THE IMPERIAL VALLEY SOIL SAMPLING APPARATUS
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One of the major tasks confronting the Imperial Valley Drainage Investigation is a study of soils. Those occurring in the Imperial Irrigation District are unweathered deposits, for the most part of lacustrine origin. These deposits were transported to the Salton Sink by the Colorado River. Sediments varied in quantity and character with the sub-watersheds of their origin and with precipitation cycles. Conditions of deposition were further modified by varying levels of the Salton Sea and its predecessor, Lake Cahuilla. It is probable that during these fluctuations of the ancient water levels, a network of channels was eroded in those areas from which the sea had receded, only to be refilled in places with wind-blown sands or, as the sea levels rose again, with silts and clays. The arable soils of the Valley, therefore, are erratic in that there is little uniformity of stratification. Lenses and subsurface dikes complicate the pattern.

Investigations with the soil auger have shown that even in relatively firm soils, each stratum becomes mixed with adjoining strata in sampling to the extent that few can be identified. Below the water table, mixing is increased to the point where only broad classifications are feasible.

Extensive tests have been made using several adaptations of the standard soil tube, operated with equipment developed by Blaney and Taylor, and, in soils that are not too damp, this tube is a decided improvement over the auger. In the taking of a few hundred samples, several types of tube points have been tried and various methods of extracting the cores from the tube have been used. Bulking has occurred in many instances, especially below the water table. Holes often have become partly filled with water while the tube was out of the ground for extraction of the cores; and in removal from the tube, cores commonly have become so disturbed and displaced as to be entirely unsatisfactory for analysis and study. The method has been abandoned in favor of one using the present equipment.

The tube must bring out a sample that represents accurately the texture and exhibits the structure of the soil at the exact location from which it was taken; hence, there must be little lineal distortion of the core and no mixing of strata.

To accomplish this, the tube must case the hole during the entire sampling process to prevent sloughing and water seepage while the sample is extracted. Suction around the coring cylinder of withdrawal must be eliminated.

It must be possible to operate the equipment in relative ease and to obtain samples from a depth of 12 to 18 feet as rapidly as can be done by any other method.

THE TUBE AND ITS OPERATION

The Imperial Valley soil sampling apparatus consists of an outer tube not unlike a standard soil tube into which is inserted a 2-foot demountable coring cylinder lined with a removable split sleeve and attached by a screw joint to an inner tube which has no function except to hold the coring cylinder in place. This is accomplished by means of a driving head or cap on the inner tube which fits over the driving head on the outer tube and is then keyed snugly, cap on cap, with a %-inch tapered steel pin, to produce a strong and well integrated union and permit easy extraction and insertion of the inner tube (Fig. 1).

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1Associate Civil Engineer, Associate Soil Scientist, and Associate Soil Conservationist, respectively. The Imperial Valley soil sampling apparatus in its original form was designed by Willis C. Barrett, Civil Engineer, and was constructed under his supervision. Mr. Barrett left to assume new duties with the Chinese Government before the present report was begun. Free use has been made, however, of reports that he wrote while he was directing the Imperial Valley Drainage Investigation. Acknowledgment is made of the assistance of the Imperial Irrigation District, which made its machine shops and personnel available for construction and operation of the apparatus.
