NOTES ON A TAPPER'S WORKING TIME

BY

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The time that a tapper spends in tapping his task, excluding the time spent in collection, can be divided into two parts; that spent in the actual work of tapping including the collection of tree-scrap and cup-scrap, cleaning the cup and setting it in position, and that spent in walking from tree to tree. The time spent in walking is from the point of view of the owner of the rubber entirely unproductive and the recent experiments with double-cut tapping systems have been made in an attempt to reduce the time so spent and in consequence to use the tapper's time more economically.

Maas* examined the question in Sumatra and came to the following conclusions:—

(a) The average time spent in tapping and walking was 19.6 and 5.2 seconds respectively

(b) The average time spent in collection and walking was 9.6 and 5.2 seconds respectively

(c) Of the actual time spent in tapping most is spent in starting and finishing the cut, collecting the scrap rubber etc., in consequence of which the length of cut makes relatively little difference to the total time required for tapping.

The analysis of a tapper's time described in these notes has been made in order to see to what extent Maas's conclusions are applicable to Malayan conditions and to examine the actual basis of the economies expected from double-cut tapping.

The observations from which this analysis is made were taken in the Rubber Research Institute Experimental Block on Seventh Mile Estate. A description of this experiment appears in this *Journal* and will not be repeated here. It will be sufficient for this purpose to record that the land was undulating with a stand of 70 trees to the acre.

In selecting the 24 tappers to be employed in the experimental area, women and tappers known to be much above or below the average in skill were rejected. From the 24 tappers thus selected,

*MAAS, J. G. J. A. *Archief voor de Rubbercultuur* **9** (1925) 179

TABLE I

Time spent in Tapping and Walking

Task	A. D.		A. B. C.		Sunderland			Double-Four			Mean	
Mean Girth	45.6 in.		46.4 in.		44.5 in. 50.8 in.			44.0 in. 50.2 in.				
Mean Height of Cut	44.5 in.		31 in.		42.5 in. 22 in.			46 in. 23.5 in.				
	Tapping Sec.	Walking Sec.	Tapping Sec.	Walking Sec.	Tapping Upper Sec.	Tapping Lower Sec.	Walking Sec.	Tapping Upper Sec.	Tapping Lower Sec.	Walking Sec.	Tapping Sec.	Walking Sec.
Tapper A	41.2	5.0	33.8	6.3	34.9	36.8	6.4	34.0	36.0	6.0	36.1	5.9
B	37.4	5.2	37.6	5.8	31.3	34.7	5.7	41.3	43.7	6.1	37.7	5.7
C	55.1	6.2	45.8	5.5	50.2	49.0	5.9	47.7	50.0	5.9	49.7	5.9
D	44.3	4.0	31.8	4.7	40.2	39.6	5.6	32.7	34.8	5.2	37.3	4.9
E	38.0	4.5	34.6	4.7	38.0	42.4	4.9	42.8	45.0	5.6	40.1	4.9
F	44.5	5.3	44.0	5.0	39.9	47.6	4.7	38.9	46.7	5.2	43.6	5.0
G	31.5	5.6	28.0	5.1	28.0	33.1	5.2	30.2	33.6	4.8	30.7	4.2
H	53.8	5.8	50.9	5.1	39.3	47.9	5.2	35.7	41.7	5.8	44.9	5.5
Mean	43.2	5.2	38.3	5.3	37.7	41.8	5.5	37.9	41.4	5.6	40.0	5.3

eight who were considered to be representative of the average were chosen for the purpose of this analysis.

The tapper's time was divided into two parts, tapping time and walking time as described above. A more detailed analysis of the tapping time was not considered practicable. Each tapper was timed with a stop-watch while he tapped 50 trees in a double-four task, a Sunderland task, an A.B.C. task and an alternate-daily task. This was rendered possible by the fact that the task allotted to each tapper was changed in rotation every 24 days. In the Sunderland and double-four tasks the time spent in tapping the upper and lower cuts was recorded separately.

In addition the time spent in collection was recorded for fifty trees in one double-cut task and one single-cut task.

The girth of every tree was measured at the height of the top of the two corners of the "V" cut.

Girth measurements were made to the nearest half-inch and times were taken to the nearest fifth of a second.

The time spent in tapping and walking is set out in Table I.

The coefficient of correlation between the time spent in tapping and the girth of each tree was calculated. The results are set out below in Table II.

TABLE II

Positive Correlations—Time of Tapping and Girth of Trees

	Tapping Systems						
			Sunderland		Double-four		
Tapper	A.D.	A.B.C.	Upper cut	Lower cut	Upper cut	Lower cut	Mean
A	.7568	.6527	.5785	6683	.7136	.6443	.6690
B	.6789	.6518	.6442	6238	.6594	.6664	.6541
C	.6655	.8260	.7772	.7326	.7649	.6024	7281
D	5198	.7326	.5967	.5820	.6691	.6606	.6268
E	.5940	.8888	.6676	.6230	.7173	.6158	.6844
F	.6735	.7153	.6811	6153	.7652	.6606	.6852
G	6845	.7106	6890	.6039	.6606	.5193	.6440
H	.6463	.8104	.6775	.6360	.6670	5269	.6607
Mean	6524	.7485	.6640	.6356	.7021	.6120	.6691

It is clear from the above table that there is a well-defined relationship between the size of the tree and the time spent in tapping, differing in this respect from the results obtained by Maas under Sumatran conditions.

Ignoring the size of the trees the average time required for tapping is 40 seconds and for walking $5\frac{1}{4}$ seconds, being in the proportion of 88.5 : 11.5.

Even after the selection of the tappers already described there is considerable variation in the speed at which they work, the fastest worker completing his task in approximately three-fifths of the time of the slowest.

It has already been shown that there is a close relationship between the girth of the trees and the time spent in tapping. To measure the extent of this relationship, the girths of the trees have been arranged in groups at intervals of two inches and the mean time of tapping for each group has been calculated. The results are shown in Table III and illustrated in Figure 1. Trees with a girth of over 70 inches or less than 30 inches were few in number and have been omitted from the Table.

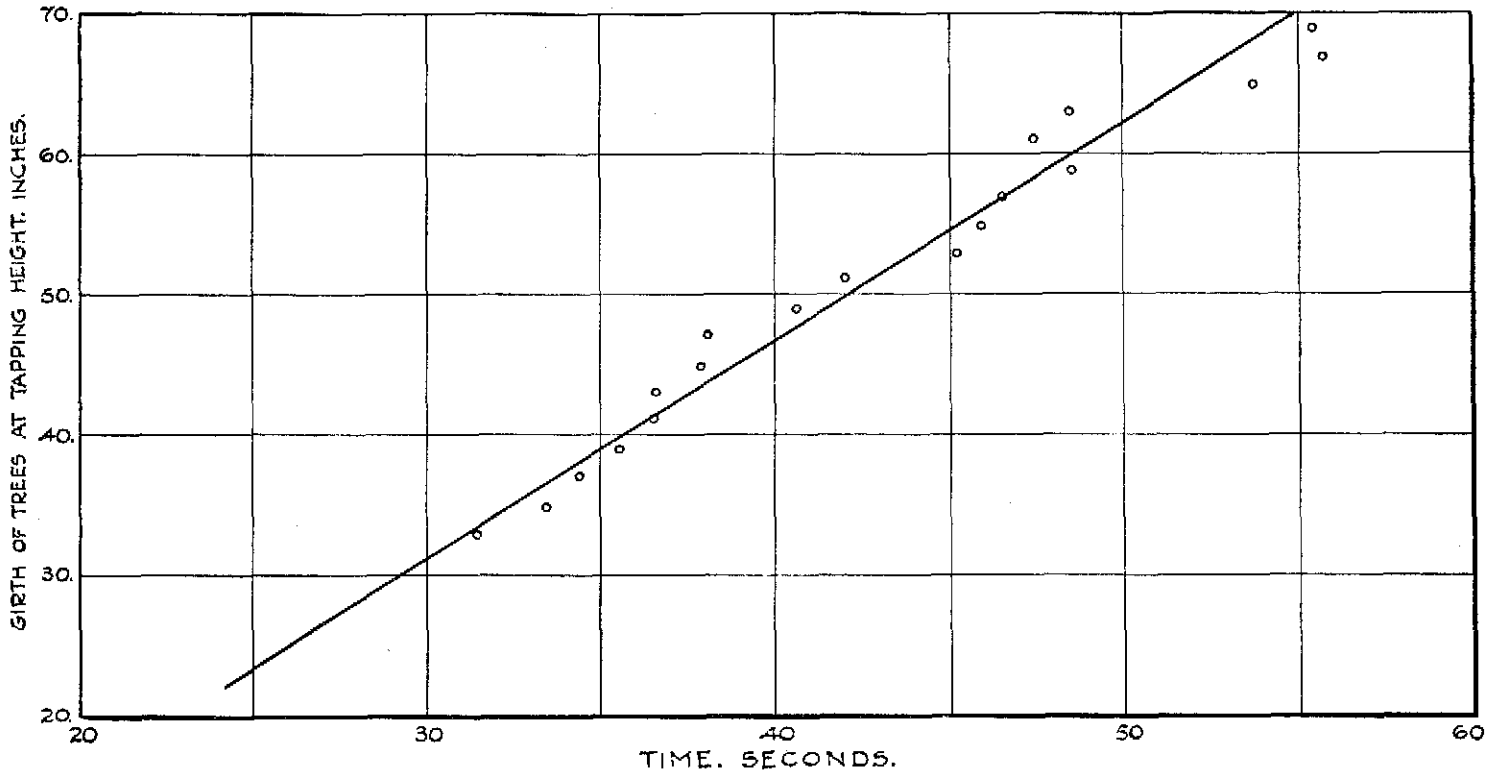
TABLE III

Mean Time of tapping a half-circumference Cut on Trees with different Girths

Girth in.	No. of trees	Mean time of tapping sec.	Girth in.	No. of trees	Mean time of tapping sec.
30—	47	29.4	50—	129	41.9
32—	93	31.3	52—	122	43.2
34—	121	33.3	54—	126	45.9
36—	153	34.3	56—	109	46.5
38—	177	35.5	58—	79	48.6
40—	189	36.5	60—	60	47.5
42—	189	36.6	62—	45	48.5
44—	191	37.9	64—	38	53.7
46—	217	38.1	66—	25	55.7
48—	188	40.6	68—	17	55.3

For practical purposes the time required for tapping a half-circumference "V" cut with Tamil tappers, exclusive of walking, can be estimated by allowing nine seconds for each tree and adding

Fig. 1. TIME OF TAPPING A SINGLE HALF CIRCUMFERENCE V CUT & GIRTH OF TREES.



two-thirds of a second for each inch of circumference of the tree at the tapping height.

Assuming a constant walking time of $5\frac{1}{4}$ seconds the proportion of tapping time to walking time for trees of varying mean girths would be as follows:

Girth of tree in.	Tapping time sec.	Proportion of tapping time to walking time
30	$28\frac{1}{2}$	5.4 : 1
35	32	6.1 : 1
40	35	6.7 : 1
45	$38\frac{1}{2}$	7.3 : 1
50	$41\frac{1}{2}$	7.9 : 1

COLLECTION

Under Malayan conditions the time spent in collection is, within quite wide limits, a matter of no great importance. The times recorded for a single-cut task and a double-cut task are shown in Table IV.

TABLE IV

Time spent in Collection and Walking

Tapper	Single-Cut		Double-Cut	
	Collection sec.	Walking sec.	Collection sec.	Walking sec.
A	5.0	5.2	9.7	4.8
B	4.4	4.9	10.8	5.0
C	4.0	4.2	12.5	5.2
D	4.7	4.9	11.5	4.3
E	5.6	4.4	9.8	4.7
F	5.5	4.0	12.5	5.3
G	4.1	3.6	8.4	4.5
H	9.3	5.6	14.8	6.3
Mean	5.3	4.6	11.3	5.0

Taking the collection and walking together the average times required for collection in single and double-cut tasks are 10 seconds and 16.3 seconds, an increase of 63 per cent. On the other hand the mean time for tapping a single-cut task is 46.0 seconds and for a double-cut task 85 seconds, an increase of 85 per cent.

The increase in time required for collection in the double-cut tasks is therefore proportionately less than for tapping in this particular case when the trees had a mean girth at the tapping height of 47½ inches.

If the double-cut tasks are fixed at such a size that they would normally be completed by the same time as single-cut tasks the total time spent in collection would be less in the case of double-cut tasks than in single-cut tasks.

Discussion

It has been shown that the time spent in tapping bears a much closer relationship to the size of the trees than would be expected from Maas's observations in Sumatra. It follows from this that, regarded solely from the point of view of the time spent in tapping, the greatest economy in tapping with double-cut systems will be obtained in tapping small poorly-grown trees. It is also *self-evident that a low stand per acre, very hilly land and* selective tapping will increase the total proportion of walking time and provide those conditions in which the maximum economy can be obtained from double-cut tapping systems. It may therefore be concluded that double-cut tapping systems will show the greatest economy in tapping time when applied to poor-yielding areas which are usually associated with one or more of the four conditions stated above.

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