

78.—EXPERIMENTS IN THE POND CULTURE OF TROUT, SUCKERS, AND CATFISH.**By A. P. GARDNER.**

[From letter to Prof. S. F. Baird.]

The first requisite in fish culture in ponds is an absolutely tight dam wherever a dam is needed. My first effort in that respect was perfect as to holding water, but in a few years the muskrats gave me much trouble. I was obliged to take up the plank spiles, dig the trenches deeper, put in sheer-bottom broken glass, and redrive the spiling, besides building a rat-proof stone wall to support the spiling and prevent them from entering under the dam from below; after which, when well graveled, I have had no trouble from muskrats or leakage. In fact, my dam, though rough and cheap, is as impervious to either water or the rats as an iron kettle. I will further say on the subject of dams that a large waste weir and fine screen upon it are indispensable to retaining small as well as large fish in small ponds.

My pond covers an area of about one and a half acres, and the water at first stood upon the natural ground—grass, sod, stumps, marsh land, and all—as it was after partial clearing and improvement for agricultural purposes; the lower portion consisting of stony, gravelly bottom, and the upper half consisting of muck and clay, which soon produced a great quantity of flags in the water, and a great variety of weeds as well as cranberry vines around the shores. After my third failure in raising fish, viz, first with trout, next with catfish or bull-heads, and finally with suckers, as described below, I made the improvement in the dam above referred to. At the same time I removed the soil and muck, stumps, &c., from the lower half of the pond, and deepened and cleaned the margins of this part to a depth of about 2 feet along the shores. I then built two stone walls, 2 feet high, equidistant from the shore and each other, extending from near the dam up stream 60 feet, with a depth of 6 feet of water between them; thence I continued two other walls up stream, about 3 feet apart, in the center of the pond, and covered them with flagstones. This structure is about 18 inches high, with an average depth of 4 feet of water, and extends to where the muck and flags still remain as feeding grounds and shelter. Leaving the pond at this point, and running around it, is a canal or conduit, 18 inches deep and 3 feet wide, branching at the head of the pond. Each branch originates in a principal spring, always affording fresh running water. These conduits are lined on either side with flagstones, lying horizontally, about 4 to 6 inches from the bottom, as shelter. The banks of these canals are also partially lined already with shrubbery as shelter for the fishes, and are intended to be fully so.

As a matter of usefulness a pond on each farm will pay interest on cost of construction aside from fish culture. I filled my inclosure last winter with about 14 tons of ice in less than a day, whereas it would have taken more than two days to have taken it from any other waters near me; also, by constructing a gate, flume, and sheep-box for washing sheep, two men and a boy washed well one hundred and one sheep this spring in four and a half hours, thus saving three or four times the expense of driving off of the farm for washing. In the near future I propose putting down a hydraulic ram to supply my buildings with water.

In the month of August, 1863 or 1864, I placed in my then new pond 240 trout caught in Roaring Brook and Kellam's Creek, differing in color, of course, according to the color of the bottom of the streams from which they were taken. There were in the pond an abundant supply of places of refuge for the smaller trout. The lot varied from 3 to 8 inches in length. I then commenced feeding them on liver, veal, beef, mutton, and some angle-worms. In September and October they made beds around gravelly shores, and I have reason to believe they hatched more young fish than they devoured. The next summer, in June, the indications of increase were quite apparent, notwithstanding an overflowing of the pond by which many escaped, caused by a sudden heavy shower and too small a waste wier. The next season I began to catch a moderate supply for the table, and they were flavorless brook trout. The next season I drew the pond down to dry the banks for cultivation on the 25th of June, and on the 5th of July shut the gate. The sun was excessively hot, and when the water began to run over, about the 8th, it looked milky, and in less than ten days I experienced a loss of about 3,500 trout, without one living one being left. Many persons thought they were poisoned by evil persons, which might have easily been done, as when trout get accustomed to being fed they become exceedingly tame, and at meal time every fish puts in an appearance; but it seems much more likely to me that the banks had, from the excessive heat, become putrid and poisoned the water, which poisoned the fish, and when once affected in that way all the pure water in the world will not restore them.

I then had learned that fish, especially trout, needed a different pond, and determined in the near future to rebuild, but, to await a convenient time for that work, stocked the water with a few catfish. In a couple of years I had enough in numbers to supply a dozen family ponds, but they never grew to any practical size; and the third year after putting in the catfish I put in 84 white suckers, in the spring of the year. After retaining them and the catfish together two winters, and having trouble with the muskrats both winters, I scuttled the dam, took out 40 suckers, all told, about double the size that they were when put in, and let the catfish go down stream, and gave them one whole year's time to be sure they all escaped. They are nocturnal in their habits and will destroy other fish that stop at nights.

After rebuilding, as first described, on October 9, 1877, though late in the season, I commenced restocking the pond with trout from Roaring Brook, Kellam's Creek, and Spring Brook. This was their spawning season that year and many of the males were decked in gorgeous colors. I put in the pond between 200 and 300 trout, and during that fall and winter put in also 900 other fish, small fry as well as some of larger pretension, viz, shiners, horned chubs, white chubs, striped and speckled dace, suckers, one perch, one sunfish, and several other varieties that I never heard named; and then my real success with a self-sustaining trout pond commenced. It is called now *Glen Mere*. After stocking this time, I commenced feeding entirely with angle-worms, which I readily procured of the boys and even girls and some women, at five cents per quart; not only feeding for the time being, but laying away in dirt, in boxes in the cellar, for winter use. I, conceiving this to be the best artificial fish-food for most kinds of fish, commenced preparing a plat of ground on the side of the pond for its culture. Where the ground is uniformly moist and made mellow and rich these worms can be produced in immense quantities, but I have never needed any of this kind of food after the first winter. The next spring the trout-food fish produced such immense numbers of young fish that after the food natural to such waters was exhausted the trout had nothing to do but turn their attention to their less royal brethren.

Most of these small fish are vegetarian, either from necessity or choice, and when they have cleared the waters of the frog spawn, &c., I feed them on boiled wheat-bran, made thick and molded into loaves. They will, in my pond, when other food is scarce, devour four loaves in five days as large as common bread pans will hold heaped up. Many of these fish escape the trout, and grow to be fine table-fish, for which purpose we use many of them. The trout are always fine and in good condition without any care as to food, and as wild as any brook trout that I ever saw. They and the suckers now hatch their own young in the canals above described, and the other fish in the gravelly banks along the shores of the main waters. The perch and sunfish that I put in with the small fish grew finely; the former grew in two years from about three inches long to about ten inches, and he was a fine old bachelor fish to eat; the latter became, in one year, about four times larger than when put in. The perch as well as the trout is carnivorous, and it is a question in my mind whether it would or would not excel the trout for domestic fish culture or whether there are other kinds which will excel either. Catfish are largely vegetable eaters in their food, and with my present experience I think I might have done better with them by correct feeding.

Suckers extract their food from the mud in the pond, but what that food is I never could learn; have feared it might in part be on other fish eggs, and they should be excluded; but in such waters as mine (entirely spring water) they make a very good breakfast when well prepared for the table.

Out of 200 acres comprising my home (called Glenhouse), I have no acre outside of my gardens and fruit land but what I would miss less than my trout pond. With probably not more than \$200 outlay, consisting of labor and money, I now have a fair supply for a large family of fresh fish of excellent quality; gather my ice and wash my sheep at probably less than one-third of what would be the cost without it; and raise on three small islands in the pond more cranberries than we can use, besides the frogs it produces during their season. Then, in addition to great improvement in the landscape by the mingling of water in it, to me it seems like money well expended, and I know of no branch of farming industry that will bring better returns in proportion to the care bestowed and money expended. I have shut in a small pen a few trout and fed to them all the angle-worms and small fish they would eat, and their growth has been as rapid and remunerative in proportion to the expense as any swine or poultry I have ever had fed. But I am now, whilst writing this, learning a new lesson which I ought to have anticipated, and probably would if I had been manipulating any other kind of farm stock. With our experience with sheep, horn cattle or horses we would not have expected a uniform supply or increase by simply stocking up with a full quota of the proper gender of each kind to start with, but we would have used art in maintaining conditions in regard to seasons, and made every other necessary special effort to see that the means used were successful. My trout from some cause utterly failed to produce any young ones last fall and winter, and my pond will have to be restocked by art, or I will have to take the doubtful chances of a better crop this winter. It may so occur with this kind of fish in their natural waters; I am inclined to think it does, and hence a variable supply in our streams. My screen at the weir may have allowed them all to pass out of the pond and should be finer. I have never propagated fish by artificial means, but am now inclined to believe that, in order to be uniformly successful with trout culture, artificial hatching will have to be included. As to a self-sustaining fish pond being practicable and profitable to farmers and others I have no doubt. Carnivorous fish can be raised successfully with other and smaller ones that live largely upon vegetable growths in the water. The latter are easily supplied with vegetable food when they need it, and angle-worms can be cheaply produced to feed the former when they need them, in addition to the food already in the water or produced there. It pays well to feed both kinds well.

I fancy you might wish to ask one question, and that is, how I can feed different kinds of fish living in the same ponds on food suitable for each and different in the kind. My answer would be that a goose would not go to share a meal with a fox, or a chicken with a hawk. When the fox and hawk were gone the others might pick up some of the crumbs, and the food for the chicken and goose would not be sought after by others.

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