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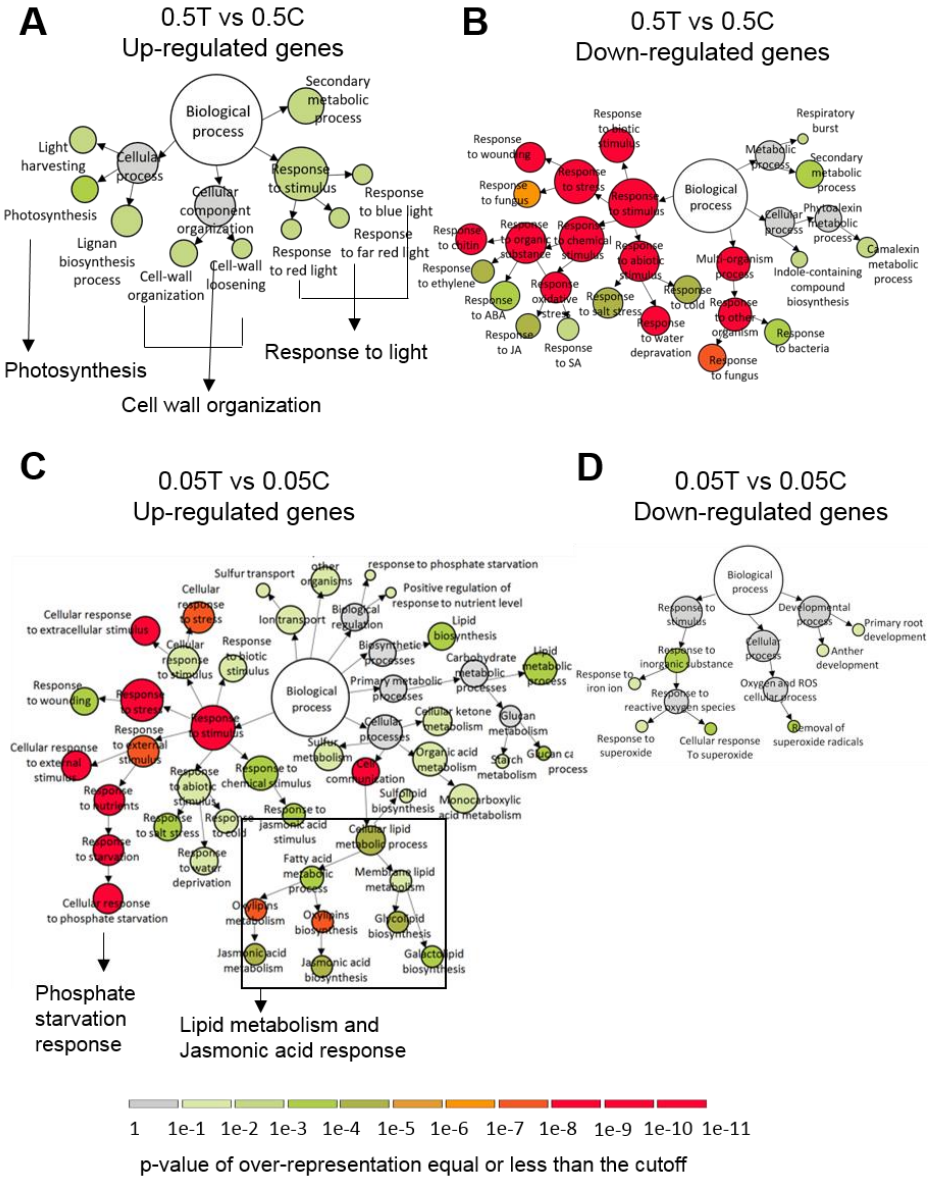
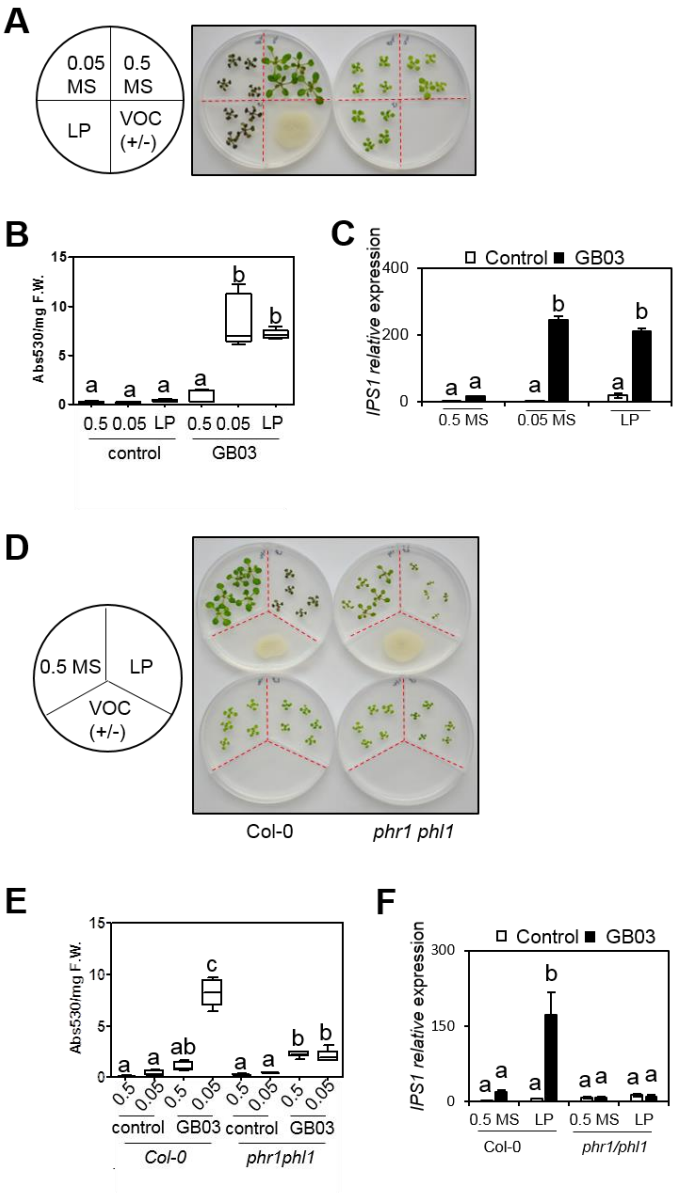


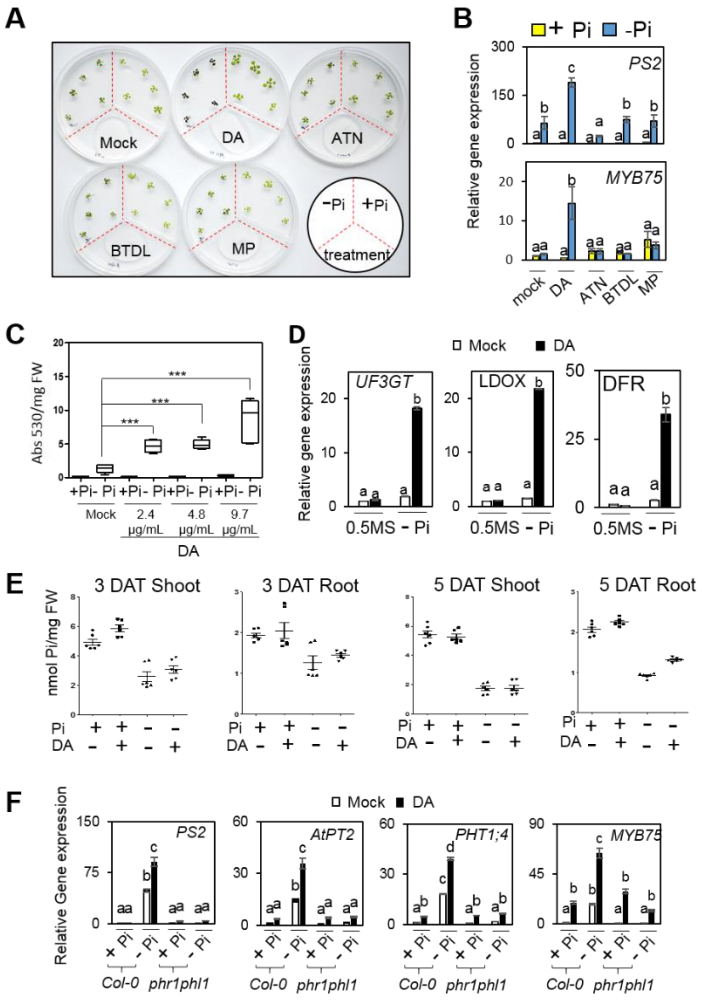
Appendix Figure S1. Phosphate availability determines *Arabidopsis* responses to GMVs (Related to Figure 1)

[A] GO analysis of GMV-induced genes in Arabidopsis grown in 0.5 MS medium. **[B]** GO analysis of GMV-repressed genes in Arabidopsis grown in 0.5 MS medium. [C] GO analysis of GMV-induced genes in Arabidopsis grown in 0.05 MS medium. **[D]** GO analysis of GMV-repressed genes in Arabidopsis grown in 0.5 MS medium. Diagrams are designed based on *VirtualPlant* platform. The size of circles represents the number of genes in each GO category. Scale color bar indicates the p-value cut-off of over-representation equal or less than the cutoff for each GO category. Darker color indicates higher possibility of each GO category. DEGs list for key terms are provided in Table EV4.



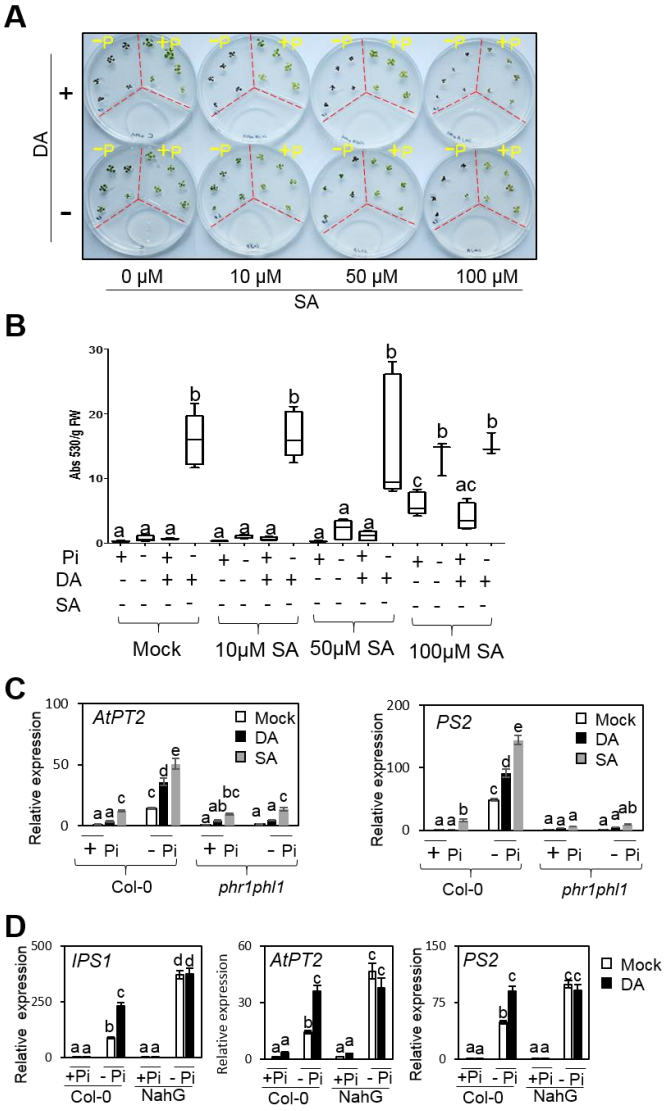
Appendix Figure S2. The PSR system in Arabidopsis is crucial for the opposed plant responses to GMVs (Related to Figure 2)

[A] Plant Pi deficiency alone (LP) is sufficient to disclose pathogenicity caused by GMVs. Images show 10 DAT plants. **[B], [C]** GMVs caused anthocyanin hyper accumulation (**B**) and IPS1 gene hyper induction (**C**) in plants with Pi deficiency. **[D]** Images of 10 DAT plants, the *phr1phl1* mutant and wild type (*Col-0*) *Arabidopsis*, grown under different conditions. **[E], [F]** Compared to the wild type plants, the *phr1phl1* mutant showed substantially decreased hyper PSR, as shown by anthocyanin (**E**) and IPS1 gene expression (**F**) levels. Anthocyanin measurements and gene expression analyses were performed by using 10 and 5 DAT plants, respectively. The boxplots show representative data from three independent experiments. qPCR results show values of means ± SE of three biological replicates. Different letters denote significantly different means at $p < 0.05$, Tukey's multiple comparison test.



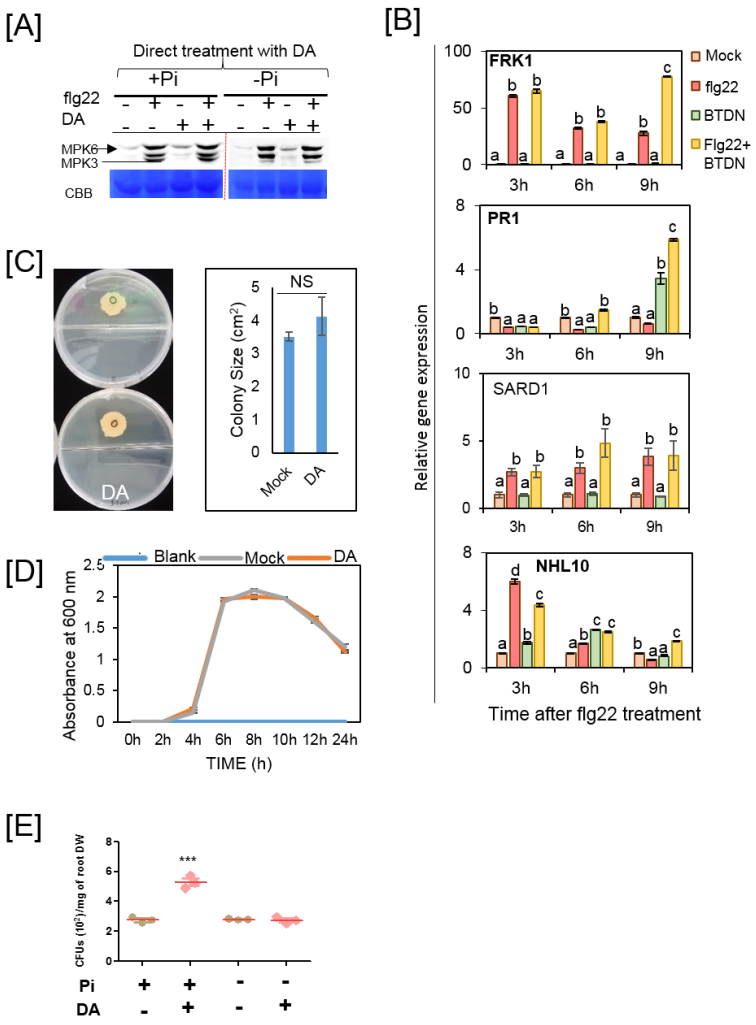
Appendix Figure S3. DA induces plant hyper sensitivity to Pi deficiency (Related to Figure 3)

[A] Images of Arabidopsis plants exposed to four individual GMV components, including diacetyl (DA), 2,3-butanediol (BTDL), 2-methyl-1-propanol (MP) and acetoin (ATN). The compounds were applied at dosages that, when the compounds totally evaporate from the agar-containing solid droplets, would yield in volatile concentrations of 9.7 µg (DA), 32.5 µg (BTDL), 7.9 µg (MP) and 28.5 µg (ATN) per mL free space in the petri dish, which resembled the 1 : 3.3 : 0.8 : 2.9 ratio among the four GMV components in natural GMVs (Farag et al., 2006). **[B]** Hyper induction of PS2 and MYB75 was specifically observed in Pi-deficient plants with exposure to DA. Bar indicates means ± SE of two biological replicates. **[C]** Anthocyanin accumulation levels in plants exposed to different dosages of DA. Asterisks denote significantly different means at $p < 0.0001$, student t-test. **[D]** DA strongly induced the expression of Arabidopsis genes involved in anthocyanin biosynthesis. Bar indicates mean ± SE (n=3), two biological replicates were analyzed with similar results. **[E]** Measurements of soluble Pi contents in Arabidopsis plants grown with or without DA exposure. The boxplots show representative data from two independent experiments. **[F]** Compared to the wild type plants, *phr1phl1* showed substantially decreased PSR gene hyper induction that was triggered by DA. Bar indicates mean ± SE (n=3), two biological replicates were analyzed with similar results. The boxplots show representative data from three independent experiments. Different letters denote significantly different means at $p < 0.05$, Tukey's multiple comparison test.



Appendix Figure S4. Exogenous SA mimics DA in triggering plant hyper sensitivity to Pi deficiency (Related to Figure 4)

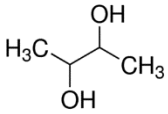
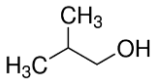
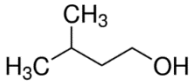
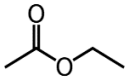
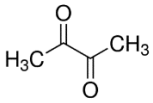
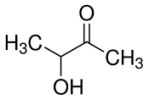
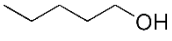
[A] Images of plants treated with different dosages of SA in the plant growth medium. **[B]** Quantification of anthocyanin accumulation levels in plants treated with different dosages of SA. **[C]** Exogenous application of SA mimics DA-induced *AtPT2* and *PS2* gene induction patterns in Pi-deficient plants. **[D]** Quantification of *IPS1*, *AtPT2*, and *PS2* gene expression levels in *NahG* plants. The boxplots show representative data from three independent experiments. qPCR results show values of means ± SE (n=3), two biological replicates were analyzed with similar results. Different letters denote significantly different means at $p < 0.05$, Tukey's multiple comparison test.



Appendix Figure S5. DA suppresses plant ROS burst but not PTI gene expression in response to flg22 (Related to Figure 5)

[A] flg22-induced MPK3/MPK6 phosphorylation in *Arabidopsis* is not decreased by DA. Kinase assays were performed at 5 min after flg22 treatment. Three independent experiments were performed and similar results were observed. **[B]** Expression patterns of several flg22-induced PTI-responsive genes in the presence or absence of DA treatments. qPCR results show values of means ± SE of three biological replicates. Different letters denote significantly different means at $p < 0.05$, Tukey's multiple comparison test within each group of the same DAT. [C] DA has no effect on GB03 bacterial colony size, graph shows means±SE (n=3) of three colony sizes, three independent experiments showed similar results. Statistical analysis was done at $p < 0.05$, student t-test. [D] DA has no effect on GB03 growth pattern, graph shows means± SE (n=3) of replicates, three independent experiments showed similar results. [E] DA is unable to induce higher root colonization by GB03 in wild type Arabidopsis (*Col-0*) grown on P-deficient medium. Asterix denotes significantly different means at $p < 0.05$ compared with *Col-0* without DA treatment, data shows mean±SE (n=3), three biological replicates, student t-test. Three independent experiments were analyzed with similar results.

Appendix Table S1 Individual components tested for GMV-induced plant hyper PSR

	Name	Chemical structure	Different concentrations tested	
			In medium	By emission only
1.	2,3-Butanediol		100,200, 250 µM	9.7 and 32.5 µg/ml free space of 9 cm petri dish
2.	1-Propanol-2-Methyl		100,200, 250 µM	7.9 and 9.7 µg/ml free space of 9 cm petri dish
3.	3-Methlybutanal		100,200, 250 µM	Not performed
4.	Ethyl acetate		100, 250, 500 µM	Not performed
5.	2,3-Butanedione		200 µM	2.4, 4.8 and 9.7 µg/ml free space of 9 cm petri dish
6.	Acetoin		100,200, 250 µM	9.7 and 28.5 µg/ml free space of 9 cm petri dish
7.	1-Pentanol		10, 20, 50 mM	Not performed

AppendixFigS3 reference:

Farag MA, Ryu CM, Sumner LW, Paré PW (2006) GC-MS SPME profiling of rhizobacterial volatiles reveals prospective inducers of growth promotion and induced systemic resistance in plants. *Phytochemistry* 67: 2262-2268