gray leaf spot at Tenti (9°48′ N, 8°48′ E, altitude 1350 m) and Vom (9°40′ N, 8°50′ E, altitude 1300 m) in Nigeria. Inoculation with gray leaf spot was done at the four- to six-leaf stage by placing a pinch of ground infected leaf samples with gray leaf spot collected in the previous season into the leaf whorls. At each location, gray leaf spot, northern leaf blight, and common rust severity were visually rated at 3 wk after silking on a scale of 1 to 5, where 1 = no visible infection and 5 = severe infection (Shagi Maroof et al., 1993). At the S_1 to S_3 stages of inbreeding, rows that exhibited disease severity ratings of 3.0 or less for the three foliar diseases in the two locations were selected. Single plant selections were then made from each selected row at each location on the basis of vigorous growth (visual assessment for bigger and sturdy plants with healthy leaves), low ear placement, resistance to lodging, synchrony between pollen shed, and silking, as well as well filled ears. At the S_4 stage, selected lines were evaluated in the field under artificial infestation with viruliferous leafhoppers (*Cicadulina* spp.) for resistance to MSV at IITA, Ibadan (7°26′ N, 3°54′ E, altitude 150 m).

S_4 lines with combined resistance to the four diseases were crossed to two inbred testers, TZMI102 and TZMI407, that are parents of the best single-cross hybrid marketed in Plateau State of Nigeria as '8535-23' to form testcrosses. The S_4 testcrosses and the check hybrid, 8535-23, were evaluated in single 5-m row plots at Tenti, Vom, and Saminaka (10°28′ N, 8°41′ E, altitude 800 m) in Nigeria in 1997 and 1998 by means of a simple lattice design. Selected S_4 lines that combined well with at least one of the inbred testers were advanced from S_5 to S_7 stages of inbreeding with repeated evaluation for resistance to gray leaf spot, northern leaf blight, and common rust at each stage. S_7 lines with combined resistance to the four diseases were selected to form experimental hybrids, which were again tested at Tenti, Vom, and Saminaka in Nigeria between 1999 and 2003. Inbred lines that did well in hybrid combinations and with better resistance to foliar diseases than the hybrid check, 8535-23, in field trials over 2 yr were selected and released to collaborators in the national agricultural research systems and seed companies in and outside of West and Central Africa.

On the basis of combining ability effects and mean grain yields of the lines in crosses with the two inbred testers, TZMI711 to TZMI718 were assigned to the TZMI02 heterotic group while TZMI719 to TZMI724 were placed in the TZMI407 heterotic group. The remaining six lines (TZMI725 to TZMI730) were found to be heterotic to both TZMI102 and TZMI407. In breeding nurseries evaluated at Tenti and Vom for six years (1998–2003), the average gray leaf spot scores for the tropical midaltitude lines varied from 1.6 to 2.9, which were similar to or significantly better than that of the standard check line, TZMI407 (2.7). In an evaluation trial conducted at Saminaka and Vom in 2003, the lines tasseled between 74 and 83 d, silked between 77 and 86 d, and had plant height varying from 91 to 188 cm and ear height varying from 40 to 96 cm. Most of the inbred lines had flint grain texture and can be used as sources of genes for combined resistance to the four foliar diseases as well as favorable alleles to broaden and diversify the genetic base of adapted germplasm in tropical midaltitude environments. They can also be used as promising sources of exotic germplasm to temperate environments because they should possess desirable traits fixed through several generations of inbreeding and selection.

Small quantities (30 kernels) of seed are available to crop researchers upon written request to the leader of the maize breeding unit at IITA, PMB 5320, Ibadan, Nigeria. It is requested that appropriate recognition of the source be given when these germplasm lines contribute to the development of new lines, hybrids, and synthetic varieties.

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Registration of KS99WGRC42 Hessian Fly Resistant Hard Red Winter Wheat Germplasm

KS99WGRC42 (Reg. no. GP-779, PI 635054) is a hard red winter wheat (*Triticum aestivum* L.) with resistance to the Hessian fly [*Mayetiola destructor* (Say)] developed cooperatively by the USDA-ARS, the Kansas Agricultural Experiment Station, and the Wheat Genetics Resource Center. It was released as germplasm in August 1999.

KS99WGRC42 is homogeneous for resistance (antibiosis) to Biotype L of the Hessian fly based on greenhouse tests of seedlings. KS99WGRC42 is an F_5–derived line of the cross 'Karl 92'/PI 94641//'Jagger'*2/Karl 92. Hessian fly resistance of the germplasm is derived from PI 94641, an accession of cultivated emmer wheat [*T. turgidum* L. subsp. *dicoccum* (Schrank ex Schübler) Thell.] from Germany. The resistance of KS99WGRC42 to Hessian fly is controlled by a single partially dominant gene located on chromosome 1AS. Analysis of KS99WGRC42 with microsatellite markers indicates that a small, interstitial segment from *T. turgidum* subsp. *dicoccum* containing the Hessian fly resistance gene was transferred to the distal portion of 1AS. Two genes for resistance to Hessian fly have been located to wheat chromosome 1A: *H5* and *H11*. KS99WGRC42 provides effective resistance to Biotype L of the Hessian fly, which is virulent to *H5* (Ratcliffe and Hatchett, 1997). The gene *H11* was transferred to common wheat from durum wheat [*T. turgidum* L. subsp. *durum* (Desf.) Husnot], a species closely related to emmer wheat. Differential reactions were observed when seedlings of PI 94641, KS99WGRC42 and PI 562617 (*H11*) (Patterson et al., 1994) were infested with Biotype L of the Hessian fly at 20°C and at 26°C. PI 94641 and KS99WGRC42 were homogeneous for resistance at both temperatures. A heterogeneous reaction was observed

for PI 562617 at 20°C and a susceptible reaction was observed at 26°C. These data indicate that the gene in KS99WGRC42 is different from *H5* and *H11*.

KS99WGRC42 is a hard red winter wheat similar to the Karl 92 (Sears et al., 1997) parent in height and days to heading. When evaluated in the field at Manhattan, KS, in 2002 and 2003, no visible symptoms of *Wheat soilborne mosaic virus* were observed on KS99WGRC42 and Karl 92. Intermediate and high levels of infection were observed for Jagger and 'TAM 107' with scores of 2 and 4, respectively, on a scale of 0 to 5 (0 = no visible symptoms and 5 = severe mottling and stunting). No stripe rust (caused by *Puccinia striiformis* Westend.) was observed on KS99WGRC42, Karl 92, or Jagger at Hutchinson, KS, in 2003, a year with heavy stripe rust infection. High levels of leaf rust (caused by *Puccinia triticina* Eriks.) were observed on KS99WGRC42 and both of the hard winter wheat parents at Manhattan and Hutchinson, KS, in 2003 and 2004.

Small quantities (3 g) of seed of KS99WGRC42 are available on written request to the corresponding author for at least 5 yr from the date of this publication. It is requested that the appropriate source be given when this germplasm contributes to research or development of new cultivars.

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Registration of Yellow Dwarf Viruses Resistant Wheat Germplasm Line P961341

P961341 soft red winter wheat (*Triticum aestivum* L.) germplasm (Reg. no. GP-780, PI 634825) was developed by Purdue University Agricultural Research Programs and USDA-ARS and released in 2003. P961341, a translocation line, has resistance to yellow dwarf viruses, *Barley yellow dwarf virus*-PAV luteovirus (BYDV) and *Cereal yellow dwarf virus*-RPV polarovirus (CYDV) from intermediate wheatgrass {*Thinopyrum intermedium* (Host) Barkworth & Dewey [syn. *Agropyron intermedium* (Host) P.B.]}.

The parentage of P961341 is 'Abe'/*Th. intermedium*//'Compton'/3/'Arthur'/'Caldwell'/4/Caldwell/5/'Oasis'*3/'Clark'*4/'Ning 7840'//Clark/'Roazon'/6/'Patterson'. After the backcross to Caldwell, an F_2 plant was identified as having a low concentration of BYDV and CYDV by ELISA testing (values of 0–0.1 in various tests) compared to susceptible Abe (values of 0.5–1.0) at 14 d after infestation of 2- to 3-leaf seedlings with viruliferous aphids (*Rhopalosiphum padi*). Cytologically this plant was $2n = 43$ (21 II + 1I). F_3 plants that were resistant to BYDV and CYDV, determined by low ELISA values of 0 to 0.1 compared to susceptible Abe (0.5–1.0), were self pollinated to produce F_4 plants. Four F_4 plants derived from this $2n = 43$ F_2 plant were identified by cytology as $2n = 42$ and resistant to BYDV and CYDV by ELISA, and self-pollinated seeds from these four plants were bulked and released as the chromosome substitution line P29 (Sharma et al., 1997). Another F_4 plant from the same $2n = 43$ F_2 plant was $2n = 44$ and resistant to BYDV and CYDV, and was designated P107. This chromosome addition line was not released. P107 was irradiated with γ rays from ^{60}Co using a 120-Gy radiation dose. Putative translocation plants in subsequent generations after selfing were selected on the basis of low or negligible ELISA values, as described above, and as having 42 chromosomes. Progenies were characterized in these subsequent generations by ELISA, chromosome analysis (counts and pairing), Southern hybridization using a *Thinopyrum*-specific probe A600 and group 7 chromosome RFLP markers, and slot blots and genomic in situ hybridization using the rye telomeric repetitive sequence pAW161, as described for progenies of P29 (Sharma et al., 1999; Crasta et al., 2000). An M_4 putative translocation plant with a low ELISA value and $2n = 42$, was crossed to an F_5 plant selection with the parentage Oasis/3/Clark*4/Ning 7840//Clark/Roazon, and the F_1 was crossed to Patterson. After the cross to Patterson, F_2 and F_4 plants were selected using a pedigree breeding method. The germplasm line P961341 is the progeny of a single F_4 plant selection. DNA marker analysis showed that P961341 has most of the long arm of chromosome 7E combined with the short arm of chromosome 7D (7DS.7DL-7EL).

ELISA values in a four-replicate test, 14 d after infestation with aphids viruliferous for BYDV and CYDV, for P961341 and Abe were, respectively, 0.095 and 0.516, $LSD_{0.05} = 0.264$. Yellow dwarf symptom scores (0–9, 0 = no symptoms to 9 = severe leaf discoloration and plant stunting) in replicated field nurseries in 2002 at Lafayette, IN, with natural yellow dwarf viruses infection in winter wheat seedlings in fall 2001 for P961341, P29, Abe, and Caldwell were, respectively, 0.5, 0.5, 7.8, and 5.2, $LSD_{0.05} = 0.7$; when evaluated in June 2002. Eighty percent of wheat tissue collections at Lafayette, IN, in 2002 were determined to contain BYDV and 20% were determined to contain CYDV. Grain yield for P961341, 'Roane', and 'Ernie' were, respectively, 2882, 2382, and 2153 kg ha^{-1} averaged over two locations in Indiana and two replicates at each location, $LSD_{0.05} = 201$ in 2002, a year characterized by considerable infection by yellow dwarf viruses. In 2003, with no or negligible yellow dwarf virus infection in wheat, grain yield for P961341, Roane, and Ernie were, respectively, 3056, 3051, and 2623 kg ha^{-1} averaged over 7 locations in Indiana, with two replicates at each location, $LSD_{0.05} = 213$.

P961341 has resistance to leaf and glume blotch [caused by *Stagonospora nodorum* (Berk.) Castellani and Germano] typically averaging a score of 4 (0–9 scale in which 0 = no symptoms to 9 = severe disease in glumes). Cultivar Patterson had an average score of 6 in the same tests. P961341 develops patches of purple pigment in the glumes to variable degrees in different environments, giving the appearance of glume blotch. P961341 has *Lr37-Yr17-Sr38* linkage block from parent