

**Supplementary Table S1. Functions of CCCH proteins in abiotic stress responses and mode of actions**

Gene	Abiotic stresses and mode of actions					CCCH motif type	References	
	Salt	Drought	Cold	Flooding	Oxidative	Transcriptional		
						DNA binding		
						Post-transcriptional RNA binding		
<i>OsC3H33</i>	+						C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[1]
<i>OsC3H37</i>	+						C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[1]
<i>OSC3H47</i>	+	+				+	C-X <sub>7</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[2]
<i>OSC3H50</i>	+						C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[1]
<i>AtZFP1</i>	+				+		C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[3]
<i>GhZFP1</i>	+	+					C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H and C-X <sub>5</sub> -C-X <sub>4</sub> -CX <sub>3</sub> -H	[4]
<i>AtSZF1</i>	+				+		C-X <sub>7</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[5]
<i>AtSZF2</i>	+				+		C-X <sub>7</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[5]
<i>AtOZF1</i>				+	+		C-X <sub>12</sub> -C-X <sub>10</sub> -C-X <sub>3</sub> -H, C-X <sub>7</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H and C-X <sub>5</sub> -C-X <sub>4</sub> -C-X <sub>3</sub> -H	[6]
<i>AtOZF2</i>	+						C-X <sub>12</sub> -C-X <sub>10</sub> -C-X <sub>3</sub> -H, C-X <sub>7</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H and C-X <sub>5</sub> -C-X <sub>4</sub> -C-X <sub>3</sub> -H	[7]
<i>OsTZF1</i>	+					+	C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[8]
<i>OsC3H10</i>		+			+		C-X <sub>10</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H and C-X <sub>5</sub> -C-X <sub>4</sub> -C-X <sub>3</sub> -H	[9]

<i>OsTZF5</i>	+		+	C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H and C-X <sub>5</sub> -C-X <sub>4</sub> -C-X <sub>3</sub> -H	[10]
<i>BoC3H</i>	+		+	C-X <sub>7</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H and C-X <sub>5</sub> -C-X <sub>4</sub> -C-X <sub>3</sub> -H	[11]
<i>AtC3H17</i>	+			C-X <sub>7</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[12]
<i>AtTZF1</i>	+	+		C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[13]
<i>AtTZF2</i>	+			C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[14]
<i>AtTZF3</i>	+			C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[14]
<i>GhTZF1</i>	+		+	C-X <sub>7</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H and C-X <sub>5</sub> -C-X <sub>4</sub> -C-X <sub>3</sub> -H	[15]
<i>AetTZF1</i>	+		+	C-X <sub>7</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H and C-X <sub>5</sub> -C-X <sub>4</sub> -C-X <sub>3</sub> -H	[16].
<i>OsCCCH-Zn-1</i>		+		C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[17]
<i>OsCCCH-Zn-2</i>		+		C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[17]
<i>OsCCCH-Zn-3</i>		+		C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[17]
<i>PvC3H72</i>		+	+	C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[18]
<i>IbC3H18</i>	+	+	+	C-X <sub>7</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[19]
<i>PeC3H74</i>	+			C-X <sub>8</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H and C-X <sub>7</sub> -C-X <sub>5</sub> -C-X <sub>3</sub> -H	[20]
<i>DgC3H1</i>		+	+	C-X <sub>5-14</sub> -C-X <sub>4-5</sub> -C-X <sub>3</sub> -H	[21]

## References

1. Jamil, M.; Iqbal, W.; Bangash, A.; Rehman, S. U.; Imran, Q. M.; Rha, E. S., Constitutive expression of OSC3H33, OSC3H50 and OSC3H37 genes in rice under salt stress. *Pak. J. Bot* 2010, 42, (6), 4003-4009.
2. Wang, W.; Liu, B.; Xu, M.; Jamil, M.; Wang, G., ABA-induced CCCH tandem zinc finger protein OsC3H47 decreases ABA sensitivity and promotes drought tolerance in *Oryza sativa*. *Biochemical and Biophysical Research Communications* 2015, 464, (1), 33-37.
3. Han, G.; Wang, M.; Yuan, F.; Sui, N.; Song, J.; Wang, B., The CCCH zinc finger protein gene AtZFP1 improves salt resistance in *Arabidopsis thaliana*. *Plant molecular biology* 2014, 86, (3), 237-253.
4. Guo, Y. H.; Yu, Y. P.; Wang, D.; Wu, C. A.; Yang, G. D.; Huang, J. G.; Zheng, C. C., GhZFP1, a novel CCCH-type zinc finger protein from cotton, enhances salt stress tolerance and fungal disease resistance in transgenic tobacco by interacting with GZIRD21A and GZIPR5. *New Phytologist* 2009, 183, (1), 62-75.
5. Sun, J.; Jiang, H.; Xu, Y.; Li, H.; Wu, X.; Xie, Q.; Li, C., The CCCH-type zinc finger proteins AtSZF1 and AtSZF2 regulate salt stress responses in *Arabidopsis*. *Plant and Cell Physiology* 2007, 48, (8), 1148-1158.
6. Huang, P.; Chung, M.; Ju, H.; Na, H.; Lee, D. J.; Cheong, H.; Kim, C. S., Physiological characterization of the *Arabidopsis thaliana* Oxidation-related Zinc Finger 1, a plasma membrane protein involved in oxidative stress. *Journal of Plant Research* 2011, 124, (6), 699-705.
7. Huang, P.; Ju, H.; Min, J.; Zhang, X.; Chung, J.; Cheong, H.; Kim, C. S., Molecular and Physiological Characterization of the *Arabidopsis thaliana* Oxidation-Related Zinc Finger 2, a Plasma Membrane Protein Involved in ABA and Salt Stress Response Through the ABI2-Mediated Signaling Pathway. *Plant and Cell Physiology* 2012, 53, (1), 193-203.
8. Jan, A.; Maruyama, K.; Todaka, D.; Kidokoro, S.; Abo, M.; Yoshimura, E.; Shinozaki, K.; Nakashima, K.; Yamaguchi-Shinozaki, K., OsTZF1, a CCCH-tandem zinc finger protein, confers delayed senescence and stress tolerance in rice by regulating stress-related genes. *Plant Physiology* 2013, 161, (3), 1202-1216.
9. Seong, S. Y.; Shim, J. S.; Bang, S. W.; Kim, J. K., Overexpression of OsC3H10, a CCCH-Zinc Finger, Improves Drought Tolerance in Rice by Regulating Stress-Related Genes. *Plants (Basel, Switzerland)* 2020, 9, (10).
10. Selvaraj, M. G.; Jan, A.; Ishizaki, T.; Valencia, M.; Dedicova, B.; Maruyama, K.; Ogata, T.; Todaka, D.; Yamaguchi-Shinozaki, K.; Nakashima, K.; Ishitani, M., Expression of the CCCH-tandem zinc finger protein gene OsTZF5 under a stress-inducible promoter mitigates the effect of drought stress on rice grain yield under field conditions. *Plant Biotechnol J* 2020, 18, (8), 1711-1721.
11. Jiang, M.; Jiang, J.; Miao, L.; He, C., Over-expression of a C3H-type zinc finger gene contributes to salt stress tolerance in transgenic broccoli plants. *Plant Cell Tissue and Organ Culture* 2017, 130, (2), 239-254.
12. Seok, H.; Nguyen, L. V.; Park, H.; Tarte, V. N.; Ha, J.; Lee, S.; Moon, Y., Arabidopsis non-TZF gene AtC3H17 functions as a positive regulator in salt stress response. *Biochemical and Biophysical Research Communications* 2018, 498, (4), 954-959.
13. Lin, P. C.; Pomeranz, M. C.; Jikumaru, Y.; Kang, S. G.; Hah, C.; Fujioka, S.; Kamiya, Y.; Jang, J. C., The *Arabidopsis* tandem zinc finger protein AtTZF1 affects ABA-and GA-mediated growth, stress and gene expression responses. *The Plant Journal* 2011, 65, (2), 253-268.

14. Lee, S.-j.; Jung, H. J.; Kang, H.; Kim, S. Y., Arabidopsis Zinc Finger Proteins AtC3H49/AtTFZ3 and AtC3H20/AtTFZ2 are Involved in ABA and JA Responses. *Plant and Cell Physiology* 2012, 53, (4), 673-686.
15. Zhou, T.; Yang, X.; Wang, L.; Xu, J.; Zhang, X., GhTFZ1 regulates drought stress responses and delays leaf senescence by inhibiting reactive oxygen species accumulation in transgenic Arabidopsis. *Plant molecular biology* 2014, 85, (1-2), 163-177.
16. Jiang, A.-L.; Xu, Z.-S.; Zhao, G.-Y.; Cui, X.-Y.; Chen, M.; Li, L.-C.; Ma, Y.-Z., Genome-wide analysis of the C3H zinc finger transcription factor family and drought responses of members in *Aegilops tauschii*. *Plant molecular biology reporter* 2014, 32, (6), 1241-1256.
17. Pandey, D. M.; Kim, S., Identification and expression analysis of hypoxia stress inducible CCCH-type zinc finger protein genes in rice. *Journal of Plant Biology* 2012, 55, (6), 489-497.
18. Xie, Z.; Lin, W.; Yu, G.; Cheng, Q.; Xu, B.; Huang, B., Improved cold tolerance in switchgrass by a novel CCCH-type zinc finger transcription factor gene, PvC3H72 , associated with ICE1-CBF-COR regulon and ABA-responsive genes. *Biotechnology for Biofuels* 2019, 12, (1), 224.
19. Zhang, H.; Gao, X.; Zhi, Y.; Li, X.; Zhang, Q.; Niu, J.; Wang, J.; Zhai, H.; Zhao, N.; Li, J., A non-tandem CCCH-type zinc-finger protein, IbC3H18, functions as a nuclear transcriptional activator and enhances abiotic stress tolerance in sweet potato. *New Phytologist* 2019, 223, (4), 1918-1936.
20. Chen, F.; Liu, H.-L.; Wang, K.; Gao, Y.-M.; Wu, M.; Xiang, Y., Identification of CCCH Zinc Finger Proteins Family in Moso Bamboo (*Phyllostachys edulis*), and PeC3H74 Confers Drought Tolerance to Transgenic Plants. *Frontiers in plant science* 2020, 11, 1697.
21. Bai, H.; Lin, P.; Li, X.; Liao, X.; Wan, L.; Yang, X.; Luo, Y.; Zhang, L.; Zhang, F.; Liu, S., DgC3H1, a CCCH zinc finger protein gene, confers cold tolerance in transgenic chrysanthemum. *Scientia Horticulturae* 2021, 281, 109901.