Supplementary Document: Identifying Emerging Phenomenon in Plant Long Temporal Phenotyping Experiments

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Table 1: Comparison of phenomenon network generated with different K_3.

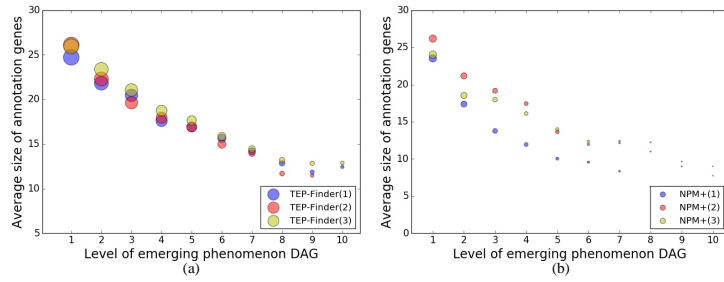| K_3	DAG depth	DAG size	Discarded nodes	Discarded leaf nodes	Ratio of leaf nodes in all discarded nodes
0.005	12	4,318	9,018	2,173	24.10%
0.010	8	1,918	12,307	2,874	23.35%
0.015	7	1,166	13,350	3,191	23.90%
0.020	7	796	13,852	3,356	24.33%
0.025	6	622	14,106	3,485	24.70%
0.030	6	486	14,276	3,556	24.91%

Figure 1: The average number of annotation genes at each level of EP-DAG generated by TEP-Finder (a) and NPM+ (b). The x-axis represents the level of EP-DAG. The y-axis represents the average size of emerging phenomena at each level, which is defined as the number of genes in an emerging phenomenon. Each method was run three times with each run marked by colors and averaged number of emerging phenomena marked by circle size.
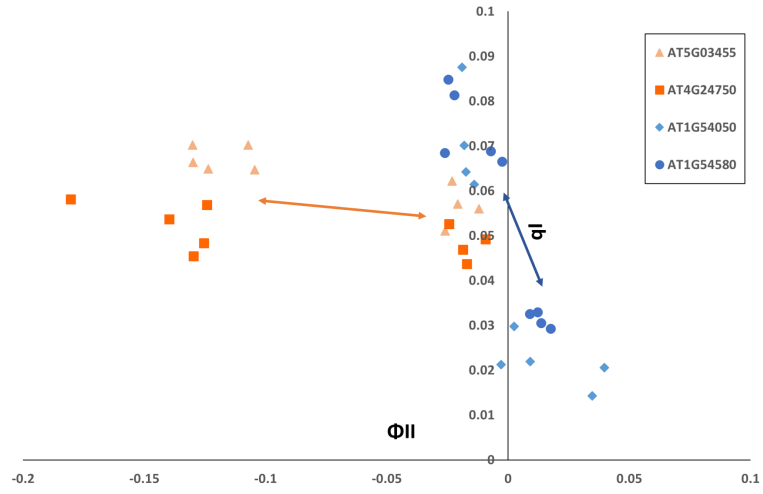
Figure 2: Two emerging phenomena found under strong fluctuating light conditions (between approximately $500 \mu mol m^{-2} s^{-1}$ (lower light) and $1000 \mu mol m^{-2} s^{-1}$ (higher light) four times repeated) have distinctively different photosynthetic phenotypes. Only two selected genotypes are shown for each group. In the first emerging phenomenon (orange), plants have constantly high photoinhibition yet the PS II activity varied from normal to low with the change of light, indicating they are under stress. In the second one (blue), plants varied from high photoinhibition to low with less decrease of PS II activity, indicating they are well accommodated with the rapid changes of light.