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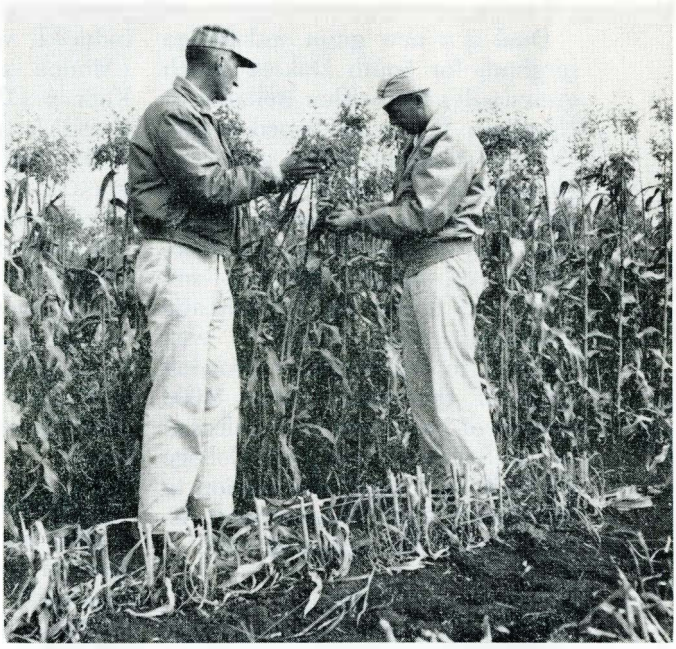

AGRONOMY DEPARTMENT
AGRICULTURAL EXPERIMENT STATION
SOUTH DAKOTA STATE COLLEGE, BROOKINGS

DUAL

AN EARLY GRAIN AND FORAGE SORGHUM

C. J. FRANZKE[1]

Dual is a new grain and forage sorghum for South Dakota which grows taller than either Reliance or Norghum. It was developed to provide the stockman with a grain sorghum having a high yield of sweet, juicy forage for both fodder and silage. Tests conducted at several locations on widely different soil types and under varying climatic conditions show Dual is well adapted to the sorghum growing areas of the state. About 8,000 pounds of Dual seed were released by the South Dakota State College Agricultural Experiment Station to the County Crop Improvement Associations in the spring of 1958.

History

Dual was derived from complex crosses plus a series of colchicine treatments made at the Station in 1949, 1951, and 1952. The sorghum lines involved were a colchicine-induced variant from Experimental No. 1 [(Dwarf Feterita x Dwarf Freed) x Grohoma], a colchicine-induced variant from the cross (Modoc x Kaoliang) x [Yellow Kafir x (Dwarf Feterita x Dwarf Freed)], and Experimental No. 3 [(Day Milo x Rancher) x (Sudan grass x Day Milo)]. Dual was a true-breeding variant obtained by colchicine treatment following the complex crosses. The purpose was to develop strains with a high yield of high quality grain, early maturity, a spreading seed panicle borne well above the flag leaf, and the ability to stand longer after a killing frost.

Seed and Plant Characters

Dual has a large seed which is a mottled brown and tan. The seeds germinate readily and seedlings emerge rapidly. Even under limited soil moisture, Dual produces good uniform stands. The young seedlings have large, broad leaves and sturdy growth. Unlike most sorghums, the dormant period of the

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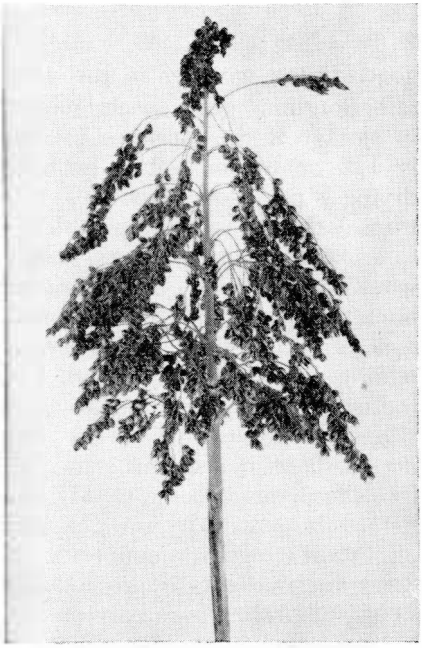

Typical open, spreading head of Dual.

seedlings is short. The large leaves, sturdy growth, and short dormant period enable the seedlings to be easily distinguished from grass-like weeds. This aids considerably in earlier cultivation of the crop.

The stems are equal in thickness to those of Reliance, though taller (table 1). They have good foliage and sweet, juicy stalks. The prussic acid content in Dual has been stabilized at a level slightly higher than in 39-30-S, a low prussic acid forage sorghum. The tannic acid content is lower than in most forage sorghums. (Tannic acid tends to slow down the milk flow in lactating animals.)

The standability of Dual after a killing frost was as good as Reliance in tests throughout the state. All sorghum varieties will eventually break over if left standing in the field too long after maturity. Therefore, the grain or forage crop should be harvested as early as possible after a killing frost before the stalks break over.

Dual has a spreading, open, seed panicle (see figure) similar to that of Rancher, a forage sorghum. The grain develops and matures more uniformly in an open head than in

Table 1. Four-Year Performance Summary (1954-57) of Dual, Reliance, Norghum, and Martin at Four Locations

Variety	Bushels Per Acre					Height in Inches				
	Brookings	Newell	High-more*	Eureka	Av.	Brook-ings	Newell	High-more*	Eureka	Av.
Dual	58.4	27.8	49.7	51.1	46.5	60	53	57	57	57
Reliance	55.4	19.8	44.6	44.8	40.8	45	38	44	40	42
Norghum	53.2	21.9	42.7	52.7	42.6	45	39	39	40	41
Martin	41.4	3.2	28.7	11.9	20.8	41	30	35	44	38
	Date Pollinated					Maturity Taken at Harvest†				
Dual	7/26	8/4	8/1	8/11	8/1	1—	1—	1	1	1—
Reliance	7/23	8/6	8/2	8/7	7/30	1	1	1	1	1
Norghum	7/27	8/7	8/1	8/9	8/1	1	1	1	1	1
Martin	8/7	8/19	8/11	8/20	8/13	3—	5	3	5	4—

*Three-year average due to poor stands in 1955.

†Maturity range 1—Very ripe; 2—Ripe; 3—Late dough stage; 4—Early dough stage; 5—Late milk stage.

a closed head. This allows for better drying of the grain at maturity and for faster drying after fall rains or snow. Open heads have much less aphid infestation than closed heads. The aphid secretes a honey dew high in sugar content and sticky. Dust adheres to the seed giving the threshed grain a dirty appearance. This dried, dirty, sugary covering is an ideal media for the culture of molds and bacteria which cause the grain to heat more readily in storage. Such grain will also take up moisture faster during damp fall and winter weather than clean grain. The seed panicle is borne well above the flag leaf, a character which is a considerable aid in combining. Also, there is less spikelet sterility due to high temperatures, less chance of harboring aphids, and faster and more uniform drying of the grain.

Adaptation and Use

Dual has the same maturity range as Reliance and Norghum (table 1). It is about 10 days to 2 weeks earlier than Martin. Dual was ripe before the first killing frost, while Martin was either in the early or late dough stage in the 4 years at all locations. When frosted before they are mature, grain sorghums produce light-weight, shrunken grain which dries out slowly in the field and is more difficult to store.

Dual can be harvested during good drying weather in the early fall. Sorghum grain heats readily in storage if the moisture content is 14% or higher unless artificial drying is provided. Since Dual matures early, it can be harvested before heavy killing frosts which would impair the germination of immature grain with high moisture content. Thus a high quality seed is readily produced with Dual. For fodder, Dual should be harvested when the seeds are in the late dough stage. It is at this stage, before the plants become woody and before the leaves dry up and drop off, that the highest amount of total digestible nutrients is present. For silage, Dual should be harvested at a later stage when the seeds are more mature. At this stage, it will make a higher quality ensilage which is less acid.

Generally Dual is 12 to 20 inches taller than Reliance or Norghum. Since it was selected for a dual-purpose (grain and forage) type, it is expected to be taller. Under irrigation and on fertile soils, one can expect a height of 7 to 8 feet. Under these conditions, Dual produces a high yield of high quality grain and forage for fodder and silage.

Dual should become popular as a grain-forage type for seed, fodder, and silage in all sorghum growing areas of the state.

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COVER PICTURE: This Foundation Seed Stocks increase seed plot of Dual Sorghum was located on a dry-land plot near Brookings. It yielded about 40 bushels of mature grain per acre in 1957.