サトウキビの新しい育種素材となるサトウキビとエリアンサスの属間雑種の作出

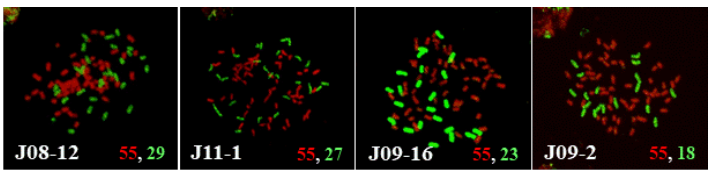
Development of intergeneric F_1 hybrids between sugarcane and *Erianthus arundinaceus* as a new sugarcane breeding material

サトウキビ（*Saccharum* spp hybrid）の生産性や不良環境適応性の更なる改良に向け、サトウキビとバイオマス生産性や不良適応性に優れる近縁遺伝資源エリアンサス（*Erianthus arundinaceus*）との属間雑種を作出した（図1）。雑種には両親それぞれの半数の染色体が遺伝するが、エリアンサスの染色体数は雑種毎に大きな変異があり（図2）、DNA量を測定することで、エリアンサス染色体数を大まかに推定できる（R^2=0.85**）。雑種の多くは両親より生育が劣る雑種弱勢を示すが、エリアンサス染色体数と収量関連形質には正の相関関係があり、母本としたサトウキビと同程度の乾物重やショ糖含率となる系統を選抜できる（図1、表1）。作出した雑種はサトウキビ改良の新しい育種素材として、雑種の特性情報は効果的な育種利用のための基礎情報として利用できる。

To improve sugarcane, we developed intergeneric F_1 hybrids between sugarcane (*Saccharum* spp. hybrid) and *Erianthus arundinaceus* (Fig. 1). The number of *Erianthus* chromosomes varied among hybrids, even though “n + n” chromosome transmission occurred (Fig. 2). Moreover, the number of *Erianthus* chromosomes in the hybrids could be estimated from DNA content (R^2 = 0.85**). Many hybrids showed “hybrid weakness,” but the selection and utilization of hybrids with higher yields or higher sugar contents is possible (Fig. 1, Table 1). These hybrids provide new breeding materials for sugarcane improvement.

a: NiF8 (*Saccharum* spp. hybrid, female parent), b: J08-12 (intergeneric hybrid with no hybrid weakness), c: J11-14 (intergeneric hybrid with hybrid weakness). These pictures were taken on 8 May 2013 in the ratooning field at JIRCAS-TARF.

図1 属間雑種の生育
Fig. 1. Growth of intergeneric hybrids between sugarcane and *E. arundinaceus*



Variation of chromosome composition among intergeneric hybrids generated by crossing between NiF8 (Sugarcane, female, 2n=110) and *E. arundinaceus* (male, 2n=60). J08-12, J11-1, and J09-16 were screened by 5S rDNA marker, while J09-2 was identified by morphological characteristics. Numbers in the bottom right corner indicate *Saccharum* (red) and *Erianthus* (green) chromosome number.

図2 属間雑種の染色体組成
Fig. 2. GISH analysis of intergeneric hybrids

表1 属間雑種の農業特性（新植栽培）
Table 1. Agronomic characteristics of intergeneric hybrids (New planting)

Characteristic	NiF8 Sugarcane (Female)	JW4 *Erianthus* (Male)	Intergeneric hybrids Average (n=32)	Min. (n=32)	Max. (n=32)	CV_g (n=23)[1)]	Correlation with *Erianthus* chromosome no. (n=14)[2)]
Dry matter yield (g/stool)	1621.9	1419.3	591.0	40.3	1713.2	68.6	0.773*
Number of stalks (no./stool)	6.4	43.4	10.8	1.0	22.1	40.2	0.336
Stalk length (cm)	119.5	64.8	67.6	15.0	125.8	39.5	0.457
Stalk diameter (mm)	21.8	10.7	12.1	5.9	16.6	17.4	0.697*
Sucrose content (%)	17.8	3.1	8.5	2.3	18.0	20.4	0.418
Fiber content (%)	10.2	23.4	16.7	8.0	22.4	15.1	-0.409

Five stools per plot (2.8 m^2) with three replicates placed according to a randomized block design were prepared for 23 intergeneric hybrids and the parental varieties. Six hybrids were replicated twice and three only once due to difficulties with multiplication. 1): Analysis of the genetic coefficient of variance (CVg) were performed using data for the 23 hybrids for which three replicates were available. 2): The data of 14 intergeneric hybrids with no intra-clonal variation in 5S rDNA sites were used. *Significance at a 5% level.

国立研究開発法人 国際農林水産業研究センター
〒305-8686 茨城県つくば市大わし1-1
Japan International Research Center for Agricultural Sciences
1-1 Ohwashi, Tsukuba, Ibaraki, 305-8686 https://www.jircas.go.jp/