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Sampling Pond Water Without a Boat

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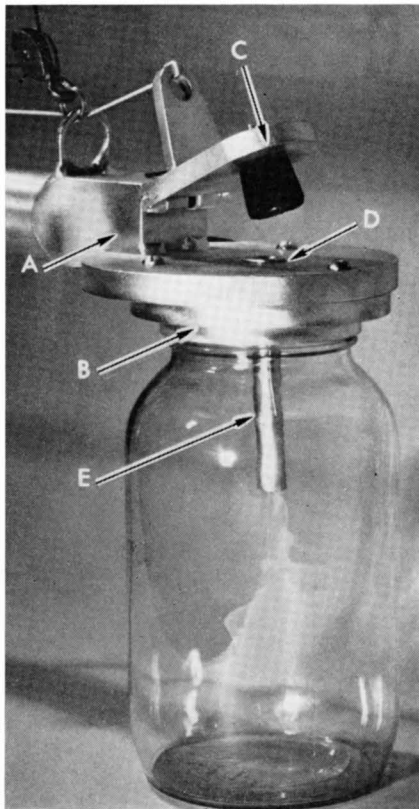
Sampling Pond Water Without a Boat

Nitrate levels in farm ponds are determined with the aid of a water sampler that can be operated from the shore

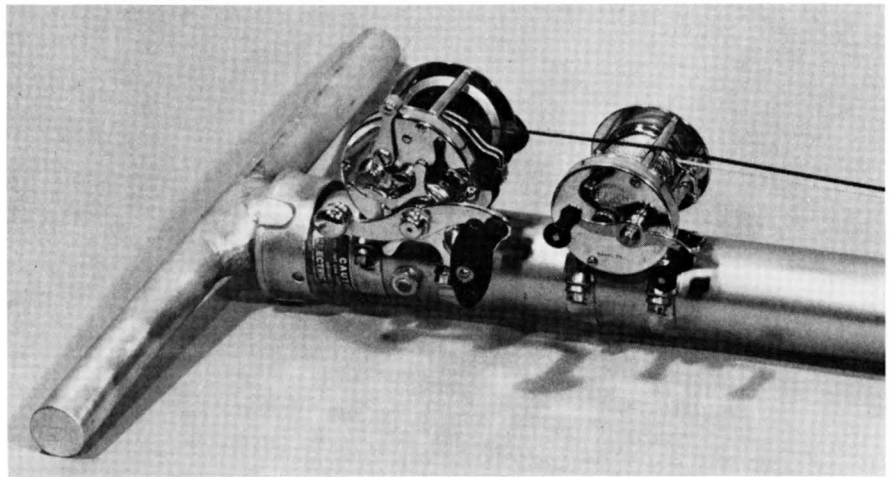
ELBERT DICKEY and J. KENT MITCHELL

THE QUALITY of pond water in southern and western Illinois is being determined with the aid of a new type of water sampler developed in the Department of Agricultural Engineering.

Work on the sampler began as part of a study of water supplies in Washington County. This study, which is being conducted through the College of Agriculture Council on Environmental Quality, was initiated in the winter of 1970, after high ni-



Sampler head and bottle. A, base; B, bottle plate; C, stopper plate; D, water port; E, water port extension. (Fig. 1)



Operator end of sampling device. The cord from one reel is connected with the float; the other, with the sampler head. (Fig. 2)

trate levels were found in the county's water supplies. Both ponds and wells are being sampled to determine their acceptability as sources of water.

For accurate tests of pond water, samples must be obtained at various depths and distances from the shore. A boat, however, is bulky and difficult for one person to handle. The new sampler was therefore devised so that an investigator can sample pond water at any depth without ever leaving the shore.

How the sampler is made

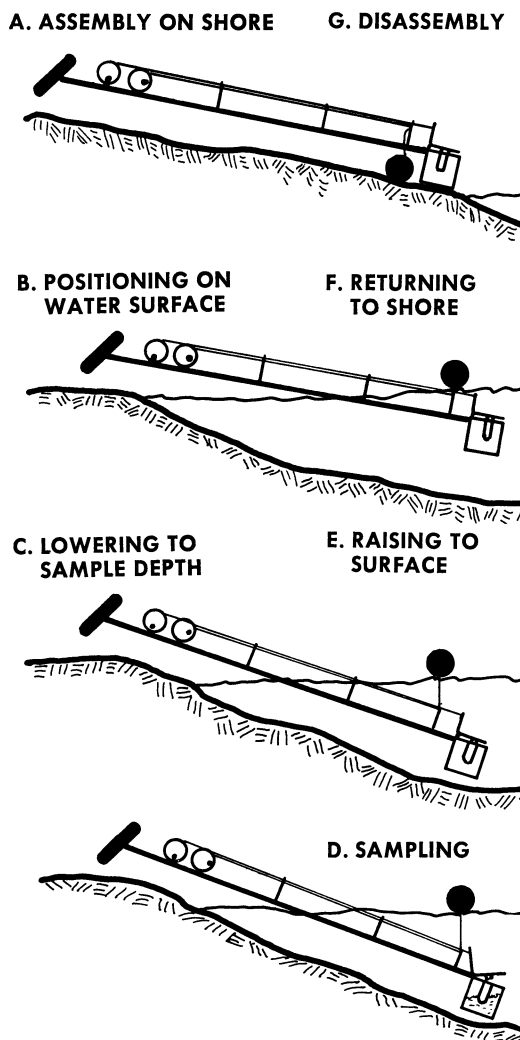
The sampler consists of a telescoping rod manufactured for window-washing units; a float, a sampler head, and a bottle at one end of the rod (Fig. 1); and a T-handle and two operating reels at the other

end (Fig. 2). One reel contains the cord to the float; the other, the cord that operates the sampler head. Cord guides are attached to the rod sections.

The sampler head (Fig. 1) is made up of three components: the sampler head base, the bottle plate, and the stopper plate. The sampler head base is attached to the sampling rod and contains the water port through which water enters the sample bottle. An extension to the water port, which extends into the sample bottle, is attached to the sampler head base. In addition, the base contains an air escape port.

The bottle plate is attached to the sampler head base and is fabricated with threads for the sample bottle. The bottle plate may be easily removed from the sampler head base so that other bottle plates fitting different sample bottles may be used

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How the sampling device is operated from the shore. (Fig. 3)

with the same sampler head. The stopper plate with stopper is spring-loaded to seal the water port while it is being positioned for sampling and after the sample has been taken.

How the sampler works

To obtain a sample, the rod is extended to the desired length and the bottle is attached to the sampler head on the pond shore (Fig. 3a). The bottle and sampler head are floated to the desired position on the pond surface with the float held tightly to the sampler end of the rod (Fig. 3b). The cord to the float is then released to allow the sampler head and bottle to sink to the desired sampling depth (Fig. 3c).

When the desired depth is reached, the sampler head cord is pulled, removing the stopper from the water port and allowing the bottle to fill with water through the water port and extension (Fig. 3d). The air is allowed to escape through the small air-escape port in the sampler head base and is conducted a few feet from the sampler head through a flexible tube. This reduces the possibility of escaping air changing the oxygen content of the water being sampled.

The sampler head and bottle are returned to the surface with the use of the float and float cord (Fig. 3e), and the apparatus is floated back to the shore (Fig. 3f). Samples have been obtained as far as 40 feet from the pond shore and as deep as 16 feet below the pond surface.

The water sampler described here and an earlier model of the sampler are being used monthly to obtain three samples from each of 15 ponds in western and southern Illinois. Both samplers have performed satisfactorily and need a minimum of maintenance.

Variable nitrate levels found

Thus far very low levels of nitrate, generally less than 3 milligrams per liter, have been found in farm ponds that have a grassed or wooded watershed. Ponds which have watersheds under a high fertility program and nearly continuous row crops have nitrate values ranging from 2 to 7 milligrams per liter.

In ponds having livestock feedlots on a major portion of the watershed, much variation in nitrate content was found. One pond, for example, has a range of 6 to 84 milligrams per liter. Also, the algae blooms in these ponds are very high at some times of the year.

It would appear that farm ponds having grassed or wooded watersheds or watersheds with a high fertility program are acceptable water supplies as far as nitrate is concerned. However, the nitrate level in ponds having a feedlot on the watershed frequently exceeds the public health limit of 45 milligrams per liter.