_J36628.p1 |
| Phatr3\_EG01994.p1 | Phatr3\_EG01989.p1 | Phatr3\_J36956.p1 | Phatr3\_J46898.p1 |
| Phatr3\_EG01991.p1 | Phatr3\_EG01992.p1 | Phatr3\_J37243.p1 | Phatr3\_J47115.p1 |
| Phatr3\_J48049.p1 | Phatr3\_EG01991.p1 | Phatr3\_J37509.p1 | Phatr3\_J47332.p1 |
| Phatr3\_EG01992.p1 | Phatr3\_EG01994.p1 | Phatr3\_J47439.p1 | Phatr3\_J37655.p1 |
| Phatr3\_EG02002.p1 | Phatr3\_J46842.p1 | Phatr3\_J37891.p1 | Phatr3\_J37892.p1 |
| Phatr3\_EG02029.p1 | Phatr3\_EG02025.p1 | Phatr3\_J47805.p1 | Phatr3\_J38112.p1 |
| Phatr3\_EG02047.p1 | Phatr3\_J54552.p1 | Phatr3\_J38413.p1 | Phatr3\_J48049.p1 |
| Phatr3\_J44839.p1 | Phatr3\_EG02075.p1 | Phatr3\_J38498.p1 | Phatr3\_J48117.p1 |
| Phatr3\_J44836.p1 | Phatr3\_EG02077.p1 | Phatr3\_J38828.p1 | Phatr3\_J38829.p1 |
| Phatr3\_EG02098.p1 | Phatr3\_EG02093.p1 | Phatr3\_J48463.p1 | Phatr3\_J38924.p1 |
| Phatr3\_EG02422.p1 | Phatr3\_EG02110.p1 | Phatr3\_J38966.p1 | Phatr3\_J48491.p1 |
| Phatr3\_EG02159.p1 | Phatr3\_EG02158.p1 | Phatr3\_J39107.p1 | Phatr3\_J48606.p1 |
| Phatr3\_EG02158.p1 | Phatr3\_EG02162.p1 | Phatr3\_J39534.p1 | Phatr3\_J48934.p1 |
| Phatr3\_EG02196.p1 | Phatr3\_EG02184.p1 | Phatr3\_J39556.p1 | Phatr3\_J39557.p1 |
| Phatr3\_EG02260.p1 | Phatr3\_J39088.p1 | Phatr3\_J49117.p1 | Phatr3\_J39760.p1 |
| Phatr3\_J36310.p1 | Phatr3\_EG02289.p1 | Phatr3\_J39785.p1 | Phatr3\_J39786.p1 |
| Phatr3\_EG02294.p1 | Phatr3\_J21006.p1 | Phatr3\_J40022.p1 | Phatr3\_J40023.p1 |
| Phatr3\_EG02356.p1 | Phatr3\_J8537.p1 | Phatr3\_J40023.p1 | Phatr3\_J49337.p1 |
| Phatr3\_EG02409.p1 | Phatr3\_J9359.p1 | Phatr3\_J40606.p1 | Phatr3\_J49814.p1 |
| Phatr3\_EG02435.p1 | Phatr3\_EG02436.p1 | Phatr3\_J40744.p1 | Phatr3\_J49918.p1 |
| Phatr3\_EG02440.p1 | Phatr3\_J32443.p1 | Phatr3\_J49948.p1 | Phatr3\_J40785.p1 |
| Phatr3\_EG02465.p1 | Phatr3\_EG02475.p1 | Phatr3\_J40861.p1 | Phatr3\_J50011.p1 |
| Phatr3\_J48544.p1 | Phatr3\_EG02487.p1 | Phatr3\_J41302.p1 | Phatr3\_J50357.p1 |
| Phatr3\_EG02495.p1 | Phatr3\_EG02498.p1 | Phatr3\_J41576.p1 | Phatr3\_J41577.p1 |
| Phatr3\_EG02525.p1 | Phatr3\_J14125.p1 | Phatr3\_J4937.p1 | Phatr3\_J42434.p1 |
| Phatr3\_J49304.p1 | Phatr3\_EG02550.p1 | Phatr3\_J9252.p1 | Phatr3\_J42439.p1 |
| Phatr3\_J49425.p1 | Phatr3\_EG02558.p1 | Phatr3\_J42529.p1 | Phatr3\_J42530.p1 |
| Phatr3\_EG02577.p1 | Phatr3\_J40521.p1 | Phatr3\_J42587.p1 | Phatr3\_J42588.p1 |
| Phatr3\_EG02582.p1 | Phatr3\_J16401.p1 | Phatr3\_J42778.p1 | Phatr3\_J42779.p1 |
| Phatr3\_EG02588.p1 | Phatr3\_J2819.p1 | Phatr3\_J42913.p1 | Phatr3\_J42914.p1 |
| Phatr3\_EG02605.p1 | Phatr3\_EG02604.p1 | Phatr3\_J43223.p1 | Phatr3\_J43224.p1 |
| Phatr3\_EG02624.p1 | Phatr3\_J50622.p1 | Phatr3\_J43232.p1 | Phatr3\_J43233.p1 |
| Phatr3\_EG02630.p1 | Phatr3\_J10704.p1 | Phatr3\_J43233.p1 | Phatr3\_J43234.p1 |
| Phatr3\_EG02634.p1 | Phatr3\_EG02633.p1 | Phatr3\_J43313.p1 | Phatr3\_J43314.p1 |
| Phatr3\_J7763.p1 | Phatr3\_J10216.p1 | Phatr3\_J43363.p1 | Phatr3\_J43364.p1 |
| Phatr3\_J33770.p1 | Phatr3\_J10830.p1 | Phatr3\_J43395.p1 | Phatr3\_J43396.p1 |
| Phatr3\_J1103.p1 | Phatr3\_J1864.p1 | Phatr3\_J43396.p1 | Phatr3\_J43397.p1 |
| Phatr3\_J12788.p1 | Phatr3\_J36259.p1 | Phatr3\_J43432.p1 | Phatr3\_J9664.p1 |
| Phatr3\_J46657.p1 | Phatr3\_J13358.p1 | Phatr3\_J43466.p1 | Phatr3\_J43467.p1 |
| Phatr3\_J1389.p1 | Phatr3\_J44011.p1 | Phatr3\_J43478.p1 | Phatr3\_J43479.p1 |
| Phatr3\_J14334.p1 | Phatr3\_J4956.p1 | Phatr3\_J43494.p1 | Phatr3\_J43495.p1 |
| Phatr3\_J14712.p1 | Phatr3\_J48080.p1 | Phatr3\_J43507.p1 | Phatr3\_J43508.p1 |
| Phatr3\_J22453.p1 | Phatr3\_J14922.p1 | Phatr3\_J43602.p1 | Phatr3\_J43603.p1 |
| Phatr3\_J15126.p1 | Phatr3\_J48538.p1 | Phatr3\_J43725.p1 | Phatr3\_J43726.p1 |
| Phatr3\_J15145.p1 | Phatr3\_J22609.p1 | Phatr3\_J43760.p1 | Phatr3\_J43761.p1 |
| Phatr3\_J48704.p1 | Phatr3\_J15217.p1 | Phatr3\_J43823.p1 | Phatr3\_J43824.p1 |
| Phatr3\_J16683.p1 | Phatr3\_J16707.p1 | Phatr3\_J44100.p1 | Phatr3\_J44101.p1 |
| Phatr3\_J23924.p1 | Phatr3\_J16722.p1 | Phatr3\_J44111.p1 | Phatr3\_J44112.p1 |
| Phatr3\_J54027.p1 | Phatr3\_J17766.p1 | Phatr3\_J44268.p1 | Phatr3\_J44269.p1 |
| Phatr3\_J25172.p1 | Phatr3\_J18049.p1 | Phatr3\_J44285.p1 | Phatr3\_J44286.p1 |
| Phatr3\_J44338.p1 | Phatr3\_J44339.p1 | Phatr3\_J54940.p1 | Phatr3\_J48660.p1 |
| Phatr3\_J44411.p1 | Phatr3\_J44412.p1 | Phatr3\_J48700.p1 | Phatr3\_J48701.p1 |
| Phatr3\_J44662.p1 | Phatr3\_J44663.p1 | Phatr3\_J48801.p1 | Phatr3\_J48802.p1 |
| Phatr3\_J44835.p1 | Phatr3\_J44836.p1 | Phatr3\_J48833.p1 | Phatr3\_J48834.p1 |
| Phatr3\_J44838.p1 | Phatr3\_J44839.p1 | Phatr3\_J48973.p1 | Phatr3\_J48974.p1 |
| Phatr3\_J44962.p1 | Phatr3\_J44963.p1 | Phatr3\_J49057.p1 | Phatr3\_J49058.p1 |
| Phatr3\_J44973.p1 | Phatr3\_J44974.p1 | Phatr3\_J49199.p1 | Phatr3\_J49200.p1 |
| Phatr3\_J45011.p1 | Phatr3\_J45012.p1 | Phatr3\_J49215.p1 | Phatr3\_J49216.p1 |
| Phatr3\_J45221.p1 | Phatr3\_J45222.p1 | Phatr3\_J49236.p1 | Phatr3\_J49237.p1 |
| Phatr3\_J45241.p1 | Phatr3\_J45242.p1 | Phatr3\_J49286.p1 | Phatr3\_J49287.p1 |
| Phatr3\_J45386.p1 | Phatr3\_J45387.p1 | Phatr3\_J49295.p1 | Phatr3\_J49296.p1 |
| Phatr3\_J45392.p1 | Phatr3\_J45393.p1 | Phatr3\_J49296.p1 | Phatr3\_J49297.p1 |
| Phatr3\_J45402.p1 | Phatr3\_J45403.p1 | Phatr3\_J49566.p1 | Phatr3\_J49567.p1 |
| Phatr3\_J45465.p1 | Phatr3\_J45466.p1 | Phatr3\_J49596.p1 | Phatr3\_J55070.p1 |
| Phatr3\_J45559.p1 | Phatr3\_J45560.p1 | Phatr3\_J49670.p1 | Phatr3\_J49671.p1 |
| Phatr3\_J45560.p1 | Phatr3\_J45561.p1 | Phatr3\_J49728.p1 | Phatr3\_J49729.p1 |
| Phatr3\_J45622.p1 | Phatr3\_J45623.p1 | Phatr3\_J49834.p1 | Phatr3\_J49835.p1 |
| Phatr3\_J45623.p1 | Phatr3\_J45624.p1 | Phatr3\_J49890.p1 | Phatr3\_J49891.p1 |
| Phatr3\_J54465.p1 | Phatr3\_J45708.p1 | Phatr3\_J49937.p1 | Phatr3\_J49938.p1 |
| Phatr3\_J45981.p1 | Phatr3\_J45982.p1 | Phatr3\_J49944.p1 | Phatr3\_J49945.p1 |
| Phatr3\_J46109.p1 | Phatr3\_J46110.p1 | Phatr3\_J49962.p1 | Phatr3\_J49963.p1 |
| Phatr3\_J46313.p1 | Phatr3\_J46314.p1 | Phatr3\_J50038.p1 | Phatr3\_J50039.p1 |
| Phatr3\_J46314.p1 | Phatr3\_J46315.p1 | Phatr3\_J50071.p1 | Phatr3\_J50072.p1 |
| Phatr3\_J46447.p1 | Phatr3\_J46448.p1 | Phatr3\_J50107.p1 | Phatr3\_J50108.p1 |
| Phatr3\_J46457.p1 | Phatr3\_J46458.p1 | Phatr3\_J50214.p1 | Phatr3\_J50215.p1 |
| Phatr3\_J46559.p1 | Phatr3\_J46560.p1 | Phatr3\_J50304.p1 | Phatr3\_J50305.p1 |
| Phatr3\_J54602.p1 | Phatr3\_J46573.p1 | Phatr3\_J50412.p1 | Phatr3\_J50413.p1 |
| Phatr3\_J46602.p1 | Phatr3\_J46603.p1 | Phatr3\_J50416.p1 | Phatr3\_J50417.p1 |
| Phatr3\_J46710.p1 | Phatr3\_J46711.p1 | Phatr3\_J50491.p1 | Phatr3\_J50492.p1 |
| Phatr3\_J46821.p1 | Phatr3\_J46822.p1 | Phatr3\_J50530.p1 | Phatr3\_J50531.p1 |
| Phatr3\_J46889.p1 | Phatr3\_J46890.p1 | Phatr3\_J50588.p1 | Phatr3\_J50589.p1 |
| Phatr3\_J46949.p1 | Phatr3\_J46950.p1 | Phatr3\_J50618.p1 | Phatr3\_J50619.p1 |
| Phatr3\_J47052.p1 | Phatr3\_J47053.p1 | Phatr3\_J54987.p1 | Phatr3\_J52498.p1 |
| Phatr3\_J47174.p1 | Phatr3\_J47175.p1 | Phatr3\_J55197.p1 | Phatr3\_J55198.p1 |
| Phatr3\_J52200.p1 | Phatr3\_J47268.p1 | Phatr3\_J9388.p1 | Phatr3\_J9625.p1 |
| Phatr3\_J47278.p1 | Phatr3\_J47279.p1 | Phatr3\_J48378.p1 | Phatr3\_J48379.p1 |
| Phatr3\_J47280.p1 | Phatr3\_J47281.p1 | Phatr3\_J48491.p1 | Phatr3\_J48492.p1 |
| Phatr3\_J47666.p1 | Phatr3\_J47667.p1 | Phatr3\_J48494.p1 | Phatr3\_J48495.p1 |
| Phatr3\_J47872.p1 | Phatr3\_J52304.p1 | Phatr3\_J48658.p1 | Phatr3\_J54940.p1 |
| Phatr3\_J48226.p1 | Phatr3\_J48227.p1 |  |  |

Note: Totally, 255 tandem-duplicated gene pairs were observed from genome.