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Cold Tolerance Characteristic Test of High Yield Tongil-type Rice Breeding Lines for Processing

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[Abstract]

Recently, the yield potential of high yield Tongil-type rice varieties has greatly increased, reaching 817kg/10a(Geumgang No.1). Moreover, in order to promote rice consumption and strengthen the competitiveness of the rice processing industry, the R&D of high yield Tongil-type rice varieties for each processing purpose, such as rice noodles, grain feed and industrial materials, has been continuously carried out. However, because Tongil-type rice varieties or lines are generally very vulnerable to cold damage, cold tolerance test can be said to be absolutely necessary to improve the cultivation safety. This study is the result of the seedling and field cold tolerance characteristic tests carried out in 2021 of high yield Tongil-type rice breeding lines. For the cold tolerance characteristic test of seedlings, total 303 high yield rice breeding lines for processing were treated in cold water of 13°C and irrigation depth of 4cm for 10 days from the third-leaf age, then it was evaluated by comparing the degree of discoloration and withering with the checked varieties(Boramchan, Hanahreum No.2). Also, for the test of field, total 186 high yield rice breeding lines for processing were treated in cold water of 17°C by keeping pouring day and night from 30 days after transplanting to ripening stage, then it was evaluated by comparing the degree of discoloration, delay of heading, shortening rate of stem length and percent of fertile grain etc. with the checked varieties. And the cold tolerance evaluative criteria were classified as strong(1~3), medium(4~6) and weak(7~9) in overall cold tolerance. (Seedling test) As for the degree of cold tolerance of the check variety, 'Boramchan' and 'Hanahreum No.2' showed a response of 'medium' and 'weak', respectively. However, there was no 'strong' line in the high yield rice breeding lines, 2 lines showed a 'medium' response, and 301 lines showed a 'weak' response. Therefore, except for a few lines(0.7%), most lines(99.3%) showed a 'weak' response. (Field test) In terms of the overall cold tolerance of the check variety, both 'Boramchan' and 'Hanahreum No.2' showed a 'medium' response. Similarly, there was no 'strong' line in the case of high yield rice breeding lines, 20 lines showed a 'medium' response, and 166 lines showed a 'weak' response. Therefore, except for some(10.8%) lines, most(89.2%) lines showed a 'weak' response. From the above results, we selected about 100 individuals with less seed shattering and degeneration of the ear tip, and with a relatively high percent of fertile grain, and are continuing to select lines with improved cold tolerance in the F₄~F₅ group in this year. As such, most of the Tongil-type rice varieties have poor cold tolerance and thus have low cultivation safety at low temperatures. However, it is important to select improved lines through generational progress because there are some lines that still have a certain level of cold tolerance among them.

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