Title: Adaptation of Tropical Rice to Temperate Climates: Efficacy of Multi-Stress Tolerant *Indica* Varieties in Reclaimed Regions of Korea

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Producing multiple-stress tolerant tropical or indica rice varieties economically in temperate regions like Korea is a viable strategy to meet the increasing demand for processed foods and accommodate a growing foreign population. Koreans primarily consume *japonica* rice, but *indica* varieties, which can thrive under adverse conditions such as salinity, low nutrient availability, submergence, anaerobic germination, and blast disease, offer promising alternatives. This approach, known as "tropicalisation," involves integrating abiotic stress tolerance traits into rice. Testing of 'CSA-Pi9', an *indica* variety with QTLs *Sub1* (submergence tolerance), *AG1* (anaerobic germination), and *Pi9* (blast resistance), showed promising yields. 'IPS', another indica variety with QTLs *Pup1* (phosphorus use efficiency) and *Sub1*, also met high-quality production standards. Although the common *indica* variety 'IR64' underperformed in yield, IR64-based breeding lines with multiple trait stacks demonstrated early heading and adaptability in the reclaimed saline areas of Jeollanam-do, Korea. Sequencing near-isogenic lines containing abiotic stress-tolerant traits revealed structural variations. An example of *de novo* assemblies of IR64-Sub1, and IR64 at the chromosome level by integrating long- and short-read sequencing data. Comparison between the assemblies revealed common structural variations between the isolines sharing common QTLs related to abiotic stress tolerance. Additionally, the study elucidated the presence of novel transposable elements preceding the *Sub1A* allele in the IR64-Sub1 pseudomolecule, contributing to a deeper understanding of the genomic landscape surrounding this crucial locus. Climate change may necessitate a shift in rice ecotypes in Korea, and adopting these indica varieties can sustain rice production and mitigate agricultural impacts of climate change.

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