# 12 Million Acres Is Goal of Italian Reclamationists

## Soil scientists still lack adequate methods for evaluation of soil conditioners

SANTA BARBARA, CALIF.—Reclamation of 12 million acres of clay soils, nearly half of Italy's 30 million acres of agricultural lands, with a combination of soil conditioners, fertilizers, and good tillage is the ambitious goal of Italian agriculturists. The soil conditioner is the new Italian product, Flotal; the fertilizer is an 8-12 (N-P) product; bulldozers, plows, and disks account for the tillage. After four years of experimenting, Italians believe they can accomplish in two years, with chemical help, what Italian farmers have been trying to do for 200 by hand.

What the Italian program is and how it is being put in operation was reported by W. R. Schoonover, University of California, to those attending the meeting of Western Society of Soil Science here in conjunction with the 34th annual meeting of the Pacific Division of the American Association for the Advancement of Science.

Flotal is ferric alum to which an unidentified organic absorbant has been added. It is believed to work as follows: It hydrolyzes to sulfuric acid, ferric hydroxide, and ammonium sulfate in the soil, the hydrolysis stopping at about pH 2. The organic material supposedly absorbs the sulfuric acid. During hydrolysis, the ferric hydroxide changes from the colloidal to the gel state. This gel "captures" the clay particles, and the gel shrinks as it dries, forming from larger clay clods the small aggregates associated with good soil structure.

In contrast to such products as vinyl acetate-maleic acid (VAMA) and hydrolyzed polyacrylonitrile (HPAN), which are aggregate stabilizers, the Italian produce is a "clod disintegrator." Alternate wetting and drying of small clay lumps which have been sprinkled with the dry conditioner soon leads to properly structured soil.

Italians take advantage of this automatic disintegration effected by their conditioner by preparing lands in the fall and letting fall rains take care of the alternate wetting and drying. Lands are first plowed, some times to a depth of two feet (where there has been severe erosion, bulldozers first do the gross leveling). The land is disked, fertilizer and soil conditioner are applied and then land is soon ready for planting. The following year, the field is plowed to about 12 inches, retreated, and disked. Schoonover notes that the conditioning process is nonreversible and permanent.

Experiments with Flotal began four years ago, although the really large field experiments began only two years ago. In 1952, about 4000 tons were manufactured and distributed. Treatments in Italy have varied from two thirds to two tons per acre, and the product costs about $40 per ton. Italians attribute over half the yields from treated fields to Flotal, the balance to fertilizer and tillage.

Is the product a potential competitor to American products? Stauffer holds U.S. rights to Flotal, which is currently being offered to the home garden trade. To date, American researchers have had only indifferent success with the product in the field, however. Dr. Schoonover says that he went to Italy last fall with the express purpose of observing Italian technique to see how we might better use the material here. As for the future, "experiments are continuing."

**Soil Conditioners—Confusion Reigns.** With some four years of soil conditioner experience behind them, soil scientists are still in a rather unenviable position—one of having a product which without doubt does affect the soil, of having clamorous requests for information, but still not having adequate scientific tests, without which proper evaluation of these oft-heralded products is impossible.

"How can we correlate treatment with crop productivity?" was the most frequently asked (and still unanswered) question passed back and forth during an hour-long, open-floor discussion led by W. H. Fuller, University of Arizona. Soil scientists are now reasonably confident they can get nearly any desired structural change in soils. To their discomfiture, however, the plants do not always seem to cooperate by giving yields greater than untreated soils. Being able to predict what treatment on which crop will give how much and, therefore, make the use of expensive conditioners practicable is the big problem facing the industry, in the view of many. Solution to this problem, rather than a reduction in price, will be the opening wedge to widespread farmer use. As one person remarked, tongue in cheek, "There's nothing wrong with our present tests. We just haven't educated our plants to correlate with them."

This lack of an apparent correlation between treatment and yield even led one person to wonder if these soil conditioners are not showing us that our soils, except for those in a few areas, are not in good shape already and that, therefore, widespread application of these

**W. R. Schoonover (right) shows samples of soils from Italy to Luigi Cavazza, University of Bari, Italy. Samples show difference between soils treated with the Italian soil conditioner and those treated with American Products VAMA and HPAN**

**On The Cover**

### Increasing Technology on the Farm

THE BROAD FIELDS of wheat on the Great American Plains no longer are harvested with the old mechanical reaper, or "binder," to be followed by the threshing machine. The entire operation now is accomplished in one sweep by the combined harvester-thresher, seen in the cover picture. This is an example of progress through technical development, a progress which is necessary if farming is to hold its position among modern producers of goods.

There is ample evidence that American agriculture is producing far less than the maximum possible yield per acre. The application of available scientific information and good management principles should make possible the farmer's holding a better relative position than ever before in a free enterprise society.

expensive materials may not be warranted. Others countered (to the manufacturers' relief, no doubt) with the belief that we have not exhausted the possibilities of how to use them most effectively and that there is a general farmer market for them when the best methods of application are found.

Meanwhile, the search for informative tests goes on. An early stand-by, extent of aggregation as determined by wet-sieving, seems to be loosing ground. Several noted that a crucial time along the route to high productivity seems to be the seedling stage, that once the plants get a good start, yields will be good, other factors being equal. For this reason, tests which show impedance to root and shoot penetration are possible answers. Modulus of rupture tests are expected to play a more prominent role in the future. Big hurdle: No two plants act alike. Best attack: Continue empirical work with available tests until we have enough data for someone to find that correlation between yield and treatment the industry needs.

# Canadians Urged to Step Up Oil Seed Production

## Oil and oil meal by-products are a value to both industry and agriculture

WINDSOR, ONT.—At the present time Canada produces only one third of the soybeans which she processes. Greater cultivation of this and other oil seed crops will not only provide industry with the needed oils, but also bring the farmer a profitable cash return, said J. C. Woodward, Canada Department of Agriculture, at the 36th annual conference of the Chemical Institute of Canada held here June 4 to 6.

Flax and soybeans are established crops in Canada, but there are other oil seed crops which have been grown successfully and have not come into general use. Among these are sunflower, rapeseed, and possibly safflower. Most important oil seed crop at the present time, said Dr. Woodward, is flax. Canadian acreage in 1952 amounted to 1,206,500 acres. Soybeans accounted for 172,000 acres. Rust cut down sunflower planting to 3500 acres, but a rust resistant strain should be developed by 1954. Rapeseed acreage was 18,500.

Soybeans are profitable in two ways. They can be raised as a cash crop or, if conditions warrant, they can be converted to a feed crop. The meal by-products are an important factor in livestock production. Sunflower seed hulls are being processed to make a fuel by one company. Rapeseed oil is obtained in good yield. At this time, rather than use this oil for edible purposes most of it is used for marine engines. Safflower gives a good edible oil and is also of interest to makers of protective coatings.

**Growth Regulators.** The most extensively used plant growth regulator is the weed killer, 2,4-D. There are other uses for chemical growth regulators, said Hubert Martin, Science Service Laboratory, London, Ont. He pointed out that it is now a common practice to induce the formation of seedless tomatoes through the application of chemicals. Hormones are used also to thin fruits. An excess of hormone will arrest growth. This property is used to advantage in the retardation of the sprouting of potato tubers.

**Bread.** Poor flours can be improved in baking properties by the addition of wheat gluten powder. A process for extracting the gluten and spray drying it has been developed by W. B. McConnell of the Prairie Regional Research Laboratory at Saskatoon. The wheat starch is recovered and has many uses. The wheat gluten is expected to find its greatest use in the improvement of flours in certain backward countries. Six per cent gluten added to flour was fed to result in enhancement of baking qualities.

It has often been said that in the future an industry might be built up involving separate utilization of starch and gluten. Starch could be used as such or in a fermentation industry. Disposal of the gluten has always been the chief drawback to such a plan said Dr. McConnell. Utilization for upgrading flour may now be feasible since the spray drying technique seems to be economical.

**Apple Carbon Dioxide.** A fixation of carbon dioxide by McIntosh apples takes place during the storage of the fruit. By employing carbon-14 labeled carbon dioxide, the amount of uptake of the gas was measured by N. Allentoff and his coworkers at the Department of Agriculture at Ottawa. The radioactivity ended up for the most part, said Dr. Allentoff, in the malic acid of the apple. Some of the carbon-14 was found in both the free amino acids and those obtained by hydrolysis of the alcohol insoluble nitrogen components.

**Rockweed.** In an effort to produce useful materials from the sea weed, *Fucus vesiculosus*, workers at the Maritime Regional Laboratory at Halifax have been carrying on a systematic analysis of the chemical constituents of the organism. Total nitrogen content varies from 1 to 3%, said D. G. Smith of the Maritime Laboratory. Free amino acids constitute 8 to 11% of the total nitrogen; polypeptides make up 7 to 8%. Most of the remainder seemed to be protein.

M. Louise Elder of Canadian Canners, Ltd., first woman scientist to be elected to fellowship in the Chemical Institute of Canada, with E. A. Crockett (center) of Polymer Corp. and R. S. Jane of Shawinigan, CIC president