

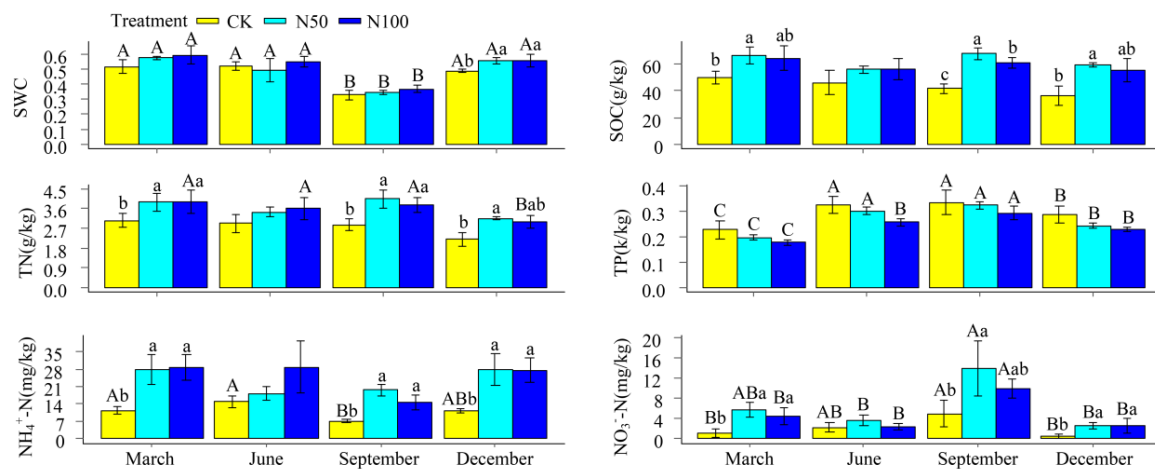


Figure S1. Changes of soil nutrient contents in different N treatments at the surface soil layer (0–10 cm). Different lowercase letters indicate significant differences between treatments in the same season; different uppercase letters indicate significant differences between seasons in the same treatment ($p < 0.05$).

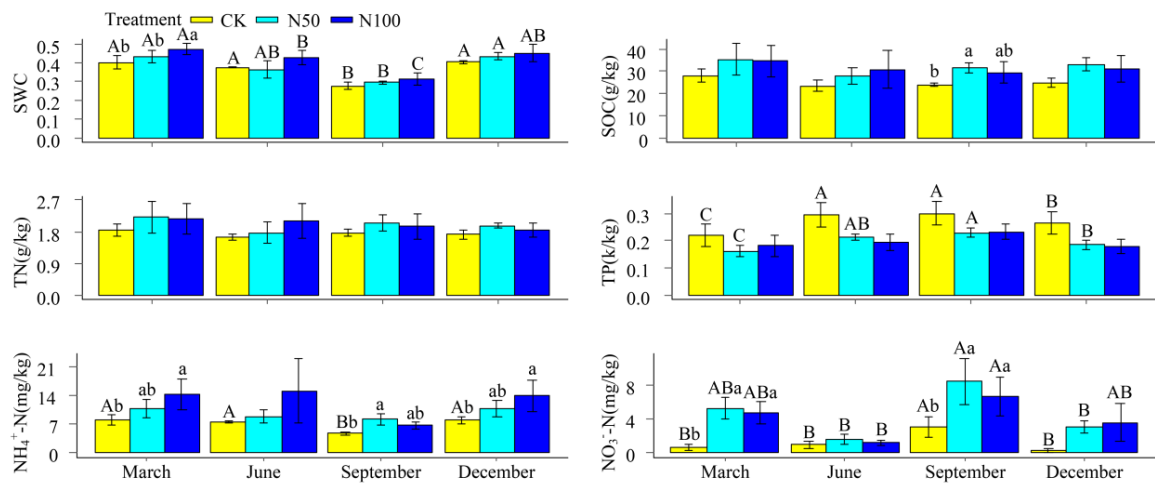


Figure S2. Changes of soil nutrient contents in different N treatments at the soil layer of 10–20cm. Different lowercase letters indicate significant differences between treatments in the same season; different uppercase letters indicate significant differences between seasons in the same treatment ($p < 0.05$).

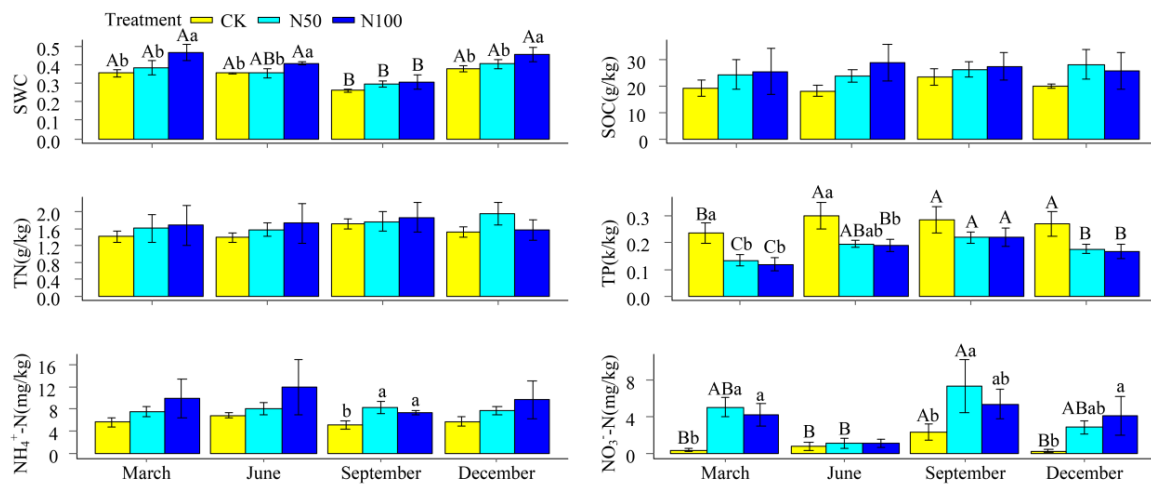


Figure S3. Changes of soil nutrient contents in different N treatments at the soil layer of 20–30cm. Different lowercase letters indicate significant differences between treatments in the same season; different uppercase letters indicate significant differences between seasons in the same treatment ($p < 0.05$).

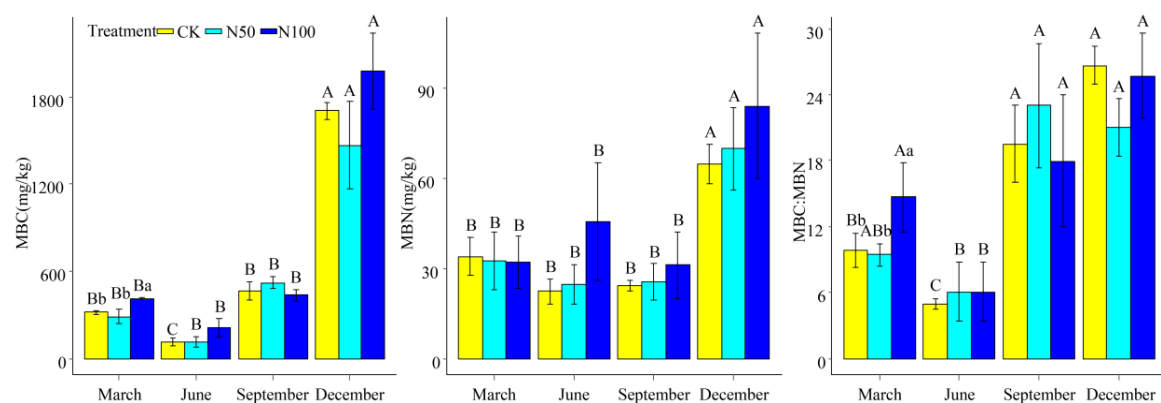


Figure S4. Changes of soil MBC, MBN and MBC:MBN in different N treatments at the soil layer of 10–20cm .Different lowercase letters indicate significant differences between N treatments during the same season; different capital letters indicate significant differences between seasons in the same N treatment ($p < 0.05$).

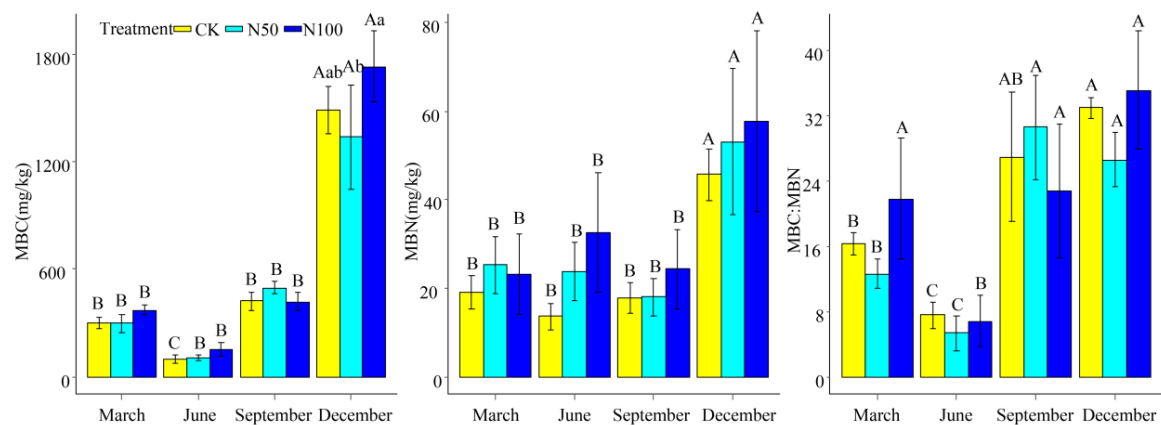


Figure S5. Changes of soil MBC, MBN and MBC:MBN in different N treatments at the soil layer of 20–30cm. Different lowercase letters indicate significant differences between N treatments during the same season; different capital letters indicate significant differences between seasons in the same N treatment ($p < 0.05$).

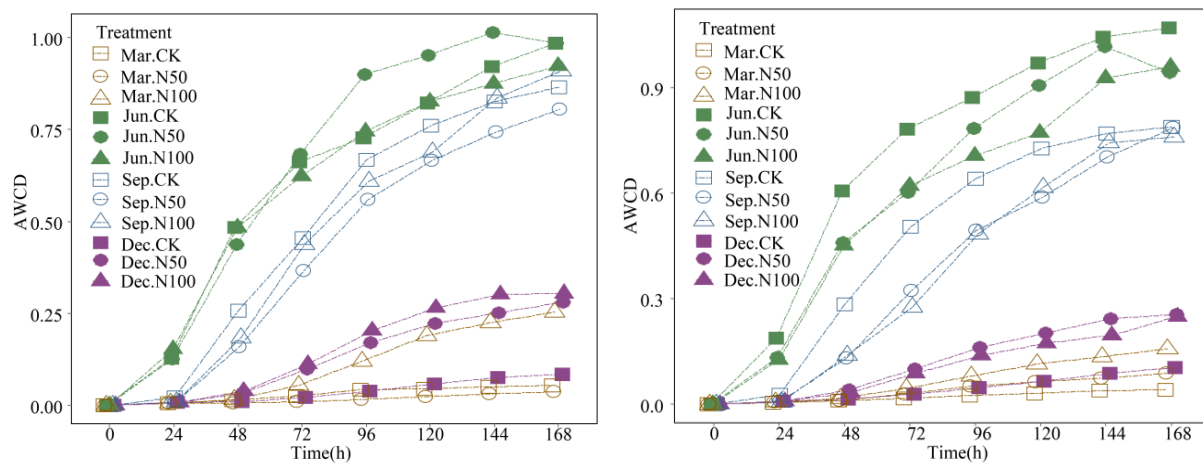


Figure S6. Changes of the average well color development (AWCD) in different N treatments at the soil layer of 10–20 and 20–30 cm.

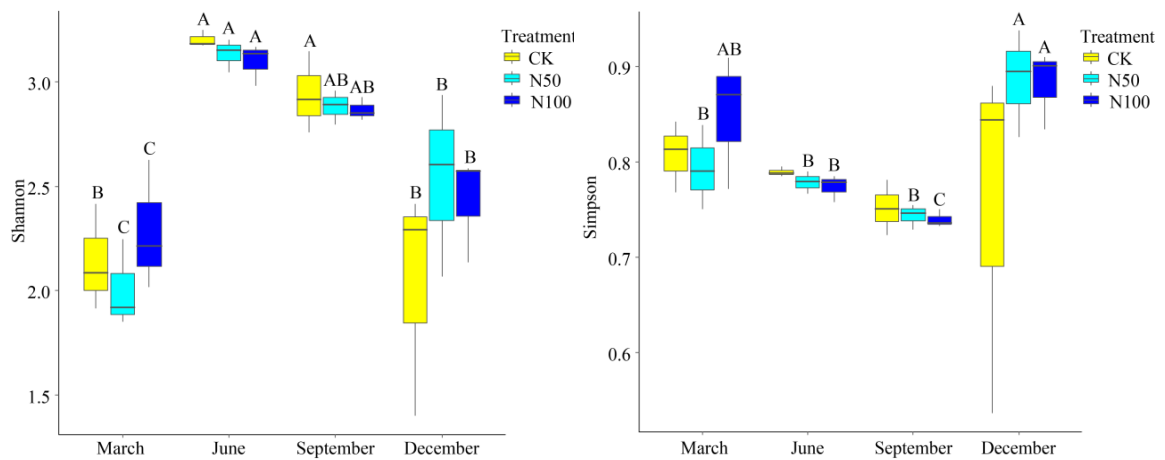


Figure S7. Changes of soil microbial community diversity in different N treatments at the soil layer of 10–20cm. Different lowercase letters indicate significant differences between N treatments during the same season; different capital letters indicate significant differences between seasons in the same N treatment ($p < 0.05$).

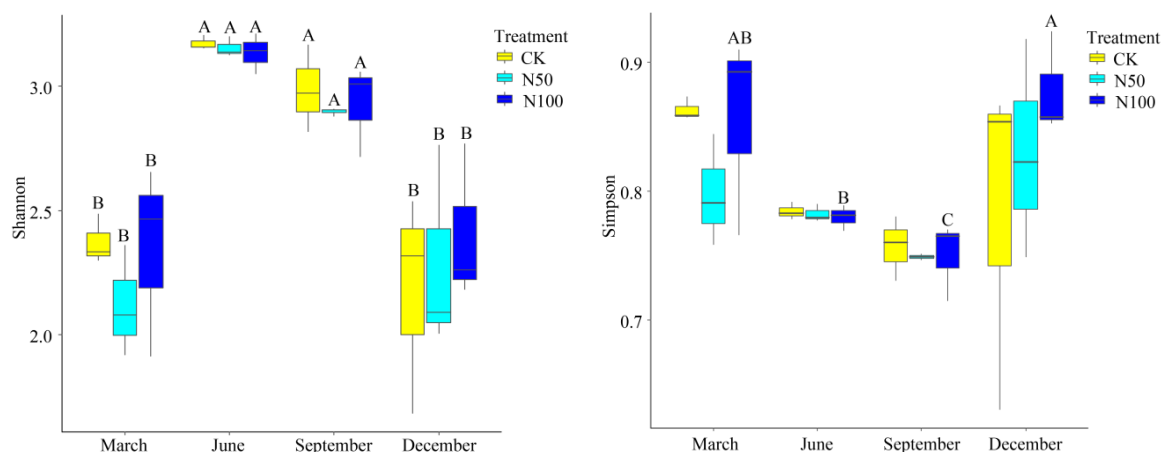


Figure S8. Changes of soil microbial community diversity in different N treatments at the soil layer of 20–30cm. Different lowercase letters indicate significant differences between N treatments during the same season; different capital letters indicate significant differences between seasons in the same N treatment ($p < 0.05$).

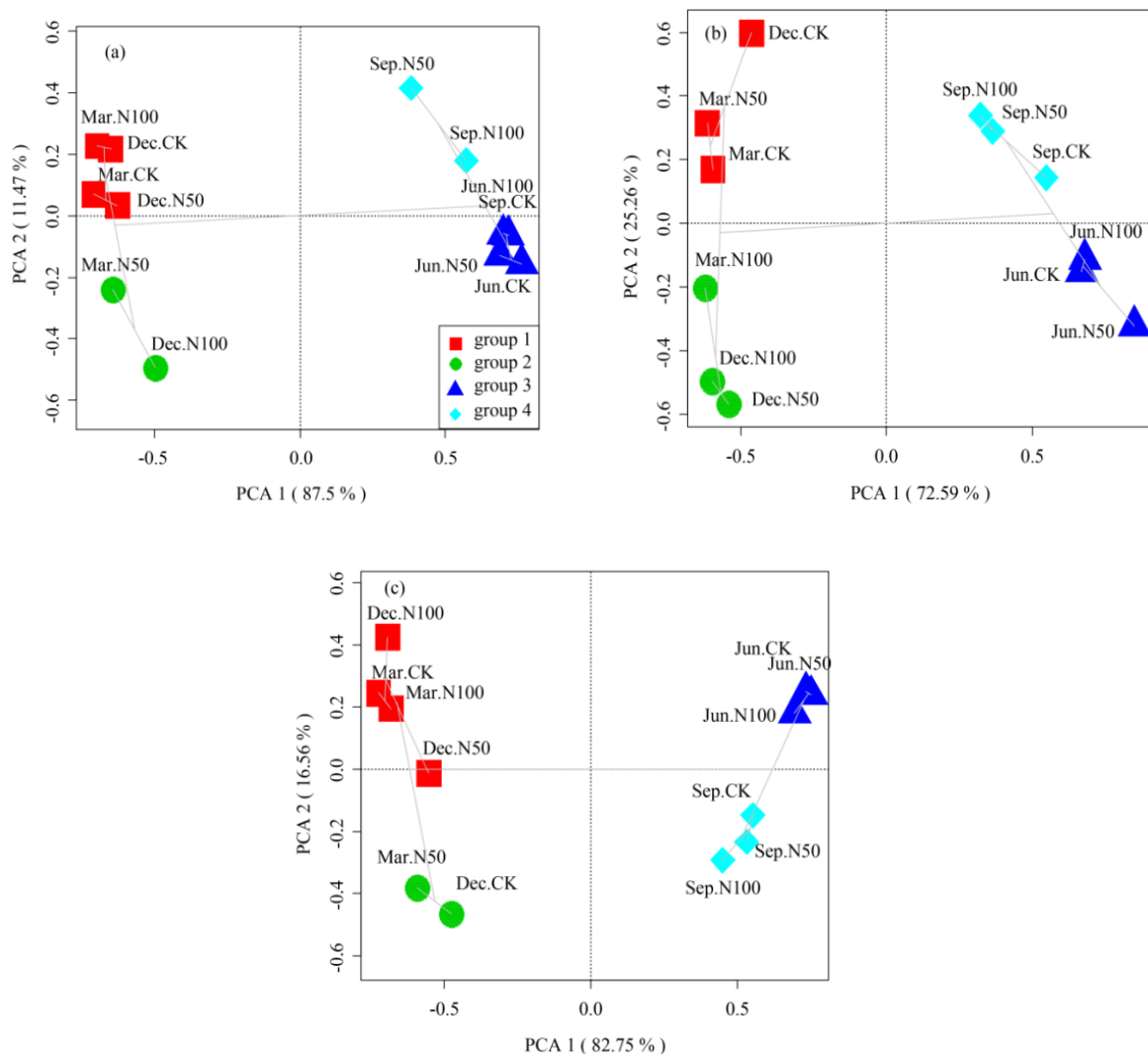


Figure S9. Analysis of principal component and cluster of AWCD and diversity indices of soil microbial community. (a) 0–10 cm, (b) 10–20 cm, (c) 20–30 cm. Each ordination point uses the average of three blocks.

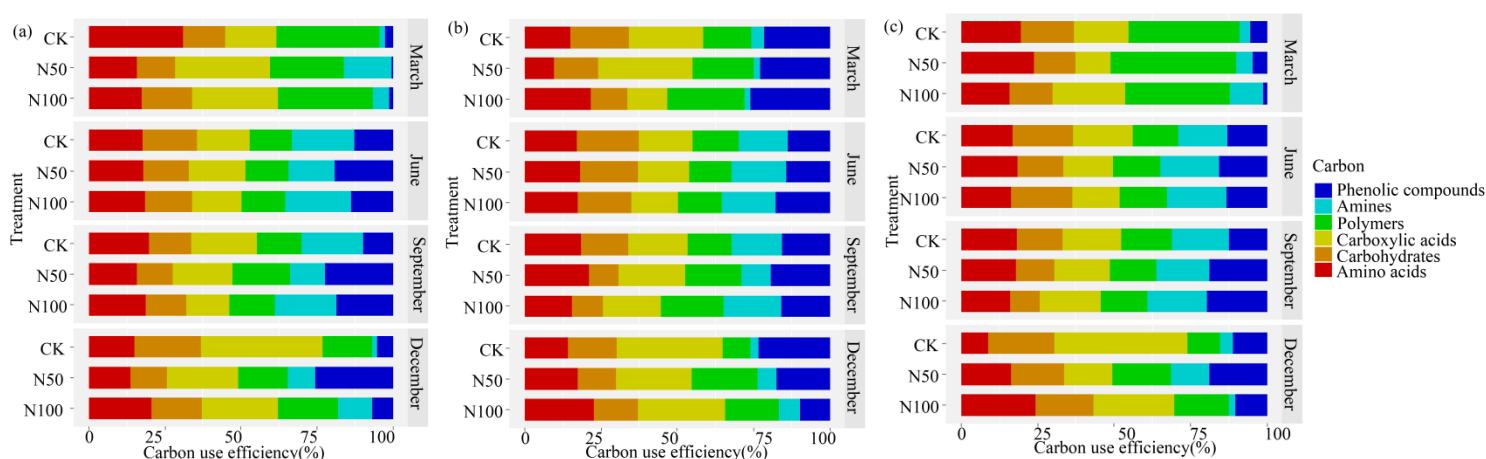


Figure S10. Effects of N-addition on carbon source availability of soil microbial communities in different treatments among three soil depth levels. (a) 0–10 cm, (b) 10–20 cm, (c) 20–30 cm.

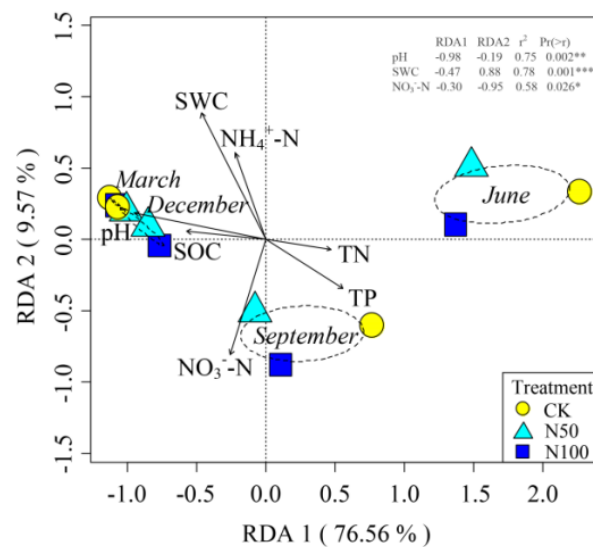


Figure S11. Redundancy analysis of the utilization of 31 carbon sources by the soil microbial community at the soil layer of 10–20cm. Each ordination point uses the average of three blocks. Asterisks indicate significance (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$).

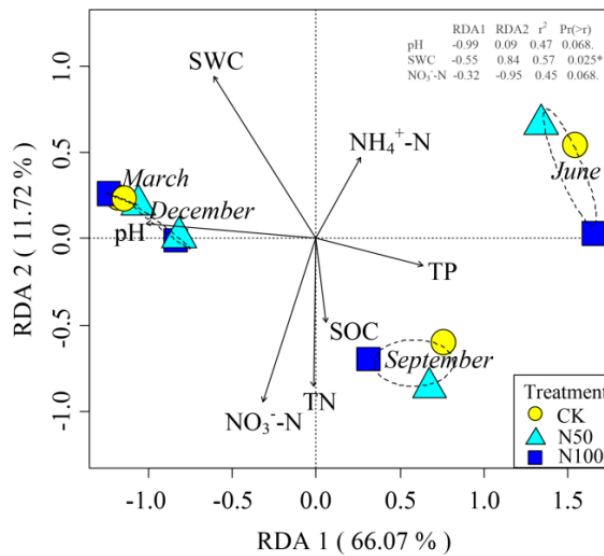


Figure S12. Redundancy analysis of the utilization of 31 carbon sources by the soil microbial community at the soil layer of 20–30cm. Each ordination point uses the average of three blocks. Asterisks indicate significance (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$).