8-1971

Uptake and Distribution of Mineral Elements by Burley 21 Tobacco as Influenced by Nitrogen Nutrition and Suckering Practice

J. L. Sims
University of Kentucky

W. O. Atkinson
University of Kentucky

UNIVERSITY of KENTUCKY • COLLEGE of AGRICULTURE

AGRONOMY NOTES

DEPARTMENT of AGRONOMY Lexington 40506

Vol. 4, No. 5 August, 1971

UPTAKE AND DISTRIBUTION OF MINERAL ELEMENTS BY BURLEY 21 TOBACCO AS INFLUENCED BY NITROGEN NUTRITION AND SUCKERING PRACTICE

J. L. Sims and W. O. Atkinson

Knowledge of nutrient content of tobacco and of removal of nutrients from soil is essential to developing sound fertilization practices for tobacco. Quantities of nutrient elements taken up by tobacco vary widely. This is because of variations in variety, soil fertility level, fertilizer application, soil moisture, plant population, and other environmental and cultural factors. We conducted the present study to determine the effects of applied N and suckering practice on the content of mineral elements in certain plant parts of burley tobacco.

The soil type used was Maury silt loam located on the University of Kentucky South Farm at Lexington. Phosphorus and potassium fertilizers were applied at constant rates in sufficient amounts for high yields. Nitrogen was applied at rates of 100, 200, and 400 lb N/acre. Each fertilizer was broadcast and all were disked in after plowing and before transplanting. Plots were irrigated when soil moisture dropped below 60% of available moisture-holding capacity. Sucker control practices tested were (a) no topping - no suckering, (b) topping - no suckering, (c) topping - hand suckering, and (d) topping - maleic hydrazide (one application of 5 qt/acre). Plants were grown and harvested conventionally, and samples were collected for chemical analysis. Data for yield and market value were reported previously in Agronomy Notes Vol. 3, No. 4, July 1970. Yields of cured leaf are shown again in Table 1 for reference purposes.

Suckering practice influenced total plant uptake of N, P, K, and Mg (Table 1). Trends indicated that suckering practice also may have influenced contents of Ca and Mn. Plants treated with maleic hydrazide contained lower amounts of elements, and topped but not suckered plants generally contained higher amounts than plants receiving other suckering practices. Lower nutrient removal by plants treated with maleic hydrazide likely occurred because maleic hydrazide has been shown to alter the root system of treated plants. Leaf yields from plants treated with maleic hydrazide were 264 and 471 lb/acre greater than from plants hand suckered or not suckered, respectively.

Although use of maleic hydrazide resulted in removal of lower total amounts of certain nutrients, leaves from plants treated with maleic hydrazide contained greater amounts, and tops and suckers lower amounts of these nutrients than from plants receiving the other suckering practices. This was because of the excellent sucker control from use of maleic hydrazide.

Agricultural and Home Economics Extension Service of the University of Kentucky, the United States Department of Agriculture, cooperating. Charles E. Barnhart, Director. Issued in furtherance of the Acts of May 8 and June 30, 1914.

Table 1. The influence of suckering practice on cured leaf yields, and content and distribution of mineral elements in certain plant parts of burley tobacco.

Suckering Practice	Cured Leaf Lb/Acre	Plant Part[1/]			
		Leaves	Stalks	Tops + Suckers	Total Plant
		- - - Pounds nitrogen per acre - - -			
No topping	2375	86	58	57	201
No suckering	2567	91	59	63	213
Hand suckering	2774	101	64	40	205
Maleic hydrazide	3038	114	67	7	188
		- - - Pounds phosphorus per acre - - -			
No topping		3.5	3.3	4.3	11.1
No suckering		3.7	3.5	4.7	11.9
Hand suckering		4.1	3.9	3.7	11.7
Maleic hydrazide		4.9	4.1	1.4	10.4
		- - - Pounds potassium per acre - - -			
No topping		73	70	50	193
No suckering		77	71	51	199
Hand suckering		80	71	36	187
Maleic hydrazide		100	63	11	174
		- - - Pounds calcium per acre - - -			
No topping		106	14	12	132
No suckering		112	16	13	141
Hand suckering		117	17	6	140
Maleic hydrazide		108	18	1	127
		- - - Pounds magnesium per acre - - -			
No topping		12	5	5	22
No suckering		14	5	6	25
Hand suckering		15	5	4	24
Maleic hydrazide		14	6	1	21
		- - - Pounds manganese per acre - - -			
No topping		0.60	0.05	0.13	0.78
No suckering		0.50	0.07	0.13	0.70
Hand suckering		0.60	0.07	0.08	0.75
Maleic hydrazide		0.60	0.08	0.02	0.70

[1/] Values represent means of 18 individual observations.

The distribution among plant parts was less variable for the mobile plant elements (N, P, K) than for the immobile or relatively immobile elements (Ca, Mg, Mn) (Table 2). These data suggest that considerable movement of the mobile nutrients occurred from the leaves to the tops and suckers in the no-topping and no-suckering treatments.

Table 2. Relative amounts of mineral elements contained in different plant parts of burley tobacco.

Element	Plant Part		
	Leaves	Stalks	Tops + Suckers
	- - - - - - - - - - - - % of Total Uptake - - - - - - - - - - - -		
N	49	31	20
P	37	34	29
K	44	37	19
Ca	82	12	6
Mg	61	23	16
Mn	78	9	13

Total plant contents of all elements generally increased as N fertilizer was increased from 100 to 200 pounds N per acre. Increasing N to 400 pounds per acre resulted in no further increase in uptake with exception of manganese. The content of manganese was nearly doubled by increasing the N rate from 200 to 400 pounds N/acre. Since yields from the 400-N treatments were no greater than those from the 200-N treatments, application of the high rate of N accentuated the likelihood of manganese toxicity problems with no economic benefit.

Relatively large amounts of N, K, and Ca and relatively small amounts of P, Mg, and Mn were taken up while producing an average of about 2700 pounds of cured leaf and 5400 pounds of total dry matter per acre.