

There was a difference of ca. 31.6 ml/min between the Hobbs #15002-3 and the measured flow rates. This indicated that when the machine was operating at the recommended rate using flow rates calculated from this hour meter it was actually dispensing 31.6 ml/min more than desired. This increased amount of insecticide would cost approximately \$1,147.00 over the entire year. If all spray units had this same situation it would have cost \$15,236.00 in a year which was 9.6% of our insecticide budget.

No significant difference ($P>0.05$) existed between the measured flow rates and the C.V. read-outs. Over the entire test there was no difference between their flow rates greater than 0.90 ml/minute, with an average difference of 0.53 ml/minute. When compared to the average differences obtained using the 3 types of hour meters, 1) 31.60, 2) 29.95 and 3) 2.43 ml/minute, the C.V. panel was considerably more efficient.

In conclusion, only the Hobbs instant on-off #24963-2 and the C.V. panel showed no sig-

nificant differences ($P>0.05$) from the actual flow rates obtained during adulticiding operations. We feel constant volume devices can improve the efficiency and effectiveness of adulticiding operations by producing more consistent flow rates. However, if any mosquito control agency can not afford this type of equipment and is using hour meters to measure flow rates, these devices should be tested to determine which is the most efficient for their needs. In either case, the operation will benefit in savings of time, money and in possible damaging effects to the environment.

Literature Cited

- Mount, G.A., M. V. Meisch, J. T. Lee, N. W. Pierce and K. F. Baldwin. 1972. Ultra low volume ground aerosols of insecticides for control of rice field mosquitoes in Arkansas. Mosq. News 32:444-6.
- Rathburn, C. B. Jr. 1977. Ground application of insecticides for control of adult mosquitoes. Mosq. News 37:376-9.

THE USE OF PROGRAMMABLE CALCULATORS FOR THE CALCULATION OF MASS MEDIAN DIAMETER

H. W. WEST AND D. L. CASHMAN

Princess Anne Mosquito Control Commission,
1848 Pleasant Ridge Rd., Virginia Beach, VA.
23457

In determining the mass median diameter and other parameters for the periodic certification of our ULV machines, the majority of time consumed in the process is in the repetitive math involved in the calculation for each machine. After pursuing several possibilities for a remedy to this problem, it was finally decided that the easiest, least costly, and fastest solution was to use a small programmable calculator. The calculator of our choice was the Radio Shack EC-4000 (\$59.95), though other programmables may be used with equal ease after minor changes in the programming format.

While writing the program, it became apparent that several avenues of approach were feasible. The most severe handicap was the limited ability (50 steps) of the calculator. To circumvent this, it was decided to sub-divide

the program into three essentially separate sections and to reduce the number of internal steps the calculator would otherwise (as a luxury to the operator) have to perform. The first section would multiply the eyepiece division (D) by the droplet numbers (N) to yield $D \times N$ while simultaneously keeping a cumulative total of N and $D \times N$. The second would yield the percent of total and the accumulated percentage. Since it was felt that some people have difficulty in interpolating the mass median diameter, the third part of the program included this process with as few steps as possible.

The end result of this effort was a program that was quick to enter and easy to use. Once the operator becomes familiar with the process, the program can be entered in a minute or less, and the certification sheet can be run in less than 60% of the time normally required.

For those commissions with a number of machines to certify, the savings can be considerable (our calculator paid for itself the first time the machines were certified for the season).

In addition to the ULV certification, a small program was written for the light trap count sheets, reducing the time used in percentage calculations. Other applications for using the

calculator in our operation are in the process of being developed. For those of us in commissions on a limited budget, the use of a programmable calculator to take care of the repetitive math work involved in daily operations can be nearly the next best thing to having a computer at our disposal.

This is the program listing.

Enter steps exactly as shown.

| | | | | |
|---------------|----------------------------|---------------|--|---------------|
| 1. LRN | | 14. ÷ | (Enter $D \times N$) | |
| 2. STO 1 | (Enters D) | 15. RCL 5 | (Divides $D \times N$ Sum $D \times N$) | |
| 3. R/S | | 16. X | | |
| 4. STO 2 | (Enters N) | 17. 100 | (Multiplies quotient by 100) | |
| 5. Sum 4 | (Sums N) | 18. = | | |
| 6. RCL 1 | | 19. R/S | (Shows % of total) | |
| 7. X | (Multiplies $D \times N$) | 20. Sum 6 | (Sums % of total) | |
| 8. RCL 2 | | 21. RCL 6 | (Shows accum. %) | |
| 9. = | (Shows $D \times N$) | 22. R/S | | |
| 10. Sum 5 | (Sums $D \times N$) | 23. GTO 2 | | |
| 11. R/S | | 24. 2nd LBL 3 | (Steps 25-47 calculate MMD) | |
| 12. RST | | 25. RCL 1 | | |
| 13. 2nd LBL 2 | | 26. - | | |
| 27. RCL 0 | 32. RCL 2 | 37. RCL 5 | 42. RCL 6 | 46. = |
| 28. = | 33. = | 38. = | 43. = | 47. R/S |
| 29. STO 4 | 34. STO 5 | 39. STO 6 | 44. X | 48. LRN |
| 30. RCL 1 | 35. RCL 4 | 40. RCL 3 | 45. R/S | 49. 2nd Fix 1 |
| 31. - | 36. ÷ | 41. - | | |

To use the program:

1. Press RST
2. Enter D; press R/S
3. Enter N; press R/S
4. Display reads $D \times N$; record on sheet
5. Continue as above until all "D"s and "N"s are entered
6. Press RCL 4; shows sum of N; record
7. Press RCL 5; shows sum of $D \times N$; record
8. Press CLR
9. Press GTO 2
10. Enter 1st $D \times N$; Press R/S
11. Display shows % of total; record
12. Press R/S
13. Display shows Accum. %; record

14. Continue as above until all $D \times N$ have been entered
15. Enter INV. 2nd C.T.
16. Enter 50 STO 0
17. Enter number just above 50% of Accum. %'s in STO 1
18. Enter number just below 50% of Accum. %'s in STO 2
19. Enter the D corresponding with number above 50% in Accum. % in STO 3
20. Enter CLR
21. Enter GTO 3
22. Enter R/S
23. Enter (Eyepiece factor \times slide factor)
24. Enter R/S
25. Display shows MMD

To run new sheet:

1. Press CLR
2. Press INV 2nd C.T.
3. Press RST
4. Run new sheet as before