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Overexpression of *ONAC016* promotes leaf senescence and improves drought stress through ABA signaling pathway

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[Introduction]

Plant-specific NAC transcription factors are involved in diverse plant processes, including plant developmental programs, cell division, leaf senescence, formation of secondary walls, and biotic/abiotic stress response. While regulatory mechanisms of *Arabidopsis* NAC TFs for leaf senescence have been well-known, in other species, especially in rice, few rice NAC TFs have been associated with leaf senescence. Here, we found that null mutation of *ONAC016* showed delayed leaf senescence in dark-incubated conditions and increased susceptibility to drought stress. However, *onac016-D* dominant mutants, in which transcripts levels of *ONAC016* increased, accelerated leaf senescence and improved the tolerance to drought stress compared with wild-type.

[Materials and Methods]

The parental *japonica* cultivar 'Dongjin', *onac016* mutant plants and *onac016-D* plants were grown in a growth chamber under LD conditions (14h light perday). The *onac016* mutant and *onac016-D* seeds were obtained from the Crop Biotech Institutue at Kyung Hee University, Korea (Jeon *et al*., 2000, Jeong *et al*., 2002).

[Results and Discussions]

The results of RT-qPCR showed that expression of *ONAC016* gradually increased in response to leaf senescence and treatment with abscisic acid (ABA). *onac016* mutants showed reduced sensitivity to ABA-induced senescence by exogenously application of ABA to detached rice leaves. *ONAC016* act as positive regulator of leaf senescence by controlling several chlorophyll degradation, such as *SGR*, *NYC1* and *RCCR1*. Moreover, deficiency of *ONAC016* left the stomatal status to open under ABA treatment. These results suggest that *ONAC016* plays an important role in leaf senescence and drought stress tolerance via the ABA signaling pathway.

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