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THE EFFECT OF NITROGEN RATE AND METHOD OF SUCKER CONTROL ON DRY MATTER ACCUMULATION IN DIFFERENT PLANT PARTS OF BURLEY 21 TOBACCO

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Earlier research has shown that higher leaf yields of burley tobacco result from topping and controlling sucker (axillary bud) growth. Suckering practices which provide the greatest degree of sucker control generally result in highest leaf yields. Chemically suckering with maleic hydrazide (MH-30) and other chemicals provides for a higher degree of control than most hand suckering practices although hand suckering at frequent intervals may produce leaf yields comparable to those from use of maleic hydrazide. High leaf yields resulting from a high degree of sucker control has been attributed to the elimination of the use of photosynthate to produce suckers.

To test this assumption and to obtain additional information concerning patterns of dry matter accumulation in tobacco, two field experiments were conducted in 1966. Burley 21 tobacco was grown at Lexington on Maury silt loam soil treated with varying rates of nitrogen fertilizer applied as ammonium nitrate. Concentrated superphosphate and potassium sulfate were broadcast uniformly on all plots and disked in after plowing and before transplanting. Two suckering practices and two tobacco strains (commercial or low nornicotine Burley 21 and high nornicotine Burley 21) were used in experiment 1. In experiment 2, sucker control practices utilized were (a) no topping - no suckering, (b) topping - no suckering, (c) topping - hand suckering, and (d) topping - maleic hydrazide. Two harvest treatments were used: (1) immature or 2 weeks prior to maturity, and (2) post maturity or 1 week past maturity.

Generally, weight of total dry matter per plant after curing increased as rate of N fertilization increased (Tables 1, 2). Weights were not greatly different at the 200- and 400-lb N levels, however. The effect of N rate was not the same for all plant parts. Weight of leaves increased significantly with increasing N-rate but weight of stalks and of tops + suckers did not increase greatly with rates of N above 100 lb N/acre.

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Table 1. — Dry weight[1/] (lb/acre) of plant parts of air-cured Burley 21 tobacco (Experiment 1)

N Rate	Suckering Practice	Plant Part: Leaves	Stalks	Tops + Suckers	Total Plant
lb/Acre		Pounds Per Acre			
100	Hand	1996	2449	453	4898
	Maleic Hydrazide	2223	2140	123	4486
	Average	2110	2295	288	4693
400	Hand	2531	2449	494	5474
	Maleic Hydrazide	2758	2017	165	4940
	Average	2645	2233	330	5208

1/ Values are averages of the two strains since dry matter was the same in the two strains. Weights are those after oven drying; therefore, weights of leaves are about 20 percent lower than normal barn leaf weights.

Table 2. — Dry weight[1/] (lb/acre) of plant parts of air-cured Burley 21 tobacco (Experiment 2)

N Rate	Suckering Practice	Plant Part: Leaves	Stalks	Tops + Suckers	Total Plant
lb/Acre		Pounds Per Acre			
100	No Topping	1729	2490	1626	5845
	No Suckering	1955	2449	1338	5742
	Hand Suckering	2140	2243	679	5062
	Maleic Hydrazide	2408	1996	185	4589
	Average	2058	2295	957	5310
200	No Topping	1955	2367	1708	6030
	No Suckering	2079	2470	1297	5846
	Hand Suckering	2387	2408	761	5556
	Maleic Hydrazide	2449	1832	123	4404
	Average	2218	2269	972	5459
400	No Topping	2017	2511	1194	5722
	No Suckering	2120	2593	1194	5907
	Hand Suckering	2243	2346	741	5330
	Maleic Hydrazide	2552	2058	185	4795
	Average	2233	2377	829	5439

1/ Values are oven dry weights; therefore, values for leaves are about 20 percent lower than normal barn leaf weights.

The suckering practice used influenced the weight of dry matter obtained for the total plant and for the leaf and stalk parts (Tables 1, 2, and 3-a, b, c). Maleic hydrazide resulted in the highest leaf weights, followed by hand suckered, no suckering, and no topping, in that order. The order of increase in dry matter by stalks, tops + suckers, and total plant was just the reverse of that for leaves. Consequently, these data together with the N-rate data indicate that photosynthate would be incorporated into stalk, sucker, and top plant parts rather than into leaves if (a) low rates of N were used, or (b) suckering practices were not adopted to prevent this from occurring.

Table 3. -- The influence of suckering practice and harvest date on dry weight[1/] of certain plant parts of Burley 21 tobacco (Experiment 2)

Harvest Date		Suckering Practice		
	No Topping	No Suckering	Hand Suckered	Maleic Hydrazide
	Pounds Per Acre			
(3-a) Leaf				
1	1976	2151	2167	2336
2	1825	1957	2270	2605
Average	1901	2054	2219	2471
(3-b) Stalk				
1	2264	2276	2200	1955
2	2659	2721	2453	1974
Average	2462	2499	2327	1965
(3-c) Tops + Suckers				
1	1089	694	685	167
2	1920	1860	764	161
Average	1505	1277	725	164
(3-d) Total Plant				
1	5329	5121	5052	4458
2	6404	6538	5487	4740
Average	5868	5830	5270	4599

[1/] Values are oven dry weights; therefore, values for leaf are about 20 percent lower than normal barn leaf weights.

Delaying harvest until the plants were mature resulted in increases in total leaf weight per plant for hand suckering and maleic hydrazide treatments (Table 3-a). For the no-topping and no-suckering treatments, delaying harvest generally decreased the total leaf weight per plant. Stalks from plants treated with maleic hydrazide did not increase in dry weight between harvests 1 and 2 (Table 3-b); stalks of plants in all other suckering practice treatments increased during this same time period. Average dry matter production for the total plant was greater at harvest 2 than harvest 1 (Table 3-c).

The data indicate that maleic hydrazide, a systemic suckering chemical, not only prevents sucker growth but prevents further growth of the stalk once the chemical is applied. Thus most carbohydrates that are formed in the leaves during photosynthesis may remain there, which explains the higher leaf yields obtained from the use of maleic hydrazide over hand suckering.

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