

Subirrigation for Gardens



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Subirrigation for Gardens

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GARDEN SUBIRRIGATION has been successfully practiced for many years in northwest Texas and in recent years has been found practical in many other parts of the state. The system is of value in those sections where good spring gardens are ordinarily produced but where it becomes too dry for summer and fall vegetables.

The advantages of subirrigation over surface irrigation are: little labor is required to water the garden; less water is needed; and the soil does not crust so badly afterwards. Tile for subirrigation was formerly made of cypress plaster lath, but at present home-made concrete tiles are almost always used because they cost little if any more and last longer.



Subirrigation has been much used for cutting beds.

Standard four-inch farm drain tile of either concrete or clay has been used in places and is satisfactory, but usually costs more than home-made concrete tile.

Soil and Crops Adapted to Subirrigation

A loam soil that has a rather tight subsoil at a depth of 12 or 14 inches is best adapted to subirrigation. This form of irrigation may be used on many other soil types, however. In land that has a very porous subsoil, or in deep sand, the water from underground tile will tend to pass downward, instead of laterally, and be wasted. There is also likely to be an excessive waste of water in soils that crack deeply in dry weather, due to the water running down into the cracks.

While subirrigation is usually profitable in a home garden, it is questionable that it will pay on a commercial scale, or in a very large home garden. For example, it will not likely be profitable to subirrigate drouth resistant crops such as cow-peas, even in the home garden. It seems that the tomato is one of the crops best adapted to subirrigation.

In several instances subirrigation tile has been laid for the watering of shrubs and lawns. There is a possibility of the roots of perennial plants stopping up the tile. Usually it is not difficult to locate the stoppage and remove it.

Amount of Water Required and Important Factors

In figuring on how much ground may be watered from a water supply, it is well to consider the minimum requirement as one inch depth of water. This will be about 125 gallons for one application to a plot of ground four feet wide and 50 feet long or one line of the tile 50 feet long. For a plot 16 feet wide and 100 feet long, or four lines of tile 100 feet long, at least 1,000 gallons of water per application will be required.

It should not be necessary to apply water oftener than once a week, and usually once every two weeks will be often enough. It is usually considered that 400 feet of the tile will meet the requirements for a garden for one family. In north-west Texas the wells with windmills will usually supply water for the subirrigation of a garden of ample size for one family.

In using subirrigation tile it is important that all joints be made tight enough to keep the dirt out; that water free from sediment be used; that the feed pipe be kept covered when not

in use, and that each tile line be laid level from end to end. In case the ground is sloping, run the tile line across the slope so that the tile will be about the same depth when laid in a trench the bottom of which is level.

The first two or three applications of water in tile after it is laid will not spread in the soil as uniformly as later applications when the soil in the trench has thoroughly settled.

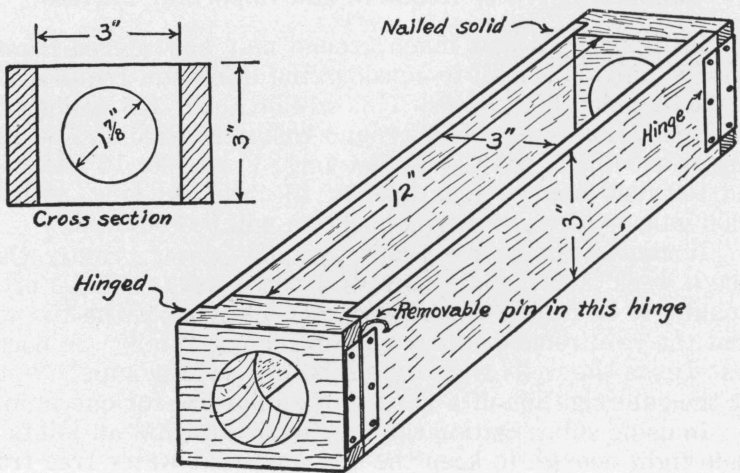
Making a Form or Mold for Concrete Tile

For a number of years tile such as is shown being placed in a cutting bed herein was used. This tile has one flat side while the top is semicircular in section. It has been found that tile square in cross-section is easier to make and is easier to fit together properly in the trench. Also, the mold for the square tile is easier to make than is the mold for the other tile.

The ends of the square tile mold are cut from 2" lumber, such as pieces of 2" x 4". Two corners of each end block are cut out about half its thickness to fit the ends of the side boards.

The core is a piece of 1½" pipe about 18" long. The outside diameter of 1½" pipe is a little less than 2". The holes in the end blocks of the mold should be made to let the 1½" pipe through easily but not too loosely.

Three corners of the mold are hinged, but the corner diagonally from the hinge having a loose pin, is nailed solidly.



Square Tile Mold

Making the Tile

Use one part of cement to four parts of clean, sharp sand. Coarse sand is best, but it should not have pebbles in it that will not go through one-fourth inch mesh screen. Very fine sand or sand containing vegetable matter or much clay is unsatisfactory for tile. A sack of cement with four cubic feet of sand will make about 100 of the concrete tiles, each one foot long.

Use only enough water to make a so-called dry mixture. A little too much water will make the tile stick in the form. Usually several trials are necessary to get the proper amount of water so that the tile will come out of the form immediately. Concrete made with fine sand may stick in the form.

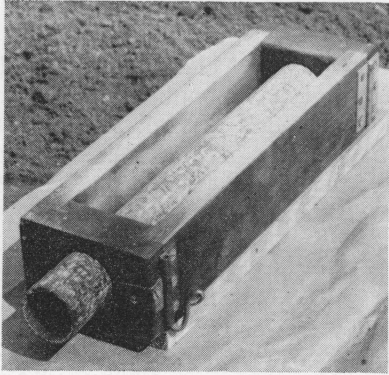
It is well to oil the lumber in the mold with some oil, such as discarded crankcase oil, to prevent the concrete from sticking to it.

To make a tile, put the pipe core in place in the mold and lay it on a pallet (1" x 4" or 1" x 5" about 14" long) with one of the open sides next to the pallet. Be sure that the removable pin in the hinge is placed with the head down.

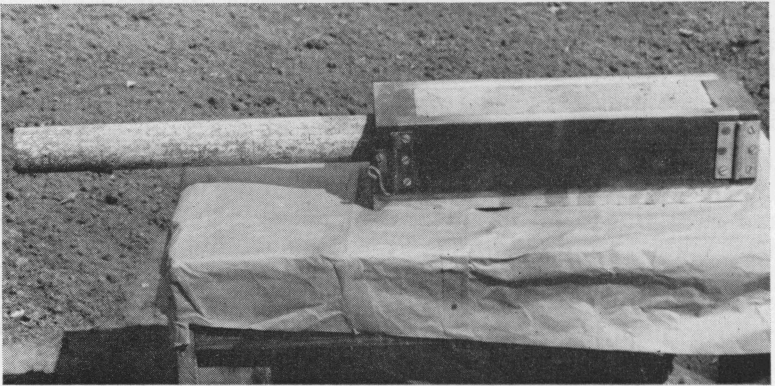
Next fill and tamp the form full of concrete, rolling the pipe core while filling. Then smooth off the concrete on the top side of the form. Next lay a pallet on top of the filled form and turn the form up side down, holding the two pallets in place while turning the form over. Remove the pallet that was formerly underneath and add concrete and tamp into the form. Again smooth off the concrete. Then pull out the pipe core, remove the hinge pin, and carefully shuck off the form from the tile. This leaves the completed tile on the second pallet that was brought into use in making this tile.

The tile should stay on the pallet about a day. This makes it necessary to have as many pallets as the number of tile made in a day. Any old pieces of board that are not likely to warp and crack the tile, may be used as pallets.

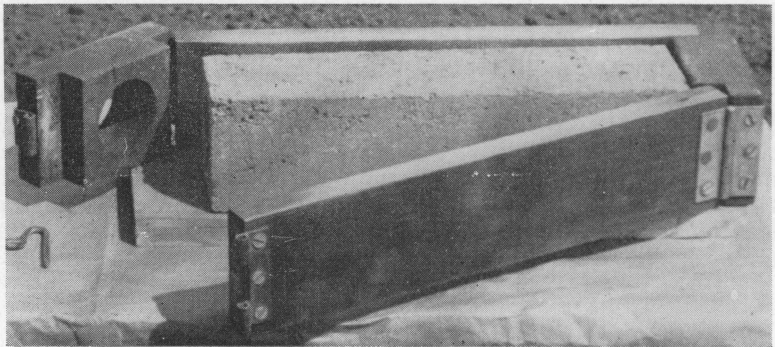
Sometimes old pieces of board suitable for pallets are not available without purchasing some lumber, in which case the following method of disposing of the newly made tile may be used. After the mold has been filled ready for turning upside down, place a piece of heavy (18 to 22 gauge) sheet iron, about 6 x 16 inches in size, over the mold. Have a place on the ground cleaned off and smoothed ready to lay the tile on. Turn the mold upside down on the ground on the piece of sheet iron. Slip the piece of sheet iron out. Then remove the mold as usual, leaving the new tile deposited on the ground without any pallet under it.



Mold in place on a pallet ready for the concrete fill.



The mold has been filled and the pipe core partially removed. The head of the loose pin should have been up at this stage.



The pipe core has been removed, and the loose pin has been removed from the hinge. The mold is partially removed from the tile.



This tile, which was made about 3 hours before, is still on the pallet, and a hole has just been cut out in one side.



Feed pipe in place in the ground, covered with a tin can.



Feed pipe and tile line have been dug out of the ground to show how feed pipe joints were plastered.

Curing the Tile

The tile should be kept in the shade and out of the wind for several days. Sprinkle the tile with water about two hours after they are made. The tile should be kept moist for about two weeks after they are made. This may be done by covering with wet sacks, or wet hay or straw, and applying more water each day.

The tile may be laid in the trench and covered with dirt ready for use about two and one-half or three days after they have been made. They should not break while laying them after about three days and if kept moist will cure in the trench as well as elsewhere. The main thing is to keep them moist for several days. Do not leave the tile exposed to freezing temperatures while they are curing.

Vertical Feed Pipe

The vertical feed pipe should extend from seven to nine inches above the ground surface. If the tile line is laid in a shallow trench as in some cases, one tile set vertically may serve as the feed pipe, but in most cases it will require one tile and a piece of another one to make the feed pipe the proper length. A piece of a tile may be obtained by cutting off a piece of a full length tile, about two or three hours after the tile is made while it is still soft.

The feed pipe is set vertically over a hole in the side of a tile that is laid horizontally in the trench. This hole in the side of a tile is easily cut out with the blade of a paring knife if worked out about two or three hours after the tile is made.

The vertical pipe is fastened to the horizontal tile by plastering a little medium wet concrete around the joint. Where the vertical feed pipe consists of a tile and a piece of a tile the two parts are held together with a plastering of mortar.

It is advisable to pour a ring of concrete around the feed pipe at the ground surface to hold it in place.

A cover for this pipe may be made from a piece of tin or sheet iron about three inches in diameter nailed to a stick 6 or 10 inches long and about an inch in diameter, such as a piece of broom handle. A big can may be put over the pipe for a cover. Do not put a wooden plug that fits tight in the tile or the wood may swell and burst the tile.

Laying the Tile

The lines of tile are placed from three to five feet apart, usually about four feet. To determine the proper spacing of the tile lines for the soil type and depth used, lay a line of tile

and run water into it for about 12 hours. Then examine the ground and see how wide a strip of ground is wet. The full width of the wet strip is the proper width for the spacing of the lines of tile. For garden crops the trench for the tile should be from 10 to 14 inches deep. It should be deep enough so that in plowing or spading the ground the tile will not be struck.

The bottom of the trench must be level and smooth, that is without humps or dips in it. If the ground has a slope, the lines may be run across the slope. To get the direction for the lines, lay off a level line on the ground surface with a farm level or a carpenter's level on a board as if running a level terrace line. A trench following this line or approximately following it, may then be dug about the same depth from end to end.

However, be sure to level the trench bottom independently of the ground surface. To get the bottom of the trench level, the following method is suggested. Drive little stakes about six inches long in the bottom of the uncompleted trench. Space them from eight to 15 feet apart depending on the length of the straight-edge board available. They should be close enough that the straight-edge will be a little longer than the distance between the stakes.

Drive one of the stakes down until the top of it is the desired depth below the ground surface which is usually about 12 inches below the ground surface. Now set the rod of a farm level on this stake top. With the farm level set up, bring the target on the rod into line with the level cross hair. Using this rod reading, drive all other stakes down to the same level. This gives a row of stakes in the bottom of the trench with their tops all on the same level. Now use a straight-edge to smooth the trench bottom down level with the stake tops. If the trench has been dug too deep in places so that some filling is required, the dirt should be well packed back into place.

The stake tops may be set level without the use of a farm level, by using a carpenter's level on the straight-edge to level the stake tops from one to the other in turn.

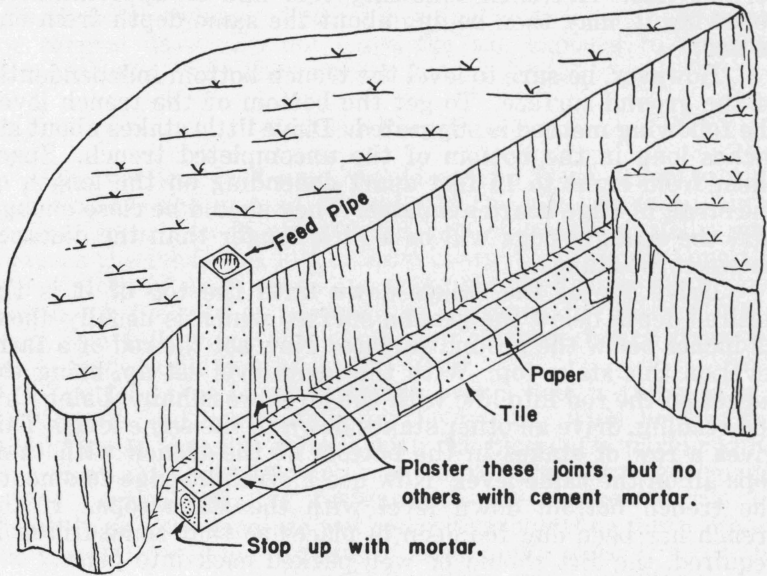
The tiles are laid end to end as close as possible so that dirt will not get into the joints. It is also advisable to lay a piece of heavy paper or old felt roofing over each joint before covering the tile with dirt, so as to be certain that no dirt gets into the tile.

It is well to locate the feed pipes, which stick up out of the ground, near the garden fence so that they will not be disturbed when cultivating the garden. It is also advisable to locate the feed pipes in a straight row, so that a trough or pipe may be run along over them. Then with the hole in the trough or pipe over each feed pipe, water may be supplied to the tile lines. In this way water from a windmill or storage

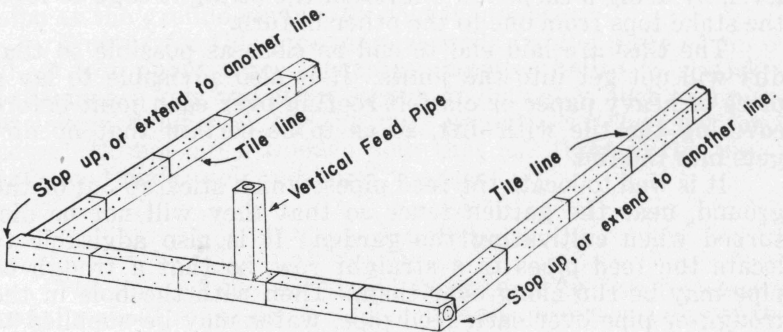
tank may be turned into one or more of the lines as desired. A hose may be used to supply each line if preferred.

The stream running into a tile line should be gauged so that the feed pipe will not overflow. The water should continue to run into a line until damp spots appear on the ground surface along the tile line.

In case two or more tile lines are joined together and supplied with water through one feed pipe, the two or more lines must be on the same level, so that the water will be delivered evenly to each line. If the garden area is not nearly level, it is best to put a feed pipe into each separate tile line.



Setting vertical feed pipe.



One feed pipe for two lines of tile.

Iron Pipe for Subirrigation

Iron pipe must be obtained at a very low cost to justify its use instead of concrete tile for subirrigation. There is some difficulty encountered in using iron pipe on account of the tendency for the seep holes to get closed with rust and dirt. When iron pipe is used, it is suggested that holes about one-fourth inch in diameter be bored in it about every 12 inches or else slots about $\frac{1}{8}$ " x $\frac{1}{2}$ " be cut with a cold chisel about every 12 inches.

Such holes or slots should be so placed in the pipe that they will be along the sides of the pipe as it lays in the trench. Then gravel or cinders may be placed over these holes, or small flat stones as big as one's hand leaned over them, so as to prevent the soil from coming in contact with the pipe holes.

With this exception, iron pipe would be laid for subirrigation in the same manner as is concrete tile.

Tin Cans Are Used as Tile

There are many instances where tin cans, such as quart oil cans or small vegetable or fruit cans are used for subirrigation in the same manner as the concrete tile are used. Both ends of the tin can are cut out with a can opener. The vertical feed pipe may also be made from cans by doing a little cutting and fitting.

The cans may not last more than one year before they rust out.

Form 1 for Substitution

of these pipes must be obtained with a very low coefficient of expansion of concrete. The expansion of concrete is usually 10 to 15 parts per million per degree Fahrenheit. The tendency for the pipes to expand with heat and contract with cold is a serious consideration. When these pipes are used in a structure that is subject to large temperature changes, the pipes must be placed in a concrete that will expand and contract with them.

Such pipes of steel should be placed in the concrete. They will be along the sides of the pipe and lay in the concrete. Their ends or joints may be placed in a concrete that will expand and contract with them. It is important to prevent the concrete from cracking in places where the pipes are placed.

With this expansion, steel pipes would be used for water supply in the same manner as is concrete pipe.

The Cans are Made of Steel

These are many instances where the cans are made of steel. The cans are made of steel and are used for storing water. The cans are made of steel and are used for storing water. The cans are made of steel and are used for storing water. The cans are made of steel and are used for storing water.

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