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More questions than answers . . .

MOST PEOPLE in the sciences feel that our knowledge today leaves much to be uncovered. There are more questions than answers. The thrust to espouse ecology as a "cause" which may make pollution "go away" is a sign of awakening interest in unanswered questions.

Since 1872 land grant institutions have been using ecological studies to help solve the problems of agriculture. Farmers have been ecologists ever since people settled down and began raising food instead of hunting for it. Basic knowledge from research translated by technology to practical use has produced our present day agriculture.

We still have many questions to answer, many problems to solve. Indeed our technology has created problems now being widely attacked. Trained personnel are using sophisticated equipment to seek new, basic knowledge. The era ahead promises to be one in which biology, the study of plants and animals including man, may well be the major field of scientific emphasis. The current flow of information in scientific literature about the cell and its mechanisms in both medicine and agriculture is overwhelming.

An interesting example of a new point of attack is the increase in studies of circadian rhythms. All living things on our planet have evolved over many years in a sequence of alternate nights and days. The fundamental rhythms thus established have set the patterns for physiological and hence behavioral patterns for plants and animals including man.

The owl, the bat, the cockroach and many people are "night animals." Others are more active during the day and sleep at night—usually! These patterns, or

rhythms, can be changed but there is still a dawn and a dusk for most living things.

If we think in terms of plants and animals important to agriculture we can recall the known examples of the effects of length of day on flowering of plants. Lights are used in poultry houses to prolong the day.

Insect rhythms

Less well known are the dawn-dusk and day-length effects on insect pests. We have long known that some insects are more susceptible to adverse stimuli, such as insecticides, at dawn or at dusk. Our knowledge of rhythmic behavior and its relation to degree of control is still very limited.

Recently it has been reported that codling moth and the European corn borer, when subjected to lights which extend the length of day in the fall, failed to survive the winter. Both these insects spend the winter as worms in a hibernating state called "diapause." The longer days apparently fool them, they fail to go into diapause and can not survive winter temperatures. Perhaps we'll see lights in fields and orchards play tricks with insect pest rhythms!

Nature yields her secrets grudgingly indeed and the costs of unravelling them, are increasing. We shall need ingenious people, adequately trained to cope with the complex problems of our agriculture. The job of feeding an expanding society while we try to minimize adverse effects on our environment will take men, money and time. The work of our colleges, universities, and agribusinesses, as well as production agriculture itself, will need public understanding and support—lest that very public suffer. The unanswered questions are legion.