SORGHUM FORAGES

for Silage in California

Since their introduction, sudangrass-sorghum hybrids have found some use as a silage crop. However, their principal use for forage will probably continue to be for pasture and green chop. Several dual purpose and intermediate height hybrids offer some lodging resistance. These types have been the only hybrid forage sorghums to gain widespread usage in California. Tall growing types of hybrid forage sorghums should be used with caution. The development of a hybrid forage sorghum type with high yield capacity and lodging resistance continues to be necessary before greater use of sorghum silage can be expected in most areas of California.

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SORGHUMS HAVE been used in a limited way as a silage crop in California for many years. Sorghums used for forage have a high yield potential and are adapted to a wide range of soil and climatic conditions. Production of more than one crop each year by the development of new tillers after cutting also makes the crop valuable.

Several factors have prevented the widespread use of sorghums for silage. Many varieties with high yield potential have lodged badly, making harvest difficult or impossible. Short varieties with resistance to lodging did not exhibit enough yielding capacity to encourage their widespread use, except in the low desert valleys of southern California, where two crops are possible each year.

With the introduction of hybrid forage sorghums and the sudangrass-sorghum crosses in the late 1950's, interest in sorghums for pasture, green chop and silage increased. Varieties of these new forage types have been evaluated for several years by the University of California Department of Agronomy and Agricultural Extension Service to determine their suitability for use as silage crops in California.

The new hybrid forage sorghums are available in a wide variety of types. Dual purpose types—varieties that can be used for grain production as well as forage—are characterized by relatively short stature, fairly strong stalks and high grain production. Forage varieties are tall-growing, usually weak-stalked and some are sterile hybrids producing little or no grain.

The sudangrass-sorghum crosses are hybrids between a male-sterile grain sorghum and sudangrass. A hybrid is usually produced by crossing two parents of the same type, but since suitable steriles were not available in sudangrass at the time, successful grain sorghum male-steriles were used in these first "hybrids." The fact that sorghum and sudangrass cross-pollinate readily was utilized in putting sudangrass pollen on a sorghum sterile, to produce the large and easy-to-harvest "hybrid" seed.

In a 1961 trial conducted at U. C., Davis, six sudangrass-sorghum hybrids and one forage sorghum outyielded Piper sudangrass an average of 35% when harvested at silage maturity (table1). The largest gain of these sudangrass-sorghum crosses over Piper sudangrass came in the first cutting when all 7 varieties outyielded Piper by 100% or more. Yields for the second cutting were nearly equal, with Piper lagging slightly behind the sudangrass-sorghum crosses. Piper matured earlier than all other varieties for both cutting dates. In this trial all varieties were grown in rows 40 inches apart and harvested at the bloom stage.

TABLE 1. YIELDS OF SEVERAL SUDANGRASS-SORGHUM HYBRIDS, PIPER SUDANGRASS AND A FORAGE SORGHUM WHEN CUT AT THE FLOWERING STAGE. DAVIS 1961

Varieties	Tons/acre at 70% moisture				Percent of Piper
	First cutting	Second cutting	Third cutting	Total	
Taylor Evans Haygrazer	26.5	15.1	...	41.6	153
Asgrow Grazer	20.9	17.7	...	38.6	142
NK 145*	22.7	15.0	...	37.7	139
Frontier Hydan	21.1	15.0	...	36.1	133
DeKalb SX-11	19.5	14.0	...	35.5	131
Durrant GX-200	21.0	13.4	...	34.4	126
Lindsey 77F	20.1	12.1	...	32.2	118
Piper	10.0	13.3	3.9	27.2	100
				Average	135

* Forage sorghum.

Although very high yields of the tall-growing hybrid forage sorghums have been obtained, the danger of lodging when grown to silage maturity makes production of most of these varieties hazardous. In observations made at Davis over the past three years, no commercially available tall type forage sorghum has exhibited any real lodging resistance. In Imperial Valley (table 2) where two silage crops are possible each year, the same lodging patterns as at Davis are shown. At both locations, the dual purpose hybrid forage sorghums have resisted lodging under most growing conditions, but have shown a yielding ability below that of the tall-growing forage types.

When grown for silage, minor differences in TDN (total digestible nutrients) content were found between the sudangrass-sorghum hybrids and sudangrass. Usually the tall-growing, late forage sorghum hybrids are higher in TDN than the shorter, dual purpose types, with both exceeding the TDN content of sudangrass-sorghum hybrids. All of the silages produce forage of a poorer feeding quality than that of corn.

Commercial Production

In commercial production and experimental tests, hybrid forage sorghums and sudangrass-sorghum hybrids have been grown over the entire state. Production has been most successful in the low desert valleys of southern California and the interior valleys of central California where the crop is grown under irrigation. Some of the hybrids, particularly the sudangrass-sorghum hybrids, have been grown along the coast and in northern mountain valleys. Results in these locations, although successful in some cases, have been variable.

One of the main advantages in the use of sorghum for forage rather than corn is the ability of the sorghum to grow in soils moderately saline or alkaline. Although production decreases under these conditions, the sorghum forage plant can produce a crop in areas where corn as a silage crop would fail.

When grown for silage, the hybrid forage sorghums and sudangrass-sorghum hybrid varieties should be seeded at 4 to 8 pounds per acre. Rows 36 to 40 inches apart are normally used. Seeding should be delayed until soil temperatures reach 65° F at planting depth for several days prior to planting. In the desert valleys

TABLE 2. YIELDS AND LODGING OF SEVERAL FORAGE SORGHUMS WHEN CUT IN THE SOFT DOUGH STAGE OF MATURITY. IMPERIAL VALLEY 1960

Varieties	Tons/acre at 70% moisture			% Lodging	
	First cutting	Second cutting	Total	First cutting	Second cutting
Brawley	37.3	17.6	54.9	1	3
Lindsey 101F	21.6	29.7	51.3	0	8
NK 300*	16.9	30.9	47.8	0	0
DeKalb FS1a*	17.0	29.3	46.3	0	0
DeKalb FS-22	29.1	16.2	45.3	55	49
Hegari*	17.9	26.7	44.6	0	0
Sila King	28.5	13.8	42.3	47	55
Atlas	24.9	15.8	40.7	0	60

* Dual purpose forage sorghums.

and southern San Joaquin Valley, this temperature usually occurs between March 1 and April 1. In the Sacramento Valley this may not occur until April 15 to May 1.

Fertilization

Most California soils require high rates of nitrogen fertilization to achieve maximum yields. Other fertilizers should be added in areas where nutrient deficiencies are known to occur. Although the crop can stand periods of moisture stress, best yields can be expected where water is adequately supplied.

Hybrid forage sorghums of the dual purpose or intermediate types should be cut for silage at the milk-to-soft-dough stage of kernel development. Tall-growing types should be harvested at bloom-to-milk stages to avoid lodging. The sudangrass-sorghum hybrids should also be harvested at the bloom-to-milk stage to avoid harvest problems created as the increasing grain weight causes the stalks to bend or break.

Because the hybrid forage sorghums and sudangrass-sorghum hybrids are often ensiled at high moisture content, as in the case of harvest at bloom stage, a preservative may sometimes be necessary to insure the production of high quality silage. Prussic acid, which at times can be a problem when these crops are used for pasture or green chop, does not present a problem when sorghums are used for silage.

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Weather Influences on use of Acaricides for Citrus Mite Control

Climatic and weather conditions directly affect the necessity for mite treatment in citrus, the number of applications needed per year, the type of application required and the effectiveness of acaricides used. The property of acaricides to be translocated is less advantageous, even for foliage applications, when made during the cooler periods of the year. Seasonal changes of the host and the direct or indirect influence of weather on the mite and the host are essential factors determining mite control and treatment scheduling under California conditions.

FAILURE TO OBTAIN the expected control of a mite infestation from an application of an acaricide is often attributed to application techniques, resistance or inferior batches of the acaricide. Acaricide treatments that are more effective than was expected are perhaps as frequent, but often go unnoticed. These differences can sometimes be attributed to the presence or lack of predators. Another important factor considered was the effect of weather on the need for or efficiency of control applications.

None of the six major mite pests of citrus in California are distributed throughout all the citrus growing areas. Differences in average temperatures among the different citrus districts do not appear to be sufficient to limit the development of any of these mite species. Extreme weather conditions, however, may be a major factor in limiting the damage caused by the pest—and perhaps distribution. Citrus bud mite, citrus rust mite, and the six-spotted mite, for example, are pests only in the coastal districts. Frequent occurrences of hot dry winds in the interior areas prevent injurious populations of these pests from developing, whereas, in coastal districts, longer intervals between such adverse conditions permit the development of injurious populations.

Although the citrus red mite populations are influenced by such conditions, injurious infestations occur throughout the intermediate citrus-growing districts as well as coastal areas. This species, however, has not been found in the desert valleys (Coachella and Imperial). The citrus flat mite is distributed throughout these warmer valleys as well as the San Joaquin Valley and the Yuma mite is restricted to the desert valleys. Factors limiting the distribution of the latter two species are as yet unknown.

Citrus red mite

Lemon trees are considered the most favorable variety for citrus red mite, followed by oranges, whereas grapefruit is infested least frequently. One of the factors contributing to these favorability differences is that citrus red mites lay more eggs on young than old citrus leaves. As a result, the most rapid development of citrus red mite populations occurs during these growth cycles. Green lemon fruits are also more favorable for egg production than the more mature lemon-colored fruit. As lemon trees produce new leaves and fruit most of the year, they provide suitable conditions for mite population increase whenever weather factors permit. Therefore, favorable weather rather than growth cycles generally governs population trends and the necessity for chemical control. Mite populations usually develop rapidly on grapefruit and Valencia orange trees only during the fall and