washing and light-induced chemical breakdown. Some of the new synthetic pyrethroids may have these properties.

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THE USE OF TACHOMETERS TO IMPROVE THE ACCURACY OF PESTICIDE APPLICATIONS BY GROUND EQUIPMENT

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ABSTRACT. A combination of a vehicular tachometer and a common stop-watch constitutes a system with which pesticides can be applied more accurately and efficiently when using ground-based spray equipment. The method also provides a useful means of determining the size of the area treated, concurrent with the actual spraying operation.

The accuracy with which pesticides are applied is of utmost concern to vector control personnel. Inaccurate applications may produce undesirable results or possibly damage the environment (Mulhern 1976, Womeldorf and Peck 1975). In addition, such applications are a waste of time and money.

Many of the chemical control measures pursued by the personnel of the Northwest Mosquito Abatement District employ the use of the Potts Mist Blower (Potts Mist Blower, Crawford, Miss.). This device consists of a blower unit driven by a gasoline engine. The air flow produced is routed through a housing and out a tubular opening about 6 inches (15 centimeters) in diameter. Mounted at the aperture of this tube are nozzles which dispense liquid pesticide at a desired rate. The exiting air breaks up the pesticide into a fine mist which is dispersed over the area to be treated.

In previous years an operator using the mist blower would measure, usually by pacing, a source to be treated. He would then treat the area, driving at a certain speed enabling him to apply a specified amount of insecticide, based upon blower output and desired dosage rate. Unfortunately, vehicular speedometers lack accuracy below 5 m.p.h. In some instances, the speedometers do not function until a speed of 10 m.p.h. is achieved. The accuracy of the application, then, was dependent upon the operator's judgment of vehicular speed. Later, stop watches were employed in an effort to reduce problems. This method, however, allowed errors as the vehicular speed remained in doubt, resulting in uneven applications. In addition, the area still had to be measured prior to treatment. This communication describes a method improving the accuracy of application and eliminating the need for measuring a mosquito breeding source prior to treatment.

MATERIALS AND METHODS. A 1975 6-cylinder Dodge 4 WD pickup with a bed-mounted Potts Mist Blower was driven at constant engine speeds over a distance of 660 ft on a fairly smooth dirt road. Each pass at a given engine RPM (1000, 1500, or 2000) and gear selection was timed. Results obtained were plotted as engine revolutions per minute versus vehicle speed. The tachometer employed was a RAC #65500 (Rite Autotronics Corp. Los Angeles, Ca.). Tests conducted in previous years showed the effective swath of larvicide oil (Golden Bear 1356) dispersed by the Potts Mist Blower to be approximately 60 ft. Blower output was calibrated to be 4 gal per acre (186 fl. oz./min.) at 3 m.p.h.

RESULTS AND DISCUSSION. Table I relates the times required to cover the measured distance using first gear (low range), first gear (high range), and second gear (low range), with engine speeds of 1000, 1500, and 2000 RPM. Converting the first gear (low range) time figures to m.p.h., and plotting the latter against engine RPM produced a linear curve (Figure I). From the graph it can be derived that an engine speed of 1250 RPM yields a vehicle speed

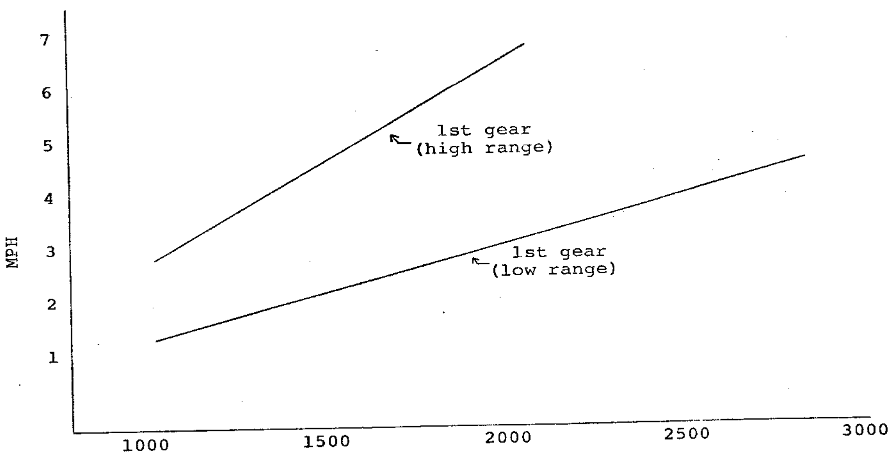

FIG. 1. - Vehicle speed (mph) v. engine speed (rpm)

Table 1. Vehicular elapsed times and speeds over a distance of 660 feet at various engine speeds and gear selections

Gear	RPM	Elapsed time (sec)	Speed (mph)
1st (low range)	1000	290	1.6
1st (low range)	1500	191	2.4
1st (low range)	2000	141	3.2
1st (high range)	1000	145	3.1
1st (high range)	1500	98	4.6
1st (high range)	2000	71	6.3
2nd (low range)	1500	97	4.6
2nd (low range)	2000	72	6.3

of 2 m.p.h., and 1850 RPM produces 3 m.p.h. In first gear (low range) a vehicular speed of 4 m.p.h. is obtained at 2500 RPM. However, at this RPM the engine "races" unduly. Engine speeds over 1000 RPM but below 2500 RPM were easiest to maintain. Second gear (low range) produced essentially the same results as first gear (high range). Similarly plotting the data for first gear (high range) shows that a 4 m.p.h. vehicular speed is obtained at a more realistic RPM of 1250 (Figure I).

A chart was prepared (Table 2) relating time to both pesticide output and vehicular distance travelled, based upon a given RPM figure. An individual can thus operate his vehicle at a certain engine speed, time the treatment by stopwatch, and subsequently derive both the volume of material applied and the distance traversed. In addition, the total area treated can be quickly calculated based upon the effective swath width used (usually 60 ft). The dosage rate (gallons per acre) can be adjusted by varying the engine speed (RPM).

The roughness and slope of the terrain upon which the vehicle is driven will, of course, reduce accuracy. However, it is doubtful that slight variations in engine RPM will be significant in most instances where the land is relatively flat. The cost for both instruments is about $55.00 per vehicle. Installation is quick and simple.

Table 2. Chart for deriving output, distance, and area based upon engine speed and treatment time

RPM = 1850 (3 mph)

Treatment Time	Output	Distance (feet)	Area (sq. ft. using 60 ft. swath)
5 sec	16 fl. oz.	22	1320
10	31	44	2640
15	47	66	3960
20	62	88	5280
25	78	110	6600
30	93	132	7920
35	109	154	9240
40	124	176	10560
45	1.09 gal	198	11880
50	1.21	220	13200
55	1.34	242	14520
1 min	1.45	264	15840
2	2.91	528	31680
3	4.36	792	47520
4	5.81	1056	63360
5	7.27	1320	79200

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