Institute of Agronomic Research (IRA) as part of the USAID-financed National Cereals Research and Extension Project. They were released in 1991 for use as source germplasm or as parental lines, principally in the high-rainfall tropical midaltitudes. Few internationally available inbred lines have been developed for this ecology.

The principal nursery and testing sites for development of these lines were located in the Western and Adamawa Plateaus of Cameroon (5° to 8° N lat, 1000 to 1500 m altitude, 1500 to 2200 mm monomodal season precipitation). Resistance to *Exserohilum turcicum* (Pass.) K.J. Leonard & E.G. Suggs, *Cercospora zeae-maydis* Tehon & E.Y. Daniels, and *Physoderma maydis* (Miyabe) Miyabe were rated on the Jos Plateau of Nigeria (9° to 10° N lat, 1350 m altitude, 1300 mm annual monomodal season precipitation). Maize streak virus (MSV) evaluation was performed at IITA, Ibadan, Nigeria (tropical lowland), using artificial field infestation with viruliferous leafhoppers (*Cicadulina* spp.).

Sixteen second-cycle lines were developed from first cycle inbred lines crossed with one of two reciprocal synthetics (SynA1 and SynB1). The inbred lines were derived in Cameroon from the IITA Midaltitude Streak Resistant (TZMSR) population (2,3). SynA1 and SynB1 had been formed from inbreds initiated in Nigeria from crosses of streak resistant lowland cultivars with East African midaltitude cultivars and hybrids. Three lines were extracted from single crosses between midaltitude lines. These 19 lines are therefore the first recycled lines in the midaltitude program (1). The principal selection procedures included disease nursery and per se selection at S_1 to S_3 stages, testcross selection (with a single-cross tester) at the S_3 stage. Testing as parents of single-cross hybrids was begun at the S_4 stage of inbreeding. All lines listed have been used as a parent of at least one outstanding or commercially acceptable single-cross hybrid in Cameroon or Nigeria in 1991. Subline selection in disease nurseries was continued until at least S_5 stage, and selected sublines were bulked within the original S_3 line parent of the testcross selection to maintain vigor.

Predominant leaf pathogens in the Cameroon selection environments were *E. turcicum* and *Puccinia sorghi* Schwein., with occasional pressure from *Bipolaris maydis* (Nisikado & Miyake) Shoemaker, *Pucc. polysora* Underw., and *Phys. maydis*. A higher pressure (or different race) of *E. turcicum*, as well as a *Cercospora* sp., was observed during rating at Jos, Nigeria, in 1991 (Table 1).

It is expected that the primary utility of these lines will be as parents in varietal synthetics, and in inbred source synthetics and crosses for the high-rainfall tropical midaltitudes. The lines all have white kernels, with a range of textures. All lines are resistant to maize streak virus. Maturity classification is late midaltitude, flowering 4 to 9 d later than TZMSR (77 d) and the Zimbabwe Seed Coop hybrid ZS206 (76 d) at Jos, Nigeria, in 1991.

Small quantities (40 kernels) of seed will be provided to crop researchers upon written request. Requests should be sent to the Maize Improvement Program Leader, IITA, PMB 5320, Ibadan, Nigeria. We ask that appropriate recognition of source be given when this germplasm contributes to an improved cultivar or germplasm.

L. A. EVERETT,* J. T. ETA-NDU, M. NDIORO, I. TABI, AND S. K. KIM (4)

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Registration of Four Tropical Midaltitude Maize Germplasm Populations

Four tropical midaltitude maize (*Zea mays* L.) populations, ATP (Reg. no. GP-289, PI 561620), Early White (Reg. no. GP-290, PI 561621), and Synthetic 4-White (Reg. no. GP-291, PI 561622) field types and sweet corn MSR-su (Reg. no. GP-292, PI 561623), were jointly developed by the International Institute of Tropical Agriculture (IITA) and the Cameroon Institute of Agronomic Research (IRA) as part of the USAID-financed National Cereals Research and Extension Project. They were released in 1991 for use as source germplasm or as cultivars, principally in the high-rainfall tropical midaltitudes of Africa. Few populations have been developed by the international research centers for this ecology.

The principal nursery and testing sites for development of these populations were in the Western and Adamawa Plateaus of Cameroon, and the Jos Plateau of Nigeria. These sites are located between 5° and 10° N lat at 1000 to 1500 m altitude, and receive 1300 to 2200 mm annual monomodal season precipitation. Maize streak virus (MSV) screening was performed at IITA, Ibadan, Nigeria (tropical lowland), using artificial field infestation with viruliferous leafhoppers (*Cicadulina* spp.).

ATP is a flinty-grained, tall midaltitude population, selected primarily on acid volcanic soils of western Cameroon. Grain color is primarily yellow, with some segregation for white. It is late maturing, requiring an average of 75 d to 50% silk emergence across the Cameroon and Nigerian midaltitude test sites in 1991, approximately the same as the IITA TZMSR population (1) and the Zimbabwe Seed Coop hybrid ZS206. It is resistant to ear rots and *Exserohilum turcicum* (Pass.) Leonard & Suggs, and is moderately resistant to MSV and *Puccinia sorghi* Schwein. Tropical lowland and midaltitude populations and hybrids were screened on acid soils in a split block design with lime (3 Mg ha^{-1}) and no lime treatments in order to separate effects of climatic adaptation from that of tolerance to acid soil. The best 11 populations and hybrids across treatments and locations were selected as parents. These were hybrids HE1066 and 1049 (Limagrain Genetics, France), and populations 'ESALQ YF3', 'ESALQ 5VF1', 'CMS 36', and 'CMS 201x' (Brazil national program, through IITA), 'Suwan-1' (Thailand national program), 'Across 7728' (CIMMYT), 'Shaba' (Zaire national program), 'COCA' (Cameroon national program), and TZMSR. The parents were recombined three times, and the resulting population received four cycles of half-sib family selection for yield, lodging resistance, leaf disease resistance, and yellow flinty grain. Selection intensity was ≈10% in the 200 to 300 families evaluated across two sites per cycle. Following recombination of Cycle 4, 350 MSV resistant plants were selected in the screening nursery and selfed. More than 300 S_1 plants were selected and recombined in the MSV nursery the following season to reconstitute the population. In 1991 trials across five midaltitude sites in Cameroon and Nigeria, ATP yielded an average of 7.0 Mg ha^{-1} at 150 g kg^{-1} grain moisture, 0.5 Mg ha^{-1} greater than entries derived from TZMSR.

Early White is a white, flinty-grained, early-maturing midaltitude population. It is moderately resistant to *E. turcicum*, *P. sorghi*, and MSV, and is short statured and lodging resistant. Early White required 68 d to 50% silk emergence across five midaltitude locations in Cameroon and Nigeria in 1991, 4 d earlier than the medium-maturing check 'Kasai' and 6 d earlier than TZMSR. One cycle of full-sib and two cycles of half-sib family selection were performed in CIMMYT subtropical Population 34 in the Cameroon midaltitudes under heavy natural leaf blight and rust infection. Recombinations were made from 26, 14, and 19 families in the respective cycles. Early flowering S_3 lines from the TZMSR population were testcrossed onto the improved Population 34, and 15 selected testcrosses were recombined to form Early White. Following three cycles of ear-to-row recombination and mild selection in the midaltitude zone of Cameroon, 340 plants were selected and selfed in the MSV screening nursery. The population was reconstituted from more than 300 S_1 plants selected and recombined in the MSV screening nursery the following season.

Synthetic 4-White is a medium-statured, white-grained, varietal synthetic, intermediate between flint and dent, and classified as late maturing, requiring an average of 74 d to 50% silk emergence across the 1991 Nigeria and Cameroon midaltitude test sites. It is resistant to *E. turcicum*, *P. sorghi*, and MSV, as well as to lodging. It is moderately resistant to ear rots. Synthetic-4 was the highest yielding open-pollinated variety in the midaltitude trials of Cameroon and Nigeria in 1991, with 7.7 Mg ha^{-1} at 150 g kg^{-1} grain moisture, 1.0 Mg ha^{-1} higher than the TZMSR derivatives. The varietal synthetic was formed by three generations of balanced recombination from 10 Cameroon midaltitude white and yellow inbred lines: M87, M131, 87036, 88069, 89199, 89258, 89292-293, 89302, and 89310. These inbreds were extracted from TZMSR and crosses of TZMSR with East African midaltitude germplasm. Synthetic-4 was screened in the MSV nursery and 350 plants were selfed. The following season, more than 300 S_1 plants were selected and recombined in the MSV nursery, and nonwhite kernels were removed.

The MSR-su sweet corn population is late maturing (comparable to TZMSR and Synthetic-4), with mixed yellow and white kernels. It is resistant to *E. turcicum*, *P. sorghi*, and MSV as well as to lodging. The population was derived by backcross transfer of the sugary-1 (*su-1*) gene from commercial sweet corn into tropical, midaltitude, normal-endosperm maize. Donor parents were: two inbred lines from McCurdy Seed (one derived from 'Sugar Coated', the other not specified), Aristogold, IoChief, Spectacular (Callahan Enterprises), and the CIMMYT population Tuxpeño Dulce. The recurrent parents were, successively, TZMSR, and Cameroon Synthetics 2, 3, and 4. Selfing and selection for sugary-type kernels were performed after the first backcross generation (BC_1). Following the BC_3 generation, over 400 plants were selected and selfed in the MSV screening nursery. A bulk of BC_3-S_1 sugary-type kernels was planted in the MSV screening nursery, and over 300 selected plants were recombined to form the final MSR-su sweet corn population.

Small quantities of seed will be provided to crop researchers upon written request to the Maize Program Leader, IITA, PMB 5320, Ibadan, Nigeria. We ask that appropriate recognition of the source be given when this germplasm contributes to an improved cultivar or germplasm.

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Registration of ICML 22 Photoperiod Insensitive, Downy Mildew Resistant Pearl Millet Germplasm

ICML 22 (Reg. no. GP-30, PI 572474) pearl millet [*Pennisetum glaucum* (L.) R. Br.] germplasm line was released by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in November 1992. This line was derived from selfing and head-to-row selection for five generations in the downy mildew [caused by *Sclerospora graminicola* (Sacc.) J. Schröt.] nursery at ICRISAT Center, Patancheru, Andhra Pradesh, India, within accession IP 2696 from the Republic of Chad. This accession developed <10% incidence of downy mildew in the S_2 to S_5 generations (1). Line 7042-3-1-2-2-2, an S_5 selection from IP 2696, exhibited ≤6% downy mildew incidence, compared to ≥70% incidence in the susceptible controls. In multilocation tests conducted in 1982 and 1991 at locations in India having downy mildew, ICML 22 exhibited a mean of 4.1% downy mildew incidence. In tests at two locations in western Africa, ICML 22 was highly susceptible to downy mildew (58 to 100% incidence). Line 7042-3-1-2-2-2 was named ICML 22 in November 1992.

ICML 22 also had high levels of downy mildew resistance when inoculated with the three most aggressive isolates (Mysore, ICRISAT, and Aurangabad) from India. In India, it did not have differential levels of resistance with respect to pathogen population, inoculum concentration, or age at inoculation. This suggests that ICML 22 has a broad genetic base for resistance to Indian populations of the downy mildew pathogen.

ICML 22 is classified as photoperiod insensitive. At 13.6 h daylength, it flowered in 36.1 ± 1.1 d. At a reduced daylength of 9 h, it flowered in 37.4 ± 0.5 d, and at 17 h daylength, it flowered in 36.1 ± 0.4 d.

ICML 22 is a restorer line when crossed to 5141A (A_1 cytoplasm). It is early maturing (64 to 68 d), short (85 to 100 cm), and profusely tillering (3 to 6 reproductive tillers plant^{-1}); it produces short (7 to 11 cm), compact, cylindrical heads bearing medium sized (7.3 g 1000 grain^{-1}), gray-brown, obovate seeds.

ICML 22 is a valuable germplasm source for photoperiod insensitivity and resistance to certain isolates of *S. graminicola*. ICML 22 is currently being used in ICRISAT as a source of earliness, photoperiod insensitivity, and downy mildew resistance for producing early maturing pollinators.

Seed of ICML 22 will be maintained and distributed by the Cereals Program, ICRISAT, Patancheru, AP 502 324, India. A sample of the original seed is permanently preserved in the ICRISAT gene bank.

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