NAC gene in oat

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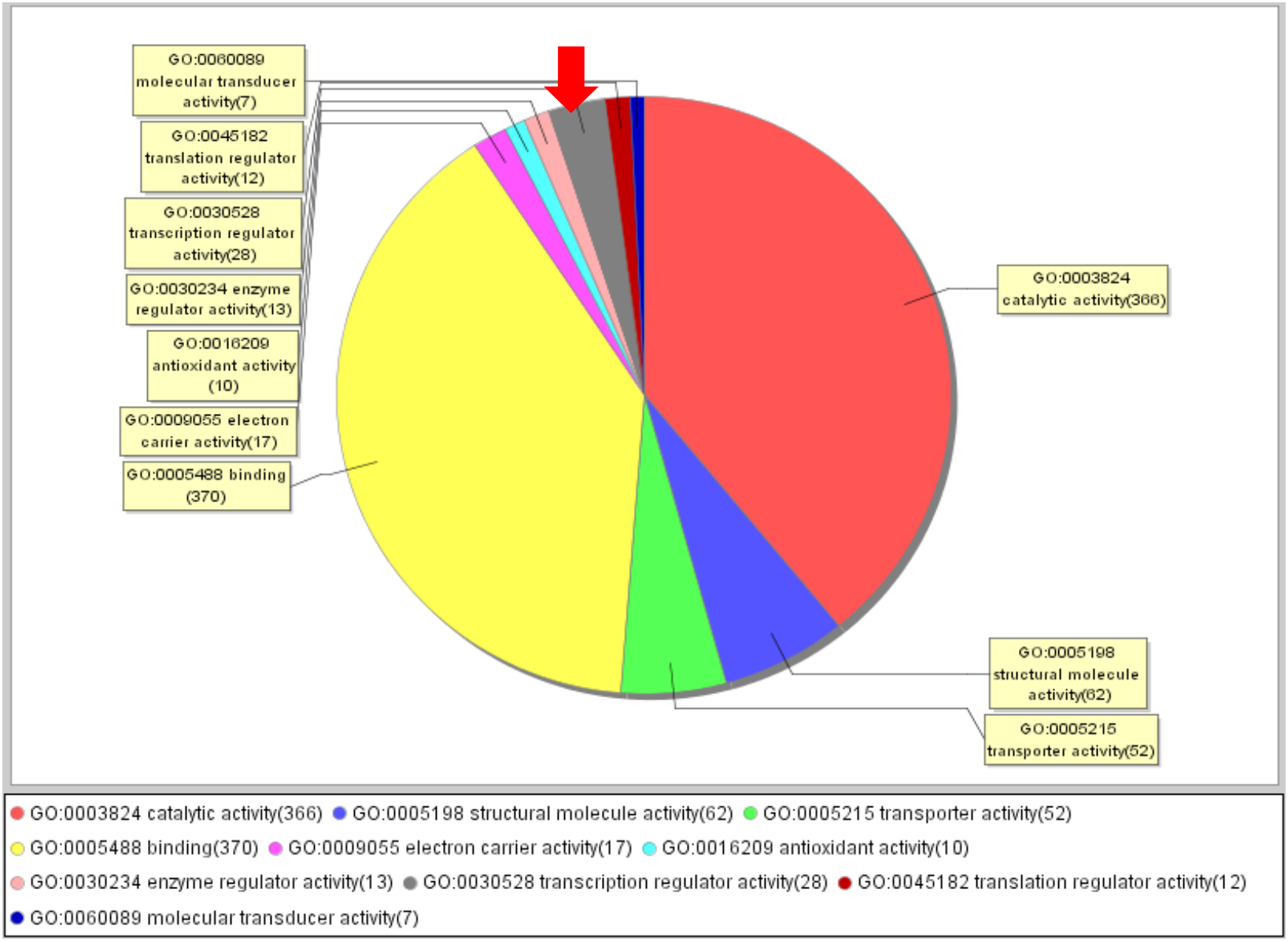
Background

- Oats are mainly distributed in arid and semi-arid areas in northwest China. Drought and salinity are major limiting factor to improve the yield of oats.
- With the increasing effect of biotic and abiotic stresses on crop yield, Breeding for stress resistance has become a new target for improving production. The transgenic provides a new technology for breeding for stress resistance.
- Our research focus on Drought-resistant and salt-tolerant in oats

NAC gene in oat



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Gene	Description
PHB	homeobox-leucine zipper protein ATHB-14[Arabidopsis thaliana]
HB-7	homeobox-leucine zipper protein ATHB-7[Arabidopsis thaliana]
TFIIIA	transcription factor IIIA[Arabidopsis thaliana]
CZF1	zinc finger CCCH domain-containing protein 29[Arabidopsis thalia
VOZ1	vascular plant one zinc finger protein[Arabidopsis thaliana]
IAA16	auxin-responsive protein IAA16[Arabidopsis thaliana]
IAA7	auxin-responsive protein IAA7[Arabidopsis thaliana]
ABI3	B3 domain-containing transcription factor ABI3[Arabidopsis thalia
WRKY19	putative WRKY transcription factor 19[Arabidopsis thaliana]
NAC073	NAC domain containing protein 73[Arabidopsis thaliana]
CUC2	protein CUP-SHAPED COTYLEDON 2[Arabidopsis thaliana]
TLP10	tubby-like F-box protein 10[Arabidopsis thaliana]
AGL12	agamous-like MADS-box protein AGL12[Arabidopsis thaliana]
RPL	BEL1-like homeodomain protein 9[Arabidopsis thaliana]
PAT1	scarecrow-like transcription factor PAT1[Arabidopsis thaliana]
TOC1	two-component response regulator-like APRR1[Arabidopsis thalia

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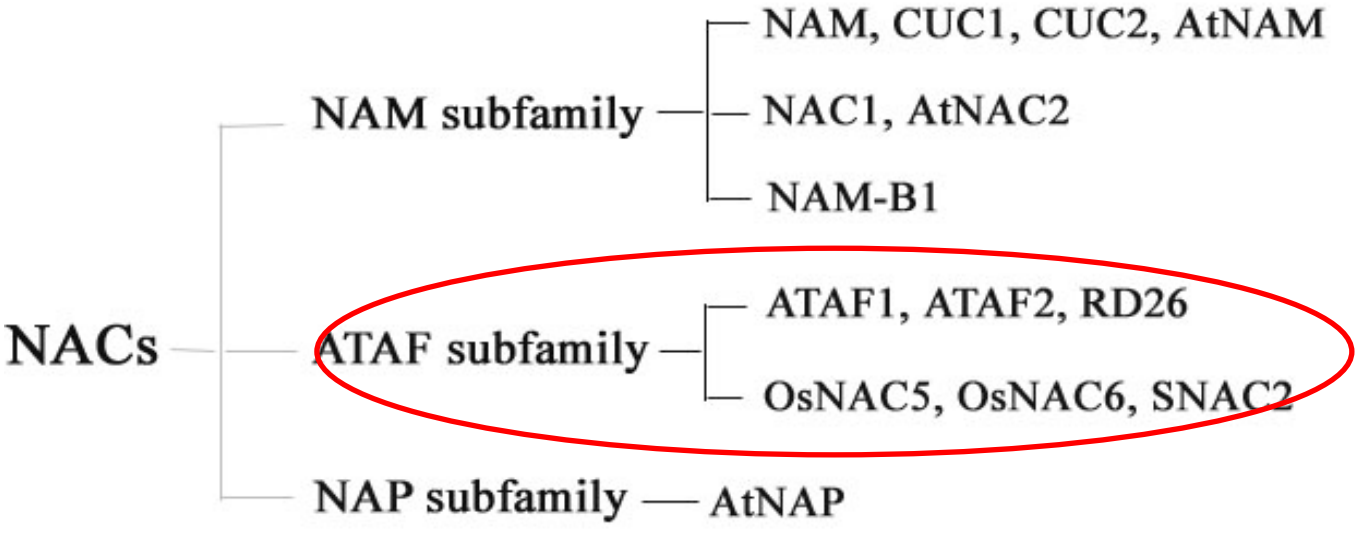
- NAC transcription factors are plant-specific which play an important role in development and plant responses to biotic and abiotic stresses.



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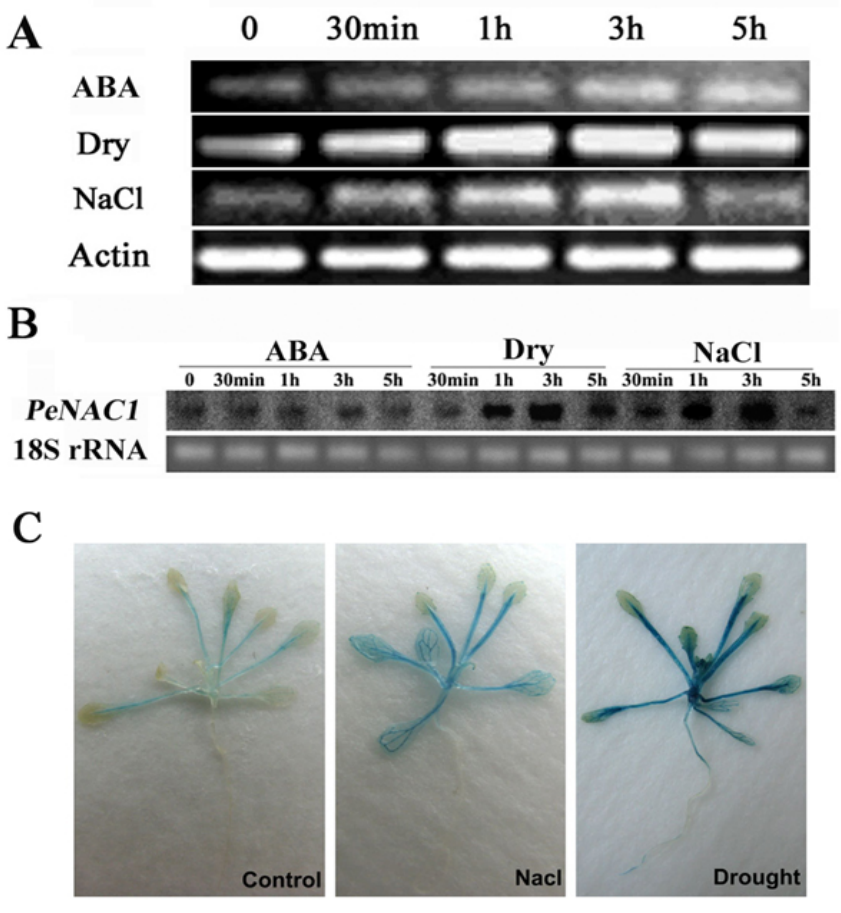
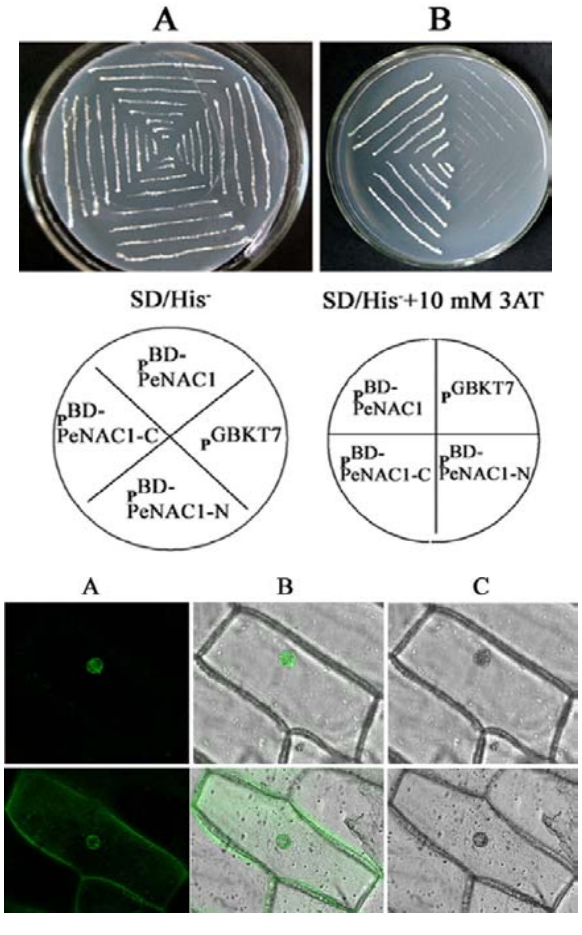
NAC gene analysis in *Populus euphratica*





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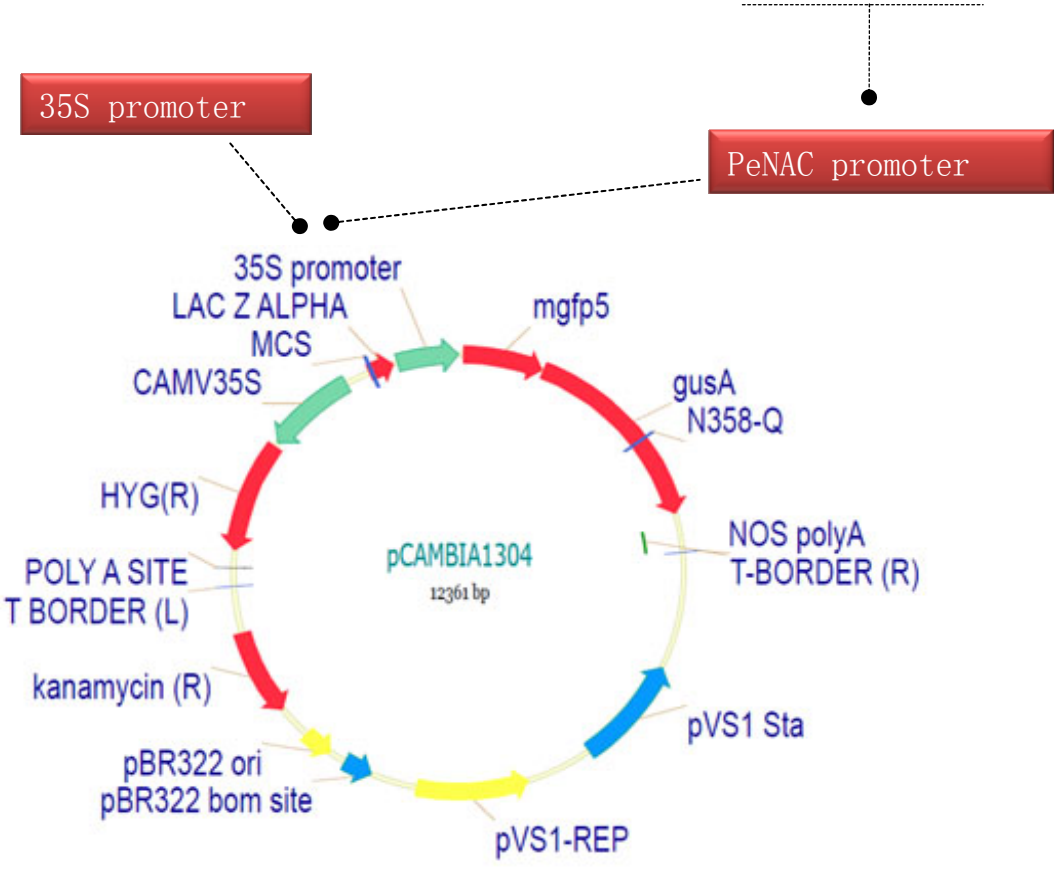
Different vectors can affect the transformation efficiency of genes

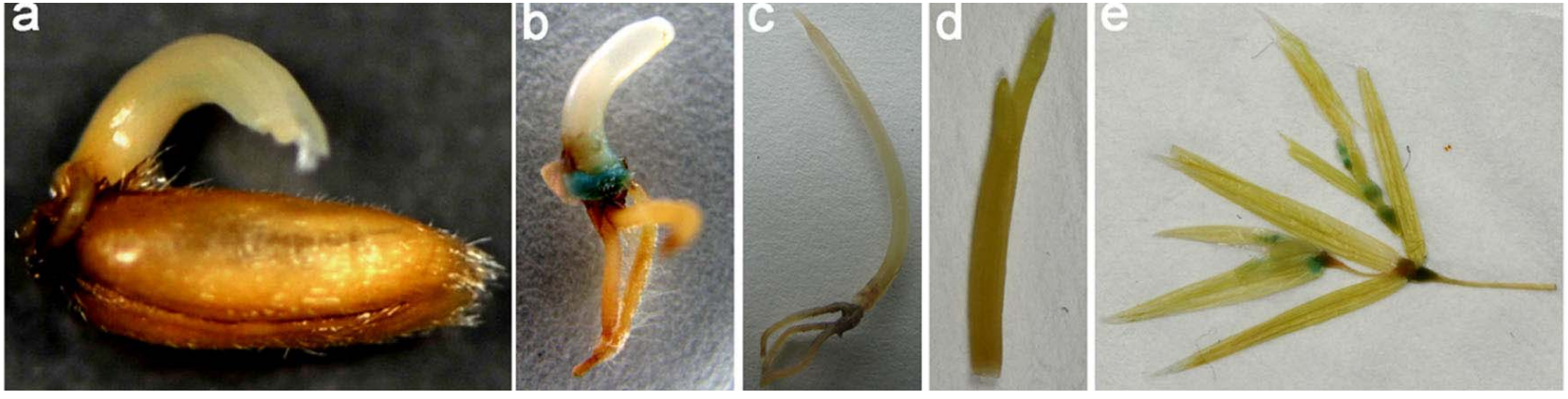


pCAMBIA-1304

Table Production of transgenic oats

Plasmide content (ng/μl)	Harvested seeds	Tansgenic lines	Transformation rate (%)
15.0	47	4	8.51
7.5	336	33	9.82
5.0	297	18	6.06
3.75	45	2	4.4
3.0	81	3	3.70
2.5	76	2	2.63
2.143	54	0	0
1.875	103	2	1.94
1.5	586	11	1.88
Total	1625	75	

GUS activity assay in transgenic oat



a. Cotyledon
b. Stem
c. Leaves
d. axillary bud
e. floral organs and seeds

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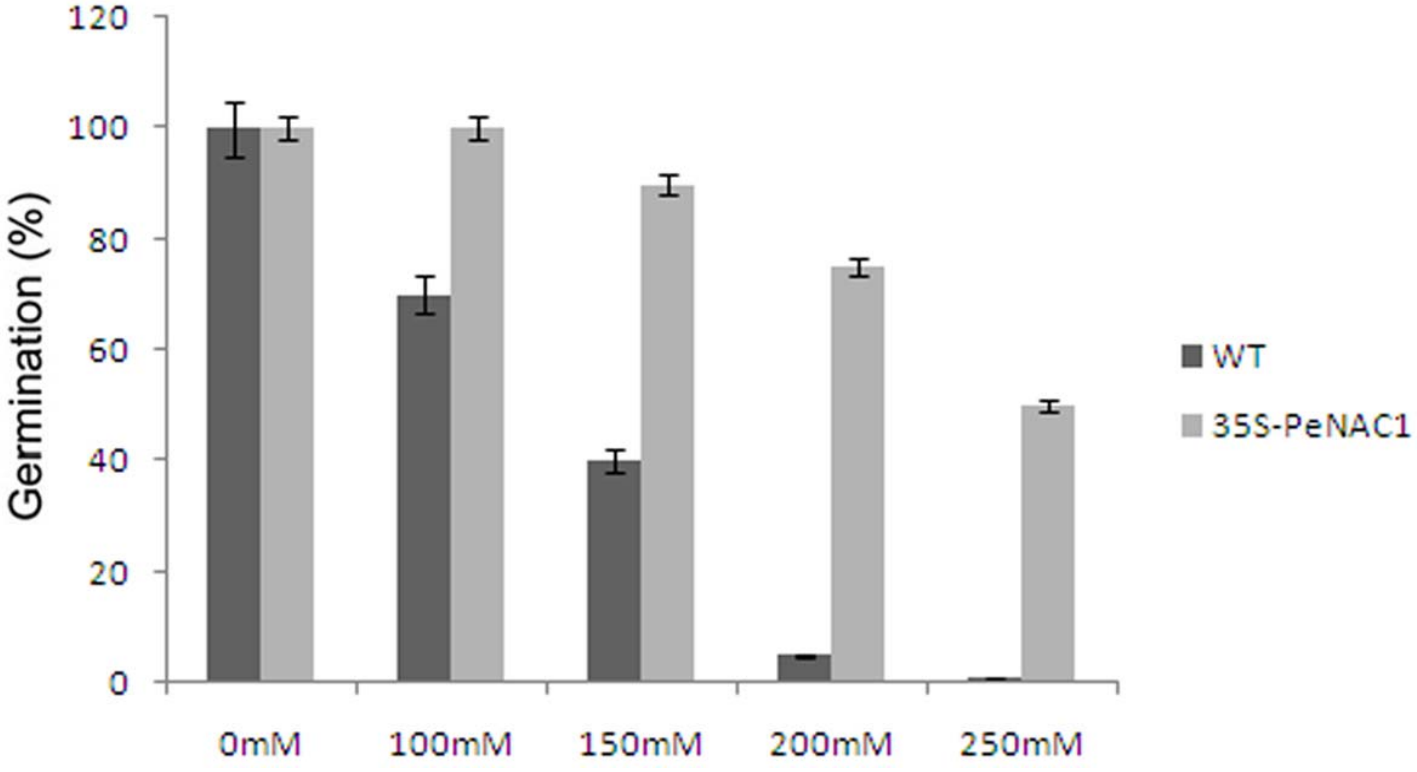
Germination rates of Wild type (WT) and transgenic oats



T3 generation transgenic oats on 1/2 Murashige Skoog (1/2MS) culture media plus 0mM, 100mM, 150mM, 200mM and 250mM NaCl respectively

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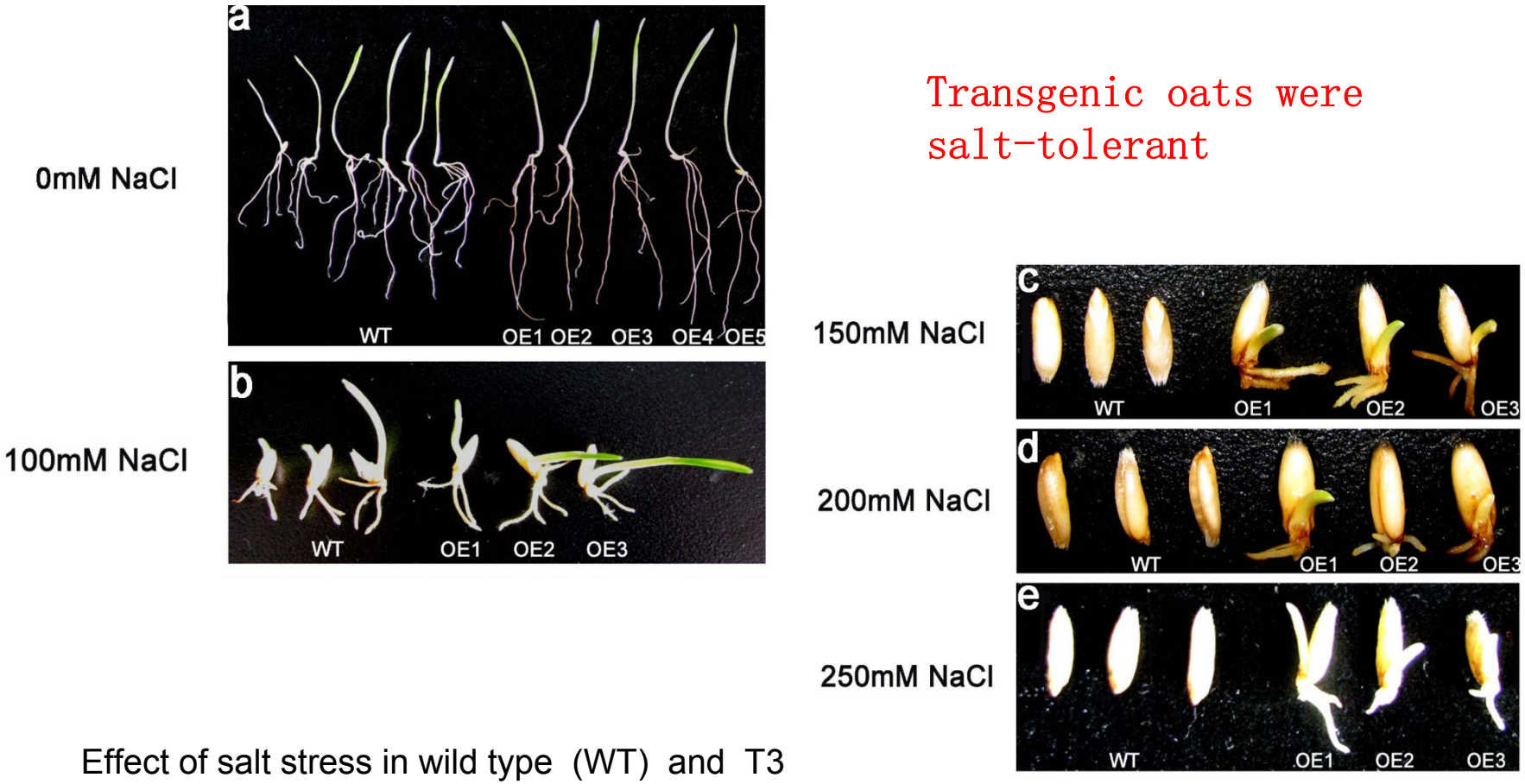
Transgenic oats were salt-tolerant



Effect of salt stress in wild type (WT) and T3 transgenic oat lines of overexpressing *PeNAC1*

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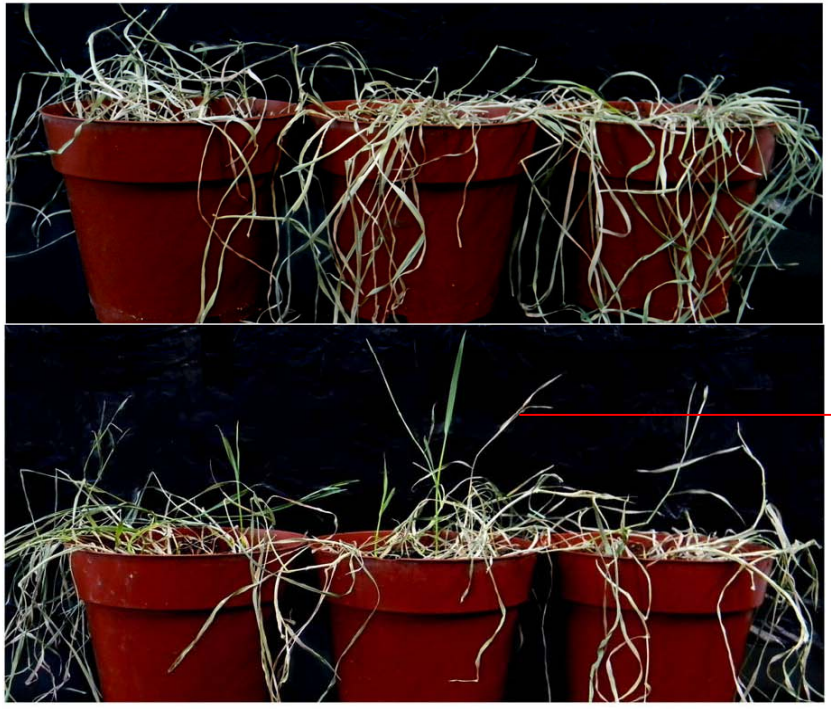
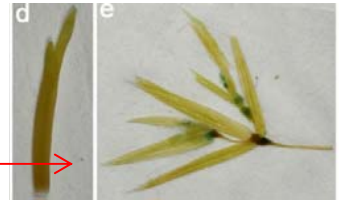
Effect of salt stress in wild type (WT) and T1 transgenic oat lines of overexpressing *PeNAC1*

WT

Transgenic lines





WT and transgenic oats grew under normal growth conditions for one month, thereafter were watered with an equal volume of 250 mM NaCl solution every five days.

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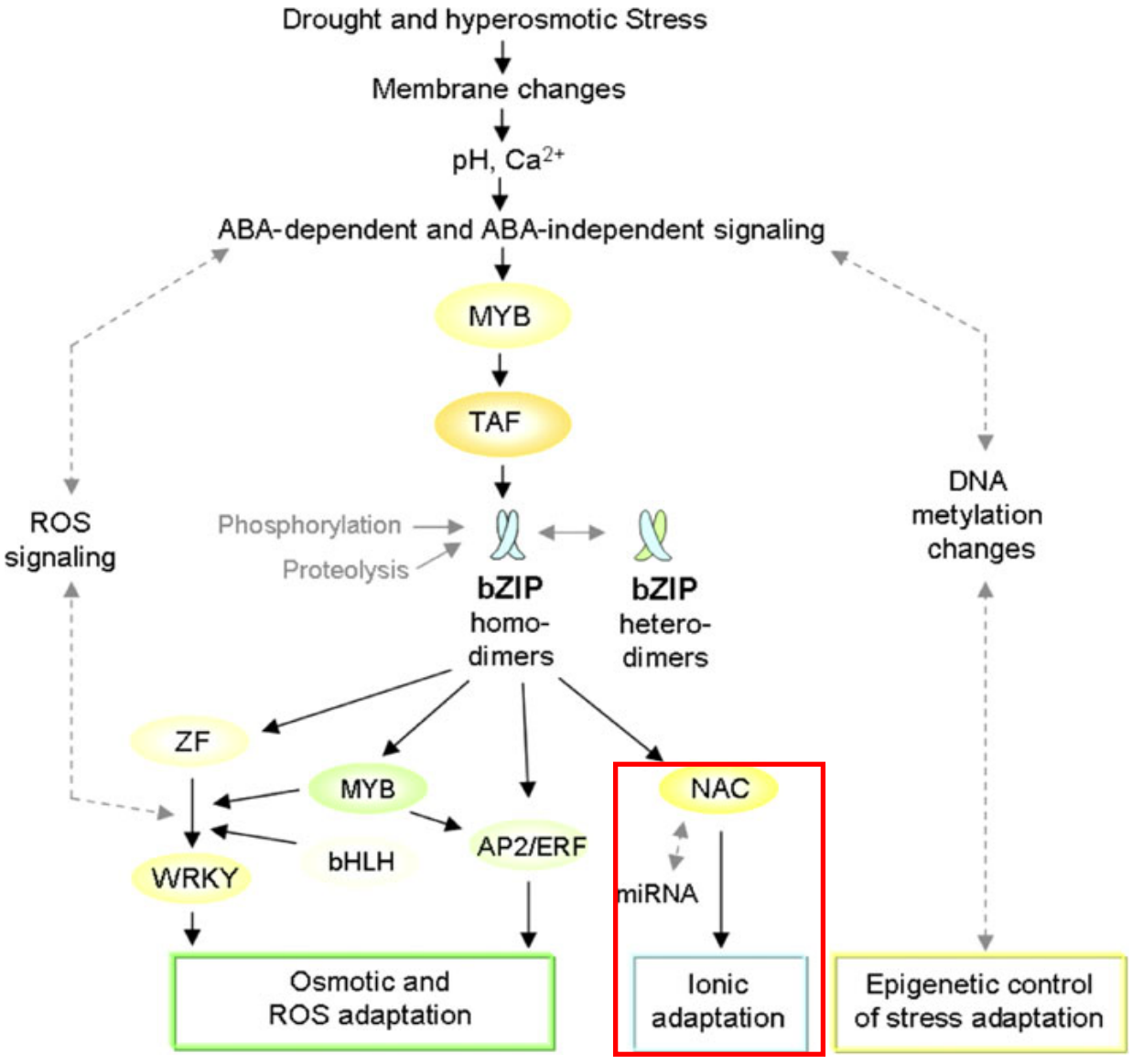
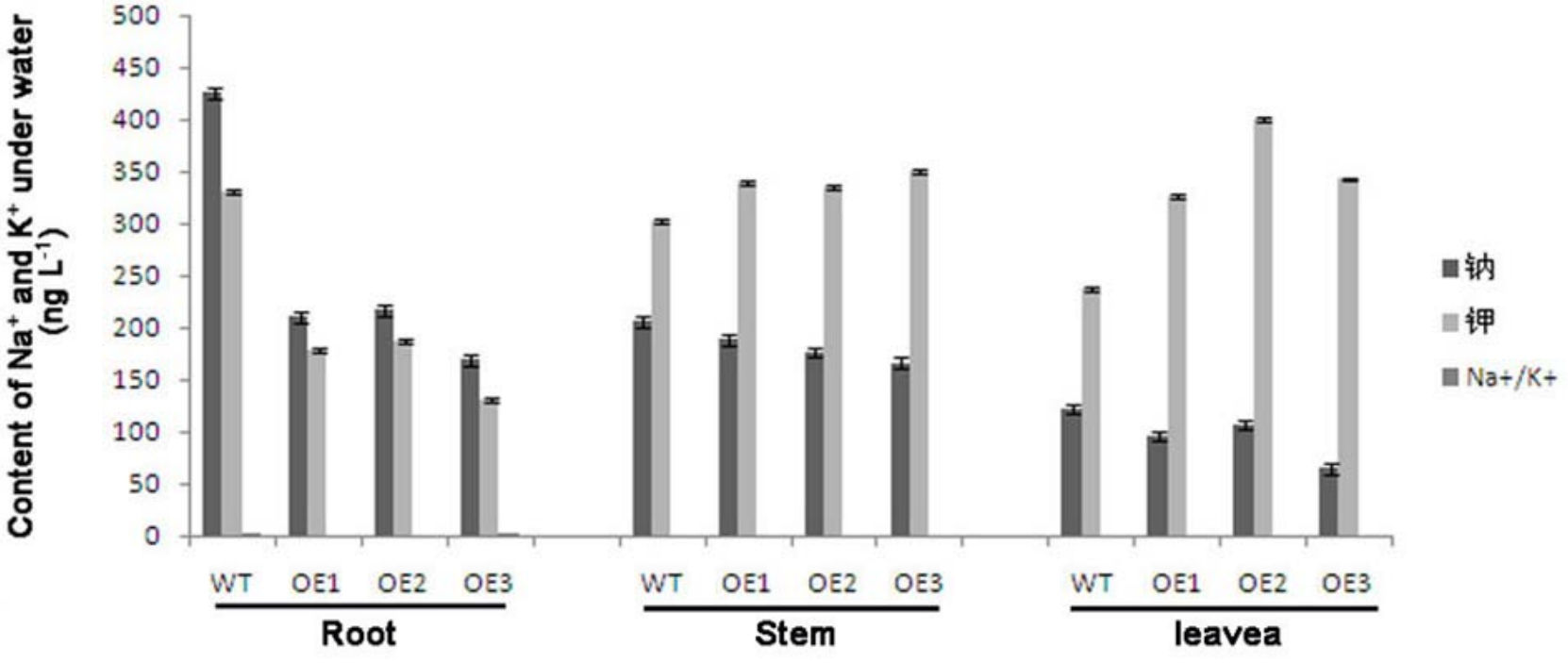


stress regulating transcription factors and their functional significance in the cellular transcriptional network

Golldack D *et al*,2011

NAC gene in oat

Determine the content of Na^+ and K^+ in oats by ICP-MS



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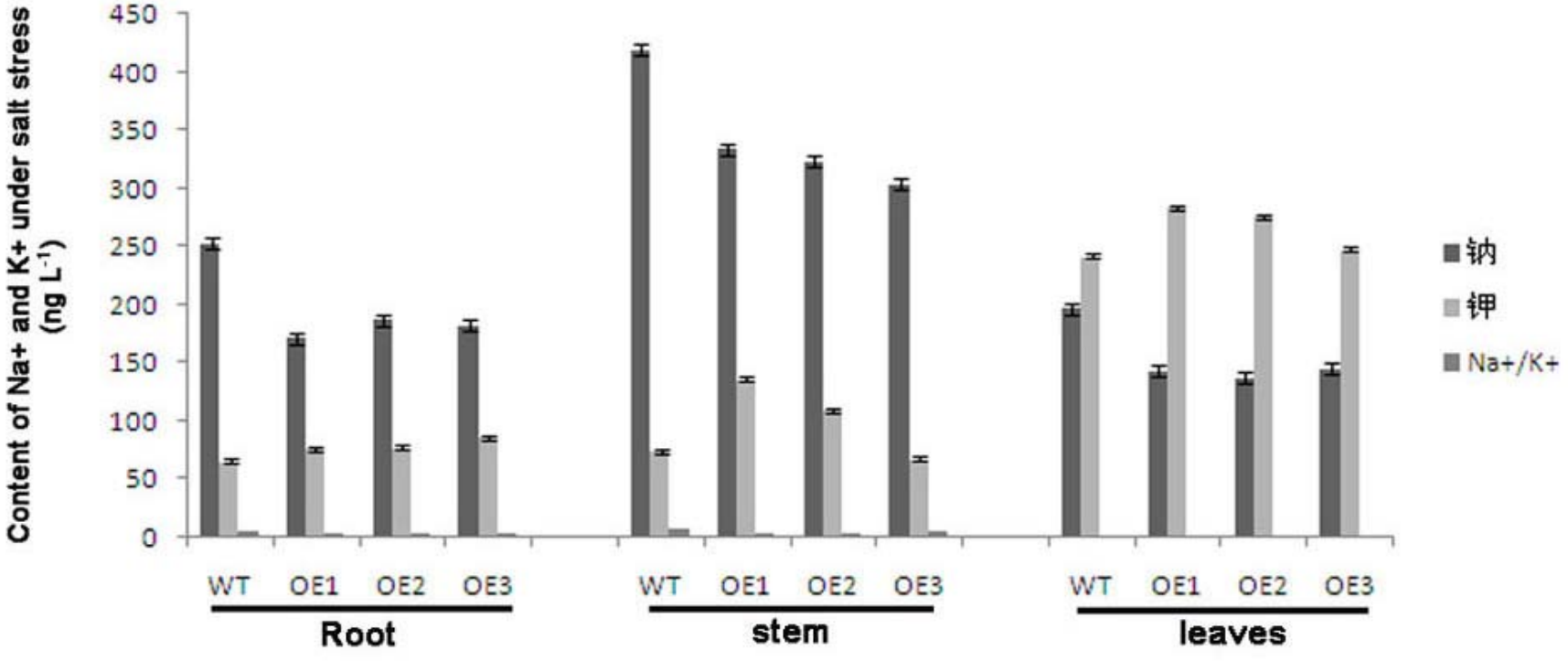

The *PeNAC1* gene regulated a series of physiological processes related to Na+/K+ homeostasis in oats and maintained lower Na+/K+ ratio in various organs transgenic oats to improve salt tolerance of transgenic oats

Acknowledgements

- Prof. Jinghui Liu
- Prof. Zongwen Zhang
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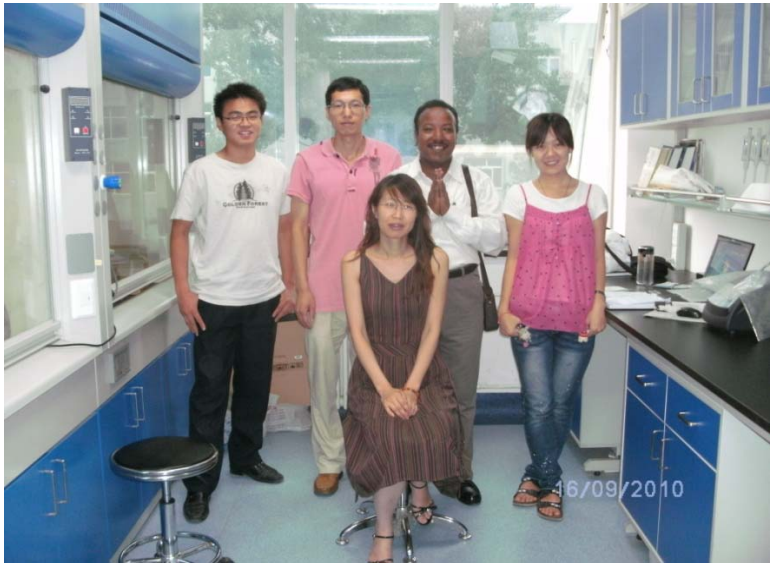

Thanks your attention !