

Mr. BROWN: Yes, there is an expert committee on insecticides of WHO which has periodic meetings, and in addition, as an offshoot of it, assembles seminars and conferences, as well as working groups, which in one way or another try to cover burning questions as they arise and demand attention.

Mr. CÔTÉ (*Longueuil*): Professor Brown, do you do any research for the government?

Mr. BROWN: Yes, I have grants for such research and also to develop particular lines which I consider to be scientifically worth while and which the government agency considers practically worth while supporting.

Mr. CÔTÉ (*Longueuil*): What department do you report to?

Mr. BROWN: The reports are made to the granting agency, to the National Research Council or to the Department of Agriculture or to the Defense Research Board of Canada depending on which project it is.

The CHAIRMAN: As the hour is getting short perhaps we can call on Professor Brown to say a few words about the development of resistance to pesticides.

Mr. BROWN: Well, Mr. Chairman, perhaps the first thing that I can say on our position in regard to insecticide-resistance is that we have already made the point that it is due to selection and not to habituation or post-adaptation. The second point we should make is that this resistance, when it comes, is not an over-all resistance to all insecticides. In other words, there is one group known as resistant to D.D.T., and this involves resistance to D.D.T. and to compounds related to it and not to others. There is another type of resistance which we now call cyclodiene-resistance or dieldrin-resistance, which is resistance developed to dieldrin, aldrin and that group, but not to D.D.T. Neither of them shows resistance to organophosphorus compounds—that in itself is a separate type of resistance and generally is slower in coming.

At the present time in Canada resistance has been developed in 17 species of insects and mites. In the world there are a little over 160 species showing resistant populations. The increase in the number of species going resistant is no longer increasing at the same rate as it has before. The increase is becoming less. It is not an avalanche, as has been described in a recent book, but it is more like a glacier. It comes at a rate allowing sufficient time to undertake alternative measures and to introduce substitute insecticides or new methods of control. The impression has been given in a movie I know of that resistance means the switch to ever more deadly insecticides. Nothing could be further from the truth. What cyclodiene-resistance is doing, and that is the most common resistance now, is to cause the switch from these compounds such as dieldrin and aldrin which are very persistent and about which Mr. Robertson will speak this afternoon, to compounds which have very little residue hazard at all because they decay very quickly, that is the organophosphorus compounds. Therefore, it is a rather curious thing that what resistance is doing is to accelerate the trend towards less persistent and more expensive insecticides. That is all I have to say on resistance.

Mr. ROXBURGH: Why this has come about is perhaps hard to understand. I do not say that my area, Norfolk county, is any different from others but we have good men there who help us out. We as growers do not continue with the use of one definite insecticide. We will put on a spray of D.D.T. and then we will follow it with phosphate and then we will follow it with lead arsenic if it is necessary, whatever the case may be. The same thing applies to fungicides, and so on. Have you any record, Professor Brown, of resistance to those insecticides in our area?

Mr. BROWN: You mean in Norfolk county? The only resistant species you have in orchards is the European red mite.