

and seed from alkaloid (sweetness), softness of seed, cold tolerance, and resistance to gray leaf spot and anthracnose. However, the nonshattering feature permits seed of SNLL-87 like Tifblue-78 to be harvested several weeks after maturity, whereas Frost and other narrow-leafed lupins in the USA shatter seed at maturity. Forage yields averaged 7.636 Mg ha<sup>-1</sup>. Crude protein of forage ranged from 16.4 to 17.6%. Nitrogen production of herbage averaged 141 kg ha<sup>-1</sup> by early April.

Breeders seed will be maintained by the University of Georgia Coastal Plain Experiment Station at Tifton, GA. Limited supplies of SNLL-87 germplasm (up to 100 g) will be provided to researchers and other interested parties upon written request.

J. D. MILLER,\* I. FORBES, JR., AND H. D. WELLS (3)

#### References and Notes

1. Wells, H.D., I. Forbes, Jr., R. Burns, J.D. Miller, and J. Dobson. 1980. Registration of Tifblue-78 blue lupine. *Crop Sci.* 20:824.
2. Forbes, I., and H.D. Wells. 1967. Registration of Rancher blue lupine. *Crop Sci.* 7:278.
3. J.D. Miller and H.D. Wells, USDA-ARS, Tifton, GA 31793; I. Forbes, Jr., retired (formerly, USDA-ARS, Tifton, GA). Cooperative investigations of USDA-ARS and Univ. of Georgia, Coastal Plain Exp. Stn., Tifton, GA 31793. Registration by the CSSA. Accepted 30 Sept. 1987. \*Corresponding author.

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### REGISTRATION OF NE-HY-13A AND NE-HY-13B COMPLEMENTARY POPULATIONS OF SUGARY MAIZE GERMPLASM

NE-HY-13A (GP-170, PI 511806) and NE-HY-13B (GP-171, PI 511807) maize (*Zea mays* L.) populations, released in 1987, were developed under USDA-CSRS Regional Project NE-124(1) as NE-HY (high yield) populations designed to provide potential for improving yield of sweet corn. Good combining sweet (*su su*) corn inbreds were separated into A (P39, C6, I5125, I2256B, GG1143, and GG1108) and B (P51, C13, I453, I2132, GG1104, GG1109, and GG1126) groups based upon superior combining ability between groups. All possible crosses were made within the A and B groups in 1978 and equal amounts of seed from each combination were bulked to form population A and population B.

Population A was topcrossed in 1979 as male onto a set of Lancaster-type dent (*Su Su*) inbreds (A619, Oh43, C103, Mo17, Tx601, Ga209, and SC301). Population B was crossed as male onto a set of Iowa Stiff Stalk Synthetic (BSSS)-type dent (*Su Su*) inbreds (B73, B37, B14A and A632, plus two inbreds (W64A and WF9) of Reid Open Pollinated type. The Lancaster and BSSS/Reid inbreds were chosen based on good combining ability and assigned to A and B groups.

The topcross populations from population A and B were each random mated in isolation for three generations without selection. Several times of planting were used each year within each population to reduce assortative mating. All mature plants contributed equally to the seed source for each subsequent year. Phenotypic mass selection for plant and ear traits useful for sweet corn production was initiated in the fourth generation (year) using the grid system and a 10% selection intensity on an individual plant basis. This selection for plant and ear traits continued in the fifth and sixth generation. In 1985, *Su Su* kernels were removed and the populations continued on an *su su* basis.

The resulting topcross population A (designated NE-HY-

13A) and topcross population B (designated NE-HY-13B) are similar in appearance, generally resembling field corn in vigor and in ear diameter and length. Kernel row number varies from 12 to 18. Kernel color ranges from pale yellow to golden to a darker (dusky), yellow-red and cob (glume), and silk colors are segregating white and red. Lodging resistance is inferior to that of the *Su Su* parentage but superior generally to *su su* types. These populations also segregate freely for kernel dry-down rate, culinary quality, and numerous other traits. Both populations approximate 1800 heat units to edible milk stage but will vary on an individual plant basis from 1400 to 2100.

Breeder seed will be maintained by the Minnesota Agricultural Experiment Station and can be obtained in germplasm quantities (1000 kernels) from D.W. Davis, Horticultural Science Department, University of Minnesota, St. Paul, MN 55108.

D. W. DAVIS,\* J. L. BREWBAKER, AND K. KAUKIS (2)

#### References and Notes

1. Members of the Technical Committee of USDA-CSRS Regional Project NE 124 and representing the State Agric. Exp. Stn. of California, Connecticut, Florida, Hawaii, Idaho, Illinois, Indiana, Massachusetts, Minnesota, New York, Pennsylvania, and Wisconsin, plus one USDA-ARS member of the committee met with industry plant breeders representing the fresh market, processing, and seed industry sectors to choose the A and B parental inbred sets and to suggest strategy for the development of NE-HY-13A and NE-HY-13B.
2. D.W. Davis, Horticultural Science Dep., Univ. of Minnesota, St. Paul, MN 55108; J.L. Brewbaker, Dep. of Horticulture, Univ. of Hawaii, Honolulu, HI 96822; K. Kaukis, The Pillsbury Co., Lesueur, MN 56058. Published as Journal Article no. 15 397 of the Minnesota Agric. Exp. Stn., St. Paul, MN 55108. Registration by the CSSA. Accepted 30 Sept. 1987. \*Corresponding author.

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### REGISTRATION OF FOUR POPULATIONS OF PEARL MILLET GERMPLASM WITH MULTIPLE DISEASE RESISTANCE

FOUR pearl millet [*Pennisetum americanum* (L.) Leeke] sib-bulk populations, ICMP 1 (ICMPES-1), ICMP 2 (ICMPES-2), ICMP 3 (ICMPES-28), and ICMP 4 (ICMPES-32) (Reg. No. GP-1, GP-2, GP-3, and GP-4) (PI 512041 through PI 512044) were developed with combined resistance to ergot (caused by *Claviceps fusiformis* Lov.), smut (caused by *Toxoposporium penicillariae* Bref.), and downy mildew [caused by *Sclerospora graminicola* (Sacc.) Shroet.] at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India. These populations have been made available for use as resistance donors in breeding of synthetic cultivars since July 1985.

ICMP 1 was derived from a J606 × J703-1 cross, ICMP 2 from a J2238 × J2210-2 cross, and ICMP 3 and ICMP 4 from a 700708-1-E-1 × J797-1-E-1-2 cross (J numbers are breeding lines from Jamnagar, India and 700708 is a breeding line from Kano, Nigeria). Each population is a sib-bulk of several selected ergot, smut, and downy mildew resistant F<sub>6</sub> lines. During development through pedigree selection, ergot resistance was of primary importance, but the lines were also screened for smut and downy mildew resistance in alternate generations. In both 1982 and 1983, each population was tested for ergot reaction in the International Pearl Millet Ergot Nursery (IPMEN) planted at 8 to 12 locations in India and Africa, and for ergot, smut, and downy mildew in the multiple disease nursery at ICRISAT Center, Patancheru.

**Table 1. Plant characteristics of four pearl millet ergot resistant inbred lines recorded in the 1984 summer at ICRISAT Center, Patancheru.**

Line	Reg. no.	Ergot severity†	Time to 50% flowering	Plant height	Tillers per plant	Head length	1000-grain mass
		%	d	cm	no.	cm	g
ICML 1	GP-5	3	57-59	149-165	3-5	21-23	5.6
ICML 2	GP-6	2	56-58	150-164	3-5	22-24	5.4
ICML 3	GP-7	3	54-56	133-149	3-4	27-29	6.5
ICML 4	GP-8	4	55-57	158-174	3-4	26-28	6.7
ICMS 7703		44‡	45-47	127-143	4-5	20-22	8.3
WC-C75		45‡	45-47	124-140	4-5	19-21	9.0

† Mean based on 2 to 4 yr of testing in the Int. Pearl Millet Ergot Nursery (IPMEN) at Samaru (Nigeria), Aurangabad, Jamnagar, Patancheru, Ludhiana, New Delhi, and Mysore (India).

‡ Based on screening at Patancheru in the 1984 rainy season.

In IPMEN testing, these populations showed 1 to 4% ergot severity compared with 66% on the susceptible check. At ICRISAT Center in the multiple disease nursery these lines were free of smut (65% severity in the susceptible check) and showed <1 to 3% downy mildew incidence (42% incidence in the susceptible check). In yield testing at seven locations in India (rainy season, 1984), ICMP 3 and ICMP 4 had grain yields of 2170 and 1970 kg ha<sup>-1</sup>, respectively, compared with 1940 kg ha<sup>-1</sup> of a standard check 'WC-C75'.

Compared to the 'ICMS 7703' and WC-C75 checks, the four populations are taller and later maturing, but they have greater head length and similar tillering capacity (Table 1). Seed color of the four populations varied from gray to deep gray to brown, seed shape from obovate to globular, and seed mass from 6.5 to 8.6 g per 1000 seed.

Seed of these populations are available on request from ICRISAT, Patancheru P.O., Andhra Pradesh 502324, India.

R. P. THAKUR,\* S. D. SINGH, AND S. B. KING (1)

#### References and Notes

1. Pearl Millet Improvement Program, ICRISAT, Patancheru P.O., Andhra Pradesh 502324, India. Submitted as Journal Article no. 565 by ICRISAT. Registration by CSSA. Accepted 30 Oct. 1987. \*Corresponding author. Published in Crop Sci. 28:381-382 (1988).

### REGISTRATION OF FOUR ERGOT RESISTANT GERMPLASMS OF PEARL MILLET

FOUR pearl millet [*Pennisetum americanum* (L.) Leeke] inbred lines, ICML 1 (Reg. no. GP-5) (PI 512045) (ICMPE 13-6-27); ICML 2 (Reg. no. GP-6) (PI 512046) (ICMPE 13-6-30); ICML 3 (Reg. no. GP-7) (PI 512047) (ICMPE 13-6-25); and ICML 4 (Reg. no. GP-8) (PI 512048) (ICMPE 13-6-34) were selected for stable resistance to ergot (incited by *Claviceps fusiformis* Lov.) at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India. These lines have been made available as resistance donors in breeding programs since January 1985.

ICML 1 and ICML 2 were derived from a J606-2 × J703-1 cross, and ICML 3 and ICML 4 from a J2238 × J2210-2 cross (J numbers are breeding lines from Jamnagar, India). These four lines are F<sub>8</sub>/F<sub>9</sub> progenies of the above crosses that were screened and pedigree selected for resistance at each generation under high artificial ergot pressure at ICRISAT Center, Patancheru. Stability of resistance of these lines was tested in the International Pearl Millet Ergot Nursery (IPMEN) at 8 to 12 locations in India and West Africa for 2 to 4 yr (1). The mean ergot severities of these lines were between 1 and 3%, compared with 68% in the susceptible check. At ICRISAT Center, the lines were also resistant to downy mildew [caused by *Sclerospora graminicola* (Sacc.)

**Table 1. Plant characteristics of six smut resistant pearl millet inbred lines recorded in the 1984 summer at ICRISAT Center, Patancheru.**

Line	Reg. no.	Smut severity†	Time to 50% flowering	Plant height	Tillers per plant	Head length	1000-grain mass
		%	d	cm	no.	cm	g
ICML 5	GP-9	<1	48-52	130-150	1-3	20-25	9.0
ICML 6	GP-10	<1	51-55	85-100	4-7	25-30	6.0
ICML 7	GP-11	<1	42-46	135-145	1-3	20-24	9.8
ICML 8	GP-12	<1	51-55	140-160	2-4	20-24	8.1
ICML 9	GP-13	<1	43-47	150-160	1-3	25-28	7.6
ICML 10	GP-14	1	58-62	150-180	1-3	22-26	8.3
ICMS 7703		25‡	45-47	127-143	4-5	20-22	8.3
WC-C75		23	45-47	124-140	4-5	19-21	9.0

† Mean of 4 to 7 yr of testing in the Int. Pearl Millet Smut Nursery (IPMSN) at Hisar, Patancheru, Jamnagar (India), and Bambe (Senegal).

‡ Mean based on screening at two locations (Hisar and Patancheru) in India during the 1984 rainy season.

Shroet.] and smut (caused by *Tolyposporium penicillariae* Bref.).

Compared with 'ICMS 7703' and 'WC-C75', two standard check cultivars that have been released for cultivation in India, the four inbred lines are later maturing and somewhat taller, but they have comparable tillering capacity and longer heads (Table 1). Seed color of the lines varies from gray to brown, seed shape from globular to obovate, and seed mass from 5.6 to 6.7 g per 1000 seed.

Seed of these lines are available on request from ICRISAT, Patancheru P.O., Andhra Pradesh 502324, India.

R. P. THAKUR\* AND S. B. KING (2)

#### References and Notes

1. Thakur, R.P., V.P. Rao, R.J. Williams, S.S. Chahal, S.B. Mathur, N.B. Pawar, S.D. Nafade, H.S. Shetty, G. Singh, and S.G. Bangar, 1985. Identification of stable resistance to ergot in pearl millet. Plant Dis. 69:982-985.
2. Pearl Millet Improvement Program, ICRISAT, Patancheru P.O., Andhra Pradesh 502324, India. Submitted as Journal Article no. 554 by ICRISAT. Registration by CSSA. Accepted 30 Oct. 1987. \*Corresponding author.

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### REGISTRATION OF SIX SMUT RESISTANT GERMPLASMS OF PEARL MILLET

SIX inbred lines of pearl millet [*Pennisetum americanum* (L.) Leeke] ICML 5 (Reg. no. GP-9) (PI 512049) (SSC FS 252-S-4); ICML 6 (Reg. no. GP-10) (PI 512050) (ICI 7517-S-1); ICML 7 (Reg. no. GP-11) (PI 512051) (EBS 46-1-2-S-2); ICML 8 (Reg. no. GP-12) (PI 512052) (EB 112-1-S-1-1); ICML 9 (Reg. no. GP-13) (PI 512053) (NEP 588-5690-S-8-4); and ICML 10 (Reg. no. GP-14) (PI 512054) (P 489-S-3) were selected for stable resistance to smut (caused by *Tolyposporium penicillariae* Bref.) at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India. These lines have been made available as resistance donors in breeding programs since June 1984.

The lines were selected from germplasm accessions/breeding lines originating from Uganda (SSC), India (ICI), Nigeria (EB/EBS), Lebanon (NEP), and Senegal (P). In each line, individual plant selection for smut resistance was carried out under artificial inoculation at Hisar and at ICRISAT Center, Patancheru, for four to five generations. Stability of resistance of these lines and others was tested for 4 to 7 yr in the International Pearl Millet Smut Nursery (IPMSN) at four to 6 locations in India and West Africa. The mean smut severities of these lines varied from <1 to 1%, compared