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AGRONOMY NOTES

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GRAIN SORGHUM AND SOYBEAN VARIETY TESTS ON RECONSTRUCTED PRIME LAND - 1985

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Prime farmland disturbed by surface mining must by law be returned to a productivity level equal to that before mining. The coal operator has several test crops that can be selected to determine whether these production standards have been met before final bond release will be made. Grain sorghum and soybeans are two of the crops that may be used. The purposes of this research are (1) to determine the crop yield potential of restored prime farmland from surface mined areas, (2) to determine varietal adaptation on restored prime farmland as compared to non-mined prime farmland, and (3) to provide crop yield data to Kentucky farmers on grain sorghum and soybeans from restored prime farmland.

Soil Type

Several soil series in the western Kentucky coal field geographical region may be involved in prime farmland reclamation. One soil series that is typical of the upland soils being mined is the Sadler silt loam which was selected for this study. Approximately 32 inches of subsoil, a mixture of B2t and Bx horizons, was replaced at this site. Then, 8 inches of Ap horizon material was placed on top of this subsoil. This study was conducted on the Peabody Coal Company, River Queen Mine Site, in Muhlenberg County.

Experimental Conditions

Phosphate and potash fertilizers were applied according to soil tests (96 lbs/A of both P_2O_5 and K_2O) and was broadcast prior to planting and incorporated into the soil by disking. Nitrogen, applied only on the grain sorghum plots, was broadcast as ammonium nitrate at 133 pounds N per acre at planting and 50 pounds N per acre as a topdressing approximately 40 days after emergence.

The grain sorghum was seeded at a rate of 7 pounds per acre and soybeans were seeded at a rate of 8-10 seeds per foot of row. Planting date was May 9, for both tests. The grain sorghum plots consisted of two 30 inch rows, 38 feet in length and were harvested on September 17 with a plot combine. The soybean plots consisted of four 30 inch rows, 38 feet in length and were harvested on October 28 with a plot combine. Yields were adjusted to 14.0% and 13.5% moisture for grain sorghum and soybeans, respectively.

Grain Sorghum Varieties

The results of the grain sorghum varieties are shown in Table 1. This was the only grain sorghum variety test conducted in Kentucky in 1985 and should be compared with more extensive tests from some of the neighboring states. The Ky. Crop and Livestock Reporting Service for 1985 listed the state average yield of grain sorghum as 80 bu/A as compared to an average corn yield of 102 bu/A. Over the past 10 years, in general, grain sorghum yields were 20-25 bu/A less than corn. Using a yield value for corn for the Sadler soil of 105 bu/A, and a difference between corn and grain sorghum of 22 bu/A, the expected target yield for grain sorghum would be about 75 bu/A (90% of non-mined land i.e. $83 \times 0.90 = 74.7$ bu/A). Although data given in Table 1 are for only one year and yields as well as relative performances of specific varieties are likely to change, yields from two entries exceeded the target yield. The maturity rating of these sorghum varieties given in Table 1 is based on information from the 1985 Missouri Grain Sorghum Crop Performance Data. A variety with a 3 maturity rating is considered medium-to-late maturing while a 1 maturity rating would be a medium-early maturing variety. A 3 to 4 maturity group variety should not be planted in a double-cropping situation after June 25 in Kentucky.

The yield levels achieved in this test are quite comparable to those that would be expected on this soil type. The medium-to-late maturing varieties tended to be higher yielding which was expected.

Table 1. Grain Sorghum Hybrid Test Results on Reconstructed Prime Land.
Peabody Coal Company - River Queen Mine 1985.

<u>Brand-Hybrid</u>	<u>Maturity Group</u>	<u>Yield (Bu/A)^{1/}</u>
Northup-King 2778	3	80.1
Taylor-Evans Y101G	3	77.3
Funks G1602	3	71.0
Funks G522DR	3	69.2
Taylor-Evans Dinero	3	68.7
Northup-King 2660	3	64.8
Asgrow Topaz	3	63.3
Funks G1711	4	63.3
Taylor-Evans Y45G	1	62.7
Northup-King 2244	2	60.9
DeKalb DK42Y	2	57.3
Southern States SS174	3	53.5
Pioneer 8333	3	53.4
Pioneer 8515	2	53.0
Taylor-Evans Y77	2	53.7
L.S.D. (.10)		14.5

^{1/} Yields adjusted to 14.0% moisture.

Soybean Varieties

The results of the soybean varieties are presented in Table 2. The maturity ratings are based on the data from the 1985 Kentucky soybean Performance Tests - Progress Report 293. The full-season varieties for this area of the state were the highest yielding in this study as was expected. The target yield for soybeans is 31.5 bu/A (90% of non-mined Sadler, i.e. $35 \times 0.90 = 31.5$ bu/A) and therefore, the top four entries would have met bond release yield values. However, since this is only one year's data, it is likely that yields and relative ranking of varieties would change from year to year. In comparing the yields of Pella with other state tests, this variety did not yield as well on restored prime farmland in comparison with the varietal test results in Progress Report 293.

Table 2. Soybean Variety Test Results on Reconstructed Prime Land.
Peabody Coal Company - River Queen Mine, 1985.

<u>Variety</u>	<u>Maturity Group</u>	<u>Yield^{1/} (Bu/A)</u>	<u>Approx. Maturity^{2/}</u>
Pershing	IV	33.9	+21
Essex	V	33.7	+20
RA-405	IV	32.6	+18
FFR-561	V	31.9	+27
SS-443	IV	26.9	+ 8
Forrest	V	25.9	+31
Mitchell	IV	23.9	+ 8
Douglas	IV	23.5	+12
Unfon	IV	21.9	+ 4
SS-391	III	21.1	+ 6
Lawrence	IV	21.1	+ 2
Williams 82	III	20.1	0
Pella	III	14.7	-4
L.S.D. (.10)		3.3	

^{1/} Yields adjusted to 13.5% moisture.

^{2/} Days later (+) or earlier (-) than Williams 82.

Summary

The yield levels of several of the grain sorghum varieties were indicative of the ability of grain sorghum to produce better than soybeans under the drier conditions that existed this year at this site. These yield levels are quite acceptable for restored prime farmland of this soil series. The trend of the later maturing soybeans to be higher yielding is in agreement with expectations for this geographic location.

The yield level of most the soybean varieties was somewhat lower than was normally expected on this soil series under non-mined conditions. It is important to remember that this is only one year's data and at least two more year's data will be obtained to answer the overall objectives of this study.