File S1

History of maize haploid inducer development in the public domain

The history of *in vivo* haploid induction in maize started with observations by Emerson and Randolph in the 1930s on spontaneously occurring haploids in certain crosses (Chase 1969). Subsequently, marker stocks were developed to identify haploids in the seed or seedling stage such as Randolph's (1940) tester stock and the Purple Embryo Marker (PEM) stock derived by Nanda and Chase (1966).

Chase (1949) described the crucial influence of pollinator genotypes on the frequency of *in vivo* haploid induction. This initiated the development of new pollinators with improved haploid induction rate (HIR). The highest HIR at that time was reported by Coe (1959), who found 343 haploids in 10,616 observed plants from selfed progeny of his "Stock 6". Chumak (1979) at the Krasnodar Lukyanenko Agricultural Research Institute (KLARI) developed synthetic populations (PEM48II and others; HIR ~ 0.02 to 0.29%) on the basis of PEM and non-inducer lines and hybrids. In 1986, they observed that a hybrid from the cross of synthetic population PEM48II (HIR ~ 0.08%) and Zarodishevy Marker Saratov (ZMS, HIR ~ 0.55 to 3.43%; Tyrnov and Zavalishina 1984) introduced from Saratov State University (SSU) has HIR of 0.27%. In 1989, Shatskaya and colleagues developed a high HIR inducer-population Zarodishevy Marker Krasnodar (ZMK1, HIR~6 to 8%) using four lines from the cross PEM48II×ZMS. One family of inducer ZMK1 is also known as the Krasnodar Embryo Marker Synthetic (KEMS). The improved inducer ZMK1U (HIR~11 to 13%) was created by direct selection of ZMK1 (Shatskaya 2010). At SSU, besides ZMS, Zavalishina and colleagues also developed KMS (HIR ~ 3%) by crossing Brown markers with Stock 6 in 1979 (A. Zavalishina, personal communication 2014) and subsequently developed ZMS8 in 1987 (HIR ~ 8 to 10%; Zavalishina and Tyrnov 1992). In 1987, Lashermes and Beckert (1988) developed WS14 (HIR ~ 3 to 5%) from the cross Stock 6 × W23ig. These inducers were introduced into Germany, Moldova and Romania, and served as basis of further improved inducers, such as RWS (HIR ~ 8%; Röber *et al.* 2005), UH400 (HIR ~ 8%; Prigge *et al.* 2012b), LfL inducers (HIR > 10%, J. Eder, personal communication 2013), MHI (HIR ~ 7 to 9%; Chalyk 1999), and PHI inducers (HIR ~ 10 to 16%; Rotarenco *et al.* 2010). Recently, the University of Hohenheim released inducers UH600 and UH601 combining high oil content in the seeds (OC ~ 10.5 to 11.6%) with good HIR > 8% (Melchinger *et al.* 2013).

Inducer development was also conducted independently in several Asian countries. Sarkar developed

inducer ACIR (HIR ~ 3%) from a cross with Stock 6 (Sarkar *et al.* 1994). Liu and Song (2000) developed the first Chinese maize inducer CAUHOI (HIR ~ 3%) by crossing Stock 6 and Beijing High-oil synthetic in 1998. Chen continued this work and developed CAU5 (HIR ~ 8%) and CAU079 (HIR ~ 6%) by crossing UH400 and CAUHOI (Xu *et al.* 2013). The HZI inducers were also developed in China by Huangzhong Agricultural University with HIR ~ 4 to 8% (F. Qiu, personal communication 2013). CIMMYT in collaboration with the University of Hohenheim developed tropically adapted inducer lines (TAIL5, and TAIL7 to TAIL9, HIR ~ 5 to 11%) as described by Prigge et al. (Prigge *et al.* 2012a).