Registration of HT621, a High Carotenoid Content Tritordeum Germplasm Line

HT621 is a doubled haploid hexaploid tritordeum (× Tritordeum Asch. & Graebn.) (Reg. no. GP-7, PI 636334) developed and released by the Institute for Sustainable Agriculture (CSIC) in Córdoba, Spain (2001) for use in research and crop improvement programs. Tritordeums are the amphiploids derived from crosses between Hordeum chilense Roem. & Schult. (2n = 2x = 14) and Triticum turgidum Desf. (2n = 4x = 28) (Martín and Sánchez-Monge, 1982) or T. aestivum L. (2n = 6x = 42) (Martín and Chapman, 1977). After chromosome doubling of the hybrid using colchicine treatment, hexaploid and octoploid tritordeums are developed from the crosses with durum and bread wheat, respectively. These amphiploids show potential to become a new crop (Martín and Cubero, 1981; Martín et al., 1996). However, the main interest of tritordeum relates to its use as a genetic bridge for wheat breeding (Martín et al., 1999).

HT621 is a tritordeum with high levels of seed carotenoid content derived from the multiple-way cross (HT47/HT31/HT44/HT31). HT22, HT24, HT44, and HT47 are primary hexaploid tritordeums (2n = 6x = 42) while HT18 is an octoploid one (2n = 8x = 56). These primary tritordeums were derived from the following crosses: HT22 = H1/T22, HT24 = H1/T24, HT44 = H16/T81, HT47 = H8/T31, HT18 = H7/T59. HT31 was derived from the cross HT22/HT24/HT18. H1, H16, H8, and H7 are H. chilense accessions; T22 (Cocorit), T24 (Mexicali-Andalucía), T31 (CBDWCIIMMYT, 1986–87; Entrie 31) and T81 (CBDWCIIMMYT, 1986–87, Entrie 81) are durum wheats. T59 is T. aestivum L. subsp. sphaerococcum (Percival) Mackey. For somatic chromosome counting, root-tips were treated for 4 h with a 0.05% colchicine-aqueous solution, fixed in 3:1 ethanol/acetic acid, and stained by the conventional Feulgen technique.

Tritordeum is a new species; therefore fertility, earliness, and disease resistance were the selection criteria in early generations. Carotenoid content was not a selection criterion in early generations. A pedigree method of breeding was followed. In F5, we selected the line HTC486 due to its agronomic performance including height, flowering time, yield and disease resistance against stripe rust [caused by Puccinia striiformis West. (syn. P. glumaeum Eriks & Henn.)], leaf rust [caused by P. triticina Eriks (syn. P. recondita Rob. ex Desm. f. sp. triticci)], stem rust [caused by P. graminis Pers.:Pers. f. sp. triticii Eriks & E. Henn.], powdery mildew [caused by Blumeria graminis (DC) E.O. Speer f. sp. tritici Em. Marchal (syn. Erysiphe graminis DC f. sp. tritici Marchal)], and leaf blotch [caused by Mycosphaerella graminicola (Fuckel) J. Schrött In Cohn [anamorph: Septoria tritici Rob. in Desm.]] and Septoria nodorum (Berk.) Berk. [teleomorph: Leptosphaeria nodorum (Müller)]. HTC486 was characterized for different quality parameters and it showed a high seed carotenoid content. We produced double-haploid lines from HTC486 using the maize (Zea mays L.) method according to Ballesteros et al. (2003). The double-haploid lines were multiplied and evaluated for carotenoid content by absorbance reading at 440 nm following the method proposed by Williams et al. (1988).

In 4 yr of Guadalquivir River Valley irrigated trials with three replications (37° 85′ N; 04° 85′ W), HT621 grain yield of 4000 kg ha	extsuperscript{-1}, less than Cartaya and Simeto (4800 kg ha	extsuperscript{-1}). In the same trials, HT621 and Simeto had test weights of 755, 800, and 790 kg m	extsuperscript{-1}. The thousand seed weight was 35, 39.5, and 46 g for Cartaya, and Simeto, respectively. All seed development without glumes. Alveograph deformation 125 × 10	extsuperscript{-4} J for HT621 and 150 × 10	extsuperscript{-4} J for Cartaya, and 2% with 43. J. Ballesteros, M.C. Ramírez, S.G. Atienza, A. Martín, Instituto de Agricultura Sostenible (CSIC), Apartado 4084, E-14080 Córdoba, Spain. Registration by CSSA. Accepted 31 July 2004. Bread and durum wheat, barley and triticale cultivars (2003). The development of tritordeum: A novel cereal for food and animal nutrition. J. Cereal Sci. 30:85–95.

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