MOSQUITO RESEARCH FROM AN OPERATOR'S VIEWPOINT

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WHAT DO WE MEAN BY RESEARCH

Webster defines research as an investigation, inquiry, inquisition, inquest or probe; a search for truth, knowledge or information. For our immediate interpretation here, research might be limited to inquiries and investigations carried on by scientists and others especially for the sake of uncovering new knowledge, of getting at the facts when these are not known, or of discovering laws of nature.

How does this definition apply to the field of mosquito control operations?

It is hardly necessary to point out that to do without continual investigations, or a search for better ways of accomplishing control, is to accept existing operations as being adequate or the ultimate; in other words, to suggest that improvement of effectiveness or efficiency is not probable or practical. Such an attitude would be like the proverbial ostrich burying its head in the sand. I am sure we are all agreed that few control operations, if any, should be content to rest with existing knowledge and control techniques. On the contrary, we find that most operational agencies are continually seeking new answers, and through them, the development of better methods of attack, and better insecticides and equipment.

Mosquito control agencies are established and maintained for the purpose of suppressing mosquito populations and even eradicating certain species. However, if such agencies were content to carry on with only the well established tried and true operations, they would rapidly fall behind the times and become inadequate in fulfilling their functions. Where would we be today without the acceptance and use of DDT, other chlorinated hydrocarbons and the phosphate insecticides; without the formulations and control techniques with residual treatments, larvicides, granules, mists and aerosols; without airplanes and all the other specialized equipment designed to use these insecticides in markedly different manners under widely varying conditions. If operations are to progress and improve, mosquito control agencies must continuously carry on investigations along with their daily operations. While doing this we cannot, however, lose sight of the fact that mosquito control agencies' primary concern and effort must be concentrated on their control activities. The extent to which these agencies can devote time and energies and carry the expense of such investigations will vary widely. Their search for answers will usually be in the classification of field trials. They are rarely staffed with the professional personnel or have the necessary equipment adequately to carry on the technical phases of research, to come up with the basic knowledge and answers needed today. Obtaining basic answers would therefore have the most likely prospect of success when handled on a full time basis by trained specialists in such fields as chemistry, biology, limnology, physiology, engineering, etc. Control agencies need and solicit the aid of universities and other research centers adequately staffed and equipped to develop the basic knowledge necessary to improve and guide their operations.

To facilitate the advancement of research for mosquito control purposes, it is necessary that operations investigations be undertaken and carried on to the greatest extent possible by control agencies; that they solicit and obtain the help of universities and other research centers in seeking the multiplicity of data required in answering their problems. The interest and efforts of both groups need to be coordinated as closely as possible, with problems

coming from the field to the research center, and promising laboratory knowledge and developments returned to the field for final evaluation with the aid of control agencies.

Up to this point, I have attempted to outline a general pattern of a mosquito control agency's views concerning the need for and an approach to research. Here it might be timely and might stimulate discussion to enumerate a few specific problems that are of interest to mosquito workers today.

1. The phenomenon of insects developing tolerance to insecticides:
   A. How does tolerance or resistance develop?
   B. What rates of development can be expected?
   C. What can be done to prevent it?
   D. What can be done to overcome it?

I am sure we were all pleased to learn that the WHO is beginning studies, hoping to determine the basic facts in this problem.

2. The development of new insecticides for use in mosquito control.
3. Research on the performance and efficiency of insecticidal formulations for mosquito control purposes.
4. Toxic hazards involved when using different insecticides in various formulations.
5. Research on the biology and physiology of mosquitoes.
6. More comprehensive evaluation of biological control techniques and improved methods of evaluation.
7. Improved source reduction measures.