

**Azolla mediated alterations in grain yield and quality in Rice**

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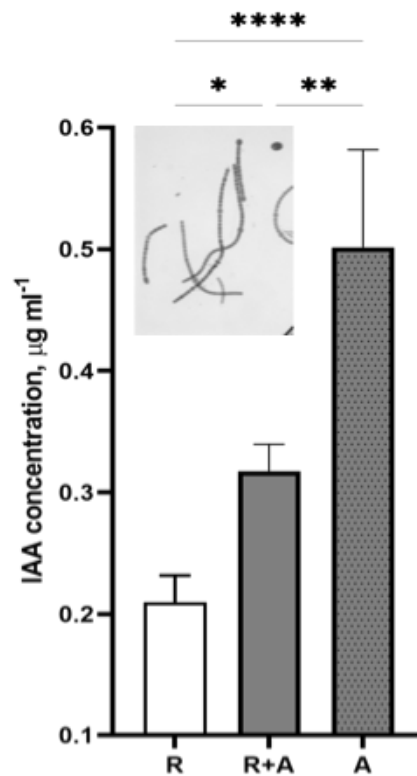
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35    **Supplementary materials**

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38    Figure S1. Bar charts illustrating how the concentrations of Indole-3-acetic acid differ among  
39    treatments. R indicates rice grown by itself, R+A refers to the azolla-rice co-cultivation and with  
40    azolla growing alone (A). The photo shows the cyanobionts found in the leaves of azolla grown in  
41    Nitrogen-rich growing solution Yoshida. Asterisks denote significance levels from ANOVA analysis:

42    \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ , \*\*\*\*  $p < 0.0001$ .  $n=3$

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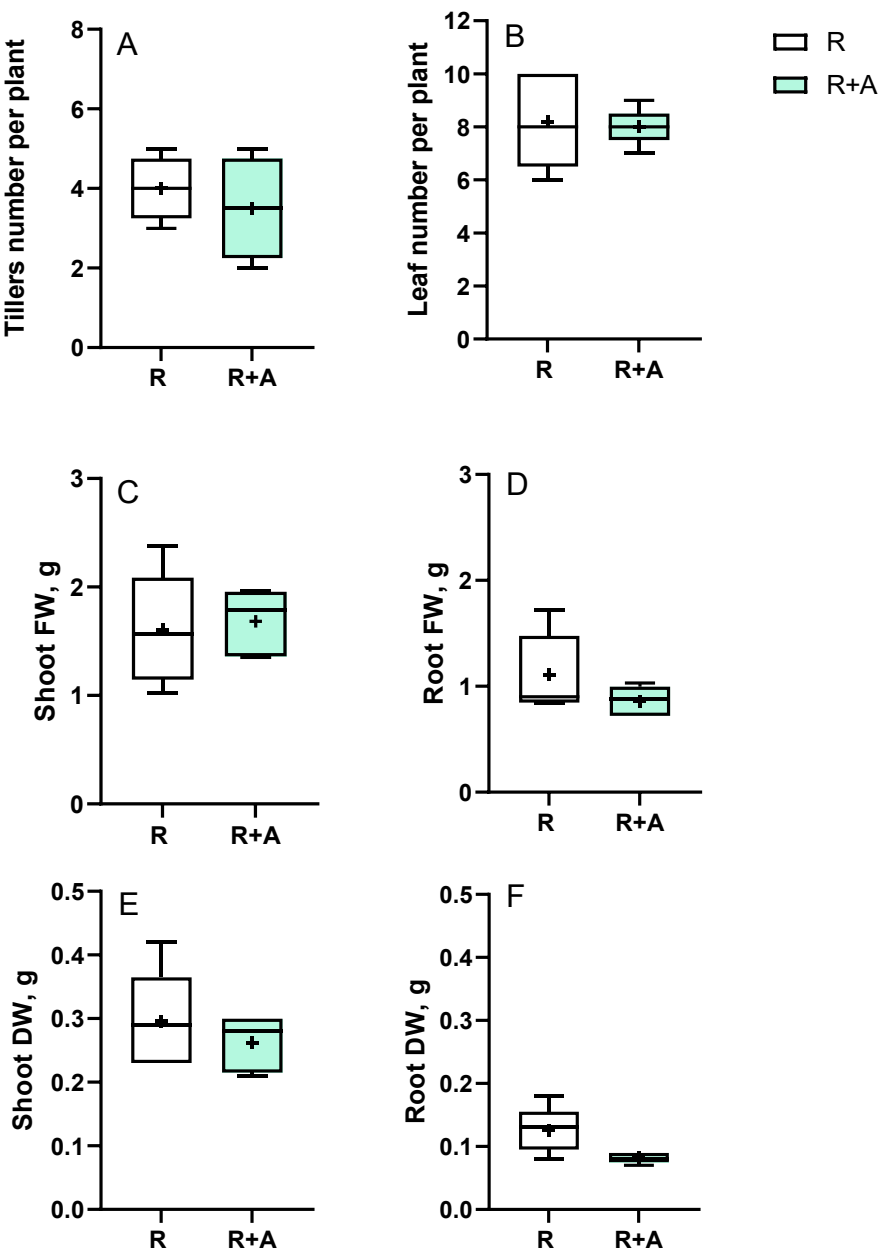
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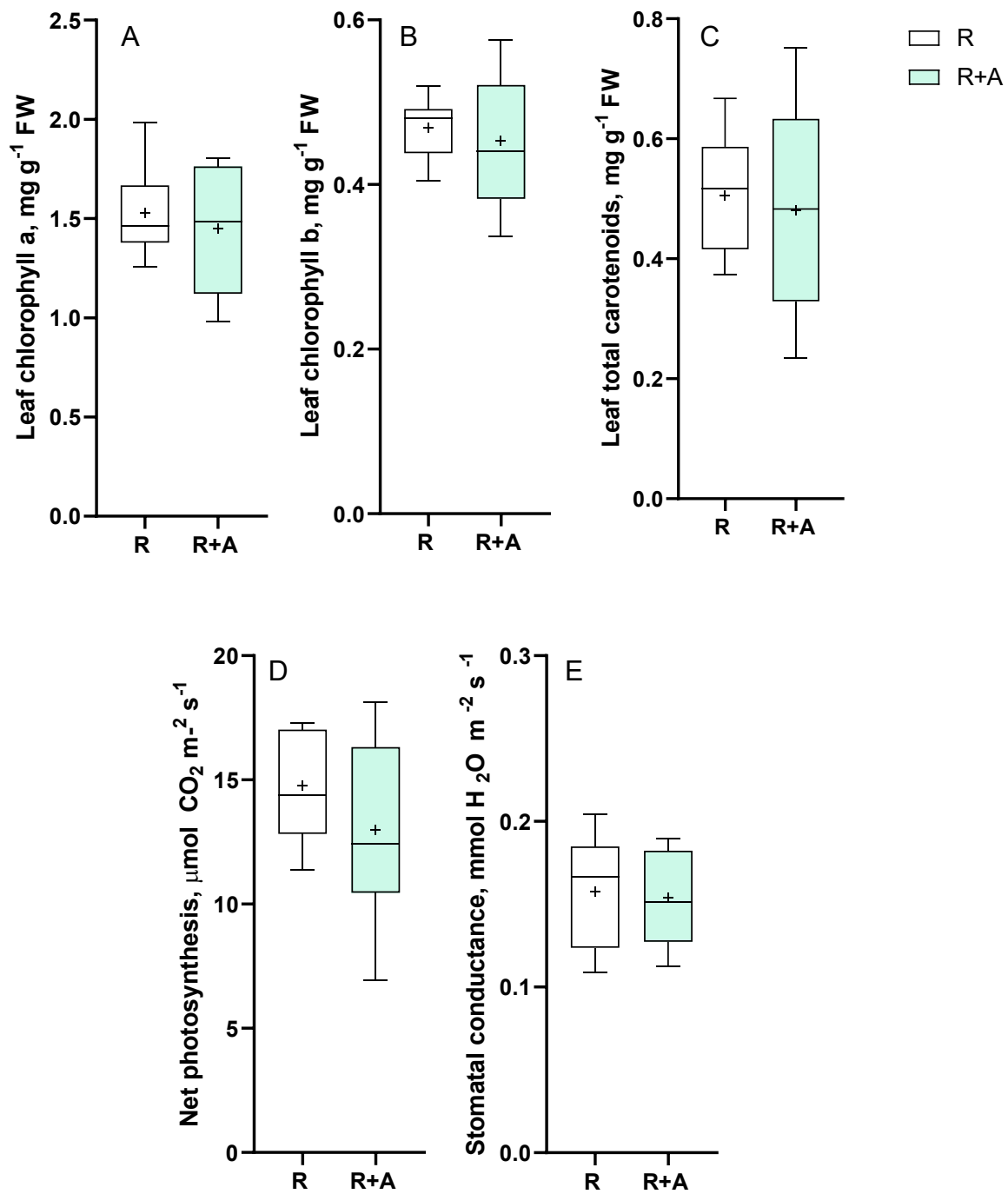
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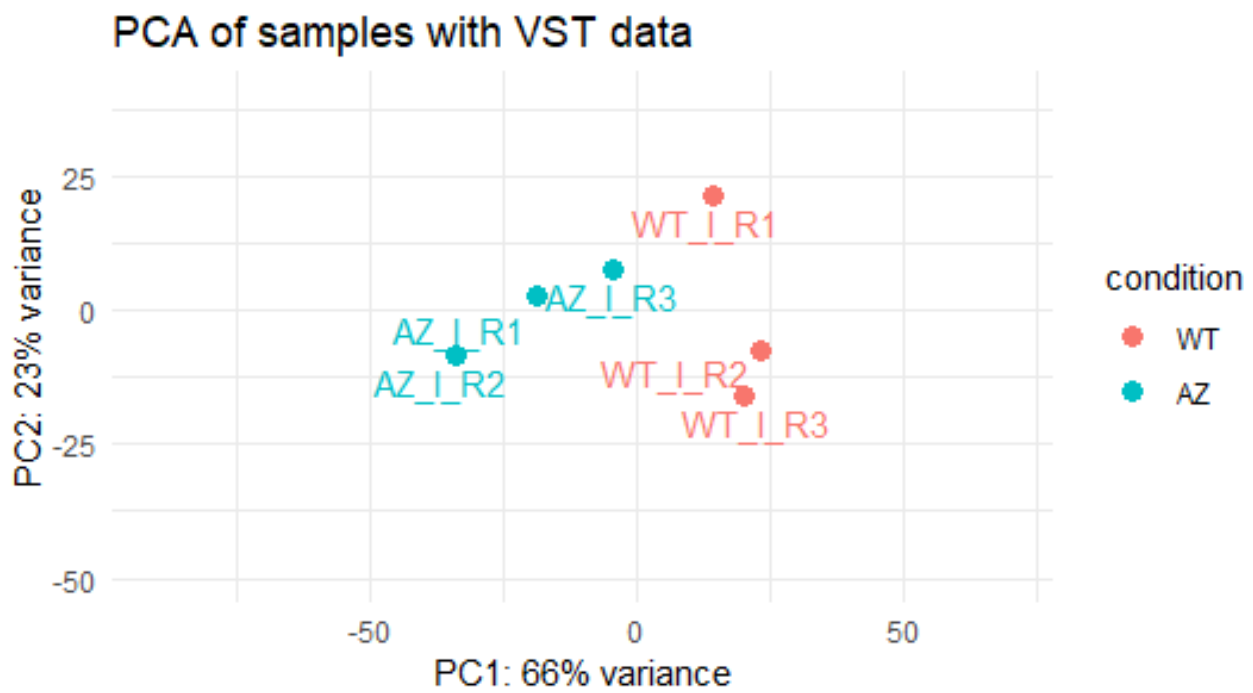


58 Fig S2: Boxplot graphs showing the number of tillers (A) and leaves (B) per plant, shoot and root  
59 fresh (C and D, for shoot and root tissues respectively) and dry weight (E and F, for shoot and root  
60 tissues respectively) in rice plants grown alone (R) or in co-cultivation with azolla (R+A) for 30 days.  
61 R indicates rice grown by itself while R+A refers to the azolla-rice co-cultivation.



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68 Figure S3. Boxplot graphs illustrating the effect of azolla on leaf photosynthetic pigments and leaf  
69 gas exchange parameters of rice plants. A) Concentration of chlorophyll *a* in fresh leaves; B)  
70 Concentration of chlorophyll *b* in fresh leaves; C) Concentration of total carotenoids in fresh leaves;  
71 D) Net photosynthetic rate; E) Stomatal conductance. R indicates rice grown by itself while R+A  
72 refers to the azolla-rice co-cultivation. Asterisks denote significance levels from ANOVA analysis: \*  
73 p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001. n=8



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75 Figure S4. PCA of the VST-transformed RNA-seq data. WT: not co-cultivated with azolla. AZ: co-  
 76 cultivated with azolla.

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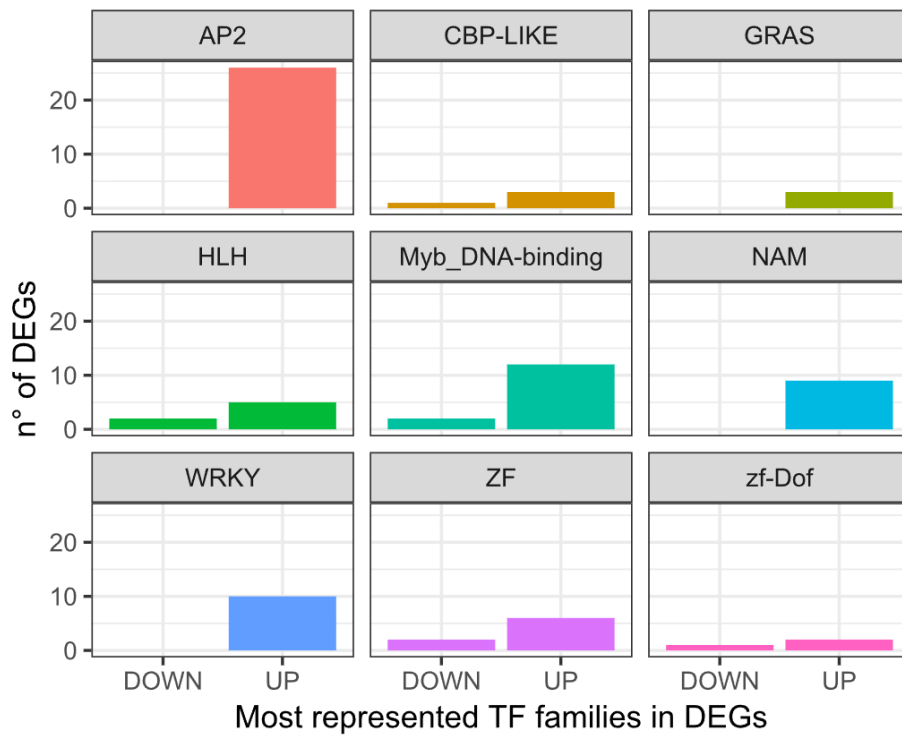


Figure S5. Families of transcription factor encoding genes up- or down-regulated in R+A vs R. The number of either down- or upregulated genes is shown for the most represented transcription factor families in the list of DEGs (n° genes > 2).

| Locus ID            | Log2FC | padj     | Gene name(s) | Synonyms                              |
|---------------------|--------|----------|--------------|---------------------------------------|
| <b>Os01g0797600</b> | 1.47   | 0.002606 | OsERF3       | OsERF75, AP2/EREBP4, OsBIERF2, OsDLN3 |
| <b>Os03g0263000</b> | 1.64   | 0.023968 | OsERF9       | AP2/EREBP135                          |
| <b>Os06g0196700</b> | 1.15   | 4.87E-04 | OsARF16      |                                       |
| <b>Os02g0676800</b> | 3.36   | 6.47E-08 | OsERF20      | AP2/EREBP126, OsDREB1G                |
| <b>Os04g0572200</b> | 3.3    | 0.010125 | OsERF23      | AP2/EREBP144                          |
| <b>Os02g0656600</b> | 0.83   | 0.02366  | OsERF32      | AP/EREBP21, OsDREB2B                  |
| <b>Os04g0549700</b> | 2.62   | 1.50E-05 | OsERF33      | OsAP2/ERF40, AP2/EREBP40, OsDREB4-2   |
| <b>Os04g0550200</b> | 2.02   | 0.000202 | OsERF34      | AP2/EREBP42                           |
| <b>Os10g0560700</b> | 0.87   | 0.000218 | OsERF36      | AP2/EREBP7                            |
| <b>Os04g0549800</b> | 4.98   | 8.81E-09 | OsERF37      | AP2/EREBP41                           |
| <b>Os03g0191900</b> | 1.75   | 0.000362 | OsERF47      | AP2/EREBP121                          |
| <b>Os08g0408500</b> | 1.51   | 0.00012  | OsERF48      | OsDRAP1, AP2/EREBP170                 |
| <b>Os09g0369000</b> | 0.99   | 0.010747 | OsERF50      | OsDREB6, AP2/EREBP113                 |
| <b>Os07g0674800</b> | 4.5    | 0.000599 | OsERF67      | AP2/EREBP76                           |
| <b>Os05g0497300</b> | 1.49   | 0.001391 | OsERF74      | AP2/EREBP4, OsBIERF2, OsDLN3          |
| <b>Os04g0610400</b> | 3.05   | 0.011598 | OsERF77      | AP2/EREBP 149, OsDLN121               |
| <b>Os02g0654700</b> | 2.47   | 8.62E-08 | OsERF91      | OsAP59, AP2/EREBP147, OsBIERF3        |
| <b>Os09g0457900</b> | 6.22   | 0.007271 | OsERF102     | AP2/EREBP123, OsEATB                  |
| <b>Os02g0764700</b> | 5.44   | 0.000107 | OsERF103     | OsDERF5, OsERF109, AP2/EREBP130       |
| <b>Os06g0553700</b> | 1.37   | 0.008531 | OsERF122     | AP2/EREBP56                           |
| <b>Os02g0638650</b> | 2.24   | 0.000473 | OsERF141     | AP2/EREBP109                          |
| <b>Os02g0767800</b> | 2.34   | 0.006627 | AP2/EREBP139 |                                       |
| <b>Os09g0522200</b> | 3.06   | 0.004379 | OsDREB1A     | OsERF24, AP2/EREBP114, OsCBF3         |
| <b>Os06g0127100</b> | 6.44   | 0.004258 | OsDREB1C     | OsERF26, AP2/EREBP98, OsCBF2          |
| <b>Os04g0572400</b> | 4.9    | 0.006309 | OsDREB1E     | OsERF30, AP2/EREBP160                 |
| <b>Os01g0968800</b> | 4.36   | 0.035221 | OsDREB1F     | OsERF27, AP2/EREBP81                  |
| <b>Os02g0677300</b> | 5.14   | 0.039963 | OsDREB1G     | OsERF25, AP2/EREBP138                 |
| <b>Os01g0693400</b> | 1.43   | 0.004386 | OsRAV11      | AP2/EREBP127                          |
| <b>Os05g0549800</b> | -1.81  | 0.032939 | OsRAV12      | AP2/EREBP96                           |

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| Locus ID            | Log2FC | padj       | Gene name(s) | Synonyms         |
|---------------------|--------|------------|--------------|------------------|
| <b>Os04g0508400</b> | 5.26   | 4.7351E-10 |              |                  |
| <b>Os03g0815100</b> | 2.23   | 7.243E-06  | SNAC1        | OsNAC9, OsNAC19  |
| <b>Os07g0225300</b> | 1.17   | 0.02259884 | NAC3         | OsNAC3, OsDLN180 |
| <b>Os01g0261200</b> | 0.95   | 0.02974326 | NAC8         | OsNTL3, OsNAC8   |
| <b>Os01g0675800</b> | 2.07   | 0.00051868 | NAC14        | OsNAC14          |
| <b>Os03g0133000</b> | 2.17   | 0.00028905 | NAC22        |                  |
| <b>Os10g0359500</b> | 0.72   | 0.04135597 | NAC61        |                  |
| <b>Os04g0536500</b> | 2.00   | 0.00183051 | NAC82        | OsSWN6           |
| <b>Os05g0421600</b> | 3.12   | 0.02532471 | NAC88        | OsNAC52          |

Tab S2. List of NAC transcription factors differentially expressed in the azolla-grown samples.

| Locus ID     | Log2FC | padj       | Gene name |
|--------------|--------|------------|-----------|
| Os01g0246700 | 3.33   | 0.00253938 | OsWRKY1   |
| Os05g0537100 | 2.27   | 0.03182277 | OsWRKY7   |
| Os05g0571200 | 1.69   | 0.01000141 | OsWRKY19  |
| Os01g0821600 | 2.86   | 2.35E-07   | OsWRKY21  |
| Os01g0826400 | 2.58   | 0.00422976 | OsWRKY24  |
| Os05g0322900 | 1.51   | 0.00053148 | OsWRKY45  |
| Os02g0181300 | 3.56   | 0.01817818 | OsWRKY71  |
| Os09g0334500 | 2.42   | 0.02561687 | OsWRKY74  |
| Os09g0417600 | 3.41   | 0.00969667 | OsWRKY76  |
| Os03g0855100 | 1.13   | 0.00486725 | OsWRKY80  |

Tab S3. List of WRKY transcription factors differentially expressed in the azolla-grown samples.