FIG. 1: The field testing

the Snake River AUTO-START Siphon Tube

A siphon tube that stays primed between irrigations or when the water supply is interrupted . . .

Robert V. Worstell
Member ASAE

SIPHON tubes — widely used to distribute water to individual corrugates and furrows in irrigated fields — create some inherent problems which are aggravating to the irrigator. Plugging by trash or silt carried in the water, a reduction in the water level due to flow changes made upstream, or brief power outages to a pump because of lightning-related voltage fluctuations can stop some or all of the tubes.

When the water level drops, several hundred siphon tubes may have to be restarted (even at night) or valuable irrigating time is lost. If water returns to the ditch without repriming the siphons, the ditch bank may be washed away and the crop damaged. If some of the tubes stop flowing and are not restarted before the next set is made, the ends of these rows will be inadequately irrigated.

The Snake River auto-start siphon tube (Fig. 1) is equipped with a cup on each end that holds water over the ends of the siphon so that air cannot enter the tube when the water supply level recedes or leaves the ditch. The cups hold enough water to maintain the water level above the tube ends for 10 to 14 days.

The bottoms of the inlet and outlet cups must be at the same elevation or the water in the higher cup will be low-

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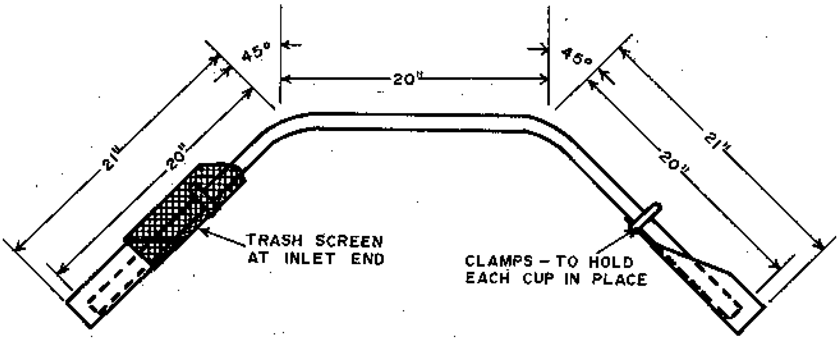

FIG. 2: The minimum recommended cup diameter is 2.25 times the tube diameter. Length of cup from bottom to lip = 1.41 (E) – (D – d – S) where E = nominal 10 day evaporation, inches; D = diameter of cup, inches; d = tube diameter, inches; S = distance between bottom of cup and tube end in inches. The ¼ in. mesh trash screen is 7 in. long. It is wrapped around the cup, soldered at the joint, and the top bent to close around the tube

ered excessively and the siphon won't remain primed for the maximum period. The tube end sections are each bent to a 45 deg angle with the tube center section (Fig. 2). The inlet leg then conforms to the side of a small, standard concrete-lined ditch when the center section is level and the cups are at the same elevation. In earth ditches, the tubes are also placed so that the center section is level.

Tube length was determined after evaluating a number of concrete-lined and earth ditches. The tube must be long enough to extend well down into the ditch, over the bank, and well down outside the bank to achieve a maximum head difference between the water in the ditch and the lip of the outlet cup. The flow rate under these conditions is similar to that of standard siphon tubes. The 60 in. tube length with 45 deg angle bends proved best for most ditches.

The lip of the inlet cup is at a 2 in. higher elevation than the lip of the outlet cup (with the bottoms at the same elevation) so that water in the ditch can flow past below the siphon inlets until the water level is raised with a check dam for distribution through the siphons. In low gradient ditches this difference between inlet and outlet elevations should be greater than 2 in. In high gradient ditches no difference would be needed.

The lip of the outlet cup is cut at an angle to direct the flow away from the ditch bank. A ¼ in. wire mesh screen at the inlet prevents trash from clogging the tubes. This screen does not clog easily and is quickly cleaned with a long-handled brush.

The inlet cup also makes the siphon resistant to plugging by sand and silt. Most of this material deposits around the outside of the cup. Turbulence and flow velocity keep the sediments that enter the cup in suspension and carry them through the siphon. The outlet cup reduces erosion in sandy soils because the water flows upward out of the cup at a reduced velocity rather than jetting into or falling onto the soil as it does from a standard siphon tube.

The space between the end of the tube and the bottom of the outlet cup can be varied to adjust the discharge rate. This is done by sliding this cup along the tube slightly. If the lip of the inlet cup is above that of the outlet cup, this adjustment will not reduce the reserve supply needed for evaporation between irrigations.

The First Prime

The siphons are primed initially by complete immersion. This is done by putting one end in the water, then lowering the length of the tube under water while permitting air to escape from the other end which is kept above water until the last moment.

After the tube is filled with water, it is turned upright in the ditch and quickly lifted into position over the ditch bank. This motion must be smooth or the water surges to one end, empties the cup on the other end, and "un-primes" the siphon so that it has to be filled again. This seldom happens when the ditch is full. With a little practice the siphons can be started easily. If they can be left in place, priming is required only once each season.

When a check dam is pulled to release the water fast at the end of an irrigation set, the inlet end of siphons just above the dam may swing downstream enough to cause them to lose their prime. This is more of a problem in steep ditches. This movement can be avoided either by using two dams and sequencing irrigation up the ditch rather than down or by not placing the siphons too close to the check dam. Siphons could also be staked or braced to avoid this movement.

Forty tubes were satisfactorily field tested during the 1970 irrigation season at four locations. The Empire Corp. of Twin Falls, Idaho and Adams City, Colo. is starting production on this new siphon tube. • •

Robert V. Worstell is with the Snake River Conservation Research Center at Kimberly, Idaho. This is a contribution from the Northwest Branch, USDA-ARS-SWCRD, with the Idaho Agricultural Experiment Station cooperating.

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