Interspecific hybridization of cultivated rice, Oryza sativa L. with the wild rice, O. minuta Presl.

Abstract

Crosses were made between four varieties (‘Mahsuri’, 'Setanjung', 'MR84' and 'MR103') of Oryza sativa L. (2n = 24, AA) and one accession of O. minuta (2n = 48, BBCC). The seed set obtained ranged between 9.5% and 25.1% depending on the rice variety used. By rescuing 14-day-old embryos and culturing them on 25%-strength MS medium we obtained a total of 414 F1 hybrids. The F1s were vigorous, tillered profusely, were perennial and male-sterile. The hybrids were triploid (ABC) with 36 chromosomes and showed irregular meiosis. The average frequency and range of chromosome associations at metaphase I or early anaphase I pollen mother cells of F1 plants were 29.31(16-36) Is + 3.32(0-10) IIs + 0.016(0-1) IIIs + 0.002(0-1) IIIs. Upon backcrossing the original triploid hybrids and colchicine-treated hybrids to their respective recurrent parents, and further embryo rescue, 17 backcross-1 (BC₁) plants were obtained. Of all the crosses using MR84, no BC₁ plant was obtained even after pollinating 13894 spikelets of the triploid hybrid. The BC₁s were similar in appearance to the F1S and were male-sterile, their chromosome number ranged from 44 to 48. By backcrossing these BC₁s and nurturing them through embryo rescue, we obtained 32 BC₂ plants. Of these, however, only 18 plants grew vigorously. One of these plants has 24 chromosomes and the other 17 have chromosome numbers ranging between 30 and 37. The 24-chromosome plant was morphologically similar to the O. sativa parent and was partially fertile with a pollen and spikelet fertility of 58.8% and 12.5% respectively. All of the F1 and BC₁ plants were found to be resistant to five Malaysian isolates (XO66, XO99, XO100, XO257 and XO319) of Xanthomonas campestris pv oryzae. Amongst the BC₂s, the reaction varied from resistant to moderately susceptible. The 24-chromosome BC₂ plant was resistant to the four isolates and moderately resistant to isolate XO100 to which the O. sativa parent was susceptible.