

Cement Tile: Efficiency and Cost.

Editor "The Farmer's Advocate":

Responding to your enquiry re cement-tile experiments, I would say that we have not yet completed them, but we have considerable material, a synopsis of which at this time may be of interest to your readers.

The solubility tests mentioned in previous reports are still being continued. As a result of these we are coming to the conclusion that where there is no acid or alkali in the soil—e.g., in Ontario clays or loams—the cement tile should prove durable. But where there is likely to be acid—e.g., in some mucks or alkali, as in the West—it is undoubtedly risky to use them.

During the autumn of 1910 a cement tile machine company furnished us with one of their machines, equipped with all sizes from 3" to 6", to run either by hand or by power. We propose to determine at least three things: (1) The amount of material necessary for 1,000 tile of various sizes, with different strengths of grout; (2) the rate at which tile of different sizes can be made by hand and by power; (3) the porosity of the tile and the pressure exerted by the packer. Thus far the work has been mostly on the amount of material for tile of different sizes. Table I. shows the results obtained to date.

TABLE I.—SHOWING THE ACTUAL NUMBER OF TILE MADE FROM GIVEN QUANTITIES OF MATERIAL.

Size of Tile.	Feet of Sand Used.	Proportions of Sand and Cement.		Number of Tile Made.
		Sand.	Cement.	
3-inch.....	2	7	to 1	44
3-inch.....	2	6	to 1	44
3-inch.....	2	5	to 1	44
3-inch.....	2	4	to 1	44
3-inch.....	2	3	to 1	48
4-inch.....	2	4	to 1	33
5-inch.....	2	4	to 1	25
6-inch.....	2	4	to 1	22

To those not familiar with cement it might seem strange that the same number of tile should be obtained for several different strengths of mixture (see 3-inch figures). Until a strength of 3 to 1 is reached, however, the cement appears to have no effect on the volume—it is lost, going into the pores of the sand. This gives us a clue to what we may expect to find when we reach the study of porosity and pressure.

From the data given in table I. we have calculated the number of tile from one yard of sand and from one bag of cement. See table II.

TABLE II. — THE NUMBER OF TILE OF VARIOUS STRENGTHS THAT CAN BE MADE FROM ONE YARD OF SAND AND FROM ONE BAG OF CEMENT.

Size of tile.	Strength of mixture.	Number of tile from 1 yd. of sand.	Amount of		
			Cement for 1 yd. of sand.	No. of tile sand for from 1 bag of cement.	
			Bags.	Cubic feet.	
3-inch	7 to 1	594	3 6/7	154	7
	6 to 1		4 1/2	132	6
	5 to 1		5 4/5	110	5
	4 to 1		6 3/4	88	4
	3 to 1		9	72	3
4-inch	4 to 1	445	6 3/4	66	4
5-inch	4 to 1	337	6 3/4	50	4
6-inch	4 to 1	297	6 3/4	44	4

AMOUNT OF MATERIALS NECESSARY FOR 1,000 TILE.

Calculating still another way, we found the amount of materials necessary for 1,000 tile. See table III.

TABLE III.—THE AMOUNT OF MATERIALS NECESSARY FOR 1,000 TILE OF VARIOUS SIZES AND STRENGTHS.

Size of tile.	Strength of mixture.	Cement required for 1,000 tile.	Sand required for 1,000 tile.
3-inch	7 to 1	6.5 bags	46 cubic feet
	6 to 1	7.6 "	= 1.7 yards.
	5 to 1	9.1 "	
	4 to 1	11.4 "	
	3 to 1	14.0 "	42 cubic feet
4-inch	4 to 1	15.1 "	= 1.6 yards.
	4 to 1	20.0 "	61 cubic feet
5-inch	4 to 1	20.0 "	= 2.2 yards.
6-inch	4 to 1	22.7 "	80 cubic feet
	4 to 1	22.7 "	= 3.0 yards.
			90.9 cubic feet
			= 3.4 yards.

Knowing the amount of material needed for 1,000 tile, we can calculate the cost thereof if we know the price of materials. Many people have sand available, at a few cents a load. It costs

them something to haul it, but as the hauling is not usually included in comparing the cost of tile, we have used in this estimate a cost of 15 cents per load for sand at the pit. I think that this is fairly representative of the price throughout the country. Cement is figured at \$1.90 per barrel; that is, 47½ cents per bag. At these prices the cost of material for 1,000 tile of various sizes figures out as shown in table IV.

TABLE IV.—SHOWING THE COST OF SAND AND CEMENT FOR 1,000 TILE OF VARIOUS SIZES. SAND, 15 CENTS A LOAD; CEMENT AT \$1.90 PER BARREL, OR 47½ CENTS PER BAG.

Size of tile.	Strength of mixture.	Cost of cement for 1,000 tile.	Cost of sand for 1,000 tile.	Cost of sand and cement.
3-inch	7 to 1	3.09	26	3.35
	6 to 1	3.61	25	3.86
	5 to 1	4.32	26	4.58
	4 to 1	5.41	26	5.67
	3 to 1	6.65	24	6.89
4-inch	4 to 1	7.17	33	7.50
5-inch	4 to 1	9.50	45	9.95
6-inch	4 to 1	10.78	51	11.29

WHAT STRENGTH TO MAKE THE TILE.

From table IV. we can derive a hint as to the most desirable proportion in which to mix the sand and cement. The stronger the mixture the less the porosity, until a strength of 3 to 1 is reached. There the cement begins to affect the volume. If porosity is the thing to be desired, the mixtures weaker than 4 to 1 should be used. If, on the contrary, compactness is the valuable quality, the proportion should be 4 to 1, or stronger. Porosity of tile is not essential to good drainage. In clay tile the water enters by the joints, practically none going through the pores, and good results are obtained. The joints of cement tile will prove just as efficient. In the past, cement tile have been strongly attacked on the ground that the cement is soluble in water, and it is to some slight extent. And if the tile are so open that the water enters through the pores the solubility is likely to be greater. Because porosity is not essential, because it tends to increase the solubility, and because strength is a very valuable quality, we believe that cement tile should be made in the proportions of about 4 to 1. In this view we are confirmed and supported by the experience and practice of many advocates of cement tile.

SPEED OF MAKING.

We have determined the rate at which three-inch tile can be made by hand. In making the tile the work is divided up; one man "turns" while the other "fills." Then the latter removes the "form," containing the newly-made tile, carries it off to one side, sets it down and brings back the "form." While this is being done, what shall the "turner" do? If using only one "form" he must stand idle until it is brought back, so it is wise to have two forms—it saves time. Using one form we found that we could make at the rate of 477 three-inch tile per day, but using two forms, 600 per day. This, however, does not make any allowance for removing the casings and making them ready for use again, for watering the tile daily for a week, stacking the tile when dry, or sifting the sand, if needed. Making allowance for these, the two men could make probably 500 to 525 tile per day. At this rate it would take two men about two days to make 1,000 three-inch tile; making the labor cost as follows:

Rate of wages.	Cost of labor for 1,000 three-inch tile.	
	\$1.00 per day.	\$4.00
1.50 "		6.00
2.00 "		8.00

The rate of making the larger sizes by hand has not been satisfactorily determined yet. And the power attachment has not yet been used.

TOTAL COST OF CEMENT TILE.

We can now arrive at the total cost of three-inch cement tile. At 4 to 1 the material costs \$5.67. Adding this to the cost for labor we get \$9.67, \$11.67 and \$13.67 as the price of 1,000 three-inch tile at the various wages mentioned. Of course, if a man makes them in his spare time, so that his labor costs him little or nothing, the cost of material represents the cash outlay for the tile.

The total cost of 4-inch, 5-inch and 6-inch cannot be arrived at until we have determined the speed at which they can be made.

A WARNING.

There is, we think, an element of grave danger in the cement-tile situation, viz., that in some cases the tile made by inexperienced men will be of inferior quality. To show how easy it is for this to occur, we might note that if cement tile are exposed to strong sun or drying wind, or both, so that they dry in a few hours after being

made, the "first set" of the tile is interfered with and the quality of the tile permanently injured; so that those who may think of making cement tile should take every precaution that no inferior tile are made, and if, perchance, any poor ones are made they should be discarded rather than placed in the drains. It takes only one defective tile to render a whole drain useless.

Ontario Agricultural College. WM. H. DAY.

Bumper Crop of Sorghum.

Editor "The Farmer's Advocate":

As many farmers are becoming interested in sugar cane or sorghum as a fodder crop, I thought I would like to place before your readers facts and comments gathered from my experience with last year's crop. On eight acres I grew, at a moderate estimate, 176 tons of green fodder. This estimate was made by careful measuring and weighing from various representative parts of the field. The field is a little over 60 rods long. One end is a light gravel, the other a heavy clay; the middle is loam. The gravel and the clay ends yielded each 19 tons, and the loam 28 tons, per acre. The gravel end was three or four weeks ripier than the clay end. I planted about the first of June, and cut from the 1st to the 22nd of October. Before the latter date a few frosts had occurred, slightly drying the leaves and tops on the gravelly end, while the clay end was as green as ever. A picture was taken on the 22nd of October. Not a shock was tied without the use of a ladder, and I had two tall men at it; the one on ground fixed a device for carrying top cord around on end of stick. The sheaves lay think on the ground, almost overlapping each other. I used about six pounds seed per acre, drilling in like corn.

Now, as to cultivation: I do not state this as a model to be followed; I do not want to repeat it in toto myself; I give it that some helpful lessons may be gained. I have always advised one hoeing, and thorough cultivating, but, on my last year's crop, only about half the field was hoed, and it was cultivated once, and half over again. The least expensive and most telling labor I put on it was before the sorghum was up. I cultivated what we generally consider ample, and then went over it once more before seeding. When the corn, which was on one side of the field, was up, and before the sorghum (which takes longer to germinate) was through, I sent my man to harrow the field. I was preparing to go away from home. He went across to the corn side and nearly up to the far corner, when he called a halt, and could proceed no further, but hurried to the barn and told me he was afraid he was ruining the crop. I finished the round, and then gave him the lines and told him to go ahead. It was covering some in the loose gravel, and tearing out some, and I don't know that I could have finished it myself, but knew if I got once away the job would be done. It proved to be the best corn I ever raised. I caught the sorghum just before it was up. I would not harrow it after, being so fine and weak on the start; but it should be hoed soon after it is up.

Sorghum parallels human conditions in some respects: In its infancy it is exceptionally weak, and needs attention. Its plaint and promise is, "Give me a chance when I am young, and I will take care of myself, and defy the elements after, and return a hundredfold for every timely favor." Middlesex Co., Ont. EDGAR M. ZAVITZ.

To Hitch the Pulley for Unloading Hay or Grain.

Editor "The Farmer's Advocate":

The post to which we attached the pulley when we were unloading hay or grain was near the stable door, and it was always in the way, and rotted off every few years. I got a large stone, weighing 600 or 800 pounds, and drilled a hole on the top of it, and then got a bolt made with a ring in the end. The bolt was firmly wedged into the hole, and the stone let down level with the ground. We find it very convenient. It is out of the way, and won't rot or rust out. It is always ready; just take a small clevis and attach the pulley to it. Those who do not have any large stones could dig a good-sized hole and fill it with good cement-concrete, putting in a bolt with a ring to project above the level of the ground, having the lower end bent, so that it would not pull out. D. L.

Mr. Hoyle has introduced a bill in the Ontario Legislature to amend the Line Fences Act, by adding the following section:—Owners and occupants of the land immediately adjoining a division or line fence on either side shall keep such land free from weeds, stones, brush, and refuse of any kind, and in case of default proceedings may be taken as provided by subsections 2, 3 and 4 of section 16.