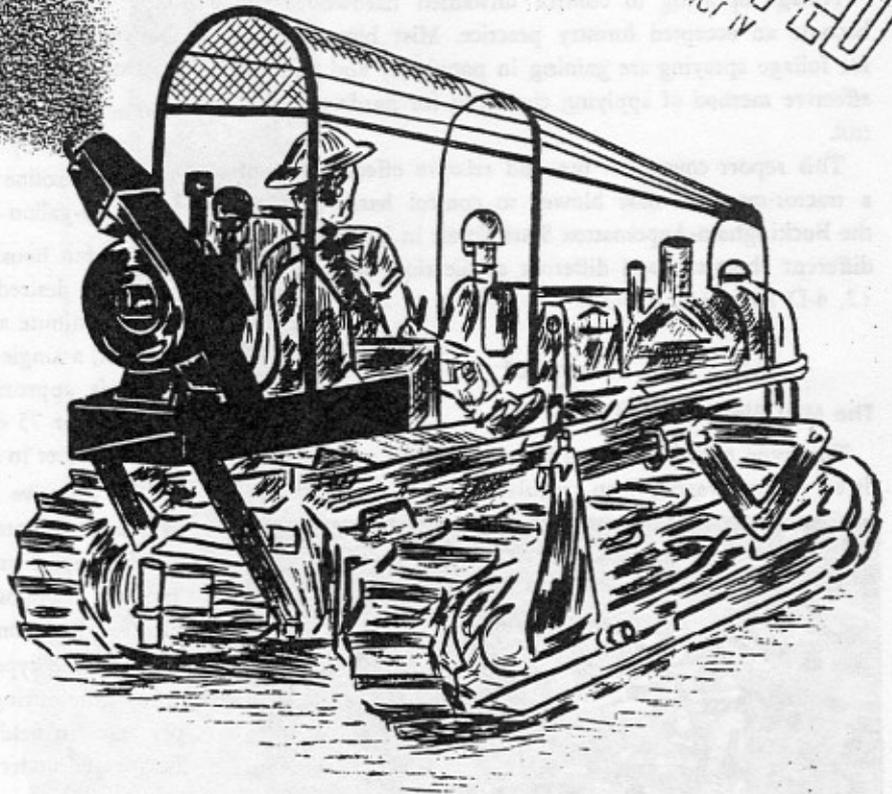
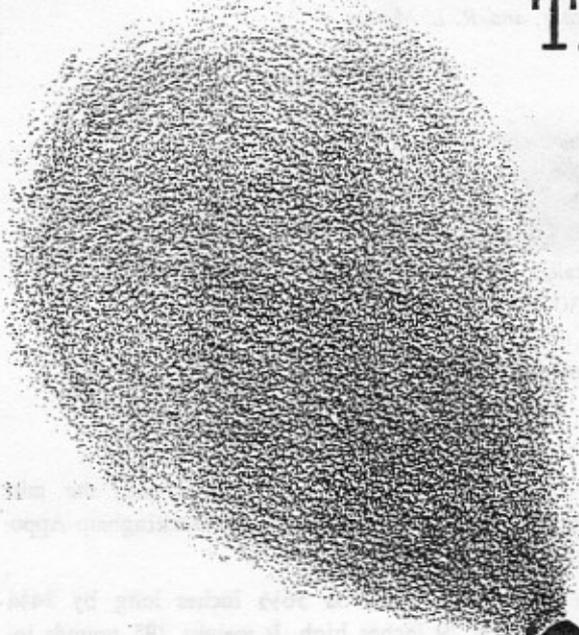


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# TRACTOR MOUNTED MIST BLOWER STUDY



 **Virginia Division of Forestry**   
 Department of Conservation and Economic Development

# TRACTOR-MOUNTED MIST BLOWER TESTS ON THE BUCKINGHAM-APPOMATTOX STATE FOREST IN VIRGINIA

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## Summary

Tractor-mounted mist blower tests using different chemicals and different application rates of acid (2, 4-D and/or 2, 4, 5-T) per acre were installed on the Buckingham-Appomattox State Forest in Virginia.

The tests show that two pounds acid per acre gave satisfactory control and that some follow-up control work is necessary on those taller trees not completely controlled by the mist blower. Good control of trees less than 30 feet in height was obtained.

The tests further showed that tractor-mounted mist blowers, such as the one used in the test, are effective for hardwood control and deserve serious consideration and use.

## Introduction

Foliage spraying to control unwanted hardwoods has become an accepted forestry practice. Mist blowers used for foliage spraying are gaining in popularity and offer an effective method of applying chemicals for hardwood control.

This report covers the use and relative effectiveness of a tractor-mounted mist blower to control hardwoods on the Buckingham-Appomattox State Forest in Virginia using different chemicals and different application rates of acid (2, 4-D and/or 2, 4, 5-T).

## General

### The Mist Blower<sup>1</sup> Used

This type mist blower can be mounted on a four-wheel drive power wagon, Jeep, regular tractor, or a crawler-

type tractor. A D-4 crawler-type tractor with the mist blower rear-mounted was used for the Buckingham-Appomattox State Forest tests.

The mist blower used is 36½ inches long by 24¾ inches wide by 29 inches high. It weighs 285 pounds including gasoline motor, fan, housing, pump, pressure gauge, and a 33-gallon tank (empty) with recirculating agitation.

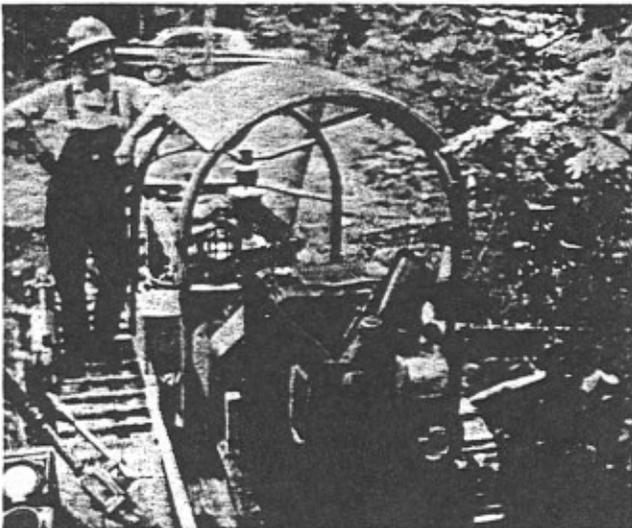
The fan housing can be set to deliver to any angle or direction desired and the fan delivers 2400 cubic feet of air per minute at velocities up to 190 miles per hour. For the test, a single round "tree" outlet was used and pointed upwards approximately 75 degrees from horizontal. This "setting" of 75 degrees permitted spray coverage on trees up to 70 feet in height.

The effective spray swath with this 75 degree "setting" was approximately 35 feet. Tractor "paths" were marked 70 feet apart and the tractor covered the "paths" twice moving in opposite directions each time spraying one side of the path on one trip and the other side returning.

With the type terrain and tree growth present actual spray time during the tests was approximately ten minutes per acre. In field operation 30 to 40 acres per day could be sprayed under conditions similar to those offered by the test area.

### Test Area Description

The Buckingham-Appomattox Forest areas used for the test are typical of lower Virginia piedmont cut-over hardwood stands. The overstory was predominantly white, post, chestnut, and scarlet oak, with some hickory, red maple, and other oaks. The understory included small trees of the above species plus dogwood, black gum, and a number of shrub species.



<sup>1</sup>Potts Mist Blower—1961 model powered with a 4-cycle Wisconsin engine.

### Time Sprayed

The spray tests were carried out in two successive years, beginning May 31 and ending June 7, 1961, and from June 15 to June 22, 1962.

Growing conditions for both years were favorable due to abundant rainfall prior to and following spraying.

During the spray tests care was taken so that no spraying was done when wind velocities exceeded ten miles per hour.

### Chemicals Used

Eleven different spray treatments involving four different chemicals were used. Individual plot size was either three or five acres and there were three replications for each treatment. A list of the chemicals used including composition is appended to the report.

Five gallons of spray mixture were applied per acre. The different treatments used per acre follow:

Chemical Name	lbs. Acid-#	Gal.	1961 (Gallons)		
			Fuel Oil	Water	Total
1. Esterone 245 OS	2 - ½		1	3½	5
2. "	3 - ¾		1	3¾	5
3. Forron 245	2 - 1			4	5
4. "	4 - 2			3	5

Chemical Name	lbs. Acid-#	Gal.	1962 (Gallons)		
			Fuel Oil	Water	Total
1. Esterone 245 OS	1 - ¾		1	3¾	5
2. "	2 - ½		1	3½	5
3. Forron	1 - ½			4¾	5
4. "	2 - ¾			4½	5
5. "	3 - 1			4	5
6. Amchem Spec. Air Form.	1 - ¾		1	3¾	5
7. " "	2 - ½		1	3½	5
8. " "	3 - ¾		1	3¾	5

### Results and Conclusions

Spray evaluation was done during late summer one year after spraying and tree species present tallied into size and defoliation classes.

For evaluation purposes four arbitrary defoliation classes were used:

1. less than 20 percent defoliated
2. 20 to 50 percent defoliated
3. 50 to 80 percent defoliated
4. 80 percent or more defoliated

Tree growth present was divided into the following size classes:

1. low brush—up to 6' in height
2. tall brush—from 6' in height to 1.5" DBH (diameter at breast height)
3. trees—1.6" DBH and up

Sprout growth was tallied only if thought a serious problem to growth and development of planted pine seedlings.

A complete tabular presentation of results by treatment may be found in the Appendix. The following is a *summary* of results and conclusions:

1. For the chemicals used in the tests the two pound acid rates per acre gave somewhat better results than the one pound rates and the two pound rates gave as good results as either the three or four pound rates. Therefore, it is concluded and recommended that two pounds acid per acre be used in mixture with one gallon of fuel oil (where oil will mix with the chemical used) and enough water carrier added to obtain a total spray coverage of five gallons per acre.

2. Low and tall brush, as defined above, were well-controlled, with the possible exception of red maple and dogwood.

3. The taller trees (over 30 feet) were not completely controlled and additional control measures, which may easily be applied using hand methods such as frilling and poisoning will be necessary for complete release of established seedlings. However, it was felt that the spraying was definitely worthwhile because it substantially reduced the total number of taller trees necessary to control.

4. Tractor-mounted mist blowers, such as the one used in the tests, while not a "cure-all" for hardwood control problems, are effective for hardwood control measures and deserve serious consideration and use.

### Remarks

1. Aside from minor operating difficulties the mist blower used appears sturdy and performed well. The D-4 tractor and rear-mounted mist blower were well-mated and for the tree growth and terrain present on the test areas the D-4 tractor provided ample power and maneuverability.

2. Marking the tractor course with flagging at intervals or guiding the tractor is necessary for proper spray coverage. Several different methods were used and "flagging" the course with brightly colored plastic strips proved the most effective and satisfactory of those used.

3. Low and tall brush falling into either the 50 to 80 or 80 to 100 percent defoliation class was considered adequately controlled because it was felt that established pine seedlings could "outgrow" brush of this size before it recovers.

4. Taller trees (over thirty feet) more than 50 percent defoliated (unless dead) were not considered adequately

controlled because it is felt that many of these trees will recover and overtop established pine seedlings.

Taller trees proved more difficult to kill. Some reasons for this difficulty are listed below:

- The distance factor between the tree and tractor path. Taller trees near the tractor path did not receive as much spray due to the 75 degree fan housing setting. The spray pattern intersects the lower portions of the crown and fails to reach into upper crown portions when the tractor passes too close to the tree.
- Density of the taller trees. Where dense, due to interception of spray, adequate spray coverage of all trees was not obtained.
- Height limitations of the mist blower. Even though

individual trees up to 70 feet were killed as a result of spraying killing trees of this height proves difficult unless conditions are favorable for spray coverage—i.e. lower trees densities and the tree located far enough from the tractor path for adequate crown coverage. It should be remembered that all fan housing settings ("pointing" the spray nozzle upward) are made in an attempt to obtain both maximum spray height and width coverage for the tree growth present, and that the final setting used is usually a compromise in order to obtain as much of both as possible.

5. Because of drift, spraying should not be done on days when wind velocity is high. Wind velocity should be preferably well under ten miles per hour.

#### APPENDIX I

##### Chemicals Used

- AmChem—special air formula containing 2, 4, 5-Trichlorophenoxyacetic acid. Butoxy ethanol ester. Four pounds total acid equivalent per gallon. *Trichlorophenoxyacetic acid*
- Esteron 245 OS—contains ~~two~~ <sup>two</sup> pounds acid equivalent of propylene glycol butyl ether ester of 2, 4, 5-T and ~~two~~ <sup>two</sup> pounds acid equivalent propylene glycol butyl ether ester of 2, 4, 5-T per gallon. Four pounds total acid equivalent per gallon.
- Forron—contains 1½ pounds 2, 4-Dichlorophenoxy acetic acid and 1½ pounds 2, 4, 5-Trichlorophenoxyacetic acid per gallon. Three pounds total acid equivalent per gallon.
- Forron 245—contains two pounds 2, 4, 5-Trichlorophenoxy—acetic acid propylene glycol butyl ether esters per gallon.

#### APPENDIX II

1961—Esterone 245 OS—2 lbs. acid (½ gal.) + 1 gal. oil + 3½ gals. water		Species <sup>1</sup>								Misc.
Size Class		CO	WO	RO	RM	BG	D	H	YP	
Low Brush	No. T/A <sup>2</sup>	8	42	167	42	217	...	25	8	17
(up to 6' in ht.)	% (50-100%) defoliated	100	80	55	60	92	...	100	100	50
	% Sprouts <sup>3</sup>	...	...	10	40	...	...	...	100	50
Tall Brush	No. T/A	42	17	67	242	175	17	17	...	...
(6' in ht. to 1.5" DBH)	% (50-100%) defoliated	60	100	88	72	100	100	100	...	...
	% Sprouts	60	...	...	3	...	100	...	...	...
Trees	No. T/A	288	245	208	165	70	7	80	18	...
(1.6" DBH up)	% (50-100%) defoliated	89	95	94	63	95	100	94	91	...
	% Sprouts	...	...	6	39	5	50	2	100	...

1961—Esterone 245 OS—3 lbs. acid (¾ gal.) + 1 gal. oil + 3½ gals. water		Species								
Size Class		CO	WO	RO	RM	BG	D	H	YP	Misc.
Low Brush	No. T/A	22	56	211	110	600	11	22	...	56
(up to 6' in ht.)	% (50-100%) defoliated	100	100	74	40	98	100	50	...	60
	% Sprouts	...	...	11	10	...	...	...	...	...

<sup>1</sup> CO represents Chestnut oak, PO—post oak, WO—white oak, RO—red oak (group), RM—red maple, BG—black gum, D—dogwood, H—hickory, YP—yellow poplar, Misc.—includes elm, sassafras, ash, sweet gum, and sourwood.

<sup>2</sup> T/A refers to trees per acre.

<sup>3</sup> Only those sprouts considered a problem to planted trees were included.

\* Herbaceous my kill E - *Erigeron*  
M - *Melilotus*  
H - *Hibiscus*

Tall Brush	No. T/A	11	67	178	133	211	....	22	44	11
(6' in ht. to 1.5" DBH)	% (50-100%) defoliated	....	100	94	67	100	....	100	100	100
	% Sprouts	....	....	....	....	....	....	....	100	....
Trees	No. T/A	198	356	233	156	109	9	104	36	11
(1.6" DBH up)	% (50-100%) defoliated	98	97	93	77	100	75	96	100	60
	% Sprouts	1	....	....	16	6	....	....	75	....

### APPENDIX III

1961—Forrone 245—2 lbs. acid (1 gal.) + 4 gals. water

Size Class		PO		Species						
		CO	WO	RO	RM	BG	D	H	YP	Misc.
Low Brush	No. T/A	89	59	293	93	207	4	7	4	7
(up to 6' in ht.)	% (50-100%) defoliated	88	81	72	84	98	100	100	100	50
	% Sprouts	21	....	9	28	20	100	....	....	....
Tall Brush	No. T/A	18	26	37	44	33	....	11	....	....
(6' in ht. to 1.5" DBH)	% (50-100%) defoliated	60	100	100	92	100	....	100	....	....
	% Sprouts	....	....	20	33	11	....	....	....	....
Trees	No. T/A	75	41	84	66	22	5	56	....	....
(1.6" DBH up)	% (50-100%) defoliated	99	100	99	87	100	100	100	....	....
	% Sprouts	....	....	1	13	3	29	....	....	....

1961—Forrone 245—4 lbs. acid (2 gal.) + 3 gals. water

Size Class		PO		Species						
		CO	WO	RO	RM	BG	D	H	YP	Misc.
Low Brush	No. T/A	80	73	203	43	263	....	20	....	....
(up to 6' in ht.)	% (50-100%) defoliated	75	91	85	85	99	....	100	....	....
	% Sprouts	8	....	21	46	13	....	....	....	....
Tall Brush	No. T/A	23	27	70	30	77	3	....	....	10
(6' in ht. to 1.5" DBH)	% (50-100%) defoliated	100	100	100	89	100	100	....	....	100
	% Sprouts	....	....	5	22	9	100	....	....	....
Trees	No. T/A	99	89	82	35	19	4	37	1	....
(1.6" DBH up)	% (50-100%) defoliated	98	99	100	92	100	100	100	100	....
	% Sprouts	....	....	....	6	....	....	....	100	....

### APPENDIX IV

1962—Esterone 245 OS—1 lb. acid (¼ gal.) + 1 gal. oil + 3% gals. water

Size Class		PO		Species						
		CO	WO	RO	RM	BG	D	H	YP	Misc.
Low Brush	No. T/A	39	39	72	50	461	6	22	17	67
(up to 6' in ht.)	% (50-100%) defoliated	100	85	92	89	100	100	75	100	100
	% Sprouts	....	....	....	....	....	....	....	67	8
Tall Brush	No. T/A	17	11	....	22	161	....	33	11	33
(6' in ht. to 1.5" DBH)	% (50-100%) defoliated	100	100	....	75	96	....	100	100	100
	% Sprouts	....	....	....	33	....	....	....	100	17
Trees	No. T/A	90	166	53	26	31	7	30	18	1
(1.6" DBH up)	% (50-100%) defoliated	89	97	60	61	96	100	100	94	100
	% Sprouts	2	....	....	48	....	....	....	63	....

1962—Esterone 245 OS 2 lbs. acid ( $\frac{1}{2}$ gal.) + 1 gal. oil + 3 $\frac{1}{2}$ gals. water			Species							
Size Class		PO		RO	RM	BG	D	H	YP	Misc.
		CO	WO							
Low Brush (up to 6' in ht.)	No. T/A	39	50	194	28	456	6	28	....	28
	% (50-100%) defoliated	86	67	77	40	94	100	100	....	80
	% Sprouts	....	....	....	....	....	....	20	....	20
Tall Brush (6' in ht. to 1.5" DBH)	No. T/A	17	22	6	....	128	....	11	....	....
	% (50-100%) defoliated	100	100	100	....	100	....	100	....	....
	% Sprouts	....	....	....	....	4	....	....	....	....
Trees (1.6" DBH up)	No. T/A	149	101	82	3	16	7	37	2	1
	% (50-100%) defoliated	70	92	61	100	100	80	100	100	100
	% Sprouts	....	....	....	33	....	20	....	50	....

#### APPENDIX V

1962—Forron—1 lb. acid ( $\frac{1}{2}$ gal.) + 4 $\frac{1}{2}$ gals. water			Species							
Size Class		PO		RO	RM	BG	D	H	YP	Misc.
		CO	WO							
Low Brush (up to 6' in ht.)	No. T/A	61	28	133	39	539	....	11	....	6
	% (50-100%) defoliated	73	40	54	14	94	....	100	....	100
	% Sprouts	....	20	....	....	6	....	....	....	....
Tall Brush (6' in ht. to 1.5" DBH)	No. T/A	39	17	....	11	138	....	56	....	....
	% (50-100%) defoliated	86	100	....	50	92	....	100	....	....
	% Sprouts	28	....	....	....	....	....	....	....	....
Trees (1.6" DBH up)	No. T/A	146	96	102	6	18	8	52	2	....
	% (50-100%) defoliated	66	85	62	80	94	71	81	50	....
	% Sprouts	1	....	....	40	....	....	....	....	....

1962—Forron—2 lbs. acid ( $\frac{2}{3}$ gal.) + 4 $\frac{1}{2}$ gals. water			Species							
Size Class		PO		RO	RM	BG	D	H	YP	Misc.
		CO	WO							
Low Brush (up to 6' in ht.)	No. T/A	61	56	178	28	500	....	11	....	28
	% (50-100%) defoliated	91	90	94	60	94	....	100	....	100
	% Sprouts	....	....	3	....	....	....	....	....	40
Tall Brush (6' in ht. to 1.5" DBH)	No. T/A	44	11	6	11	161	....	33	....	....
	% (50-100%) defoliated	75	100	100	100	93	....	100	....	....
	% Sprouts	....	....	....	50	....	....	....	....	....
Trees (1.6" DBH up)	No. T/A	126	140	69	20	18	3	19	3	....
	% (50-100%) defoliated	79	92	77	61	81	100	94	100	....
	% Sprouts	1	....	....	5	....	....	....	....	....

1962—Forron—3 lbs. acid (1 gal.) + 4 gals. water			Species							
Size Class		PO		RO	RM	BG	D	H	YP	Misc.
		CO	WO							
Low Brush (up to 6' in ht.)	No. T/A	72	50	189	17	517	17	22	6	6
	% (50-100%) defoliated	92	100	94	....	99	100	100	100	100
	% Sprouts	....	....	3	....	....	....	....	....	....
Tall Brush (6' in ht. to 1.5" DBH)	No. T/A	33	6	11	6	117	6	11	....	....
	% (50-100%) defoliated	83	100	100	100	100	100	100	....	....
	% Sprouts	....	....	....	....	....	....	....	....	....

Trees	No. T/A	101	131	149	28	16	2	22	3	....
(1.6" DBH up)	% (50-100%) defoliated	76	92	84	52	87	100	100	100	....
	% Sprouts	....	....	1	4	....	....	....	66	....

APPENDIX VI

1962—AmChem Spec. Air Form.—1 lb. acid (¼ gal.) + 1 gal. oil + 3% gals. water

Size Class		Species								
		CO	WO	RO	RM	BG	D	H	YP	Misc.
Low Brush	No. T/A	78	50	200	22	333	11	22	....	....
(up to 6' in ht.)	% (50-100%) defoliated	100	89	89	25	97	50	100	....	....
	% Sprouts	....	....	....	....	....	50	25	....	....
Tall Brush	No. T/A	22	28	22	....	117	17	22	6	6
(6' in ht. to 1.5" DBH)	% (50-100%) defoliated	100	100	100	....	86	66	100	100	100
	% Sprouts	....	....	....	....	....	....	....	100	....
Trees	No. T/A	71	150	56	14	18	18	41	8	....
(1.6" DBH up)	% (50-100%) defoliated	83	91	52	46	94	56	100	100	....
	% Sprouts	....	....	....	23	....	31	....	43	....

1962—AmChem Spec. Air Form.—2 lbs. acid (½ gal.) + 1 gal. oil + 3½ gals. water

Size Class		Species								
		CO	WO	RO	RM	BG	D	H	YP	Misc.
Low Brush	No. T/A	33	50	111	39	550	....	22	....	28
(up to 6' in ht.)	% (50-100%) defoliated	100	100	90	100	100	....	100	....	100
	% Sprouts	17	11	20	28	2	....	50	....	20
Tall Brush	No. T/A	6	28	6	22	178	....	22	6	11
(6' in ht. to 1.5" DBH)	% (50-100%) defoliated	100	100	100	75	97	....	100	100	100
	% Sprouts	....	20	....	25	3	....	50	100	....
Trees	No. T/A	81	183	77	12	15	9	47	2	13
(1.6" DBH up)	% (50-100%) defoliated	92	96	77	100	93	88	100	100	100
	% Sprouts	1	....	....	55	....	37	5	50	66

1962—AmChem Spec. Air Form.—3 lbs. acid (¾ gal.) + 1 gal. oil + 3½ gals. water

Size Class		Species								
		CO	WO	RO	RM	BG	D	H	YP	Misc.
Low Brush	No. T/A	39	28	133	33	594	6	39	....	22
(up to 6' in ht.)	% (50-100%) defoliated	100	100	83	100	97	100	71	....	100
	% Sprouts	....	....	4	33	1	....	....	....	....
Tall Brush	No. T/A	28	39	....	28	172	6	33	6	11
(6' in ht. to 1.5" DBH)	% (50-100%) defoliated	100	100	....	80	97	100	100	100	100
	% Sprouts	....	....	....	....	3	....	....	....	....
Trees	No. T/A	87	184	73	8	23	3	38	9	....
(1.6" DBH up)	% (50-100%) defoliated	86	98	77	57	100	100	94	100	....
	% Sprouts	....	....	....	14	....	....	....	88	....