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Burley 64 Tobacco Variety

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Burley 64 Tobacco Variety

C. L. Gupton and M. O. Neas²

INTRODUCTION

There is a need for a wider choice of burley tobacco varieties with multiple disease resistance, adequate yield, good handling characteristics, and acceptability to the trade. All present varieties are deficient in one or more of these desirable attributes. Only one variety, Burley 49, has been available for use where both race 1 of the black shank organism³ and black root rot⁴ are problems. Some growers find the yield of this variety inadequate.

Burley 64, tested as Greeneville 64A, was released in 1973 by the Tennessee Agricultural Experiment Station and the Agricultural Research Service, U. S. Department of Agriculture. The new variety has resistance to all major diseases of burley tobacco and is superior to Burley 49 in yield and quality.

ORIGIN AND DEVELOPMENT

Burley 64 originated from the cross 62-231-25H X 62-486-25H. It was in the F₉ generation at the time of release. The 62-486-25H parent contributed resistance to black root rot, derived from *Nicotiana debneyi*; resistance to tobacco mosaic⁵, derived from *N. glutinosa*; and resistance to wildfire⁶, derived from *N. longiflora*; in addition to *N. tabacum*-type resistance to Fusarium wilt⁷ and black shank. A high leaf number from the mutation HLN Burley 21 and resistance to all diseases listed above except black root rot were contributed by 62-231-25H. Burley 64 was evaluated in the state yield and quality trials from 1968 through 1972 and in the 1972 Regional Burley Variety Test.

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³*Phytophthora parasitica* Dast.

⁴Caused by *Thielaviopsis basicola* (Berk. & Br.) Ferr.

⁵Caused by tobacco mosaic virus.

⁶Caused by *Pseudomonas tabaci* (Wolf and Foster) Stevens.

⁷Caused by *Fusarium oxysporum*, (Schlecht.) F. Sp. *nicotianae* (J. Johnson) Snyd. & Hans.

DESCRIPTION

Burley 64 is a high-leaf-number, late-flowering variety. However, if it is topped early, the upper leaves fill out well, resulting in a cylindrical plant that matures uniformly (Figure 1). Short internodes and very upright leaves provide a plant that is much easier to handle than any older variety, other than Burley 49. The yield of Burley 64 is adequate, and its acceptability to cigarette manufacturers is good. This variety has consistently cured well under the variable conditions during the curing seasons of the last 5 years.

Agronomic Characteristics

Burley 64 generally yielded more than the check variety, Burley 49, in trials at several locations over 4 years (Table 1). On the average of all tests, Burley 64 yielded 262 pounds per acre more than Burley 49. The number of leaves after topping, plant height, internode, and width of leaf were almost identical for Burley 64 and Burley 49 (Table 2). However, Burley 64 leaves averaged about 1 inch longer, and the plants required about 9 days longer to flower than the check variety.

With the shortage of labor for barning tobacco and the poundage limitation on production, the handling characteristics of varieties

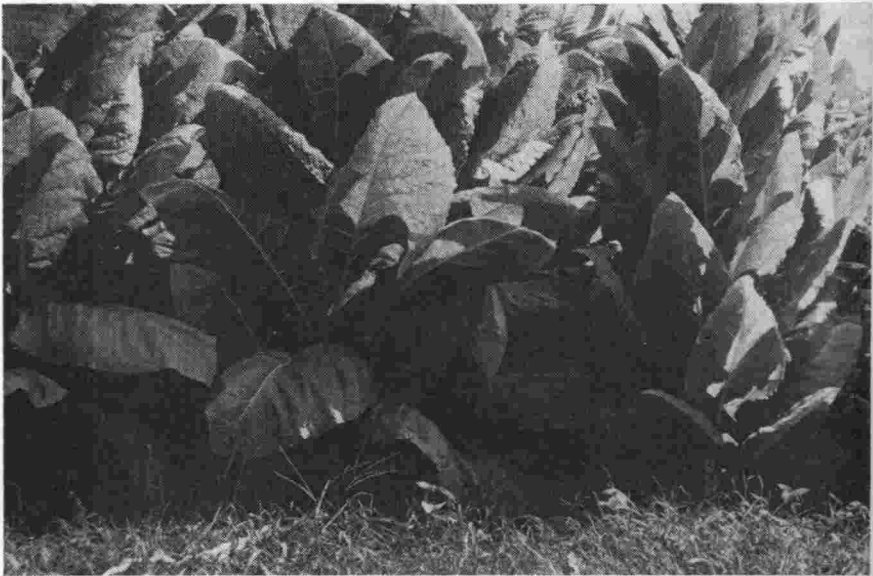


Figure 1. Burley 64 on the right compared with a drooping type breeding line on the left which is difficult to handle without leaf breakage.

Table 1. Yield (lb./acre) of Burley 64 and Burley 49, based on four replications of single-row plots 156 feet long at each location each year

Year	Variety	Location—Grower/County											
		Rutherford Sullivan	Kincheloe Hawkins	Street Washington	Price Hawkins	TES* Greene	Moser Jefferson	Fisher Loudon	Bettis Loudon	PES* Cumberland	Turner Trousdale	HRES* Robertson	MTES* Maury
1969	Burley 64	2,908	—	3,190	2,928	2,872	2,892	—	3,176	2,240	2,709	2,685	—
	Burley 49	2,633	—	3,005	2,493	2,802	2,442	—	2,567	1,826	2,280	2,732	—
	LSD _{0.05}	215	—	NS	310	NS	325	—	299	289	NS	NS	—
1970	Burley 64	2,854	2,455	3,230	—	2,440	2,309	—	—	2,094	—	2,795	—
	Burley 49	2,578	2,091	3,096	—	2,371	2,021	—	—	1,973	—	2,722	—
	LSD _{0.05}	185	274	NS	—	NS	NS	—	—	NS	—	NS	—
1971	Burley 64	2,997	2,201	3,442	—	2,222	—	2,542	—	2,196	—	2,974	—
	Burley 49	2,647	2,156	2,993	—	2,116	—	2,174	—	1,817	—	2,761	—
	LSD _{0.05}	273	NS	NS	—	NS	—	368	—	214	—	NS	—
1972	Burley 64	—	2,390	2,834	—	2,548	2,908	—	—	2,252	—	2,973	2,444
	Burley 49	—	2,015	2,825	—	2,375	2,403	—	—	1,968	—	2,686	2,270
	LSD _{0.05}	—	245	NS	—	NS	277	—	—	219	—	NS	NS
Average of 30 tests:													
	Burley 64	2,690											
	Burley 49	2,428											
	LSD _{0.05}	70											

*TES, PES, HRES, and MTES refer to the Tobacco Experiment Station, Plateau Experiment Station, Highland Rim Experiment Station, and Middle Tennessee Experiment Station, respectively.

Table 2. Agronomic characteristics of Burley 64 and Burley 49 at two locations—average of 4 years

Character	Variety	TES*	HRES**	Average
Leaf no.	Burley 64	22.6	22.1	22.3
	Burley 49	22.2	22.0	22.1
	LSD _{0.05}			NS
Plant height (inches)	Burley 64	47.9	48.9	48.3
	Burley 49	49.4	47.6	48.5
	LSD _{0.05}			NS
Internode (inches)	Burley 64	2.2	2.2	2.2
	Burley 49	2.2	2.2	2.2
	LSD _{0.05}			NS
Length of largest leaf (inches)	Burley 64	26.7	25.2	26.1
	Burley 49	25.9	24.2	25.2
	LSD _{0.05}			0.4
Width of largest leaf (inches)	Burley 64	12.4	12.0	12.2
	Burley 49	12.2	12.0	12.1
	LSD _{0.05}			NS
Days to flower	Burley 64	84.3	80.0	82.1
	Burley 49	76.3	70.8	73.4
	LSD _{0.05}			1.0

* Tobacco Experiment Station, Greeneville, Tennessee.

** Highland Rim Experiment Station, Springfield, Tennessee.

are more important considerations than formerly. The closely-spaced, upright leaves and short plant makes Burley 64 easier than most varieties to barn and cure. The late-flowering characteristic of this variety will be discussed in a later section.

Quality Characteristics

The grade index⁸, crop index⁹, and acre value of Burley 64 were significantly higher than those of the check (Table 3). There was

⁸Grade index is based on average market values of various U. S. government grades during the years 1934-1935 and 1937-1940. The market preference for certain grades is probably different presently; however, tobacco with a high grade index has a good visual appearance.

⁹Crop index is the product of grade index and yield.

¹⁰Market value (\$/cwt) is computed as the average market price for the given U. S. government grades in the given year.

no difference between varieties in market value¹⁰ and percent usable to cigarette manufacturers. The percent of tobacco fitting manufacturer's cigarette grades is a measure of the overall demand for the type of tobacco produced by a given variety. According to the manufacturers, Burley 49 produces a very desirable leaf. These data indicate that Burley 64 should be equally as acceptable to the buyers.

The chemical and physical characteristics of Burley 64 are within the acceptable range for burley tobacco (Table 4). Cigarettes made with Burley 64 have been smoked by test panels and found to be normal for burley.

Results from Regional Tests

The results of comparing Burley 64 with two check varieties, Burley 21 and Ky 10, in the 1972 Regional Burley Variety Test appear in Table 5. Yield of Burley 64 was significantly less, but it averaged one leaf per plant more than the check varieties. The

Table 3. Comparison of Burley 64 with Burley 49 for some quality characteristics—average of 30 tests

	Grade index	Crop index	Market value (\$/cwt)	Acre value	% Usable by mfg.
Burley 64	0.586	1,551	75.52	\$2,023	57.5
Burley 49	0.552	1,322	75.28	\$1,827	58.4
LSD _{0.05}	0.008	41	NS	\$0,029	NS

Table 4. Chemical and physical characteristics of Burley 64 and Burley 47 cured leaf—average 1969-1971

Data courtesy of American Tobacco Company								
	Specific volume	Agtron no.	TVB*	% Nico- tine	% TVB/ nicotine	Ratio nico- tine/TVB	% Ash	Sol- uble ash
Burley 64	1.58	58	0.848	3.47	0.483	0.43	22.34	74.0
Burley 49	1.53	55	0.858	3.24	0.518	0.39	22.11	78.4
Data courtesy of Liggett and Myers, Inc.								
	% Nicotine	% Total N.	% Nitrate N.	% α -amino N.	WSA**	ph		
Burley 64	3.16	4.23	0.99	0.507	2.62	6.02		
Burley 49	3.25	4.37	0.99	0.520	2.66	6.04		
Data courtesy of American Tobacco Company								
	% Total N.	% Total Alkaloids	% Nicotine	% nornicotine	Ratio SAA/TA***			
Burley 64	5.10	3.73	3.38	0.32	0.09			
Burley 49	5.27	3.55	3.12	0.40	0.12			

*Total volatile bases.

**Water-soluble acids.

***Secondary amine alkaloids/total alkaloids.

Table 5. Comparison of Burley 64 with two check varieties in the 1972 Regional Burley Variety Test—average of tests at Lexington, Ky.; Glade Spring, Va.; and Greeneville, Tenn.

Variety	Yield (lb./acre)	Days to flower	Plant height (inches)	Number leaves	Length of 5th leaf (inches)	Width of 5th leaf (inches)	Internode length (inches)	% Usable in cigar- ette mfg.*
Burley 21	2,797	69	55.7	22.1	21.9	10.1	2.52	61.2
Ky 10	3,003	73	50.2	21.5	23.9	10.6	2.33	65.5
Burley 64	2,596	76	48.5	23.3	21.9	10.2	2.08	68.1
LSD _{0.05}	151	1.3	2.1	1.2	0.9	0.5	0.30	—
CV	6.8	2.3	5.0	6.8	4.8	5.5	5.9	—

* Average of Lexington and Greeneville.

average size of the leaves near the top of the plant was the same for Burley 21 and Burley 64, but was larger for Ky 10 than for the other two varieties. The shorter plant height of Burley 64 would be advantageous for barning and curing. The percent of Burley 64 tobacco usable for cigarettes was equal to or better than those of the check varieties.

Resistance to Diseases

Diseases constitute the most limiting factor in the choice of varieties to grow in Tennessee. Black root rot is found throughout the production area, and black shank is also widespread. In addition, the presence of race 1 of the black shank organism narrows the choice of varieties. Before Burley 64 was released, only one available variety was safe to use where both black shank and black root rot occurred.

Burley 64 has resistance to all of the major diseases of burley tobacco (Table 6). It survived 100% in a race 1-infested black shank nursery in 1972. The new variety has a medium level of resistance to Fusarium wilt, as compared to a low level for Burley 49 (Table 6). It possesses the dominant factors for resistance to tobacco mosaic, wildfire, and black root rot.

Table 6. Resistance of Burley 64 and Burley 49 to major diseases of burley tobacco

Disease	Burley 64	Burley 49
Black shank survival, race 0	93.3%	97.2%
Black shank survival, race 1	92.2%	93.8%
Fusarium wilt symptomless plants	83.2%	51.6%
Tobacco mosaic	Resistant	Resistant
Wildfire	Resistant	Resistant
Black root rot	Resistant	Resistant

EFFECTS OF TOPPING DATE

There are possible advantages and disadvantages of the late-flowering characteristic of Burley 64. Therefore, the stage at which the plants are topped is critical for this variety. Experiments were conducted during 1971 and 1972 to determine the effects on yield and quality of topping at different stages of plant growth.

Yields of Burley 64 were not very different when topped on the first two dates, but were decreased significantly when topping was delayed until 50% of the plants were in bloom (Table 7). The bottom leaves of plants topped at mid-bloom deteriorated before harvest (Figure 2). This was probably caused by translocation of mobile constituents to the upper leaves before topping. Grade index and market value were not different for any treatments, but crop index and acre value were reduced for the last topping date. As expected, percent total alkaloids were progressively lower with successive topping dates, but none were outside the normal range for burley tobacco. The cigarette manufacturers graded more tobacco usable from the first than from the other topping dates.

Table 7. Response of Burley 64 to topping at various stages of growth; 1971-1972

Character	Treatment*			
	1	2	3	4
Yield	2,387ab**	2,283ab	2,225 b	2,454a
Grade index	0.688a	0.690a	0.631a	0.656a
Crop index	1,635a	1,576ab	1,408 b	1,618a
\$/cwt	80.54a	80.62a	80.47a	80.50a
Acre value	1,922ab	1,840ab	1,791 b	1,978a
% Total alkaloids	4.39a	4.22ab	3.35 b	3.54 b
1971 % total N.	3.71 b	4.00a	3.52 b	3.66 b
1972 % usable	82.6	60.3	63.3	60.0

*Treatment 1 was topped to 25 leaves about 2 weeks before mid-bloom.

Treatment 2 was topped to 25 leaves about 1 week before mid-bloom.

Treatment 3 was topped to 25 leaves at mid-bloom.

Treatment 4 was topped to 8-12 inch top leaves, without counting, about 1 week before mid-bloom.

**Means in the same line followed by the same letter are not significantly different at the 0.05 level of probability.



Figure 2. Burley 64 topped too late. Note the deterioration of the bottom leaves.

SUGGESTION TO GROWERS

Based upon our results, it is recommended that Burley 64 be topped to 22 or 23 leaves at the time that the uppermost leaf can be left 8 to 12 inches long, regardless of whether the plants have begun to flower. The recommended time of topping is usually around August 1. If the variety is topped then, the tobacco matures at about the same time as earlier-flowering varieties. Later topping results in reduced yields, and small, immature leaves at the top of the plant. Thus, it is important that this variety be topped as suggested herein. In addition to producing higher yield and quality,

topping before flowering provides the advantage of having no suckers to be pulled before applying chemical sucker-control materials.

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