Kwanhatai Tanongjid 2008: Population Improvement in Thai Supersweet Composite 1 DMR by Using Testcross Selection with Inbred Tester. Master of Science (Agriculture), Major Field: Agronomy, Department of Agronomy. Thesis Advisor: Assistant Professor Choosak Jompuk, Dr.sc.nat. 105 pages.

The objectives of this research were to: (1) study the response to selection of S_2 testcross selections with an inbred tester of the Thai Supersweet Composite 1 DMR cycle 1 (TSC 1 DMR (HI)C1-F_4) and: (2) investigate the combining ability and seed yield of inbreds with respect to fresh yield of hybrids developed by this research. The experiment with 150 S_2 x KSei14004 was evaluated during the 2006 dry season at the National Corn and Sorghum Research Center. Twenty five selected S_2 lines were recombined to form cycle 2. A selection of 60 S_4 lines were selected to cross with KSei 14004 and tested during the 2007 dry season. The 77 hybrids of the selected S_6 line that were crossed with four inbreds (KSei 14004, SSH 0001-S_{12}-82-2-2-1-1, Hi-Brix4-S_{12}-25-1-2 and Hi-Brix-4-S_{11}-26-5-2-3-1) were evaluated during the 2008 dry season. The five outstanding hybrids gave higher fresh yields and had some better agronomic traits with a similar eating quality (tenderness and sweetness) compared to the four hybrid checks (Insee 2, Sugar 75, Hi-Brix 3 and KSSC 604). The results from the 34 inbreds tested during the 2008 dry season showed that four of the inbreds' parents of the 5 hybrids gave higher seed yields than those of the two inbred checks (KSei14004 and SSW1114) as well as some better agronomic traits. The progress of the selections was evaluated during the 2008 dry season and consisted of: six populations (TSC 1 DMR (HI)C0, C1 and C2 and KSC2 (HI)C0, C1 and C2); nine inter-population crosses of TSC 1 x KSC 2; six populations crossed with the four inbreds; and three hybrid checks. For the populations *per se*, TSC 1 DMR (HI)C2 gave the highest fresh yield and tenderness with most agronomic traits also better than those of cycle 0 and 1. With respect to the inter-population crosses, cycle 2 provided the highest general combining ability (GCA) for fresh yields and tenderness. For population crosses with inbreds, cycle 2 also gave the highest fresh yield and eating quality (tenderness and flavor). In conclusion, the S_2 testcross selection with the inbred tester was highly efficient in improving fresh yield, eating quality, some agronomic traits and GCA for populations *per se*, inbreds, and hybrids including seed yields of the inbred lines.

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