MOSQUITO CONTROL PROBLEMS OF THE IRRIGATOR

STERLING DAVIS[1]

In irrigated areas, it is waste water, or lost water, i.e., water not used by the plants, that is available for mosquito producing sites.

If we are to control mosquito production, we must acquaint the irrigator with irrigation practices that limit mosquito breeding: We can tell him that if he applies water using "good water management practices" and if he makes "better use of his irrigation water," no mosquitoes will be produced and crop production will increase. This over-simplifies the problem. We have told him what to do, but not how to do it. The irrigator still has many problems, including some which are very real and difficult to him, and others which he faces without even knowing they exist.

Each year some irrigators are faced with the task of filling an empty or partially filled container, having an unknown capacity, with a fluid flow of unknown size and with no way of knowing how fast the flow is going into the container or when the container is overflowing.

This process will be repeated again after some of the fluid has been removed at an unknown rate. These irrigators are using a stream of water that has not been measured which is applied to a field to fill the root zone of the crop with water. The irrigator probably does not know the potential water-holding capacity of the soil or the amount of water that is in the root zone when irrigation starts. Also, he probably does not know how fast the soil will take the water or when it will hold no more. After irrigating, he may not know how fast the plants take the water out of the soil.

The properties with which the irrigator is directly concerned are:

1. Root zone of the crop (i.e., that part of the soil from which the plant roots draw food and water).
2. Water-holding capacity of the soil (i.e., amount of water the soil will hold against gravity).
3. Soil moisture before irrigating (i.e., amount of water already in the soil).
4. Intake rate (i.e., the rate at which the soil takes water).
5. Deep percolation (i.e., water that goes through the root zone of the crop and is lost).
6. Consumptive use (i.e., actual amount of water used by the plants and evaporated from the soil surface).

These items present a problem for the irrigator because soil-water-plant relationships need to be understood for each soil type.

To add to the problems of the irrigator, we tell him he must have his land leveled properly and/or the irrigation system designed and installed for the type of soil that exists. He is also told that he should have good water control structures and operate his system as designed.

This may all seem fairly hopeless to the irrigator, or to us to try to encourage the irrigator to perform as we would like him to. However, in most areas there is some information and help available for the individual who is interested or who can be persuaded to use it.

The first major problem on which help will be needed may be land leveling. Many times both engineering and financial assistance are available to help level land that requires reshaping.

Another problem on which help is available is the design and operation of the irrigation system. Irrigation guides are available in many areas, as well as assistance in use of the guides, from various state and federal agencies. Information available in these guides for each soil type

[1] Irrigation Engineer, U. S. Department of Agriculture, Agricultural Research Service, Western Soil and Water Management Research Branch, Grand Junction, Colorado.

in an area includes: suggested irrigation system, frequency of irrigation, stream size, length of border or furrow, spacing of furrows or width of border, sprinkler application rates, amount of water to apply, crops to plant and other physical data needed in irrigation design and operation. When this information is available, the irrigator need not worry so much about other soil factors unknown to him. Knowledge of these other factors was used by experienced technicians in developing the suggested designs in the irrigation guides. Information in these guides will, if used as suggested, be an important factor in mosquito control.

In certain areas problems may develop that are not covered in the general guide, many of which will require research work. For example, in the Milk River Valley of Montana large acreage of high-percent clay soil exists that was producing only small amounts of poor quality native hay. The per-acre return on this soil was so low that good water management practices were not economically possible. Water was applied in large lakes for weeks at a time, resulting in prolific mosquito production. In addition to the low cost of applying water as lakes, the impression was prevalent that the water went into the soil very slowly and must be ponded on the area a long time. However, research results have shown that most of the water that goes into this soil goes in during the first few minutes after application and no water goes in after twenty-four hours.

Research has also shown that by intermittent applications of water and with fertilization, production of the native grass can be increased about ten-fold. In addition, with good water management and application of nitrogen fertilizer, many other grasses will produce yields of more than five tons per acre. Alfalfa, also, will yield over five tons per acre with intermittent water applications. Corn and sugar beets will also yield well with the same combination of the right amount of water and fertilization.

The problem of getting the irrigator to apply the water as recommended still exists, but further education on use of present information and research to develop better irrigation methods should someday make a large contribution toward reducing mosquito populations by source reduction methods.