

A NEW PATTERN SOIL SAMPLER

By B. E. BEATER

The soil sampler described in this paper was selected from a variety of makes which were experimented with. Once the writer had satisfied himself that the two-handed principle, incorporating two foot-pressure brackets as well, gave the maximum possible thrust, careful attention was devoted to the design of the cutting edge. About a score of differently designed cutting edges were manufactured and each design was tried out in turn, the object being to select one which would adapt itself to most known soil variations. It would be comparatively simple to design a sampler for a single class of soils, but when all factors had to be considered, a considerably more versatile product would be required. This increased demand for general serviceability must undoubtedly result in certain limitations being imposed upon the sampler.

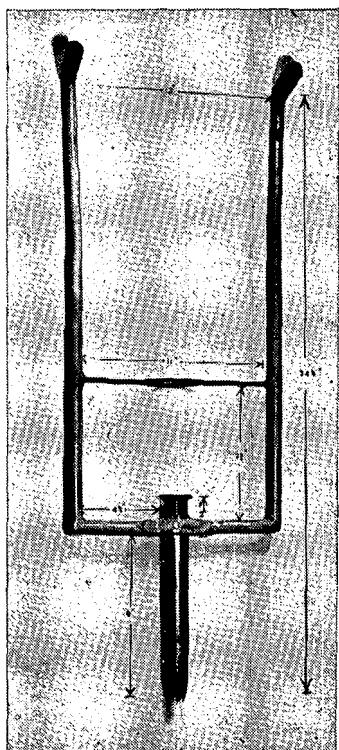


Fig. 1—Dimensions of the soil sampler

A primary difficulty throughout has been the non-existence in this country of a supply of high quality steel tubing of 14-gauge and of uniform internal diameter of 1 inch. Such a material could be manufactured, but only to meet a large order. The writer, therefore, had to take what was available, but latterly was fortunate in securing an odd supply of Black Vereeniging special bending 12-gauge tube of uniform 1 inch internal diameter. As this material was still too thick it was machined down in the process of manufacture.

The actual procedure for manufacture of the sampler is as follows: Select an 11" length of the steel tubing and after facing the end, set to $1\frac{1}{4}^\circ$ to $1\frac{1}{2}^\circ$ taper and machine back to 9". Draw the cutting head down to an internal diameter of $\frac{25}{32}$ " (2 cms), and mill four teeth to a squared-off depth of $\frac{13}{32}$ " ($1\frac{1}{2}$ cms) into the head. The four squared-off sections between the teeth are now ground back, resulting in four $\frac{3}{8}$ " flattened faces tapering back about $1\frac{1}{2}$ " from the tip. This uneven outer shape of the tube appears to assist penetration in hard dry soils. The point should finally be correctly hardened.



Fig. 2—The cutting tip of the soil sampler

In order to attach the tube to the handles, which consist of $\frac{3}{4}$ " heavy duty seamless conduit tubing, two 4" lengths of $\frac{3}{4}$ " wide by $\frac{3}{16}$ " thick shaped steel supports are first brazed onto the tube 9" from the tip. A connecting arm and ring of $\frac{1}{4}$ " steel rod flattened at both ends is now brazed onto the arms $7\frac{1}{2}$ " up from the foot pressure brackets. This device not only gives strength to the arms but acts as a support for the sampling bag.

The actual sampling operation comprises a two-handed-and-right-foot thrust, using the weight of the body and accompanying the action with sharp twisting of the sampler from side to side. In the case of very hard soils, the sampler is aided by a "shuffling twist," as this opens up the ground around the cutting tip.

In all cases, to remove the core, invert the sampler and thump the tube with the palm of the hand, or give it a sharp stroke with a piece of wood. If the core fails to fall into the attached sample bag, support the bag with the left hand and thump the handles sharply on the ground. A gentle pressure may be applied with the finger to an obstinate core,



Fig. 3—Thrusting and twisting the sampler into the soil



Fig. 4—Removing the soil core by thumping the tube

but under *no* circumstances—we repeat, under *no* circumstances—should the core be initially thrust in with the finger. Such a procedure may firmly lock the core in the tube, which incidentally must always be kept very clean inside.

To withdraw the sampler from the soil without difficulty it should be levered about in four directions, and the procedure of emptying the core into the bag can be carried out while proceeding to the next sampling site. If it is desired to incorporate surface litter, the sampler is hurled into the ground before twisting in. In the case of a heavy blanket of trash not required in the sample, a small patch of ground will of course have to be cleared. As the weight of each soil core is about $4\frac{1}{4}$ ozs., up to twenty-five samples can be taken with comfort before the attached bag need be replaced.

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Mr. Dymond said that anyone who had had experience of taking soil samples should welcome this new type of soil sampler, which was a big improvement over the old type of soil auger.

Mr. Lintner said in these days of complicated layouts of plots in field experiments, it was necessary to take a large number of samples and using the

usual type of soil auger presented a lot of problems, but this particular piece of apparatus allowed one to take a large number of samples in a short time. **Mr. Lintner** thought an improvement would be effected if the bottom bar to which the centre piece was attached, was made rather wider, that the handle-bars might be longer to suit a tall individual, and also that the handles themselves might be bigger. These minor modifications would not improve or detract from the efficiency of the instrument, but merely add to the comfort of those using it.

Mr. Boule enquired of Dr. Beater if he did not find this new type an encumbrance in big cane as compared with the other type of soil sampler.

Mr. Schmelz said that he had taken over 3,000 samples with this sampler and in cane up to about ten months old and in all types of soil, and although at times it was difficult to push the sampler into the soil, it was still easier than the older type, which required hammering. A large number of samples could be taken in a short time. It was essential, however, to make sure that the sampling tube was perfectly clean.

Mr. Lintner said there was no difficulty in getting through large cane, one had only to turn the handles sideways and the handle then went through tall cane quite easily; even the bag proved to be no encumbrance.