THE DEVELOPMENT OF A MONOSOMIC SERIES IN A SEMI-DWARF INDIAN BREAD WHEAT CULTIVAR KALYANSONA

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FOLLOWING the development of the complete series of 21 monosomic lines in the hexaploid wheat variety Chinese Spring by Sears[1], scientists in several countries started transferring the monosomic set to their locally adapted wheat cultivars. The Canadian workers transferred the monosomic series from Chinese Spring to other wheat varieties[2]. The European Wheat Aneuploid Cooperative (EWAC) was established in 1967 to coordinate the development and use of monosomic series in locally adapted European wheat cultivars[3]. These monosomic series are being used as a basis for developing intercultivaral chromosome substitutions. In India, Swaminathan *et al*[4] reported the development of a monosomic series in a tall, local wheat variety, Pb. C591. Most of the present day semi-dwarf wheats developed through the use of Norin 10 dwarfing genes (*Rht1* or *Rht2*) carry the necrotic gene *Ne2* on the short arm of chromosome 2B whereas the tall Indian wheat varieties carry the gene *Ne1* on the long arm of chromosome 5B[5,6]. As a result of this, lethal hybrid necrosis occurs in crosses between tall and dwarf wheats whenever the two dominant complementary necrosis genes come together in the F_1. Since high yielding, semi-dwarf varieties are grown in the major area under wheat in India, it would be advantageous to have the monosomic series in a semi-dwarf bread wheat cultivar, Kalyansona.

The 21 Chinese Spring monosomic lines were crossed as female parents to Kalyansona. The monosomic F_1 plants ($2n = 41$) were identified cytologically in each of the 21 crosses and crossed again as female parents to Kalyansona. The backcrossing of the monosomic hybrids to Kalyansona was repeated in succeeding generations and 6 to 7 backcrosses have been completed for most of the monosomic lines except mono-3B and 5B. Kalyansona mono-3B and mono-5B are still in the first backcross stage because of univalent shift detected in the earlier backcrosses.

Meiotic study of F_1 hybrids between Chinese Spring monosomes and Kalyansona indicated that these two cultivars differ by one reciprocal translocation involving chromosomes 2A and 2D[7]. Monosomic F_1s involving mono-2A and mono-2D were found to carry one trivalent at meiosis instead of a quadrivalent.

Genetic study of the F_2 progeny derived from monosomic F_1 plants was made to locate genes responsible for the character differences between Kalyansona and Chinese Spring. The gene for brown glume colour (*Rg1*) in Kalyansona was located on chromosome 1B. Kalyansona was found to carry the necrotic gene *Ne2* on chromosome 2B. The hybrid between the tall local wheat cultivar NI-4 and Kalyansona was a complete necrotic lethal. When Kalyansona mono-2B was used in this cross, monosomic F_1s were normal whereas disomic F_1s showed necrosis.

In the Kalyansona monosomics, mono-5A was identified phenotypically by speltoidy, mono-5D by lateness and monosomics for chromosomes 2A, 2B and 2D by their short plant height and reduced awning. However, all monosomics except mono-5A were identified only after cytological confirmation.

The monosomic set in Kalyansona will be useful for cytogenetic analysis of semi-dwarf bread wheat varieties since Kalyansona has been used as a parent in the pedigree of many of the recently improved Indian wheat cultivars. It is widely recognised that for the genetic study of quantitative characters of economic importance, it is essential to have the monosomic lines in locally adapted varieties. Inter-varietal chromosome substitutions can provide meaningful information only when both the donor and recipient are well adapted locally cultivated varieties.

11 May 1984; Revised 19 June 1984

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