The Breeding Behavior of Side-oats Grama in Partially Isolated Populations

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Side-oats grama (Bouteloua curtipendula (Michx.) Torr.) is a species of wide distribution throughout the eastern and central portions of the United States and extending into the southwestern states. Over much of its range it is of minor value, but throughout the Great Plains, the adjoining prairies to the east, and the semi-arid regions of the Southwest, it lends itself readily to domestication and use as a forage crop. Extensive pure stands are seldom found, and in recent years most of the available seed has come from reseeded pastures. Side-oats grama in the Great Plains occurs usually on rocky outcrops, steep hillsides, and open, pervious soils. When planted in other locations it has done well, producing abundant forage of high palatability and excellent quality during the summer months.

For the most part, the species is cross pollinated and highly variable. One group of apomictic types has been found by the writer (2). Chromosome numbers $2n = 28, 35, 40, 42, 45, 56, 70,$ and $98$ were reported by Fults (1). Several of the medium numbers are represented in the Woodward collection of sexual forms while the apomictic types run from about 87 to 101. In the study here reported, the known asexual types were avoided. It is probable that all plants reproduced sexually, but because of the variable chromosome numbers, it is likely that plants were not equally compatible.

Materials and Methods

A space-planted side-oats grama nursery set out in 1942 by M. L. Peterson contained bulk material either directly, or derived, from: Slapout, Okla., Hardesty, Okla., El Reno, Okla., Indiahoma, Okla., Woodward, Okla., Temple, Tex., Gatesville, Tex., Lamesa, Tex., San Antonio, Tex., Perryton, Tex., Manhattan, Kans., and Tucson, Ariz. In July 1943 the writer selected 14 plants of each type listed below, without regard to source or origin, purely on a basis of the agronomic characters involved. These plants were transplanted to separate isolation blocks, cut back, and watered. Seed was harvested from each block that fall and a population of approximately 180 individuals established from each lot in the 1944 side-oats nursery. Reselection for type was made in each of the populations in 1945 and somewhat smaller sample populations established in the 1946 nursery. Twelve plants were used in the second generation isolated populations.

The isolation blocks were approximately 25 feet square and 28 feet apart in each direction. The intervals were planted to a thick stand of sorghum. Genetic isolation was probably incomplete, but the rather striking results obtained in two generations indicate that genetic exchange between blocks was of minor importance.

Types 1 to 8.—Nearly all plants in the nursery were selected into eight types according to a relationship between leaf and inflorescence as indicated in Fig. 1. This classification was sure, somewhat arbitrary and subject to personal error, but the whole has proved to be a satisfactory classification of growth form. Type 1 is an extreme expression of low growing rosette and relatively tall seed stalks. Each successive type has more leaf. In type 6 the leaves extend into the basal inflorescences. Type 7 is more erect than type 6 while type 8 is an extreme expression of the erect habit.

Type 10 (Late).—The latest flowering plants in the nursery selected and isolated.

Type 11 (Coarse leaves).—Plants with the broadest leaves selected for isolation.

Type 12 (Fine leaves).—Narrow leafed plants were selected.

Types 13 & 14 (Hay types).—Large, robust, and very high yielding types were selected. Type 14 consisted of the best plants, second choice plants.

Type 15 (“Seedy”).—Plants producing the greatest number of inflorescences were selected. Actual seed production was examined.

Other types.—In a similar study selected, matched plants isolated from the 1943 nursery containing somewhat bulk material. They will not be considered here in detail. It was observed that individuals within a block and between blocks contribute equally to the succeeding generation since the effective size of the isolated population was also observed to decrease as the number of individuals covered from transplanting more readily than others. It was also observed that individuals within a block and between blocks contribute equally to the succeeding generation since the effective size of the isolated population was also observed to decrease as the number of individuals covered from transplanting more readily than others.

If on the other hand, these blocks were not completely isolated, one from the other, the effective size would be increased what and the selective influence correspondingly decreased.

Results