N-BANDING KARYOGRA1\1M OF "ALCEDO" AND CHROMOSOME BAND NOI\'IENCLATURE

Muharnmad Fareed Khan
University College of Agriculture,
Rawalakot, Azad Kashmir

A standard karyotype based on N-banding has been constructed for *Triticum aestivum* L, "Alcedo". Total 12 chromosomes (2A, 3A, 4A, 5A, 7A, IB, 2B, 3B, 4B, 5B, 6B, and 7B) have been identified. N-banding chromosomes of "Alcedo" were compared with the standard karyogramm of "Chinese Spring". Majority of the chromosomes consists of dark bands. In some cases each arm has been subdivided into more than one regions. All the chromosomes were found to be similar with the "Chinese Spring" chromosomes, except 3B and 6B. The chromosomes 3B and 6B have shown translocation.

INTRODUCTION

For the last 15 years attempts have been made to recognise the wheat chromosomes by means of chromosome banding. The heterochromatin diversity has been reported in plants (Cones and Escalza, 1(86) by using different banding techniques in different species (Endo and Gill, 1984). Obviously, this involves studying the chromosome structure and banding mechanism (Jock *et al.* 1(86) and analysing chromosome evolution and genome relationship among the species (Badaeva *et al.* 1(86). This technique has only limited application to certain monocotylcdonous plants, originally developed to stain nucleolar organiser (NOR) chromosomes in animal and plants.

This technique was shown to stain specialised heterochromatin in wheat (Gerlach, 1(77). Endo and Gill (1984) reported an improved N-banding technique that was used to identify 16 of the 21 chromosomes of common wheat. A number of cereals have been subjected to chromosome banding techniques (Bennett *et al.* 1977). Giemsa banding techniques have enabled the complete identification of individual chrnrnosorpcs and chromosome arms (Fukui and Kakeda, 1990).

Chromosome band nomenclature: Lukaszcwski and Gustafson (1983) presented ideograms of the 21 C-banded wheat chromosomes based on standard genetic nomenclature of wheat. However, no attempts have been made to developa nomenclature system for the description of bands.

lordansky *et al.* (1978) proposed the generalised Cytological Nomenclature for cereal chromosomes (GCNCC) after the Paris Conference (1971) on the standardisation in human cytogenetics. Under the GCNCC system, chromosome were number on the basis of their length rather than the existing genetic nomenclature. Van Nickcrk and Picnaar (1983) and Gill (1987) took initial steps in combining the genetic and GCNCC nomenclature and made proposals for a standard nomenclature system for the description of chromosome bands in wheat. The chromosome banding nomenclature proposals were discussed at the First American Wheat Cytogenetics Workshop

held in Columbia, Missouri, in 1986. At the 7th International Wheat Genetics Symposium (IWGS), Cambridge, England, an international chromosome banding nomenclature committee was formed, which met at the site of the 7th IWGS and reached a consensus on nomenclature and designation of chromosome bands in Triticum aestivum L. "Chinese Spring" Wheat (Gill *et al., 1991).*

The main objectives of this paper arc:

i. To identify the individual chromosome.

ii. To test the chromosomal stability and translocations.

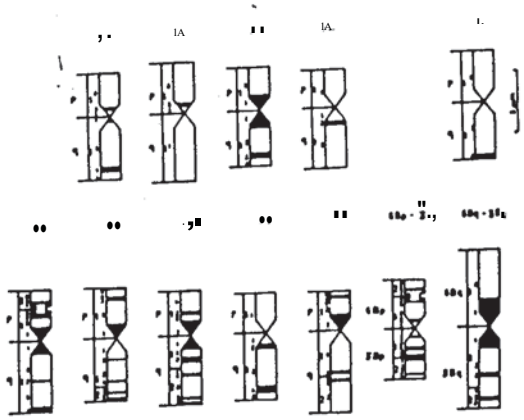

Fig. 1. N-Banding Karyogramm of "A1cdeo·

MATERIALS AND METHODS

Seeds of "Alccdo" winter wheat used in the construction of karyotype were obtained from the Department of Plant 8reeding and Genetics, Martin-Luther University, Federal Republic of Germany. N-banding procedure was originally reported by Gerlach (1977) and an improved N-banding technique reported by Endo and Gill (1984) was used here. Seeds of "Alccdo" were germinated in Petri-dishes on moist filter paper. Root tips (1.5 - 2.5 cm long) were treated with ice (0° C) for 24 hr.

Petreate root tips were fixed in ethanol-acetic acid (3:1) for 5 days and may be kept for months in a refrigerator at 4° C. N-banding: Root tips were hydrolysed with IN HCl for 1hr. followed by 45% acetic acid for 2hr. and kept at 60° C for 10 minutes, again air dried and placed in incubator for 1-2 weeks. Dried slides were treated with O.1M NaH2PO~ (pH. 4.2) solution for 140 sec. at 92 ° C and washed in distilled water. Slides were stained with 2% Giemsa stain solution (2ml stain in 100 ml 1/15 M Sorenson phosphate buffer-pH 6.8) for 40 minutes, rinsed briefly in water, and air dried.

RESULTS AND DISCUSSION

In this study the chromosome banding pallern of "Alccdo" is compared with the N-banded chromosomes of "Chinese Spring". Through N-banding total 12 chromosomes (2A, 3A, 4A, SA, 7A, 18, 28, 38, 48, 58, 68, and 78) were identilied (See Fig. 1). All the chromosomes, except 3B and 6B were found to be identical with the N-banded chromosomes of "Chinese Spring". The chromosome 38 and 68 were proved to be translocated chromosomes.

Short arm of the chromosome 38 is attached with the short arm of the

chromosome 6B (3Bq-6Bq), and long arms of 3B is attached with the long arm of the chromosome 6B (3Bq-6Bq). Such cases of translocation were also reported by Lukaszewski and Gustafson (1983). In this case no chromosome belonging to O-Genome has been identified. Banding techniques, especially N and C-banding are integral part of Cytogenetic analysis in cereal crops such as wheat, barley, rye and alfalfa, and provide a powerful tool for the analysis of cytogenetic structure and manipulation of wheat genome. There is a need for the application of banding analysis to additional crop plants. More work needs to be done on the development and application of new banding techniques in plants, from breeding point of view.

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