

THE INFLUENCE OF  
PLASTIC MULCHES AND FERTILIZER RATES  
ON THE PERFORMANCE OF  
SWEET POTATO VARIETIES IN KENTUCKY

By Dean E. Knavel and H. C. Mohr

Progress Report 153  
UNIVERSITY OF KENTUCKY  
AGRICULTURAL EXPERIMENT STATION  
Department of Horticulture  
Lexington

THE INFLUENCE OF PLASTIC MULCHES AND FERTILIZER RATES  
ON PERFORMANCE OF  
SWEET POTATO VARIETIES IN KENTUCKY

By Dean E. Knavel and H. C. Mohr

The acreage of sweet potatoes in Kentucky decreased from 14,178 acres in 1899 to 2.3 acres in 1960. However, yields per acre nearly doubled, from approximately 65 bushels in 1899 to 113 in 1960. Average yields per acre reported for the years 1943-52 were equivalent to those reported during the same period for states with greater acreage than Kentucky's.

The decrease in the state's acreage over the last 60 years may be attributed to several factors, of which the lack of facilities for curing the potatoes properly after harvest is probably the most important. Uncured potatoes had to be sold quickly on local markets, resulting in an oversupply and a drop in price.

The loss of land best suited for high quality sweet potato production may have influenced production decline also, since much of the sandy-loam soil (thought to be best for producing quality) has been lost to urbanization.

However, with rapid, long-distance shipping, low-cost curing facilities, new production techniques such as the use of plastic mulches, and improved varieties, Kentucky growers should be able to produce efficiently a high quality sweet potato. The use of plastic mulches has been shown to increase yields in several vegetable crops. Therefore, trials were initiated to determine the value of plastic mulches for sweet potato production and to determine the most beneficial fertilizer practices for use with plastic mulches.

CULTURAL PROCEDURES

Seven varieties, Porto Rico, Copperskin Gold Rush, Centennial, Georgia Red, Bunch Porto Rico, and Nancy Hall, were compared in 1963 by growing with and without black and clear plastic mulches. Dacthal<sup>1</sup>, an herbicide, was used at the recommended rate under the clear mulch to control weeds. The varieties in the unmulched plots received regular cultivation for weed control.

A 12-12-12 fertilizer was broadcast at the rate of 1000 pounds per acre and disked into the soil prior to planting. The soil was mounded into rows before the plastic films were laid, and planting was done through slits made in the plastic after it had been placed over the mulch-treatment rows. The plants were spaced 18 inches apart in rows spaced 4 feet apart. Each sub-plot contained 10 plants of each variety, and the treatments were replicated 4 times.

---

<sup>1</sup>Product of Diamond Alkali Company.

In 1964, Allgold and Nancy Hall were grown with and without black plastic mulch at various fertilizer rates. The fertilized plots received nitrogen from ammonium nitrate, phosphorus from superphosphate, and potassium from potassium sulfate. The following combinations of fertilizer treatments, in pounds per acre, were used:

	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	
1.	0	0	0	(check)
2.	50	0	0	
3.	0	50	0	
4.	0	0	200	
5.	50	0	200	
6.	0	50	200	
7.	50	50	0	
8.	50	50	200	

The plants were set 15 inches apart in rows spaced 3 feet apart. The rows were prepared and the plastic laid as described for the 1963 experiment. Other cultural practices were similar to those in 1963.

The vines were cut immediately after the first frost each year in October, and the potatoes were dug and graded as either marketable or non-marketable. The non-marketable consisted of non-enlarged roots and excessively large, mis-shaped potatoes. The potatoes were cured at 85°F for 3 weeks and stored at 50-60°F.

## RESULTS OF EXPERIMENTS

### 1963

The use of black and clear plastic mulches increased yields of the marketable grade and resulted in fewer non-marketable potatoes (Table 1).

Centennial, Porto Rico, and Nancy Hall were the highest yielding varieties with the clear plastic mulch. The range from low to high yield was less for varieties grown with clear plastic mulch than those with the black plastic mulch.

### 1964

Results show that black plastic mulch increased total yields of marketable sweet potatoes (Table 2). The varieties performed best with plastic mulch when either 50 pounds per acre of nitrogen or when nitrogen plus 200 pounds per acre of potassium (K<sub>2</sub>O) was applied.

Allgold showed the largest increase in yields of potatoes, with and without plastic mulch and had the highest percentage of marketable roots at all fertilizer levels with and without plastic mulch. No differences in keeping quality of potatoes could be observed between varieties after 6 months' storage for either year. All varieties in the test, when bedded, proved to be adequate producers of plants.

Table 1. -- Average Marketable Yields (bu/A), Percentage of Total Yields Marketable, and Color of Roots for Sweet Potato Varieties Grown With and Without Plastic Mulch in 1963

Variety	Check (no mulch)		Black plastic mulch		Clear plastic mulch		Variety means		Root color	
	Mktbl.	%	Mktbl.	%	Mktbl.	%	Mktbl.	%	Skin	Flesh
Porto Rico	128	81	207	82	213	85	182	83	pink	lt. salmon
Copper Skin Gold Rush	44	72	135	82	178	82	119	79	copper	deep salmon
Centennial	133	85	321	92	203	89	219	89	copper	orange
Georgia Red	82	73	162	82	180	77	141	77	red	salmon
Bunch Porto Rico	124	84	178	85	164	87	156	82	pink	orange- salmon
Nancy Hall	91	73	288	85	227	87	201	82	white	lt. salmon
Treatment means	100	78	215	85	194	85	--	--	--	--

Table 2. -- Average Marketable Yields (bu/A) and Percentage of Total Yields Marketable for Sweet Potato Varieties Grown at Various Rates of Fertilizers With and Without Black Plastic Mulch in 1964

Fertilizer rates (lb/A)	Allgold				Nancy Hall					
	Without plastic		With plastic		Without plastic		With plastic			
	Bu	%	Bu	%	Bu	%	Bu	%		
0 - 0 - 0	463	76	545	72	125	56	143	55	134	56
50 - 0 - 0	343	72	546	74	114	57	161	58	138	58
0 -50 - 0	412	72	457	74	155	59	174	57	165	58
0 - 0 -200	472	74	416	72	171	62	161	57	166	59
50 - 0 -200	412	73	653	75	147	59	206	59	177	59
0 -50 -200	423	71	500	76	161	62	198	59	180	61
50 -50 - 0	445	73	498	70	174	59	153	62	164	61
50 -50 -200	466	73	512	71	169	61	229	65	199	63
Average	430	73	516	73	152	59	178	59	165	59

### CONCLUSIONS

The use of plastic mulches was shown to increase yields of sweet potatoes in both years of the trials. Porto Rico, Centennial, and Nancy Hall were the highest yielding varieties, with and without plastic mulches, in 1963. Allgold out-yielded Nancy Hall in 1964.

The greatest response from additional amounts of fertilizers was with the use of plastic mulch. Plants fertilized with 50 pounds per acre of nitrogen and 200 pounds of potassium ( $K_2O$ ) per acre gave the highest yield of roots under conditions at Lexington, Ky. The sweet potato varieties tested did not show any response to additional amounts of phosphorus. Also, high potassium without nitrogen reduced yields and, therefore, nitrogen appeared to be essential with potassium.