Supplementary Table 2. Genes for expression level detection in Col and *PGX2AT* seedlings.

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| --- | --- | --- | --- |
| **Name** | **Gene** | **Description** | **Reference** |
| **phosphate deficiency response** | | | |
| *WRKY 75* | At5g13080 | a transcription factor of phosphate acquisition and root development | (Devaiah et al., 2007; Rishmawi et al., 2014) |
| *PDR2* | At5g23630 | a single P5-type ATPase required for SCN and RAM maintenance in Pi-deprived roots | (Muller et al., 2015) |
| *LPR1* | *At1g23010* | a multicopper oxidase required for SCN and RAM maintenance in Pi-deprived roots | (Muller et al., 2015) |
| **root hair development** | | | |
| *RHD6* | At1g66470 | required for early stages of trichoblast development | (Moro et al., 2017) |
| *ROP2* | At1g20090 | activated by auxin, a positive regulator of root hair initiation and tip growth | (Kang et al., 2017) |
| *RSL2* | At4g33880 | crucial for hair morphogenesis, responsive to P deficiency | (Bhosale et al., 2018) |
| *RHD1* | At1g64440 | necessary for proper initiation of root hairs | (Schiefelbein and Somerville, 1990) |
| *TIP1* | At5g20350 | play a key role in growth polarity, mutants exhibit root hairs with multiple initiations and with branches. | (Zhang et al., 2015; Chai et al., 2016) |
| **auxin transport and signaling** | | | |
| *AUX1* | At2g38120 | auxin transport | (Qin and Huang, 2018) |
| *PIN3* | At1g70940 | Auxin efflux carrier family protein | (Sasayama et al., 2013) |
| *PIN1* | At1g73590 | Auxin efflux carrier family protein | (Sasayama et al., 2013) |
| *PIN2* | At5g57090 | Auxin efflux carrier family protein | (Rigo et al., 2013) |
| *ERU* | At5g61350 | regulate cell wall composition in root hairs and modulates pectin dynamics through negative controlling pectin methylesterase (PME) activity | (Schoenaers et al., 2018) |
| *DAO1* | At1g14130 | up-regulated by P deficiency | (Bhosale et al., 2018) |
| *ARF7* | At5g20730 | a transcription factor of root hair growth | (Schoenaers et al., 2018) |
| *ARF19* | At1g19220 | a transcription factor of root hair growth | (Schoenaers et al., 2018) |
| **cell wall integrity signaling** | | | |
| *THE1* | At5g54380 | a key signaling element mediating CWD | (Engelsdorf et al., 2018) |
| *MSL3* | At1g58200 | mechanosensitive, activation of CWD-induced responses | (Engelsdorf et al., 2018) |
| *FER* | At3g51550 | CWD perception, required during root hair development | (Engelsdorf et al., 2019) |

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