

IDENTIFICATION OF A NEW MONOSOME IN COTTON: CHROMOSOME 21**Dwaine A. Raska, David M. Stelly, M. Nurul Islam-Faridi and Michael E. Woods****Texas A&M University****College Station, TX****Abstract**

Cytogenetic stocks that are deficient for specific chromosomes and segments are extremely useful for genome analysis and genetic manipulations, including interspecific germplasm introgression by chromosome substitution and high-resolution QTL mapping by development of chromosome-specific recombinant inbred lines. Normal plants of the cultivated cotton species *Gossypium hirsutum* typically contain two sets of chromosomes or “genomes” per cell, where each set or genome consists of 26 chromosomes, for a total of 52 chromosomes per cell. An effort has been ongoing of many years to develop a comprehensive set of abnormal cotton plants that have just 51 chromosomes, due to loss of one chromosome each. These plants have 25 normal pairs of chromosomes and one singleton, to which the term “monosome” alludes (“mono”, for one, and “-some”, for chromosome). The long-term goal is to establish monosomic plant materials for each of the 26 different kinds of chromosomes, and once identified, to use them in research and breeding. A review of available cytogenetic stocks available as of 2003 revealed an extreme need for cytogenetic coverage on several chromosomes, including chromosome 21. Here, we describe the discovery, phenotype and evidence on the chromosomal identity of a new monosome-- for chromosome 21 (H21). An unidentified monosome designated M229 was recovered in 1993. Genomic *in situ* hybridization (GISH) to microsporocyte metaphase I chromosome spreads delimited the new monosome to the D-subgenome of cotton, but not the specific chromosome of the subgenome. Subsequent testcrosses with homozygous translocations associated the monosomic with translocations 20R-21L (7-3F) and 19L-21R (E22-13), and thereby established monosome M229 as chromosome 21 (H21). The plant phenotype consists of slower growth habit with reduced side branching; small wide leaf with reduced lobing; small flower; small bract with reduced lobing/teeth at base; small slightly longer boll with reduced seed count. Recovery rate by way of the female parent is very low (~0.25%). To date the aneuploid has been backcrossed to the BC3F1 generation with TM-1 and an F1 chromosome substitution stock with *G. barbadense* has been recovered. The latter will be used to assign linkage group(s) to chromosome 21.