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The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

Cytogenetical studies on hybrids between *S . sudanense* and *S . bicolor*

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Key words : Sudangrass(*S . sudanense*) , Sorghum(*S . bicolor*) , F_1 hybrid , F_2 hybrid , Cytogenetics

Introduction Sudangrass [*Sorghum sudanense* (piper) stapf] and sorghum [*Sorghum bicolor* (L) Moench] are two members of the genus *Sorghum* (Gramineal) (Lu , 1999) . Their Hybrid has exhibited favorable forage yields and overall improved quality and disease resistance . They are widely used in aquaculture , production of livestock food and environmental protection (Zhan *et al* . , 2008) , but some disagreement exists as to whether they actually belong to the same species . We studied the relationship between sudangrass (*S . sudanense*) and sorghum (*S . bicolor*) using cytogenetical characters of 2 sudangrass varieties , 2 sorghum varieties , 3 F_1 hybrids and 2 F_2 hybrids .

Material and methods The materials used for this study included 2 sudangrass varieties (Sa , S722) , 2 sorghum varieties (Tx623A , 3042A) , 3 F_1 hybrids (Tx623A×S722 F_1 , 3042A×Sa F_1 , Tx623A×Sa F_1) and 2 F_2 hybrids (Tx623A×S722 F_2 , Tx623A×Sa F_2) . The experiment for somatic cell chromosome slides was conducted using the method of wall degradation and hypotonic treatment for making chromosomal preparations . Chromosome pairing behavior was observed in meiosis of pollen mother cells (PMCs) using the acetic-carmine smear method .

Results The karyotypic types of the 7 materials were all 1A (Figure 1) . The karyotype formula of Sa was 2n=18m+2sm (2sat) , the formulas of 3042A and Tx623A×S722 F_1 were 2n=20m , the others 4 materials were 2n=20m (2sat) . The karyotype formulas were different , whether within the 2 sudangrass varieties or within the 2 sorghum varieties . The differences of all chromosome indexes weren't significant among 3 groups using Duncan's SSR test ($P>0.05$) .

The paired chromosome configuration of sorghum-sudangrass hybrid F_1 in pollen mother cells at metaphase I was $2n=2x=20$ (10II) (Figure 2) . The frequency of paired bivalent was 10 , but the frequencies of rod bivalent of Tx623A×S722 F_1 , 3042A×Sa F_1 and Tx623A×Sa F_1 were different , i .e . 4 .887 , 5 .710 and 5 .126 . At anaphase I , the paired chromosomes of hybrid F_1 could separate from each other . The pollen fertility rates of F_1 hybrids were 92 .62% , 95 .21% and 96 .53% respectively ; the seed set rates were 69 .15% , 70 .32% and 72 .28% , respectively . The chromosome number of hybrid F_2 was 20(2n=20) . Therefore , there was a higher homology between sudangrass and sorghum .

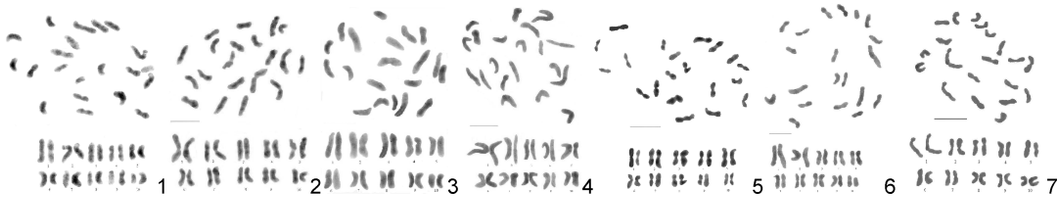

Figure 1 *Mitotic metaphase chromosomes and karyograms of 7 varieties (Bar= 5μm) . Note : 1 : Sa ; 2 : S722 ; 3 : Tx623A : 4 : 3042A ; 5 : Tx623A×S722 F_1 : 6 : 3042A×Sa F_1 ; 7 : Tx623A×Sa F_1 .*

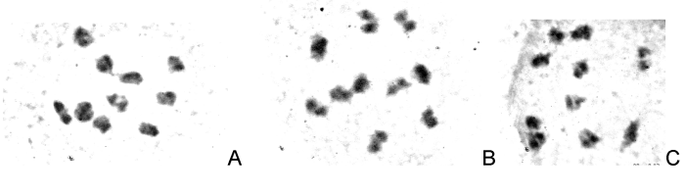

Figure 2 *Meiotic chromosome configuration of pollen mother cell of F_1 hybrid (×1600) . Note : A : Tx623A×S722 F_1 ; B : 3042A×Sa F_1 ; C : Tx623A×Sa F_1 .*

Conclusions The change of chromosome length wasn't obvious in sorghum and sudangrass . The chromosomes of F_1 hybrid paired and divided regularly in meiosis , therefore sudangrass/sorghum relationship is sufficiently close .