

# Corn tops sorghum in comparison trials

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Grain sorghum has been grown as the second crop in double crop systems in California agriculture for years. Its use has been marginally profitable, especially in occasional years with early, wet falls. Growers interested in greater profits began investigating the possibility of substituting early maturing corn varieties for grain production in place of sorghum. When grown as a full season crop, corn usually shows a yield advantage over grain sorghum. These comparisons by growers indicated that corn did have a potential yield advantage over sorghum as a double crop and also showed the ability to overwinter when early autumn rains made fall harvests impossible.

In 1974, experiments were started on the Agronomy Farm at UC Davis to obtain direct comparisons between corn and sorghum in a double crop program for grain production. Objectives included determination of relative yield, screening the potential of a number of early maturing varieties, and investigation of the potential risks or problems, especially if the crops had to overwinter. The experiments were conducted through 1975 and 1976.

All trials were established on typical double crop planting dates, the last week in June through the first week in July. Each trial contained 24 early maturing corn and 12 early maturing sorghum varieties. Each trial was a nested design with four replications. Plantings were made on pre-irrigated beds in 1974 and 1976, but were irrigated up in 1975. The trials were irrigated every 10 days throughout each growing season and fertilized with 200 pounds nitrogen per acre.

Corn was grown each year at a population of 28,000 plants per acre on 30-inch beds. The sorghum was planted two rows per 30-inch bed using an 18 pounds-per-acre seeding rate.

Each plot consisted of two beds 20 feet long. Harvesting each year was done by hand during November. However, to test overwintering, one-half of the 1974 and 1975 plantings was left in the field and harvested the following March. Grain moisture percentage was determined immediately after shelling or threshing with a Burrows moisture meter except in 1974, when grain was oven-dried to determine percent moisture. Yields are re-

ported at 15.5 moisture for corn and 14 for grain sorghum—the standards for No. 2 grain.

Three-year yield averages at fall harvest (table 1) showed corn had a 1300-pound per acre average advantage over sorghum. The moisture levels for the two crops in 1975 and 1976 show average moisture for corn was higher, but still low enough to be harvested as efficiently as the sorghum.

Table 2 summarizes the performance of the five varieties tested in both 1975 and 1976, and which exhibit good agronomic characteristics as well as excellent yield potential. The average moisture percentage of these varieties was 27.5 in 1975 and 25.1 in 1976. During the testing, corn varieties with high grain moisture content at harvest (30 or above) were eliminated. Corn can be harvested efficiently at moistures below 30 percent although drying is necessary.

In years with early fall rains, soil and weather conditions might not allow harvest until spring. Corn showed a distinct advantage in its ability to overwinter compared to sorghum. In 1975 the mean yield from the 24 corn varieties was 8165 pounds per acre for the November harvest and 7750 pounds per acre for the overwintered March harvest, a decrease of 5 percent. Protein content of the grain harvested in November and in March remained the same. The rainfall during this period was 3.24 inches. Although no yields were taken from overwintered grain in 1974, corn grain samples taken in the spring averaged 1.6 percent lower protein. Rainfall was 14.1 inches in the overwintering period. There was no harvestable sorghum present at the March harvest in either year; kernels of all 12 sorghum varieties

were decomposed, shattered by wind, or eaten by birds.

In 1975 and 1976 several varieties were studied at different plant populations per acre. Varieties appeared to vary in their response. As with full season corn production, it appears optimum plant population levels need to be developed on a variety-by-variety basis. However, these populations may be higher than for full season corn production. Populations below 30,000 plants per acre did not give maximum yields.

## Summary

In three years of testing, corn demonstrated a significant yield advantage over sorghum when planted as the second crop in a double crop system. Grain moistures observed indicated corn is as well suited to the double crop growing season as sorghum.

Corn demonstrated an ability to overwinter in a year of moderate rainfall whereas sorghum was a complete loss.

Several corn varieties are suitable for double crop. Resistance to Fusarium ear rot and lodging is essential. More experience is needed to evaluate the influences of diseases and insects on corn production in double crop systems.

Additional advantages exist for corn as a double crop. It can be irrigated up because it can be used with nonresidual herbicides that are not available to sorghums. This allows earlier planting and can give a somewhat longer growing season for corn by eliminating the time needed for preirrigation. Corn can also be harvested with greater success at higher grain moisture percentages than sorghum. This could also prove advantageous when time is critical although drying charges might be increased.

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TABLE 1. Three-year Summary of Mean Yields\*—Double Crop Trials

Crop	1974		1975		1976		3-year average
	Yield†	Yield	Moisture at harvest‡	Yield	Moisture at harvest§	Yield	
Corn	5700	8170	28.0	7040	25.9	6970	
Sorghum	5280	5740	23.5	6000	20.8	5670	
LSD, .05							322
C.V., %							5.6

\* Yields in lb/acre; corn at 15.5% moisture; sorghum at 14.0% moisture.

† Moistures not available.

‡ November 7, 1975.

§ November 24, 1976.

TABLE 2. Summary of Corn Varieties Tested in 1975 and 1976

Brand name	Variety	Yields at 15.5% Moisture		
		1975	1976	Mean*
Northrup, King	PX 20	10,460	7,610	9,035
DeKalb	XL21A	8,920	8,300	8,610
Funk's	G-4195	9,370	7,850	8,610
Ferry-Morse	X310	8,770	7,250	8,010
Funk's	G-4141	8,070	7,920	7,995

\* No significant difference in yield at 5% level of probability.