

Comparative trial of three Allen Machines, The Four Seasons and the Bushwakka in comparison with hand weeding and chemical control in young plantations

A long term investigation has taken place in search of a machine suitable for weeding between the rows in young plantations to relieve the arduous and costly hand weeding which is often the only way that the work can be done.

On areas which have been single-furrow ploughed before planting no machine has been able to replace hand work owing to the very rough ground surface. Fortunately ploughing normally suppresses weed growth for long enough to reduce the weeding problem to some extent. Where planting has been done without ploughing the standard Allen Autoscythe has already been used with success.

There are now a number of machines on the market which appear to be capable of taking on this work so a large scale trial was arranged in S.E. England to compare five of these machines with hand weeding and with chemical weed control.

The following machines were tested:-

(a) The standard Allen Autoscythe Type T.S. with 4 stroke Villiers engine as used in the Forestry Commission for many years.

(b) The Type F Allen Autoscythe with 4 stroke Villiers engine which is a new development of (a) having an adjustable width of wheel track and a new transmission case. It is heavier 408 lbs. compared with 349 lbs. and costs £98. 15. 0 compared with £94. 15. 0 for the Type T.S.

(c) The Allen Motor Sickle, a rotary disc on the same general lines as (d) and (e) below. Engine = 4 stroke Villiers. Weight = 213 lbs.

(d) The Four Seasons Scrubcutter made by Standard Insulators Ltd. of Camberley. This consists of a tubular frame carrying a rotary disc driven by belt from a Villiers 2 stroke engine. Weight of machine = 128 lbs.

(e) The Bushwakka Scrubcutter made by Farmfitters Ltd., Gerrards Cross, Bucks. This is on the same general lines as the Four Seasons but the rotary cutting disc is driven direct by a 75 CC or 100 CC Vincent engine with centrifugal clutch. Weight = 79 lbs.

Of the above all the Allen Machines are self-propelled but the Four Seasons and the Bushwakka are pushed over the ground by the operator.

Conditions

The trial took place at Chawton Park and South Warnborough in Hampshire between the 24th of June and the 4th of July, 1958.

Sites Three different sites were chosen i.e.

Site 1. A vigorous growth of grass and thistles which had completely overgrown the young trees which were P.56 (3 rows N.S. 2 rows Oak).

Site 2. A mixture of juncus grass, bracken and birch coppice which was higher than some of the less forward trees in a mixed beech and D.F. stand P.52.

Site 3. A mixed stand of beech and D.F. (3 rows - 3 rows) which had been planted in 1958 and had since become entirely covered with a growth of hazel, oak coppice, willow herb and bramble. The site contained a number of old stumps concealed in the vegetation making any kind of machine weeding very difficult.

Each site was divided into eight half acre plots carrying about the same amount of weed vegetation. Eight different kinds of weed eradication were applied as follows:-

1. Cut by Allen Autoscythe Type T.S. (Two passages of the machine between the lines leaving a 12-inch strip in the line to be cut by hand.

2. Cut by the Four Seasons machine with no supplementary hand weeding.
3. Complete hand weeding for comparison.
4. Cut by the new Allen Autoscythe Type F as in 1 (above).
5. Chemical treatment.
6. Cut by the Allen Motor Sickle as in 1 (above).
7. Cut by Bushwakka machine as in 4 (above).
8. Chemical treatment.

The operators changed over from one machine to another every hour so that in addition to measured results, a separate opinion could be obtained on each machine on each site.

Observations

1. On site 3 it was necessary to do some preliminary hand weeding before using any of the machines so that the plants could be seen.
2. The technique for weeding with the self-propelled Allen machines is different to that used with the hand-propelled types. The self-propelled machines are driven straight up and down the gaps between the lines of plants clearing the path in two passages of the machine to within 6 inches of the plants. This leaves a 12-inch strip uncut in the lines of trees which must be cleared by hand after the machine has finished.

The hand-propelled machines can however do the whole job without any subsequent hand weeding though they take longer than the Allens and are much harder work for the operators.

3. Detailed records of the times taken to weed each site with each machine are given in Appendices A, B and C.

On Site 1. The two Allen Autoscythes performed very similarly but the Type T.S. was faster and proved more handleable than the Type F. All weed growth was cut down to a height of 3 inches (12-inch strips in the lines have to be subsequently weeded by hand). The Allen motor sickle was not very successful as it tended to push the vegetation down rather than cut it and it frequently became choked.

The Four Seasons machine was very effective as it produced the best finished work having cut to within 3 inches of ground level. No subsequent hand weeding is necessary but operators find it an exhausting machine to work for more than an hour or two.

The Bushwakka produces nearly as good a finish as the Four Seasons. This machine also does the whole job and no subsequent hand weeding is necessary. Fuel replenishment is needed far too often as by no means all the fuel in the tank is usable. (Level too low). The operators prefer it to the Four Seasons owing to its very low weight. A 100 CC engine was fitted in place of the 75 CC unit for work on Site 3 and this was a great improvement.

On Site 2. The results were very similar to those produced on Site 1. It became evident that the Type T.S. Allen Autoscythe is far more manoeuvrable than the Type F on rough ground owing to lack of crank case ground clearance and greater weight in the case of the latter. The Allen Motor Sickle, Four Seasons and Bushwakka were outclassed by the Allen T.S. due to the great weight of vegetation.

On Site 3. In this case the plants were P.58 and invisible under the grass and weeds. It was therefore necessary to cut in advance a strip 12 inches wide down the planting line of those plots to be weeded by the Allens and to spot weed by hand round the plants in the plots to be cut by the Sickles. There was less lush grass on this site in spite of the high growth of other vegetation and this made hand weeding easier. The Allen Type T.S. was again the best all round machine for this site but the Type F was frequently in trouble on old stumps owing to lack of ground clearance. The extra weight of the Type F was also an inconvenience when pulling the machine backwards to clear it from obstructions.

The Allen Motor Scythe, Four Seasons and Bushwakka were all effective but the operators all complained about the physical effort required.

4. From the detailed figures in the appendices the following cost figures emerge:-

METHOD	TIME BY MACHINE & OPERATOR HRS. MINS.		TIME FOR SUPPLEMENTARY HAND WEEDING HRS. MINS.		TOTAL MAN HOURS	TOTAL COST PER HALF ACRE PLOT MACHINE = 3/6. hr. LABOUR = 5/- " INC. 40% ON COST	
Allen T.S.	1	5	3	50	5	£1	8s. 6d.
Four Seasons	6	0	NIL		6	£2	11s. 0d.
Hand	NIL		11	0	11	£2	15s. 0d.
Allen F	1	20	4	0	5½	£1	12s. 9d.
Allen Sickle	2	30	4	50	7½	£2	6s. 3d.
Bushwakka	6	15	NIL		6	£2	11s. 0d.
Allen T.S.	1	32	4	20	6	£1	15s. 3d.
Four Seasons	7	15	-		7	£2	19s. 6d.
Hand	-		-		17	£4	5s. 0d.
Allen F	2	5	5	30	7½	£2	4s. 6d.
Allen Sickle	2	55	3	30	6½	£2	3s. 0d.
Bushwakka	7	30	-		7½	£3	1s. 0d.
Allen T.S.	1	35	3	40	5	£1	10s. 3d.
Four Seasons	7	40	2	40	10	£3	14s. 6d.
Hand					9½	£2	7s. 6d.
Allen F	1	30	4	35	6	£1	15s. 3d.
Allen Sickle	4	25	4	10	8½	£2	18s. 3d.
Bushwakka	5	40	3	0	8½	£3	0s. 0d.

Cost of application of chemical was as follows:-

CHEMICAL	TIME BY MACHINE AND OPERATOR (Hrs)	TOTAL COST PER HALF ACRE PLOT INCLUDING CHEMICAL AND LABOUR AT 5/- PER HOUR INC. 40% ON COST
Delapon (for grass control)	6	Labour £1. 10. 0 Chemical £4. 1. 0 £5. 11. 0
Brushkiller (for control of woody growth)	6	Labour £1. 10. 0 Chemical £1. 10. 6 £3. 0. 6

One plot on each of the three sites was treated with each of the
above chemicals.

Interim
Conclusions

The trial has shown that for clearing weeds between the rows in young plantations on unploughed ground the Allen Autoscythe Type T.3. is consistently the most economical machine for the job. This machine shows a substantial saving in cost compared with hand weeding under these conditions. Both the Bushwakka and Four Seasons machines, although unable to compete on a cost basis, produced a rather higher standard of work than the Allen. If this high standard results in a saving in later weeding both these machines may have to be considered as competitors. The long term effect of the chemicals remains to be seen.

Further
Action

The effects of all these treatments on weed growth in 1959 must be seen before final conclusions can be drawn.

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Machine and Hand Weeding Record -
Site No. 1.

Appendix A

Plot No.	Machine	Time taken to weed $\frac{1}{2}$ acre (Working time)	Additional hand weeding (time)	Losses		Fuel Consumption	Mechanical Failures	Maintenance time	Remarks
				N.B.	Other				
1	Allen Autoscythe (Type T.S.)	1 hr. 5 mins.	3 hrs. 50 mins.	0	0	2 pints approx. petrol	Nil	Nil	Cutting between rows of trees only. Two foot blade. Not as low a cut as hand weeding (3).
2	Four Seasons Scrubcutter	6 hrs.	Nil	4	55	12 pints petrol	Air cleaner fell off after 2 hrs. work.	30 mins.	
3	Control (hand weeding)	11 hrs. 5 mins.		2	8			30 mins. (sharpening)	Steady worker doing very thorough, complete weeding.
4	Allen Autoscythe Model F.	1 hr. 20 mins.	4 hrs.	4	3	1½ pints petrol	Nil	Nil	3 foot blade. All operators expressed the opinion that Model F harder going than with the old Allen grass cutter.
5	Chemical Control								
6	Allen Rotary Sickle	2 hrs. 30 mins.	4 hrs. 50 mins.	6	6	5 pints petrol approx.	Nil	20 mins. (sharpening)	Machine found the going rather heavy, and frequently stalled.
7	Bushwacker	6 hrs. 15 mins.	Nil	17	17	13 pints petrol	trouble with centrifugal clutch - not transferring drive to blade quickly enough. Bracket holding cover to cylinder head broke with vibration.	30 mins. (sharpening)	Did a fairly good job; operators found machine light and readily manoeuvrable. Only possible to work for about 1½ hours before topping up with petrol.
8	Chemical								

Machine and Hand Weeding Record -
Site No. 2.

Appendix B

Plot No.	Machine	Time taken to weed $\frac{1}{2}$ acre (Machine Working Time)	Additional hand weeding (time)	Losses		Fuel Consumption	Mechanical Failures	Maintenance time	Remarks
				N.B.	Other				
1	Allen Autoscythe	1 hr. 32 mins.	4 hrs. 20 mins.	0	4	3 pints petrol	4 rivets sheared on cutter and many others loose.	1 hr.	2 ft. blade.
2	Four Seasons Scrubcutter	7 hrs. 15 mins.	Nil	3	18	12 pints petrol	Airflow blocked with grass - engine overheating - just cleaned out.	30 mins. sharpening etc.	Worked steadily on, doing thorough weeding.
3	Control (hand weeding)	16 hrs. 45 mins.		3	5			20 mins. sharpening	Steady worker, doing complete weeding.
4	Allen Autoscythe Model F.	2 hrs. 5 mins.	5 hrs. 30 mins.	5	18	3 pints petrol	Cutter bed bolts became loose, and drive arm jumped out.	40 mins.	Area very irregular - many stumps and much coppice up to 4" diam. Not normally tackled with Allen. This model difficult to control on this terrain.
5	Chemical								
6	Allen Rotary Sickle	2 hrs. 50 mins.	3 hrs. 30 mins.	4	4	4 pints petrol	One wheel seized solid. Governor failed. Belt constantly slipping and burning.	2 hrs. 20 mins.	Dense growths of jungle, epilobium and bramble evidently too much for the machine.
7	Bushwacker	7 hrs. 30 mins.	Nil	1	1	11 pints petrol	Plug whiskered up once, some delay in clutch picking up drive, but generally ran very well.	65 mins.	Ran well, doing reasonable job of work, and completed area satisfactorily.
8	Chemical								

Machine and Hand Weeding Record -
Site No. 1.

(Appendix A)

Plot No.	Machine	Time taken to weed $\frac{1}{4}$ acre (machine)	Additional Hand Weeding time	Looses		Fuel Consumption	Mechanical Failures	Maintenance time	Remarks
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1	Allen Autocycle (Old Type)	1 hr. 35 mins.	3 hrs. 40 mins.	2	5	2 pints petrol	Nil	20 mins.	2' blade
2	Four Seasons Scrubcutter	7 hrs. 40 mins.	2 hrs. 40 mins.	8	7	11 pints petrol	Cutting sections had to be continually straightened.	30 mins.	Ground fairly rough with old hazel stumps.
3	Hand weeding	9 hrs. 40 mins.		2	4	-	-	15 mins. sharpening up hook.	-
4	Allen Autocycle Model P.	1 hr. 30 mins.	4 hrs. 35 mins.	3	4	3 pints petrol	Nil	10 mins.	
5	Chemical	-	-	-	-	-	-	-	-
6	Allen Rotary Sickle	4 hrs. 25 mins.	4 hrs. 10 mins.	8	2	$4\frac{1}{2}$ pints petrol	Partial blockage of main jet in carburettor.	40 mins.	Oil in air cleaner had to be frequently changed.
7	Bushwacker	5 hrs. 40 mins.	3 hrs.	5	6	8 pints petrol	Engine is difficult to start when hot. Plug whiskered up. Centrifugal clutch became unscrewed and allowed assembly to float upwards and damage the access cover.	$4\frac{1}{2}$ hrs.	Material is thrown back at operator. When centrifugal clutch became unscrewed whole unit became seized solid. Repaired in field.
8	Chemical								