

# プロヒドロジャスモンの小松菜の成長に対する作用メカニズム



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## ■ はじめに

Prohydrojasmon (PDJ) is a plant growth regulator analogous to jasmonic acid (JA) that has been used to regulate various aspects of growth and development in plants. Our previous study has revealed that application of PDJ induced total phenolic and anthocyanin content in komatsuna (Azis et al., 2019). However, as a stress-related hormone PDJ also possesses inhibitory effect on plant growth (Azis et al., 2020). How far this effect and how the mechanism of action behind it remain unclear. In this study, PDJ effect on the growth of komatsuna and their possible mechanism action was investigated.

## ■ 活動内容

### 1. Experimental section

Komatsuna was grown in growth chamber at 23 °C and 60% relative humidity with a 14 h light/10 h dark photoperiod. After two weeks, komatsuna was treated with PDJ at 200–1000 ppm and their growth parameters was evaluated. Gene expression analysis was performed to find out the possible mechanism action of PDJ on the growth of komatsuna. Komatsuna was grown at similar conditions and was treated with PDJ at 200 and 1000 ppm. Total RNA of komatsuna leaves were extracted and small scale library was prepared. RNA-seq data was generated and further analyzed.

### 2. Findings

#### 2.1 PDJ at high concentration inhibit growth of komatsuna

PDJ did not show significant change in growth parameter of aerial part of komatsuna in all concentration. However, PDJ at higher concentration showed growth reduction tendency, particularly PDJ spray at 1000 ppm caused wilting leaves in komatsuna which may indicate senescence. PDJ at 600 and 1000 ppm also significantly reduced the length and weight of root (Figure 1).

#### 2.2 PDJ altered gene expression involved in senescence

Gene expression analysis revealed that PDJ at 1000 ppm induced a significant change in the expression of several genes linked to senescence (Figure 2). Some genes from chlorophyll cluster genes (*ATPB*, *LHCBs*, *CHL*, *HCFP244*) were found to be downregulated in leaves treated with PDJ. Subsequently, increase expression of some senescence-associated genes (*SAGs*) was also observed. Additionally,

PDJ also upregulated some pathogen-related genes (*MLOs*) attributable to the premature leaf senescence. Furthermore, nutrient recycle and cell-loosening related genes (*BCAT4* and *EXPA8*) also upregulated by PDJ which also linked to the senescence cascade.

### 3. Conclusion

Conclusively, PDJ at lower concentrations did not cause inhibitory effect to the growth of komatsuna. However, at higher concentrations, PDJ started to show significant inhibitory effect indicated by wilting leaves. This inhibitory effect can be explained by the change expression of some genes involved in multiple senescence mechanisms.

## ■ 関連情報等(特許関係、施設)

1. Azis et al., 2019. Biosci, Biotech, & Biochem 84: 178-186.
2. Azis et al., 2020. Plants (Basel) 9: 1368

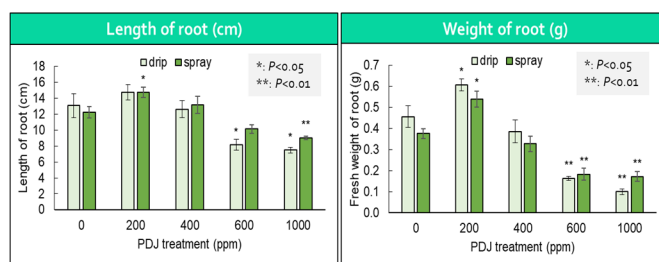


Figure 1. length of root (left) and weight of root (right)

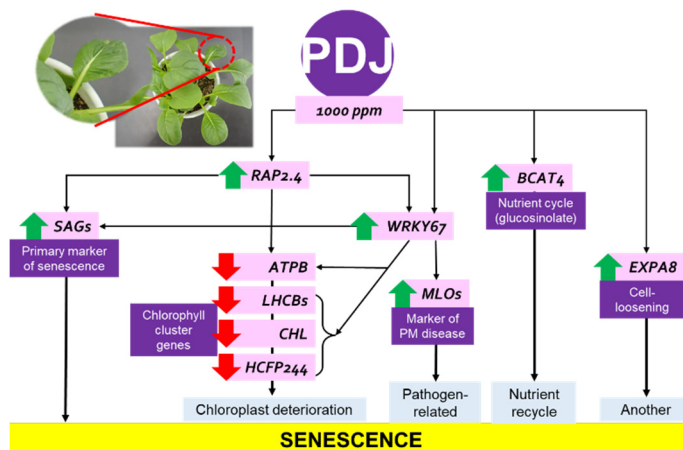


Figure 2. Mechanism action of PDJ on growth of komatsuna

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