|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Substance application** | **Applied concentration** | **Affected gene/pathway or protein/enzyme activity** | **Species** | **Reference** | **Action or mitigation effect** |
| Urea | 50 µM | ADC1/2, SPMS, SPDMS(up) | Cotton, | Liu et al., 2021 | NH4+ toxicity |
| Urea | 50–100 µM | N/A | Arabidopsis, Tobacco, Rice | Ke et al., 2020 | NH4+ toxicity |
| Spd | 0.5 mM | ADC | Rice | Jiang et al., 2020 | Aluminum toxicity |
| Spd | 0.1 mM | ROS scavenging enzymes | Cucumber | Kubiś, 2007 | Water stress |
| Put | 1 mM | ADC1/2 | Tomato | Ding et al., 2021 | Cold stress |
| Silicon | Sodium silicate fertigation  250 mL per pot (1.67 mM) | PAO, DAO (down) | Cucumber | Szegó et al., 2021 | Oxidative stress |
| Put orSpd | 0.75 mM | N/A | Beet, Tegetes | Bais et al., 2000 | Growth & metabolic change |
| Spd | 1 mM | N/A | Rice | Saleethong et al., 2013 | Salt stress |
| Spd | N/A | N/A | *Citrus sinensis* | Saleem et al., 2008 | Enhance growth |
| PAs | N/A | N/A | *Nepeta cataria* | Yang et al., 2010 | Enhance growth |
| Spd or Spm | 0.5 mM | SOD, CAT | *Rosa deamascena* | Hassan et al., 2018 | Drought stress |
| Spd | 1 mM | SOD, CAT, POD | *Calendula officinalis* | Baniasadi et al., 2018 | Salt stress |
| Spd or Spm | 1 mM | SOD, CAT, POD | Wheat | Guo et al., 2020 | Heat stress |
| PAs |  |  |  | Hasanuzzaman et al., 2019 | Metal stress |
| Spm | 0.01–5 mM | N/A | In 20 species | Reviewed by Hasan et al., 2021 | Drought stress |
| Put | 1 mM | ODC | Strawberry | Tarenghi and Martin-Tanguy, 1995 | Floral development |
| Zeatin | 20 µM | ADC, SPDS, SAMDC, DHS (Deoxyhypusine synthase) | Wheat | Alharby et al., 2020 | Salinity and drought stress |
| Spm | 100 ppm | N/A | Canola | Orabi et al., 2020 | Salinity stress |
| Put/Spd/Spm | 10–1000µM | ROS | *Pyrus communis* | Aloisi et al., 2015 | Pollen tube elongation |

**Supplementary Table 1.**PA directly or indirectly mediates a tolerance-enhancement in different plant species

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