**Additional file 7.** Homology search for upstream sequence (31,942 bps) (a) and downstream sequence (26,288 bps) (b) to nucleotide collection database in NCBI, respectively.

(a) upstream sequence of *NnP AL1*

(b) downstream sequence of *NnP AL1*

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**Alignment I.** Homology search for upstream sequence of *NnP AL1*.

Homologous regions of dicots with the first three highest scores upstream 1-5000 bps are *Vitis vinifera* [uncharacterized LOC100852583 (LOC100852583), mRNA], *Populus trichocarpa* [tetratricopeptide repeat-containing family protein (POPTR_0010s10880) mRNA, complete coding sequence] and *Ricinus communis* conserved hypothetical protein, mRNA (XM_002518755.1), respectively.

(1) PREDICTED: *Vitis vinifera* uncharacterized LOC100852583 (LOC100852583), mRNA. Sequence ID: ref|XM_003631297.1| (e-value, 9e-105)
(2) *Populus trichocarpa* tetratricopeptide repeat-containing family protein (POPTR_0010s10880g) mRNA, complete coding sequence. Sequence ID: ref|XM_002314704.2| (e-value, 7e-94)
(3) *Ricinus communis* conserved hypothetical protein, mRNA. Sequence ID: ref|XM_002518755.1| (1e-90)
**Alignment II.** Homology search for downstream sequences of *NnP AL1*.

Homologous regions of dicots with the first three highest scores downstream 20,000-25,000 bps are *Vitis vinifera* (contig VV78X242760.3, whole genome shotgun sequence), *Citrus sinensis* (PREDICTED: zinc finger CCCH domain-containing protein 17-like (LOC102617828), mRNA) and *Populus trichocarpa* [zinc finger family protein (POPTR_0008s14320g) mRNA, complete coding sequence], respectively. Also, aligned regions in the section of 10-15K are homologous to partial coding sequence of GWD gene for alpha-glucan water dikinase of *Nelumbo nucifera* itself.

1. *Vitis vinifera* contig VV78X242760.3, whole genome shotgun sequence, Sequence ID: [emb|AM427456.2|](e-value, 3e-34)
(2) PREDICTED: *Citrus sinensis* zinc finger CCCH domain-containing protein 17-like (LOC102617828), mRNA. Sequence ID: ref|XM_006470838.1| (1e-31)

(3) *Populus trichocarpa* zinc finger family protein (POPTR_0008s14320g) mRNA, complete cds. Sequence ID: ref|XM_002312469.2|
(4) *Nelumbo nucifera* itself *GWD* gene for alpha-glucan water dikinase, partial cds. Sequence ID: dbj|AB548406.1| (e-value,5e-18)