1966 Work

Effect of Rubber Resilience on the Operation
of the Spiral Rubber Wiper Defoliator

The spiral rubber wiper defoliator, Figure 1, was conceived in spring of 1954 and operated in the field that same summer. In numerous field tests since that time it has been found to be a simple and effective device for removing leaves from approximately the lower half of the stalk. The knife defoliator is superior for removing the upper leaves. Success and adaptability of the spiral rubber wiper (SRW) to removing the lower leaves is due, at least in part, to the flexibility of the rubber web which allows for misalignment of the plant, resiliency of the material thus reducing stalk and leaf damage and simplicity of design which makes it adaptable to operating in the abrasive environment close to the ground.

In operation, two SRW units are used, one on each side of the row so that the plant stalk can pass between them, Figure 2. There may or may not be a gap between them depending on the severity of the desired action. In some cases the webs of the two units may overlap by as much as one inch. In essentially all cases some deflection of the web is necessary for the stalk to pass, being largest when the webs are overlapped most. Web deflection is limited to the general area of the wiper in contact with the stalk. That is, a deflection wave moves with the stalk as it progresses through the defoliators. Hardness (durometer) of the rubber material in the defoliator determines the extent to which the deflection is localized around the stalk and the amount of overlap possible without impeding the passage of stalks between the defoliators.

For field operation the units are mounted at an angle to the horizon. The

front end is higher than the rear and is fitted with a divider to separate the leaves to be harvested from those to be left on the stalk. For effective harvest, all parts of those leaves to be harvested must pass beneath the de defoliator. Some difficulty has been experienced with varieties or crops on which the leaves grew upward at a small angle to the stalk. Leaves on such plants tend to pass through the defoliators with part of the midrib and the petiole below the defoliator in the swath area but with the main portion of the laminar above the defoliator. Leaf damage results especially to the foliar material on the petiole and the butt end of the leaf.

Because of the possible effects of defoliator design and rubber durometer on harvesting efficiency a set of experiments was set up to measure the effects of these variables. Three hardnesses of rubber material were used. These were, from softest to hardest 40-50, 50-60 and 70-80 durometer. Three sets of defoliators were made from the hard and intermediate material and two sets from the soft material. One extra set, except for the soft material, were modified by cutting slits along the axis to relieve some of the stress from twisting into a spiral. The other extra sets were modified by slicing the web part-way through from each side along the edges which came into contact with the plant. This was done to facilitate deformation of the material by the stalk and allow the material to conform more closely to the stalk.

The units were tested in plots of G-36, C-319, NC 2512 and NC 2326 varieties growing on the Central Crops Research Station, Clayton, N. C. during the summer of 1966. Evaluations were made of elevator loss, stalk loss, damage and total harvesting losses plus damage.

Results and Discussion

There was little difference in the overall performance of the hard and soft rubber wiper units, Table 1. The defoliators made of intermediate hardness material gave results in the same general range as the hard and soft materials. These results indicate that there is a large amount tolerance available in the design and operation of SRW defoliators.

It should be noted that leaf damage (next to last column of Table 1) was approximately three to five percent with a few values between five and six percent. Stalk loss and elevator loss made up the rest of the value shown in the total loss plus damage column except for a small amount of operator errors which was present in some of the runs. Under the present acreage-poundage allotment program elevator and field losses would not represent severe disadvantages because the procedures could plant extra acreage to make up for it. Cost of these losses would be the cost of producing this extra tobacco up to the point of harvesting. A realistic estimate would be 15¢/lb. or less than 1/4 of the value of the losses.

Stalk losses were quite high at the first of the season. The sand lugs were badly burned and sun scalded due to hot dry weather so the data starts with the leaves just above the lugs as priming A. These leaves were attached to the stalk at an acute angle thus making it difficult for the defoliator dividers to separate the ripe swath from the rest of the plant. Because of this, difficulty was experienced in stripping the lamina off some of the leaves. As these leaves were folded up along the stalk the wipers were free to strip part

Table 1. Effect of Defoliator Design on Leaf Loss and Damage.

Variety	Defoliator	Priming	Elevator Loss, %	Stalk Loss %	Leaf Damage %	Total loss plus Damage %
G 36	Hard					
		A	2.93	16.05	5.95	25.67
		B	3.99	3.01	4.29	11.53
		C	2.06	0.81	3.19	6.07
	Soft					
		A	7.42	15.73	5.77	30.82
		B	1.73	1.02	4.99	7.78
		C	2.81	1.58	3.70	8.05
C-319	Hard					
		A	3.03	12.06	5.59	21.14
		B	2.53	1.21	4.67	8.42
		C	2.52	0.77	2.63	5.59
	Soft					
		A	4.92	17.39	5.70	28.26
		B	1.40	1.48	3.92	11.25
		C	1.64	0.65	2.30	5.59
N.C.2512	Hard					
		A	2.69	19.10	5.10	26.92
		B	2.34	4.15	3.55	10.28
		C	3.96	2.14	2.98	9.08
	Soft					
		A	2.29	19.50	4.14	27.02
		B	3.13	0.63	4.84	7.94
		C	3.86	0.91	2.10	6.91
N.C.2326	Hard					
		A	4.50	20.16	2.87	27.86
		B	7.97	5.38	2.52	15.89
		C	0.49	1.94	2.41	4.84
	Soft					
		A	6.04	6.54	3.65	16.31
		B	4.20	4.65	2.95	13.60
		C	1.67	3.40	3.69	9.93

of the lamina and have the midrib and the rest of the lamina on the stalk. The severity of this action expressed as a percentage of the harvested leaves is given in Table 2.

Table 2. Effect of Rubber Hardness on Stripping of Lamina Material from Leaves Left on Stalk, N.C. 2326 Variety.

	Row 1			Row 2		
Defoliator	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3
Hard	24.8	3.15	22.1	22.6	20.1	20.5
Soft	32.5	30.7	39.3	36.2	40.0	23.9

Leaf angles of the lower leaves to the stalk are given in Table 3. These angles increased later in the season after several rains.

Table 3. Leaf Angle at Time of Priming A. Average Values Two Inches From Base of Petiole.

Variety	G 36	C 319	N.C. 2512	N.C. 2326
Angle	31.3°	35.5°	37.5°	30.7°

There were no appreciable differences in the harvesting efficiency of the defoliators with and without sliced edges. Also slitting and removing material along the axis of the wiper blade did not improve its action.

Summary

Field tests of the effects of rubber resiliency on the operational effectiveness of spiral rubber wiper defoliators showed that variations in durometer values from 40 to 80 units did not appreciable affect the results. The adverse effects

of acute angles between the stalk and the leaf were evident. Variations in the design of the defoliator with respect to edge slicing or central slits did not produce detectable changes in the operating characteristics.

Additional work to determine if durometer value has an effect on the harvesting characteristics of a more normal crop of tobacco is recommended.

Average Overall % Loss of Reps 1, 2 & 3

VARIETY IVC 2326 ($\frac{1}{2}$" clear)

Consistency of Dehiscence	Priming				
	July 15 A	July 24 B	Aug. 8 C	D	E
Very HARD Old Black (Plain)	29.44	43.22	42.20		
Hard Red + Green (Plain)	18.79	26.31	27.85		
Hard Green + Yellow (Edges Sliced)	15.00	24.24	34.33		
(only one rep)					
Hard (Red + Blue) Slits in middle	19.20	25.87	27.84		
Medium (Green) (Plain)	36.03	23.07	28.55		
Medium (Blue) Sliced on Edges	38.25	29.84	26.10		
Medium (Red + Yellow) Slits in Middle	42.44	34.98	25.04		
Soft (Red) Plain	40.26	28.59	16.31		
Soft (Yellow) Sliced on Edges	40.74	44.68	32.60		

EFFECT OF RUBBER RESILIENCE ON THE OPERATION OF THE SPECIAL RUBBER WIPER DEFOLIATOR

1967 work

C. W. Suggs
February 15, 1968

This work, performed during the summer of 1967, represents an extension of the investigations made during the summer of 1966. At that time special rubber wiper defoliators of hard (70-80 durometer) and soft (40-50 durometer) were tested over four varieties of flue cured tobacco. Results indicated that the operation was not sensitive to the hardness of the rubber used in the construction of the defoliator. The 1966 growing season was dry and the crop produced what was typical of dry weather tobacco in that the leaves were inclined upward with an angle between the midrib and the stalk of 30° to 40°. This made it difficult for the equipment to divide the leaves into those which were to be removed and those which were to remain on the stalk. As a result, there was considerable stripping of leaf lamina from the midrib and in general, poor operation of the equipment, especially at the first priming. For this primary the total of the losses plus damages ran from 16% to 30%. Considerable reduction in this value were realized progressively at the second and third primarys as the leaves flattened out, with some observations being as low as 5%.

It was felt that, because of the dry weather characteristics of the 1966 crop, it would be desirable to repeat the experiment in 1967. The defoliator materials used were extra hard (above 80 durometer), hard (70-80 durometer), medium (50-60 durometer) and soft (40-50 durometer). Two sets of the hard and medium units were used. One set of each had the edges which come in contact with the plant sliced part way through from each side. This was done to

facilitate deformation of the rubber material by the stalk and allow the material to conform more closely to the stalk in an effort to increase the percentage of the leaves removed. The other sets were slit and some material removed along the axis to relieve some of the stress which arrise when the material is twisted into a spiral. There was also a very hard plain set and a medium hard plain set of defoliator units in the test. Nominal diameter of all the units was 5" except for two large units which were 6½" in diameter.

All of the defoliators except one which is designated in the table of results were mounted and run on a modified Powell tobacco harvester. The exception was run on a Harrington machine. Units were mounted so that there was approximately 1/2" overlap between the web of the left and right hand units. This overlap was provided to bring the defoliator webs into more aggressive engagement with the leaves.

The tobacco crop was of the N.C. 2326 variety produced in accordance with normal practices. Some leaching of fertilizer due to heavy rains during the growing season limited the plants to less than normal growth. Excellent stands resulted in a uniform crop. Harvesting was started on July 28 and ran through the first three primings.

Results and Discussion

Results are presented in table 1 to indicate the response of the hardness and sizes of defoliators with respect to elevator loss, stalk loss, leaf damage, and total loss plus damage.

Elevator loss. There are no indications that defoliator type had any effect on elevator loss. For the Powell machine the average values ran from 5.0% to 7.2%. It is unlikely that this range is due to the defoliator because variations greater than this were observed within the data from a single unit.

There does, however, appear to be a significant reduction in elevator losses on the Harrington machine where the losses are about 0.8%. Because only limited observations are available, additional runs should be made to determine if the conveying and elevating arrangements of this machine offer additional promise.

Stalk loss. Lowest average value of stalk loss (3.2%) was achieved with a medium hard set of units which had the edges sliced to improve deflection at the point of stalk contact. The largest value (6.4%) was found for both the very hard and the soft units. There did not appear to be any difference between the medium and the hard units nor between the center relieved and edge sliced configurations. In fact, a plain hard unit appeared, based on a few observations, to operate about the same as the two hard units included in the table. The wide medium hard unit performed similarly to the narrower medium and hard units.

Leaf damage. None of the units imparted significant damage to the leaf with values ranging between 0.5% and 2.3%. These values are generally lower than the previous year when only two values as low as 2.3% were observed and most of the values were around 4 to 5%. This may be due in large part, to a difference between the two crops caused perhaps by the dry weather of the previous year as compared to an excess of moisture for the current year.

Because of the variability of the individual data it would be difficult to single out any particular unit as superior with respect to leaf damage. In fact, all of the units worked quite well and inflicted only minimal damage to the leaves.

Total, loss plus damage. This measure of performance is the sum of the elevator losses plus the stalk losses plus the leaf damage. For the Powell

machine this overall measure of response fell between 10.6% and 12.6% regardless of the characteristics of the spiral rubber wiper used. (A single set of data at the third priming resulted in an overall value of 13.9%, however, it is considered to be unreliable because of the shortage of data). For the Harrington machine the overall value was 6.5% which was due to the quite low elevator loss values. As evidenced by the stalk loss and leaf damage values the defoliator appeared to work just as well on one machine as the other.

Summary and Conclusions

A series of spiral rubber wipers constructed of various durometer rubber ranging from very hard (above 80 durometer) to soft (40-50 durometer) was tested in a normally grown field of N.C. 2326 flue cured tobacco over the first three primings. The results showed that elevator loss was the largest single source of harvesting loss or damage, and ranged from 5% to 7.2% except for the Harrington machine which was only a fraction of this value. The Harrington machine had a conveyor belt configuration which was different from the Powell machine.

Stalk losses ranged from 3.2% to 6.6% and appeared to be highest for the very hard and soft defoliators, but independent of the modifications to the edge or axis of the defoliator web. Stalk losses did not appear to be dependent on the conveyor belt configuration of the machine on which they were tested. Leaf damage was quite low and independent of the defoliator rubber composition and the sliced web edges or the stress relief along the axis of the unit.

It can be concluded from these tests that there is a rather wide range of spiral rubber wiper designs and characteristics that will do a good job of leaf removal at an acceptable leaf damage level. There is opportunity for an improvement in elevator design.

Defoliator	Priming	Elevator Loss	Stalk Loss, %	Leaf Damage %	Total, Loss Plus Damage, %
	A	1.8	4.7	0.7	7.2
Very Hard	B	4.1	9.6	0.5	14.2
Plain	C	9.0	4.9	0.3	14.2
Average		5.0	6.4	0.5	11.9
Hard	A	2.4	2.9	1.5	6.8
Middle	B	7.8	5.6	2.9	16.3
Relieved	C	9.4	3.0	0.8	13.2
Average		6.5	3.8	1.7	12.0
Hard	A	3.8	3.7	1.0	8.5
Edges sliced	B	6.9	6.8	1.0	14.7
	C	8.5	2.3	0.7	11.5
Average		6.4	4.3	0.9	11.6
Medium	A	4.6	4.7	1.5	10.8
Middle relieved	B	6.5	3.9	1.2	11.6
	C	6.8	1.8	0.7	9.3
Average		6.0	3.5	1.1	10.6
Medium	A	3.2	3.3	1.0	7.5
Edges sliced	B	9.9	4.6	0.7	15.2
	C	8.6	1.7	0.9	11.2
Average		7.2	3.2	0.9	11.3
Medium	A	3.4	3.9	2.2	9.5
Wide, plain	B	8.5	8.0	3.4	19.9
	C	5.8	1.3	0.8	7.9
Average		5.9	4.4	2.1	12.4
Medium	A	1.0	3.5	3.3	7.5
Wide on Harrington Machine	B	0.6	3.4	1.4	5.4
Soft plain	C	6.5	6.4	1.0	13.9
Average		0.8	3.4	2.3	6.5

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	C	8.6	1.7	0.9	11.2
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Wide, plain	B	8.5	8.0	3.4	19.9
	C	5.8	1.3	0.8	7.9
Average →		5.9	4.4	2.1	12.4
Medium	A	1.0	3.5	3.3	7.5
Wide on Harrington Machine	B	0.6	3.4	1.4	5.4
Soft plain	C	6.5	6.4	1.0	13.9
Average →		0.8	3.4	2.3	6.5

close up

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1967 data

CWS Clayton 1967

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	A	1.8	4.7	0.7	7.2
Very Hard	B	4.1	9.6	0.5	14.2
Plain	C	9.0	4.9	0.3	14.2
Average		5.0	6.4	0.5	11.9
Hard	A	2.4	2.9	1.5	6.8
Middle	B	7.8	5.6	2.9	16.3
Relieved	C	9.4	3.0	0.8	13.2
Average		6.5	3.8	1.7	12.0
Hard	A	3.8	3.7	1.0	8.5
Edges sliced	B	6.9	6.8	1.0	14.7
	C	8.5	2.3	0.7	11.5
Average		6.4	4.3	0.9	11.6
Medium	A	4.6	4.7	1.5	10.8
Middle relieved	B	6.5	3.9	1.2	11.6
	C	6.8	1.8	0.7	9.3
Average		6.0	3.5	1.1	10.6
Medium	A	3.2	3.3	1.0	7.5
Edges sliced	B	9.9	4.6	0.7	15.2
	C	8.6	1.7	0.9	11.2
Average		7.2	3.2	0.9	11.3
Medium	A	3.4	3.9	2.2	9.5
Wide, plain	B	8.5	8.0	3.4	19.9
	C	5.8	1.3	0.8	7.9
Average		5.9	4.4	2.1	12.4
Medium	A	1.0	3.5	3.3	7.5
Wide on Harrington Machine	B	0.6	3.4	1.4	5.4
Soft plain	C	6.5	6.4	1.0	13.9
Average		0.8	3.4	2.3	6.5

close up

August 17, 1967

Priming 3 Unit, Rep. Var. Clearance

				Total Leaves	Ele. Loss No.	Ele. Loss %	Stalk Loss No.	Stalk Loss %	Net Dam. in Bin No	Net Dam. in Bin %	Gross Dam. No	Gross Dam. %	Total Loss No	Total Loss %
151		red × green	1	165	10	6.0%	4	2.4%	2.30	1.5%	2.30	1.3%	16.30	9.8%
158		Hard plain	2	178	12	6.7%	8	4.4%	0.45	0.2%	0.45	0.2%	20.45	11.4%
159			3	182	19	10.4%	4	2.1%	0.45	0.2%	0.45	0.2%	23.45	12.8%
					7.7		3.0				0.6		11.3	
136	✓	red × yellow	1	147	11	7.4%	0	0	1.65	1.2%	1.65	1.1%	12.65	8.6%
171		Med middle slit	2	188	12	6.3%	5	2.6%	1.50	0.8%	1.50	0.7%	18.50	9.8%
159			3	176	12	6.8%	5	2.8%	0.85	0.5%	0.85	0.4%	17.85	10.1%
					6.8		1.8				0.7		9.3	
168	✓	yellow × green	1	178	11	6.1%	5	2.8%	1.70	1.0%	1.70	0.9%	17.70	9.9%
189		Hard, slight slope	2	215	19	8.8%	7	3.2%	2.30	1.2%	2.30	1.0%	28.30	13.1%
177			3	200	21	10.5%	2	1.0%	0.75	0.4%	0.75	0.3%	23.75	11.8%
					8.5		2.3				0.7		11.5	
191	✓	wide black	1	206	12	5.8%	3	1.4%	1.95	1.0%	1.95	0.9%	16.95	8.2%
247		Med	2	262	13	4.9%	2	0.7%	2.00	0.8%	2.00	0.7%	17.00	6.4%
297			3	270	18	6.6%	5	1.8%	2.55	1.0%	2.55	0.9%	25.55	9.4%
					5.8		1.3				0.8		7.9	
146		green	1	169	20	11.8%	3	1.7%	2.30	1.5%	2.30	1.3%	25.30	14.9%
111		Med, plain	2	127	13	10.2%	3	2.3%	0.70	0.6%	0.70	0.5%	16.70	13.1%
107			3	127	18	14.1%	2	1.5%	0.50	0.4%	0.50	0.3%	20.50	19.1%
					12.0		1.8				0.7		14.5	
120	✓	small black	1	145	15	10.3%	10	6.8%	0.45	0.3%	0.45	0.3%	25.45	17.5%
159		very hard plain	2	172	9	5.2%	4	2.3%	0.50	0.3%	0.50	0.2%	13.50	7.8%
160			3	121	14	11.5%	7	5.7%	0.50	0.5%	0.50	0.4%	21.50	17.7%
					9.0		4.9				0.3		14.2	
183	✓	Blue	1	202	14	6.9%	5	2.4%	3.45	1.8%	3.45	1.7%	22.45	11.1%
170		Med. slight slope	2	188	16	8.5%	2	1.0%	1.50	0.8%	1.50	0.7%	19.50	10.3%
142			3	162	17	10.4%	3	1.8%	0.80	0.5%	0.80	0.4%	20.80	12.8%
					8.6		1.7				0.9		11.2	
88	✓	Red × Blue	1	109	17	15.5%	4	3.6%	1.70	1.9%	1.70	1.5%	22.70	20.8%
142		Hard middle slit	2	155	9	5.8%	4	2.5%	0.95	0.6%	0.95	0.6%	13.95	9.0%
130			3	144	10	6.9%	4	2.9%	0.70	0.5%	0.70	0.4%	14.70	10.2%
					9.4		3.0				0.8		13.2	
268		Red - soft plain	1 2	295	19	6.4%	8	2.7%	4.20	1.5%	4.20	1.4%	31.20	10.5%
124			3	149	10	6.7%	15	10.0%	0.75	0.6%	0.75	0.5%	25.75	17.2%
					6.5		4.5				1.0		13.9	

July 28, 1967

Priming 2 Unit, Rep Var. clearance

			Total Leaves	Ele. Loss No.	Ele. Loss %	Stalk Loss No.	Stalk Loss %	Net Dam. in Bin No.	Net Dam. in Bin %	Gross Dam No.	Gross Dam %	Total Loss No.	Total Loss %
136	wide black	1	165	16	9.6%	13	7.8%	3.10	2.2%	3.10	1.8%	24.1	~~16.5~~ 19.2%
131	Med, Plain	2	152	9	5.9%	12	7.8%	11.00	8.3%	11.00	7.2%	~~28.2~~ 30.9	~~18.5~~ %
107		3	131	13	9.9%	11	8.3%	1.80	1.6%	1.80	1.3%	25.8	19.6%
				8.5		8.0				3.4			19.9
138	red & yellow	1	151	8	5.2%	5	3.3%	2.35	1.7%	2.35	1.5%	15.35	10.1%
115	Med. Middle Slit	2	129	8	6.2%	6	4.6%	2.40	2.0%	2.40	1.8%	16.4	12.7%
119		3	135	11	8.1%	5	3.7%	0.55	0.4%	0.55	0.4%	16.55	12.2%
				6.5		3.9				1.2			11.6
120	red & blue	1	138	8	5.7%	10	7.2%	1.20	1.0%	1.20	0.8%	19.2	13.9%
118	Hand, Middle slit	2	134	11	8.2%	5	3.7%	1.15	0.9%	1.15	0.8%	17.15	12.7%
99		3	117	11	9.4%	7	5.9%	8.50	8.5%	8.50	7.2%	26.5	22.6%
				7.8		5.6				2.9			16.3
178	Green & yellow	1	208	11	5.2%	19	9.1%	4.00	2.2%	4.00	1.9%	34.0	16.3%
142	~~Hard~~ sliced edges	2	164	12	7.3%	10	6.0%	1.25	0.8%	1.25	0.7%	23.25	14.1%
166		3	192	16	8.3%	10	5.2%	1.00	0.6%	1.00	0.5%	27.00	14.0%
				6.9		6.8				1.0			14.7
122	Blue	1	145	13	8.9%	9	6.2%	1.70	1.3%	1.70	1.1%	23.7	16.3%
123	Med sliced edges	2	141	13	9.2%	5	3.5%	1.40	1.1%	1.40	0.9%	19.4	13.7%
134		3	147	17	11.5%	6	4.0%	0.15	0.1%	0.15	0.1%	23.15	15.7%
				9.9		4.6				0.7			15.2
125	small Black	1	148	7	4.7%	16	10.8%	1.30	1.0%	1.30	0.8%	24.3	16.4%
122	Very hard, plain	2	142	8	5.6%	12	8.4%	0.70	0.5%	0.70	0.4%	20.7	14.5%
127		3	144	3	2.0%	14	9.7%	0.70	0.5%	0.70	0.4%	17.7	12.2%
				4.1		9.6				0.5			14.2
184	Harrington	1	190	1	0.5%	5	2.6%	4.80	2.6%	4.80	2.5%	10.8	5.6%
205	wide Med-	2	222	3	1.3%	11	4.9%	1.95	0.9%	1.95	0.8%	15.95	7.1%
203		3	209	0	0	6	2.8%	2.00	0.9%	2.00	0.9%	8.0	3.8%
				0.6		3.4				1.4			5.4

Tob. Harvesting 1967 Data -

												Damage						CWS	
											Swath	Net							
					Total leaves	Elev. Loss		Oper. Error		Stalk Loss		Down in Bin		Gross Dam				Total Loss	
						No.	%	No	%	No.	%	No.	%	No	%			No	%
	Priming	1	Unit, Rep	Var Change														12 + 19 + 12.6	
				½ ow	329+17+19														
	1 Wide	Blank	1	½ overlap	360	12	3.3%			19	5.2%	12.60		12.60	3.8%			43.6	12.1%
337	Med	Plain	2		350	15	4.2%			12	3.4%	7.10	2.1%	7.10	2.0%			34.1	9.7%
249			3		264	7	2.6%			8	3.0%	2.40	0.9%	2.40	0.9%			17.4	6.5%
							3.4				3.9				2.2				9.5
311	red	yellow	1	½" overlap	345	18	5.2%			16	4.6%	8.60	2.7%	8.60	2.4%			42.60	12.3%
298	Med,	Middle slit	2		321	14	4.3%			13	4.0%	3.70	1.1%	3.70	1.1%			30.70	9.5%
			3		273	12	4.3%			14	5.1%	2.75	1.1%	2.75	1%			28.75	10.5%
	4						4.6				4.7				1.5				10.8
356	red	blue	1		381	11	2.8%			14	3.6%	9.30	2.6%	9.30	2.4%			34.30	9.0%
320	Hard,	Middle slit	2		335	6	1.7%			9	2.6%	4.60	1.4%	4.60	1.3%			19.60	5.8%
301			3		318	9	2.8%			8	2.5%	2.25	0.7%	2.25	0.7%			19.25	6.0%
	2						2.4				2.9				1.5				6.8
343	green	yellow	1		380	17	4.4%			20	5.2%	6.20	1.8%	6.20	1.6%			43.2	11.3%
308	Hard,	sliced edges	2		328	10	3.0%			10	3.0%	2.60	0.8%	2.60	0.7%			22.6	6.8%
285			3		306	12	3.9%			9	2.9%	2.30	0.8%	2.30	0.7%			23.3	7.6%
	3						3.8				3.7				1.0				8.5
411	Blue		1		427	5	1.1%			11	2.5%	5.95	1.4%	5.95	1.3%			21.95	5.1%
328	Med	sliced edges	2		352	14	3.9%			10	2.8%	3.95	1.2%	3.95	1.1%			27.95	7.9%
309			3		340	16	4.7%			16	4.7%	2.70	0.8%	2.70	0.7%			34.7	10.2%
	5						3.2				3.3				1.0				7.57.7
338	small	Black	1		356	4	1.1%			20	5.6%	3.25	0.9%	3.25	0.9%			27.25	7.6%
311	Very	Hard, plain	2		336	9	2.6%			16	4.7%	1.45	0.4%	1.45	0.4%			26.45	7.8%
306			3		324	6	1.8%			12	3.7%	3.06	1.0%	3.06	0.9%			21.06	6.5%
	1						1.8				4.7				0.7				7.2
295	Harrington		1		306	1	0.3%			10	3.2%	11.30	3.8%	11.30	3.6%			22.3	7.2%
320	Wide	Med-	2		336	4	1.1%			12	3.5%	9.90	3.0%	9.90	2.9%			25.9	7.0%
314			3		332	5	1.5%			13	3.9%	11.10	3.5%	11.10	3.3%			29.1	8.7%
							1.0				3.5				3.3				7.8

Tobacco Harvesting 1966

Data

C.W.S.

Purple Leaf

			Total Leaves	Elev Loss		Operator error		Stalk loss		Net Damage in Bin		Green Dam.		Total Loss	
				No.	%	No.	%	No.	%	No	%	No	%	No	%
Prompt (Aug 8)	Limit, Ref	van Clearance													
		1	116	11	9.48	1	.86	18	15.51	3.60	4.18	3.60	2.81	33.6	28.96
	Red & Blue	2, 2326, ½"	128	8	6.25	0	0	26	20.31	3.40	3.61	3.40	2.65	37.40	29.21
		3	142	9	6.33	0	0	23	16.19	4.0	3.63	4.0	2.81	36.00	25.35
	Green	1	129	8	6.20	1	.77	19	14.73	7.6	7.52	7.6	5.89	35.6	27.59
		2, 2326, ½"	81	4	4.93	0	0	16	19.75	1.7	2.78	1.7	2.09	21.7	26.79
		3	70	4	5.71	0	0	15	21.42	2.9	5.68	2.9	4.14	21.9	31.28
	Red & Green	1	105	7	6.66	1	.95	23	21.9	2.7	3.64	2.7	2.57	33.7	32.09
		2, 2326, ½"	145	8	5.51	0	0	26	17.93	4.4	3.96	4.4	3.03	38.40	24.48
		3	150	2	1.33	0	0	31	20.66	4.5	3.84	4.5	3.00	37.50	25.00
					4.50				20.16				3.48.60		27.86
													2.87		
	Red & Yellow	1	92	1	1.08	0	0	12	13.04	5.7	7.21	5.7	6.19	18.7	20.32
		2, 2326, ½"	100	8	8.00	0	0	18	18.0	2.1	2.83	2.1	2.10	28.1	28.10
		3	82	5	6.09	0	0	14	17.17	2.9	4.60	2.9	3.53	21.9	26.70
					5.06										
	Black	1	110	6	5.45	3	2.72	38	34.54	1.3	2.06	1.3	1.18	48.30	43.90
		2, 2326, ½"	109	6	5.50	0	0	36	33.02	.6	.89	.6	.55	42.60	39.08
		3	85	6	7.65	0	0	29	34.11	2.1	4.20	2.10	2.47	37.10	43.64
					6.00										
	Blue	1	92	4	4.34	0	0	18	19.56	1.8	2.57	1.8	1.95	23.80	25.86
		2, 2326, ½	87	3	3.44	0	0	16	18.39	2.2	3.23	2.2	2.52	21.20	24.36
		3	95	6	6.31	0	0	18	18.94	2.7	3.80	2.7	2.84	26.70	28.10
					4.70										
	Green & Yellow	1	105	9	8.57	2	1.90	15	14.28	4.10	5.18	4.10	3.50	30.10	28.66
		2, 2326, ½	101	8	7.92	0	0	20	19.80	3.2	4.83	3.2	3.16	31.20	30.89
		3	117	12	10.25	1	.85	19	16.23	4.5	5.35	4.5	3.84	36.50	43.45
	Yellow	1	94	10	10.63	1	1.06	25	26.59	4.7	8.10	4.7	5.00	40.70	43.29
		2, 2326, ½	90	7	7.77	1	1.11	19	21.11	4.0	6.34	4.0	4.44	31.04	34.44
		3	108	2	1.85	1	.92	12	11.11	6.7	7.2	6.7	6.20	21.70	20.09
	Red	1	53	6	11.32	0	0	2	3.77	1.9	4.22	1.9	3.58	9.9	18.67
		2, 2326, ½	66	1	1.51	0	0	7	10.60	3.3	5.68	3.3	5.00	11.3	17.12
		3	63	3	5.26	0	0	3	5.26	1.5	2.63	1.5	2.38	7.5	13.15
					6.04				6.54				3.10.96		16.31
													3.65		

Brown carts

Priming	Unit	Rep	Var	Clearance	Tot leaves	Elev. Loss		Operator Error		Stalk Loss		Net Damage		Gross Dam.		Total Loss.	
Aug 15	Red & Blue	1			215	9	4.18	3	1.39	27	12.55	8.6	4.88	8.6	4.00	47.60	22.13
		2	2326	½ clear	180	3	1.66	0	0	16	8.88	7.6	4.72	7.6	4.22	26.6	14.77
		3			196	7	3.57	0	0	24	12.24	9.6	5.81	9.6	4.89	40.6	20.71
																	19.04
		1			181	9	[illegible]	2	1.10	59	[illegible]	6.3	[illegible]	6.3	[illegible]	[illegible]	42.15
Jul 14	Brown	2	[illegible]	[illegible]	142	8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.2	3.92	4.2	[illegible]	[illegible]	27.11
		3			154	3	[illegible]	0	0	[illegible]	26.81	6.3	6.17	6.3	[illegible]	[illegible]	37.85
		1			202	6	297	2	.99	25	12.37	12.9	7.63	12.9	6.38	45.9,	22.72
Aug 15	Red & brown	2	2326	½ clear	161	3	1.86	0	0	15	9.31	6.3	4.40	6.3	3.91	24.3,	15.09
		3			161	4	2.48	0	0	19	11.8	6.9	5.00	6.9	4.28	29.9	18.57
																	18.79
		1			[illegible]	13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.0	[illegible]	[illegible]	[illegible]	94.0	57.31
[illegible]	[illegible]	2	2326	[illegible]	147	6	4.08	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		3			177	12	[illegible]	1	[illegible]	[illegible]	[illegible]	5.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		1			241	8	3.31	2	.82	42	17.42	11.5	6.08	11.5	4.77	63.5	26.34
Aug 15	Black	2	2326	½ clear	184	6	3.26	0	0	45	24.45	10.3	7.74	10.3	5.59	61.3	33.31
		3			173	6	3.46	0	0	38	21.96	5.6	4.34	5.6	3.23	49.6,	28.67
																	29.44
		1															
	Blue	2	2326	½ clear													
		3															
		1		½ clear	165	2	1.35	2	1.35	13	8.78	8.2	5.54	8.2	4.96	25.70	15.00
Aug 8	green & yellow	2	2326														
		3															
		1			190	3	1.57	2	1.05	72	37.89	3.0	2.65	3.0	1.58	80	42.1
Aug 15	Yellow	2	2336	½ clear	119	3	2.52	0	0	23	19.32	2.1	2.25	2.1	1.76	28.1	23.61
		3			183	9	4.91	0	0	53	28.96	6.4	5.28	6.4	3.49	68.4	56.52
																	40.74
		1			153	7	4.57	2	1.30	60	39.21	8.1	9.64	8.1	5.29	77.1	50.39
Aug 15	Red	2	2376	½ clear	121	2	1.65	0	0	15	12.39	2.1	2.01	2.1	1.73	19.1	15.80
		3			139	5	3.59	1	.71	28	20.14	4.7	4.47	4.7	3.38	38.7	27.84
																	31.34

Brown Cards

Processing 11

July 15

Unit	Rep	Var	Clearance	Tot Kernels	Elev. Loss		Operator Error		Stalk Loss		Net Damage		Gross Dam		Total Loss.	
	1			200	10	5.0	2	1.0	75	37.5	7.0	6.19	7.0	3.5	94	47.00
Blue	2	2326	7/8" clear	159	9	5.66	0	0	30	18.86	4.63	3.83	4.6	2.89	43.6	27.42
	3			171	5	2.92	1	.58	58	33.91	5.0	4.67	5.0	2.92	69.0	40.35
	1			169	3	1.77	1	.59	93	55.02	3.2	4.44	3.2	1.89	100.2	59.28
Yellow	2	2326	7/8"	130	6	4.61	0	0	51	39.23	2.5	3.42	2.5	1.92	59.5	45.76
	3			149	10	6.71	0	0	71	47.65	3.3	4.85	3.3	2.21	84.3	56.57
	1			181	9	4.97	2	1.1	59	32.59	6.3	5.67	6.3	3.48	76.3	42.15
Green	2	2326	7/8"	143	8	5.59	0	0	28	19.58	4.2	3.92	4.2	2.93	40.7	28.11
	3			154	3	1.94	0	0	49	31.81	6.3	6.17	6.3	4.09	58.3	37.85
	1			144	3	2.08	3	2.08	24	16.66	6.2	5.43	6.2	4.3	36.2	25.13
Red & yellow	2	2326	7/8"	154	3	1.94	0	0	27	17.53	4.3	3.46	4.3	2.79	34.3	22.27
AM.	3			137	6	4.37	2	1.45	30	21.89	4.0	4.04	4.0	2.91	42.0	30.65
	1			164	13	7.92	23	14.02	53	32.31	5.0	6.66	5.0	3.04	94	57.31
Red & yellow	2	2326	7/8"	147	6	4.08	0	0	28	19.04	4.6	4.07	4.6	3.12	38.6	26.25
PM	3			177	12	6.77	1	.56	59	33.33	5.5	5.23	5.5	3.10	77.5	43.78

Pinkears

Priming	unit	Rep	Var clearance	Tot. Clear.	Clear. Loss		Operator error		Shackles		Nut Damage		Brass Dam.		Total loss	
		1		118	4	3.38	0	0	21	17.79	4.60	4.94	4.60	3.89	29.60	25.68
(July 26)	Red/blue	2	2326 ⅛"	120	9	7.50	0	0	18	15.0	3.90	4.14	3.9	3.25	30.9	25.75
		3		109	6	5.50	0	0	19	16.51	5.20	6.11	5.2	4.77	29.70	26.78
		1		71	4	5.63	0	0	9	12.67	1.7	2.93	1.7	2.39	14.7	20.70
	Brown	2	2326 ⅛"	66	8	12.12	0	0	10	15.15	1.7	3.54	1.7	2.57	19.70	29.84
		3		83	4	4.81	0	0	8	9.63	3.5	4.92	3.5	4.21	15.50	18.67
		1		127	19	14.96	2	1.57	23	18.11	5.1	6.14	5.1	4.01	49.1	38.66
	Red/Green	2	2326 ⅛	118	6	5.08	0	0	19	12.71	2.2	2.26	2.2	1.86	23.20	19.66
		3		114	5	5.15	0	0	12	12.37	3.0	3.09	3.0	2.63	20.01	20.61
		1		125	10	8.0	0	0	30	24.0	6.2	7.29	6.2	4.96	46.2	36.96
	Red/Yellow	2	2326 ⅛"	52	5	9.61	1	1.92	9	17.30	2.2	5.94	2.2	4.23	17.2	33.07
		3		59	5	8.47	0	0	14	23.72	1.6	4	1.6	2.71	20.6	34.91
		1		109	7	6.42	1	.91	37	33.94	3.5	5.46	3.5	3.21	48.5,	44.49
	Black	2	2326 ⅛"	130	7	5.38	1	.76	45	34.61	2.8	3.63	2.8	2.16	58.8	42.92
		3		110	6	5.45	0	0	36	32.72	4.5	6.61	4.5	4.09	46.5	42.27
		1		86	2	2.32	0	0	19	22.09	3.9	6.0	8.9	4.53	24.9,	28.95
	Blue	2	2326 ⅛"	84	6	7.14	1	1.19	18	21.42	1.7	2.88	1.7	2.02	26.7	31.78
		3		75	8	10.66	0	0	11	14.66	2.6	4.64	2.6	3.46	21.6,	28.8
		1		149	7	4.69	4	2.68	20	13.42	4.7	3.98	4.7	3.15	35.7,	23.95
	Brown/Yellow	2	2326 ⅛"	114	7	6.14	0	0	17	14.91	1.6	1.77	1.6	1.4	25.60	22.45
		3		120	11	9.16	0	0	19	15.83	1.6	1.77	1.6	1.33	31.60	26.33
		1		45	1	2.22	0	0	16	35.55	2.4	5.57	2.4	5.33	19.4	43.28
	Yellow	2	2326 ⅛"	57	0	0	1	1.75	14	24.56	2.5	4.35	2.4	4.38	17.5	30.7
		3		71	1	1.4	1	1.4	18	25.35	4.2	8.23	4.2	5.91	24.20	34.08
		1		76	1	1.31	0	0	17	25.0	4.8	8.57	4.8	6.31	24.8	32.63
	Red	2	2326 ¼"	93	1	1.07	1	1.07	16	17.20	2.8	3.73	2.8	3.01	20.80	22.36
		3		87	7	8.04	0	0	16	18.39	3.8	5.93	3.8	4.36	26.80	36.80

Purple cards

Priming 1
Aug 8

Mitt	Rep	Var	Clearance	Total leaves	Elev Loss		Operator error		Stalk loss		Net Damage in Bin		Gross Dam		Total Loss	
Red&Brown	1			193	3	1.55	1	.51	32	16.58	13.70	8.72	13.70	7.09	49.76	25.75
	2	D36	1/2"	152	2	1.31	0	0	30	19.73	10.50	8.25	10.50	6.90	42.50	28.14
	3			160	8	5.92	1	.74	16	11.85	6.20	4.59	6.20	3.87	31.20	23.11
						2.93				16.05				3)17.86		25.67
														5.95		
Red	1			155	13	8.38	4	2.58	35	22.58	10.10	9.8	10.10	6.51	62.10	40.06
	2	D36	1/2	144	9	6.25	1	.69	20.	13.88	8.7	7.63	8.70	6.04	38.70	26.87
	3			130	10	7.69	3	2.30	14	10.76	6.2	6.01	6.2	4.76	33.20	25.53
						7.42				15.73				3)17.31		30.82
														5.77		
Red&Brown	1			131	2	1.52	0	0	17	12.97	9.6	8.57	9.6	7.32	28.60	21.83
	2	C319	1/2"	130	3	2.30	1	.76	15	11.53	5.9	5.31	5.9	4.53	24.9	19.15
	3			171	9	5.26	1	.58	20	11.69	8.4	5.95	8.4	4.91	38.4	22.45
						3.03				12.06				3)16.76		21.14
														5.59		
Red	1			138	4	2.91	1	.72	24	17.51	8.1	7.5	8.1	5.91	37.1	27.08
	2	C319	1/2	141	7	4.96	0	0	27	19.14	7.2	6.72	7.2	5.10	41.2	29.21
	3			174	12	6.89	0	0	27	15.51	10.60	7.85	10.60	6.09	49.60	28.50
						4.92				17.39				3)17.10		28.26
														5.70		
Red&Brown	1			259	9	3.47	1	.38	48	18.53	16.20	8.05	16.20	6.25	74.20	28.64
	2	NC.2512	1/2"	222	4	1.80	0	0	49	22.07	9.4	5.56	9.4	4.23	62.40	28.10
	3			215	6	2.79	1	.46	36	16.74	10.40	6.04	10.40	4.83	53.40	24.03
						2.69				19.10				3)15.31		26.92
														5.10		
Red	1			160	2	1.25	4	2.50	39	24.37	8.30	7.21	8.3	5.18	53.30	33.31
	2	NC.2512	1/2"	136	3	2.20	1.0	.73	25	18.38	4.1	3.83	4.1	3.01	33.10	24.33
	3			146	5	3.42	0	0	23	15.75	6.2	5.25	6.2	4.24	34.2	23.42
						2.29				19.50				3)12.43		27.02
														4.14		

Green Cards

			Tot Losses	Elec. Loss		Operator Error		Struct Loss		Net Damage		Power Dam		Total Loss	
Primary 3	Unit Rep	Var Clearance												No.	%
(Aug 30)															
	1		117	4	3.4	0	0	2	1.7	3.7	3.34	3.7	3.17	9.7	8.3
Hard	Brand Red	2 B36 1/2" overlap	137	0	0	0	0	1	.73	2.6	1.91	2.6	1.9	3.6	2.63
	3		144	4	2.78	0	0	0	0	6.5	4.65	6.5	4.5	10.5	7.3
					2.06				0.81				3)9.57		6.07
													3.19		
	1		106	4	4.0	0	0	3	3.0	3.7	3.98	3.7	3.7	10.7	14.7
Soft	Wide 2	B36 3/4"	115	1	.87	0	0	2	1.74	3.1	2.77	3.1	2.7	6.1	5.31
	3	overlap	141	5	3.55	0	0	0	0	6.5	4.78	6.5	4.6	11.5	8.15
					2.81				1.58				3)11.0		8.05
													3.7		
	1		121	1	.83	0	0	0	0	2.6	2.16	2.6	2.15	3.6	2.98
	Brand Red 2	C319 1/8" overlap	101	4	3.96	0	0	0	0	1.55	1.60	1.55	1.48	5.55	5.5
	3		216	6	2.78	0	0	5	2.32	6.9	3.37	6.9	3.2	17.9	8.3
					2.52				.77				3)7.83		5.59
													2.63		
	1		109	2	1.83	0	0	0	0	4.0	3.7	4.0	3.67	6.0	5.5
	Wide 2	C319 3/4	86	0	0	0	0	1	1.16	3.1	2.65	3.1	3.6	4.1	4.77
	3	overlap	129	4	3.1	0	0	1	.78	3.4	2.74	3.4	2.64	8.4	6.5
					1.64				.65				3)7.91		5.59
													3.30		
	1		108	6	5.56	0	0	1	.93	3.5	3.46	3.5	3.24	10.5	9.75
	Brand Red 2	2512 1/8"	117	2	1.7	0	0	1	.85	1.9	1.67	1.9	1.63	4.9	4.19
	3	overlap	108	5	4.63	0	0	5	4.63	4.4	4.5	4.4	4.07	14.4	13.3
					3.96				2.14				3)8.94		9.08
													2.98		
	1		119	6	5.05	0	0	1	.84	3.1	2.76	3.1	2.6	10.1	8.5
	Wide 2	2512 3/4"	113	4	3.54	0	0	1	.88	1.7	1.58	1.7	1.5	6.7	5.93
	3	overlap	100	3	3.0	0	0	1	1.00	2.3	2.4	2.3	2.3	6.3	6.3
					3.86				0.91				3)6.4		6.91
													2.1		
	1		112	0	0	0	0	0	0	1.40	1.25	1.4	1.25	1.4	1.25
Primary 5	Red/Brown 2	2326 1/8"	137	1	.73	0	0	5	3.65	6.5	4.95	6.5	4.75	12.5	9.13
	3	overlap	138	1	.73	0	0	3	2.19	1.7	1.27	1.7	1.23	5.7	4.13
					0.49				1.94				3)7.23		4.84
													2.41		
	1		73	0	0	1	1.37	3	4.1	1.6	2.32	1.6	2.19	5.6	7.68
	Wide 2	2326 3/4"	93	0	0	2	2.15	1	1.08	3.6	4.0	3.6	3.87	6.6	7.1
	3	overlap	40	2	5	0	0	2	5.0	2.0	5.55	2.0	5.00	6.0	15.0
					1.67				3.40				3)11.06		9.93
													3.69		

Green Cards

Priming	Unit	Rep	Var	Clearance	Tot leaves	Elev	Loss	Operator	Error	Stalk	loss	Net Damage		Gross Dam.		Total Loss	
2 Aug 17																	
Hard		1			115	8	6.95	0	0	3	2.60	5.4	5.19	5.4	4.69	16.4	14.26
	Blue+Red	2	b36	1/8" over	134	3	2.23	0	0	3	2.23	4.4	3.43	4.4	3.28	10.4	7.76
		3		lap.	143	4	2.79	1	.69	6	4.19	7.0	5.3	7.0	4.89	18.66	12.58
							3.99				3.01				3)12.86		11.53
															4.29		
Soft		1			161	0	0	0	0	1	.99	5.3	5.3	5.3	5.24	6.3	6.23
	Wide	2	b36	3/4" over	97	1	1.03	0	0	0	0	4.5	4.68	4.5	4.63	5.5	5.67
		3		lap	96	4	4.16	0	0	2	2.08	4.9	5.44	4.9	5.10	10.9	11.35
							1.73				1.02				3)14.97		7.78
															4.99		
		1			155	1	.64	0	0	0	0	8.2	5.32	8.2	5.29	9.2	5.93
	Blue+Red	2	C319	1/8" overlap	137	2	1.45	0	0	2	1.45	6.6	4.96	6.6	4.81	10.6	7.73
		3			182	10	5.49	0	0	4	2.19	7.1	4.22	7.1	3.90	21.1	11.59
							2.53				1.21				3)14.00		8.42
															4.67		
		1			91	2	2.19	7	7.69	0	0	5.0	6.09	5.0	5.49	14.0	15.38
	Wide	2	C319	3/4" over	114	0	0	3	2.63	2	1.75	4.8	4.4	4.8	4.21	9.80	8.59
		3		lap	148	3	2.02	0	0	4	2.70	7.5	5.31	7.5	5.06	14.5	9.79
							1.40				1.48				3)14.76		11.25
															3.92		
		1			195	9	4.61	1	.51	6	3.07	6.7	3.74	6.7	3.43	22.7	11.64
	Blue+Red	2	2512	1/8"	132	0	0	1	.75	6	4.54	4.6	3.68	4.6	3.48	11.6	8.78
		3		overlap	165	4	2.42	0	0	8	4.84	6.2	4.05	6.2	3.75	17.2	10.42
							2.34				4.15				3)10.66		10.28
															3.55		
		1			105	4	3.80	1	.95	2	1.90	3.7	3.77	3.7	3.52	10.7	10.19
	Wide	2	2512	3/4"	88	3	3.4	0	0	0	0	2.8	3.29	2.8	3.18	5.8	6.59
		3		overlap	91	2	2.19	0	0	0	0	4.4	4.94	4.4	4.83	6.4	7.03
							3.13				0.63				3)11.53		~~7.37~~ 7.94
															4.84		
		1			94	10	10.63	0	0	4	4.25	2.3	2.87	2.3	2.44	16.3	17.34
	Blue+Red	2	2326	1/4" overlap	111	9	8.10	0	0	6	5.4	3.1	3.22	3.1	2.79	18.1	16.3
		3			77	4	5.19	0	0	5	6.49	1.8	2.64	1.8	2.33	10.8	14.02
							7.97				5.38				3)7.56		15.89
															2.52		
		1			42	1	2.38	0	0	1	2.38	.75	1.87	.75	1.78	2.75	6.54
	Wide	2	2326	3/4"	56	2	3.57	3	5.35	5	8.92	1.5	3.26	1.5	2.67	11.5	20.53
		2		overlap	75	5	6.66	0	0	2	2.66	3.3	4.85	3.3	4.40	10.3	13.73
							4.20				4.65				3)8.85		13.6
															2.95		

Effectiveness of Hand and Soft Spiral Rubber with Defoliators. Numbers in Parentheses are Damage Values. Other Numbers are Total Harvesting Losses and Include Damage, Stalk Loss and Elevator Loss. 1966

Priming

Mean Values

Defoliator	Variety	A	B	C
Hand	P 34	25.67 (5.95)	11.53 (4.29)	6.07 (3.19)
Soft		30.82 (5.77)	7.79 (4.99)	8.05 (3.76)
Hand	C 319	21.14 (5.54)	8.42 (4.67)	5.59 (2.63)
Soft		28.26 (5.70)	11.25 (3.92)	5.59 (3.36)
Hand	N.C. 2812	24.92 (5.10)	10.28 (3.55)	9.08 (2.98)
Soft		27.02 (4.14)	7.44 (4.84)	6.91 (2.10)
Hand	N.C. 2326	27.86 (2.87)	15.89 (2.52)	4.84 (2.41)
Soft		16.31 (3.65)	13.60 (2.95)	9.93 (3.69)

Total Harvesting Losses and Stalk Losses (in Parentheses)

For Hard and Soft Spiral Rubber Wipers. Mean Values. 1966

Defoliator	Variety	Priming A	Priming B	Priming C
Hard	K36	25.67 (16.05)	11.53 (3.01)	6.07 (0.81)
Soft	K36	30.82 (15.73)	7.78 (1.02)	8.05 (1.58)
Hard	C819	21.14 (12.06)	8.42 (1.21)	5.59 (0.77)
Soft	C819	28.76 (17.39)	11.25 (1.48)	5.59 (0.65)
Hard	NC 2512	26.92 (19.10)	10.28 (4.15)	9.08 (2.14)
Soft	NC 2512	27.02 (14.50)	7.94 (0.63)	6.91 (0.91)
Hard	NC 2326	27.86 (20.16)	15.89 (5.38)	4.84 (1.94)
Soft	NC 2326	16.31 (6.54)	13.60 (4.65)	9.93 (3.40)

VARIETY NC 2326

Defloration Priming Reps		Bin total	Swath Total	Gross % Dam	Net % Dam	% Elev	% Op	% Stalk	Overall % Eff
Red + Yellow									
A	1	75	164	3.04	6.66	7.92	14.02	32.31	57.31
1/2" clear	2	113	147	3.12	4.07	4.08	0	19.04	26.25
	3	105	177	3.10	5.23	6.77	.56	33.33	43.78
		97.66	162.66	3.08	5.32	6.25	4.86	28.22	42.44
B	1	85	125	4.76	7.29	8.00	0	24.0	36.96
	2	37	52	4.23	5.94	9.61	1.92	17.30	33.07
	3	40	59	2.71	4.00	8.47	0	23.72	34.91
		54	72	3.96	5.74	8.69	.64	21.67	34.98
C	1	79	92	6.19	7.21	1.08	0	13.04	20.32
	2	74	100	2.10	2.83	8.00	0	18	28.10
	3	63	82	3.53	4.60	6.09	0	17.07	26.70
		72	91.33	3.94	4.88	5.05	0	16.03	25.04
D	1								
	2								
	3								
Red + Blue									
A (1/2" clear)	1	176	215	4.00	4.88	4.18	1.39	12.55	22.13
	2	161	180	4.22	4.72	1.66	0	8.88	14.77
	3	165	196	4.89	5.81	3.57	0	12.24	20.71
		167	197	4.37	5.13	3.13	.46	11.22	19.20
B (1/2" clear)	1	93	118	3.89	4.94	3.38	0	17.79	25.08
	2	93	120	3.25	4.19	7.50	0	15.00	25.25
	3	85	109	4.77	6.11	5.50	0	16.51	26.78
		90.33	115.66	3.97	5.08	5.46	0	16.43	25.87
C (1/2" clear)	1	86	116	3.10	4.18	9.48	.86	15.51	28.96
	2	94	128	2.65	3.61	6.25	0	20.31	29.21
	3	110	142	2.81	3.63	6.33	0	16.19	25.35
		96.66	128.66	2.85	3.80	7.35	.28	17.33	27.84
D (1/8" clear)	1	80	94	2.44	2.87	10.63	0	4.25	17.34
	2	96	111	2.79	3.22	8.10	0	5.40	16.30
	3	68	77	2.33	2.64	5.19	0	6.49	14.02
		81.33	94.00	2.52	2.91	7.97	0	5.38	15.88
Red + Yellow									
A	1	114	144	4.30	5.43	2.08	2.08	16.66	25.13
	2	124	154	2.79	3.46	1.94	0	17.53	22.27
	3	99	137	2.91	4.04	4.37	1.45	21.89	30.65
		112.33	145	3.33	4.31	2.79	1.17	18.69	26.01

72	169	1.89	4.44	1.77	.59	55.02	59.28
73	130	1.92	3.42	4.61		39.23	45.76
68	149	2.21	4.58	6.71		47.65	56.57

VARIETY NC 2326

	Bin total	Swath total	Gross %. Dam	Pd %. Pan	%. Elev	%. Op	%. Stalk	%. Eff
Yellow								
A 1 (1/2" clear)	113	190	1.57	2.65	1.57	1.05	37.89	42.10
2	93	119	1.76	2.25	2.52	0	19.32	23.61
3	121	183	3.49	5.28	4.91	0	28.96	56.52
	109	164	2.27	3.39	3.00	.35	28.72	40.74
B 1	28	45	5.33	8.57	2.22	0	35.55	69.28
2	42	57	4.38	5.95	0	1.75	24.56	30.70
3	51	71	5.91	8.23	1.40	1.40	23.35	34.08
	40.33	57.66	5.20	7.58	1.20	1.05	27.82	44.68
C 1	58	94	5.00	8.10	10.63	1.06	26.59	43.29
2	63	90	4.44	6.34	7.77	1.11	21.11	34.44
3	93	108	6.20	7.20	1.85	.92	11.11	20.09
	71.33	97.33	5.21	7.21	6.75	1.03	19.60	32.60
D 1								
2								
3								

	Bin total	Swath total	Gross %. Dam	Pd %. Pan	%. Elev	%. Op	%. Stalk	%. Eff
Blue (1/2" clear)								
A 1	113	200	3.5	6.19	5.00	1.00	37.5	47.00
2	120	159	2.89	3.83	5.66	0	18.86	27.42
3	167	171	2.92	4.67	2.92	.58	33.91	40.35
	113.33	176.66	3.10	4.89	4.52	.52	30.09	38.25
B 1	65	86	4.53	6.00	2.32	0	22.09	28.95
2	59	84	2.02	2.88	7.14	1.19	21.42	31.78
3	36	75	3.46	4.64	10.66	0	14.66	28.80
	53.33	81.66	3.33	4.50	6.70	.39	19.39	29.84
C 1	70	92	1.95	2.57	4.34	0	19.56	25.86
2	68	87	2.52	3.23	3.44	0	18.39	24.36
3	71	95	2.84	3.80	6.31	0	18.94	28.10
	69.66	91.33	2.43	3.20	4.69	0	18.96	26.10
D 1								
2								
3								

VARIETY NC 2326

(7/8" clear) Yellow

A	1	172	169	1.89	4.44	1.77	1.59	55.02	52.20
	2	93	130	1.92	3.42	4.61	0	39.23	45.76
	3	68	149	2.21	4.58	6.71	0	47.65	56.57
		111	149.33	2.00	4.14	4.36	.19	47.30	53.84
B	1								
	2								
	3								
C	1								
	2								
	3								
D	1								
	2								
	3								

Green (1/2" clear)

A	1	111	181	3.48	5.67	4.97	1.10	32.59	42.15
	2	107	143	2.53	3.92	5.59	0	19.58	28.11
	3	102	154	4.09	6.17	1.54	0	31.81	37.85
		106.66	159.33	3.50	5.25	4.16	.36	27.99	36.03
B	1	58	71	2.39	2.93	5.63	0	12.67	20.70
	2	48	66	2.57	3.54	12.12	0	15.15	29.84
	3	71	83	4.21	4.92	4.81	0	9.63	18.67
		59	73.33	3.05	3.79	7.52	0	12.48	23.07
C	1	101	129	5.89	7.52	6.20	.77	14.72	27.59
	2	61	81	2.09	2.78	4.93	0	19.75	26.79
	3	51	70	4.14	5.68	5.71	0	21.42	31.28
		71	93.33	4.04	5.32	5.61	.25	18.63	28.55
D	1								
	2								
	3								

VARIety NC. 2326

Green + Yellow (½" clear)

A 1	148	165	4.96	5.54	1.35	1.35	8.78	15.00
A 2								
3		NO DATA						
	148	165	4.96	5.54	1.35	1.35	8.78	15.00
B 1	118	149	3.15	3.98	4.69	2.68	13.42	23.95
2	90	114	1.40	1.77	6.14	0	14.91	22.45
3	90	120	1.33	1.77	9.16	0	15.83	26.33
	99.33	127.66	1.96	2.50	6.66	.89	14.72	24.04
C 1	79	105	3.90	5.18	8.57	1.90	14.28	28.66
2	73	101	3.16	4.38	2.92	0	19.80	30.89
3	84	117	3.84	5.35	10.25	.85	16.23	43.45
	78.66	107.66	3.63	4.97	8.91	.91	16.77	34.33
D 1								
2								
3								

Wide Defoliators (Yellow) ¾" overlap

D 1	40	42	1.78	1.87	2.38	0	2.38	6.54
2	46	56	2.67	3.26	3.57	5.35	8.92	20.53
3	68	75	4.40	4.85	6.66	0	2.66	13.73
	51.33	57.66	2.95	3.32	4.20	1.78	4.65	13.60

VARIETY C-319

Red & Blue ($\frac{1}{8}$" overlap)

B 1	154	155	5.29	5.32	.64	0	0	5.93
2	133	137	4.81	4.96	1.45	0	1.45	7.73
3	168	182	3.90	4.22	5.49	0	2.19	11.59
	151.66	158.00	4.66	4.83	2.52	0	1.21	8.41
C 1								
2								
3								
D 1								
2								
3								
E1								
2								
3								

Wide Defloiator ($\frac{3}{4}$" overlap) (Yellow)

B 1	82	91	5.49	6.09	2.19	7.69	0	15.38
2	109	114	4.21	4.40	0	2.63	1.75	8.59
3	141	148	5.06	5.31	2.02	0	2.70	9.79
	110.66	117.66	4.92	5.26	1.40	3.44	1.48	11.25
C 1								
2								
3								
D 1								
2								
3								
E 1								
2								
3								

VARIETY - C319

Defoliant Priming Reps	Bin tot	Sealed tot	Gross Dam	Rd % Dam	% Elev	% Op	% Stalk	Overall Eff %
Red								
A 1	108	137	5.91	7.50	2.91	.72	17.51	27.08
2	107	141	5.10	6.72	4.96	0	19.14	29.21
3	135	174	6.09	7.85	6.89	0	15.51	28.50
	166.66	150.66	5.70	7.35	4.92	.24	17.38	28.26
B 1								
2								
3								
C 1								
2								
3								
D 1								
2								
3								
Red & Green								
A 1	112	131	7.32	8.57	1.52	0	12.97	21.83
2	111	130	4.53	5.31	2.30	.76	11.53	19.15
3	141	171	4.91	5.95	5.26	.58	11.69	22.45
	121.33	144	5.58	6.61	3.02	.44	12.06	21.14
B 1								
2								
3								
C 1								
2								
3								
D 1								
2								
3								

VARIETY G-36

Deflorator
Pruning
Reps

Red & Blue ($\frac{1}{8}$" overlap)

Reps	Bin tot	Scatt tot	Gross % Dam	Net % Dam	% Elev	S. Of	% Stalk	Overall % Loss
B 1	104	115	4.69	5.19	6.95	0	2.60	14.26
2	128	134	3.28	3.43	2.23	0	2.23	7.76
3	132	143	4.89	5.30	2.79	.69	4.19	12.58
	121.33	130.66	4.28	4.64	3.99	.23	3.00	11.53
C 1								
2								
3								
D 1								
2								
3								
E 1								
2								
3								

Wide Defloictor (Yellow) $\frac{3}{4}$" overlap

Reps	Bin tot	Scatt tot	Gross % Dam	Net % Dam	% Elev	S. Of	% Stalk	Overall % Loss
B 1	100	101	5.24	5.30	0	0	.99	6.23
2	96	97	4.63	4.68	1.03	0	0	5.67
3	90	96	5.10	5.44	4.16	0	2.08	11.35
	95.33	98.00	4.99	5.14	1.73	0	1.02	7.75
C 1								
2								
3								
D 1								
2								
3								
E 1								
2								
3								

VARIETY G-36

Red								
A 1	103	155	6.51	9.80	8.38	2.58	22.58	40.06
2	114	144	6.04	7.63	6.25	.69	13.88	26.87
3	103	130	4.76	6.01	7.69	2.30	10.76	25.53
	106.66	143	5.77	7.81	7.44	1.85	15.74	30.82
B 1								
2								
3								
C 1								
2								
3								
D 1								
2								
3								
Red + Green								
A 1	157	193	7.09	8.72	1.55	-.51	16.58	25.75
2	120	152	6.90	8.75	1.31	0	19.73	28.14
3	135	160	3.87	4.59	5.92	.74	11.85	23.11
	137.33	16833	5.95	7.35	2.92	.41	16.05	25.66
B 1								
2								
3								
C 1								
2								
3								
D 1								
2								
3								

Variety NC 2512

Red								
A 1	115	160	5.18	7.21	1.25	2.50	24.37	33.31
2	107	136	3.01	3.83	2.20	.73	18.38	24.33
3	118	146	4.24	5.25	3.42	0	15.75	23.42
	113.33	147.33	4.14	5.43	2.29	1.07	19.50	27.02
B 1								
2								
3								
C 1								
2								
3								
D 1								
2								
3								
Red & Green								
A 1	201	259	6.25	8.05	3.47	.38	18.53	28.64
2	169	222	4.23	5.56	1.80	0	22.07	28.10
3	172	215	4.83	6.04	2.79	.146	16.74	24.83
	180.66	232.00	5.10	6.55	2.68	.28	19.11	27.19
B 1								
2								
3								
C 1								
2								
3								
D 1								
2								
3								

VARIETY NC 2512

Defloiclon
Priming

Reps	Bin + at	Swath wt	Gross 2 Dan	Net 2 Dan	% Elev	% Op	% Shrink	Overall % Loss
Wide Defloiclor (Yellow) 3/4" overlap								
B 1	98	105	3.52	3.77	3.80	.95	1.90	10.19
2	85	88	3.18	3.29	3.40	0	0	6.59
3	89	91	4.83	4.94	2.19	0	0	7.03
	90.66	94.66	3.84	4.00	3.13	.31	.63	7.93
C 1								
2								
3								
D 1								
2								
3								
E 1								
2								
3								
Red + Blue (1/8" overlap)								
B 1	179	195	3.43	3.74	4.61	.51	3.07	11.64
2	125	132	3.48	3.68	0	.75	4.54	8.78
3	153	165	3.75	4.05	2.42	0	4.84	10.42
	152.33	164.00	3.55	3.82	2.34	.42	4.15	10.28
C 1								
2								
3								
D 1								
2								
3								
E 1								
2								
3								

Some difficulty was experienced in stripping the laminae off some of the leaves when, because of their acute angle, they were folded up along the stalk. The wipers were then free to strip the lamina and leave the midrib on the stalk.

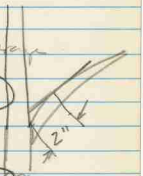
The data below elaborates this problem.

Variety — 2326	Time — before leaves filled out & dropped	Row 1			Row 2			Average
Hand rubbers (yellows & green)		Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	
	Leaves in Bin	67	76	120	103	119	85	
	Leaves Stripped	22	35	34	30	30	22	
	Total	89	111	154	133	149	107	
	% Stripped	24.8%	31.5	22.1	22.6	20.1	20.5	23.6
Soft rubber (Red)	Leaves in Bin	54	52	57	60	54	70	
	Leaves Stripped	26	23	35	34	36	22	
	Total	80	75	89	94	90	92	
	% Stripped	32.5	30.7	39.3	36.2	40.0	23.9	33.8

The problem appears to be associated ~~the~~ with the acute angle of leaf attachment. Solution would lie in a feeding device to get the leaf under the wiper type defoliator. The finger bar defoliator might work better in this connection than the wiper.

Leaf Angles — at time of 2nd priming — leaves had not fallen out because of lack of rain.

Var									
2326	29°	20°	32°	27°	40°	38°	32°	36°	Average
	31°	29°	32°	30°	28°	32°	34°		31.3
2512	42°	34°	35°	40°	38°	36°	42°	38°	37.5
	36°	36°	33°	36°	39°	41°	37°		
2326	22°	25°	30°	31°	32°	33°	31°	31°	30.7
	31°	33°	32°	34°	25°	30°	40°		
C-819	52°	46°	30°	34°	34°	30°	38°	40°	35.5
	30°	35°	34°	34°	38°	34°	30°		



Point of tangency was two inches from stalk.

Effectiveness of Hard and Soft Spiral Rubber Wiper Defoliators. Number in Parentheses are Damage Values in Percentage. Other Numbers are Total Harvesting Losses and Include Damage, Stalk Loss and Elevator Loss.

Mean Values 1966

		Priming		
Defoliator	Variety	A	B	C
Hard	G36	25.67 (5.95)	11.53 (4.29)	6.07 (3.19)
Soft	G36	30.82 (5.77)	7.78 (4.99)	8.05 (3.70)
Hard	C319	21.14 (5.59)	8.42 (4.67)	5.59 (2.63)
Soft	C319	28.26 (5.70)	11.25 (3.92)	5.59 (3.30)
Hard	N.C. 2512	26.92 (5.10)	10.28 (3.55)	9.08 (2.98)
Soft	N.C. 2512	27.02 (4.14)	7.94 (4.84)	6.91 (2.10)
Hard	N.C. 2326	27.86 (2.87)	15.89 (2.52)	4.84 (2.41)
Soft	N.C. 2326	16.31 (3.65)	13.60 (2.95)	9.93 (3.69)

Total Harvesting Losses and Stalk Losses (in parentheses)
For Hard and Soft Spiral Rubber Wipers. Mean Values 1966

Defoliator	Variety	Priming A	Priming B	Priming C
Hard	G36	25.67 (16.05)	11.53 (3.01)	6.07 (0.81)
Soft	G36	30.82 (15.73)	7.78 (1.02)	8.05 (1.58)
Hard	C319	21.14 (12.06)	8.42 (1.21)	5.59 (0.77)
Soft	C319	28.26 (17.39)	11.25 (1.48)	5.59 (0.65)
Hard	N.C. 2512	26.92 (19.10)	10.28 (4.15)	9.08 (2.14)
Soft	N.C. 2512	27.02 (19.50)	7.94 (0.63)	6.91 (0.91)
Hard	N.C. 2326	27.86 (20.16)	15.89 (5.38)	4.84 (1.94)
Soft	N.C. 2326	16.31 (6.54)	13.60 (4.65)	9.93 (3.40)

Total Harvesting Losses and Stalk Losses (in parentheses)
For Hard and Soft Spiral Rubber Wipers. Mean Values 1966

		Priming		
Defoliator	Variety	A	B	C
Hard	G36	25.67 (16.05)	11.53 (3.01)	6.07 (0.81)
Soft		30.82 (15.73)	7.78 (1.02)	8.05 (1.58)
Hard	C319	21.14 (12.06)	8.42 (1.21)	5.59 (0.77)
Soft		28.26 (17.39)	11.25 (1.48)	5.59 (0.65)
Hard	N.C. 2512	26.92 (19.10)	10.28 (4.15)	9.08 (2.14)
Soft		27.02 (19.50)	7.94 (0.63)	6.91 (0.91)
Hard	N.C. 2326	27.86 (20.16)	15.89 (5.38)	4.84 (1.94)
Soft		16.31 (6.54)	13.60 (4.65)	9.93 (3.40)

Effectiveness of Hard and Soft Spiral Rubber Wiper Defoliators. Number in Parentheses are Damage Values in Percentage. Other Numbers are Total Harvesting Losses and Include Damage, Stalk Loss and Elevator Loss.
Mean Values 1966

		Priming		
Defoliator	Variety	A	B	C
Hard	G36 y	25.67	11.53	6.07
		(5.95)	(4.29)	(3.19)
Soft		30.82	7.78	8.05
		(5.77)	(4.99)	(3.70)
Hard	C319	21.14	8.42	5.59
		(5.59)	(4.67)	(2.63)
Soft		28.26	11.25	5.59
		(5.70)	(3.92)	(3.30)
Hard	N.C. 2512	26.92	10.28	9.08
		(5.10)	(3.55)	(2.98)
Soft		27.02	7.94	6.91
		(4.14)	(4.84)	(2.10)
Hard	N.C. 2326	27.86	15.89	4.84
		(2.87)	(2.52)	(2.41)
Soft		16.31	13.60	9.93
		(3.65)	(2.95)	(3.69)

Effect of Rubber Resilience on the Operation of the Spiral Rubber Wiper Defoliator

The spiral rubber wiper defoliator, Figure 1, was conceived in spring of 1954 and operated in the field that same summer. In numerous field tests since that time it has been found to be a simple and effective device for removing leaves from approximately the lower half of the stalk. The knife defoliator is superior for removing the upper leaves. Success and adaptability of the spiral rubber wiper (SRW) to removing the lower leaves is due, at least in part, to the flexibility of the rubber web which allows for misalignment of the plant, resiliency of the material thus reducing stalk and leaf damage and simplicity of design which makes it adaptable to operating in the abrasive environment close to the ground.

In operation, two SRW units are used, one on each side of the row so that the plant stalk can pass between them, Figure 2. There may or may not be a gap between them depending on the severity of the desired action. In some cases the webs of the two units may overlap by as much as one inch. In essentially all cases some deflection of the web is necessary for the stalk to pass, being largest when the webs are overlapped most. Web deflection is limited to the general area of the wiper in contact with the stalk. That is, a deflection wave moves with the stalk as it progresses through the defoliators. Hardness (durometer) of the rubber material in the defoliator determines the extent to which the deflection is localized around the stalk and the amount of overlap possible without impeding the passage of stalks between the defoliators.

For field operation the units are mounted at an angle to the horizon. The

front end is higher than the rear and is fitted with a divider to separate the leaves to be harvested from those to be left on the stalk. For effective harvest, all parts of those leaves to be harvested must pass beneath the defoliator. Some difficulty has been experienced with varieties or crops on which the leaves grew upward at a small angle to the stalk. Leaves on such plants tend to pass through the defoliators with part of the midrib and the petiole below the defoliator in the swath area but with the main portion of the laminar above the defoliator. Leaf damage results especially to the foliar material on the petiole and the butt end of the leaf.

Because of the possible effects of defoliator design and rubber durometer on harvesting efficiency a set of experiments was set up to measure the effects of these variables. Three hardnesses of rubber material were used. These were, from softest to hardest 40-50, 50-60 and 70-80 durometer. Three sets of defoliators were made from the hard and intermediate material and two sets from the soft material. One extra set, except for the soft material, were modified by cutting slits along the axis to relieve some of the stress from twisting into a spiral. The other extra sets were modified by slicing the web part-way through from each side along the edges which came into contact with the plant. This was done to facilitate deformation of the material by the stalk and allow the material to conform more closely to the stalk.

The units were tested in plots of G-36, C-319, NC 2512 and NC 2326 varieties growing on the Central Crops Research Station, Clayton, N. C. during the summer of 1966. Evaluations were made of elevator loss, stalk loss, damage and total harvesting losses plus damage.

Results and Discussion

There was little difference in the overall performance of the hard and soft rubber wiper units, Table 1. The defoliators made of intermediate hardness material gave results in the same general range as the hard and soft materials. These results indicate that there is a large amount tolerance available in the design and operation of SRW defoliators.

It should be noted that leaf damage (next to last column of Table 1) was approximately three to five percent with a few values between five and six percent. Stalk loss and elevator loss made up the rest of the value shown in the total loss plus damage column except for a small amount of operator errors which was present in some of the runs. Under the present acreage-poundage allotment program elevator and field losses would not represent severe disadvantages because the procedures could plant extra acreage to make up for it. Cost of these losses would be the cost of producing this extra tobacco up to the point of harvesting. A realistic estimate would be 15¢/lb. or less than 1/4 of the value of the losses.

Stalk losses were quite high at the first of the season. The sand lugs were badly burned and sun scalded due to hot dry weather so the data starts with the leaves just above the lugs as priming 4. These leaves were attached to the stalk at an acute angle thus making it difficult for the defoliator dividers to separate the ripe swath from the rest of the plant. Because of this, difficulty was experienced in stripping the lamina off some of the leaves. As these leaves were folded up along the stalk the wipers were free to strip part

Table 1. Effect of Defoliator Design on Leaf Loss and Damage.

Variety	Defoliator	Priming	Elevator Loss, %	Stalk Loss %	Leaf Damage %	Total loss plus Damage %
G 36	Hard					
		A	2.93	16.05	5.95	25.67
		B	3.99	3.01	4.29	11.53
		C	2.06	0.81	3.19	6.07
	Soft					
		A	7.42	15.73	5.77	30.82
		B	1.73	1.02	4.99	7.78
		C	2.81	1.58	3.70	8.05
C-319	Hard					
		A	3.03	12.06	5.59	21.14
		B	2.53	1.21	4.67	8.42
		C	2.52	0.77	2.63	5.59
	Soft					
		A	4.92	17.39	5.70	28.26
		B	1.40	1.48	3.92	11.25
		C	1.64	0.65	2.30	5.59
N.C.2512	Hard					
		A	2.69	19.10	5.10	26.92
		B	2.34	4.15	3.55	10.28
		C	3.96	2.14	2.98	9.08
	Soft					
		A	2.29	19.50	4.14	27.02
		B	3.13	0.63	4.84	7.94
		C	3.86	0.91	2.10	6.91
N.C.2326	Hard					
		A	4.50	20.16	2.87	27.86
		B	7.97	5.38	2.52	15.89
		C	0.49	1.94	2.41	4.84
	Soft					
		A	6.04	6.54	3.65	16.31
		B	4.20	4.65	2.95	13.60
		C	1.67	3.40	3.69	9.93

of the lamina and have the midrib and the rest of the lamina on the stalk. The severity of this action expressed as a percentage of the harvested leaves is given in Table 2.

Table 2. Effect of Rubber Hardness on Stripping of Lamina Material from Leaves Left on Stalk, N.C. 2326 Variety.

	Row 1			Row 2		
Defoliator	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3
Hard	24.8	3.15	22.1	22.6	20.1	20.5
Soft	32.5	30.7	39.3	36.2	40.0	23.9

Leaf angles of the lower leaves to the stalk are given in Table 3. These angles increased later in the season after several rains.

Table 3. Leaf Angle at Time of Priming A. Average Values Two Inches From Base of Petiole.

Variety	G 36	C 319	N.C. 2512	N.C. 2326
Angle	31.3°	35.5°	37.5°	30.7°

There were no appreciable differences in the harvesting efficiency of the defoliators with and without sliced edges. Also slitting and removing material along the axis of the wiper blade did not improve its action.

Summary

Fiels tests of the effects of rubber resiliency on the operational effectiveness of spiral rubber wiper defoliators showed that variations in durometer values from 40 to 80 units did not appreciable affect the results. The adverse effects

of acute angles between the stalk and the leaf were evident. Variations in the design of the defoliator with respect to edge slicing or central slits did not produce detectable changes in the operating characteristics.

Additional work to determine if durometer value has an effect on the harvesting characteristics of a more normal crop of tobacco is recommended.

Table 1. Effect of Defoliator Design on Leaf Loss and Damage.

Variety	Defoliator	Priming	Elevator Loss, %	stalk loss %	Leaf Damage, %	Total loss plus Damage %
D 36	Hand	A	2.93	16.05	5.90	25.67
		B	3.99	3.01	4.29	11.53
		C	2.06	0.81	3.19	6.07
	Soft	A	7.42	15.73	5.77	30.82
		B	1.73	1.02	4.99	7.78
		C	2.81	1.58	3.70	8.05
C-319	Hand	A	3.03	12.06	5.59	21.14
		B	2.53	1.21	4.67	8.42
		C	2.52	0.77	2.63	5.59
	Soft	A	4.92	17.39	5.70	28.26
		B	1.40	1.48	3.92	11.25
		C	1.64	0.65	3.36	5.59
N.C. 2512	Hand	A	2.69	19.10	5.10	26.92
		B	2.34	4.15	3.55	10.28
		C	3.96	2.14	2.98	9.08
	Soft	A	2.29	19.50	4.14	27.02
		B	3.13	0.63	4.84	7.94
		C	3.86	0.91	2.10	6.91
NC 2326	Hand	A	4.50	20.16	2.87	27.86
		B	7.97	5.38	2.52	15.89
		C	0.49	1.94	2.41	4.84
	Soft	A	6.04	6.54	3.65	16.31
		B	4.20	4.65	2.95	13.60
		C	1.67	3.40	3.69	9.93