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## Registration of NP33 NP34 and NP35 Three Broadly Based Random-Mating Populations of Sudangrass

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### REGISTRATION OF NP33, NP34, AND NP35, THREE BROADLY BASED RANDOM-MATING POPULATIONS OF SUDANGRASS

NP33, NP34, AND NP35 SUDANGRASS [*Sorghum bicolor* (L.) Moench] [formerly *S. sudanense* (Piper) Staph] (Reg. no. GP-241, GP-242, and GP-243; PI 535777, PI 535778, and PI 535779) are three related random-mating populations that were developed cooperatively by the USDA-ARS and the Nebraska Agricultural Research Division and were released in April 1989. These populations represent a broad range of genetic diversity for a variety of agronomic traits and dhurrin level, and NP34 and NP35 contain the *ms<sub>3</sub>* gene for male-sterility.

NP33 resulted from interpollination of 25 lines selected from 42 sudangrass lines obtained from the Purdue Agricultural Experiment Station in 1977. The 42 lines were selected derivatives from 1633 lines developed in breeding nurseries grown at the Kansas and Purdue Agricultural Experiment Stations by Dr. R.C. Pickett. Selection of the 42 best lines was based on both line and  $F_1$  performance with regard to lodging and disease resistance, leafiness, tillering, and seed production. Additional evaluation of the 42 lines in Nebraska resulted in the selection of the 25 lines used in the synthesis of NP33. These lines represented a broad range of genetic diversity and included an array of maturities, plant types, and origins with six of the lines being derived from 'Greenleaf', five from 'Tift', three from 'Beltsville Synthetic', three from KS1044 (a 'Leoti'  $\times$  sudangrass cross), two from Wisconsin sudangrass lines, two from the cross of 'Combine Kafir 60'  $\times$  ('Leoti'  $\times$  sudangrass), one from Combine Kafir 60  $\times$  Greenleaf, and three lines of unknown parentage. NP33 averages 175 cm in height at maturity (with a range from 110–220 cm), has mostly tan plant color, green midribs, black and mahogany glumes, and brown caryopsis color. The spectrophotometric assay for dhurrin (1) as measured by the hydrocyanic acid potential (HCN-p) of first leaves from 1-wk-old seedlings grown in the same test resulted in the following values for means and standard errors (mg kg<sup>-1</sup> fresh weight, bulk of 10 seedlings per replication, three replications): NP33–671  $\pm$  34; NP25 male-sterile bulk–189  $\pm$  3; 'Piper'–378  $\pm$  28; and Greenleaf–565  $\pm$  12. To produce the seed being released, bulked seed of the 25 lines was planted in isolation and open-pollinated seed was harvested. Germplasm amounts of the bulked open-pollinated seed will be provided without cost to each applicant upon written request while supplies last.

NP34 was formed by topcrossing a bulk of the 25 lines that make up NP33 onto male-sterile (*ms<sub>3</sub>ms<sub>3</sub>*) plants of NP25(2). All fertile plants of NP25 were eliminated from the topcross nursery as soon as they could be identified. Since there was no segregation for the *ms<sub>3</sub>* allele in the  $F_1$  generation, the topcross was followed by one generation of open-pollination and one random-mating that utilized the *ms<sub>3</sub>* allele for recombination. NP34 has broad genetic diversity and is a good source of agronomically desirable R-lines that segregate for hydrocyanic acid potential as well as for the

*ms*<sub>3</sub> allele. Plants average 230 cm in height at maturity with mostly white midrib and tan plant color and have excellent resistance to lodging. Glumes are black, mahogany, and sienna; and caryopsis color is brown. The spectrophotometric assay for HCN-p for first leaves from 1-wk-old seedlings grown in the same test resulted in the following values for means and standard errors (mg kg<sup>-1</sup> fresh weight, bulk of 10 seedlings per replication, three replications): NP34 fertile bulk—457 ± 51; NP34 male-sterile bulk—400 ± 50; NP25 fertile bulk—181 ± 11; NP25 male-sterile bulk—228 ± 26; Piper—325 ± 12; and Greenleaf—567 ± 32. Germplasm amounts of two different types of NP34 will be provided without cost to each applicant upon written request while supplies last: (i) bulked seed harvested from genetic male-sterile plants (GP-242), and (ii) bulked seed harvested from fertile plants.

NP35 was derived from NP34 by selecting plants low in HCN-p from selfed progeny grown from the NP34 male-sterile bulk. Eighty S<sub>1</sub> families low in HCN-p were selected from a total of 422 S<sub>1</sub>s that were assayed. Each of the selected S<sub>1</sub>s received an additional generation of selfing, and 484 selfed progeny were again individually screened for HCN-p. A bulk of the 165 progeny lowest in HCN-p was planted in isolation in 1988 for random mating. NP35 should have value as a source of low-dhurrin sudangrass germplasm that has a broad range of genetic diversity for a variety of agronomic characteristics. The population contains the *ms*<sub>3</sub> gene for genetic male sterility; averages 190 cm in height at maturity; segregates for midrib and plant color; has black, mahogany, and sienna glumes; and brown caryopsis color. NP35 has not been evaluated for HCN-p, but some indication of the level can be obtained by comparing the HCN-p of the various groups of germplasm from which NP35 was derived. The spectrophotometric assay for HCN-p for first leaves from 1-wk-old seedlings resulted in the following values for means and standard errors for the various seed lots described above (mg kg<sup>-1</sup> fresh weight, one bulk of 10 seedlings per selfed progeny, three replications for the NP34 male-sterile bulk): NP34 male-sterile bulk—400 ± 50; 422 S<sub>1</sub>s from NP34 male-sterile bulk—370 ± 4; 80 selected low-HCN-p S<sub>1</sub>s—264 ± 5; 484 selfed progeny from the 80 low-HCN-p S<sub>1</sub>s—334 ± 4; and 165 low-HCN-p selfed progeny selected for random mating—252 ± 3. Germplasm amounts of two different types of NP35 will be provided without cost to each applicant upon written request while supplies last: (i) bulked seed harvested from genetic male-sterile plants (GP-243) and (ii) bulked seed harvested from fertile plants.

Seed of NP33, NP34, and NP35 will be maintained and distributed by the Department of Agronomy, University of Nebraska, Lincoln, NE 68583. Recipients of seed are asked to make appropriate recognition of the source of the germplasm if it is used in the development of a new germplasm, parental line, cultivar, or hybrid.

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#### References and Notes

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2. Haskins, F.A., H.J. Gorz, S.D. Kindler, S.G. Jensen, and A. Sotomayor-Rios. 1986. Registration of NP25 low-dhurrin sudangrass germplasm. *Crop Sci.* 26:213.
3. H.J. Gorz (retired) and K.P. Vogel, USDA-ARS; and F.A. Haskins (retired), Dep. of Agronomy, University of Nebraska, Lincoln, NE, 68583. Cooperative investigations of the USDA-ARS and the Nebraska Agric. Res. Division. Published as Journal Series Paper no. 8931, Nebraska Agric. Res. Division. Registration by CSSA. Accepted 31 Aug. 1989. \*Corresponding author.