

of variety improvement is well under way, said Dr. Weiss, and two new varieties are expected for release to seed growers next year. This is an important point in soybean production because costs have increased appreciably in the last decade without a consistently increasing market value, thus reducing the margin of profit.

Weeds constitute another major detriment to high unit production, Dr. Weiss stated. For instance, moderate infestations of foxtail and smartweed in the North Central region have been shown to decrease soybean yields by as much as 10%. Methods of planting and culti-

vating can help the situation, but chemical weed control is being studied intensively. Dinitro and 3-chloro isopropyl-phenyl-*N*-carbamate are both being widely tested as pre-emergence herbicides. Dinitro is being recommended by a few state experiment stations, but a slight reduction in stand can be expected with its use, said Dr. Weiss. He also said that the 3-chloro compound also causes slight injury but it seems less hazardous in this respect than dinitro. Herbicidal oils, such as those used on cotton, are showing promise in research studies, but they are not yet recommended.

pie firm is located in the Brown Bldg., Fourth & Chestnut Streets, Philadelphia 6, Pa.

Pacific Borax Completes Ag Chemicals Plant in Texas

Pacific Coast Borax Co. has announced that it has completed construction of its new plant for mixing agricultural chemicals at Slaton, Tex. Herbicides and cotton defoliants will be produced at the plant initially.

J. M. Nunn, former head of the Dumas Farm & Ranch Supply Co., is in charge of the operations. His headquarters will be in Lubbock, Tex.

Industry

Red Star Yeast, Charmin Paper Mills To Cooperate on Torula Yeast Development

Red Star Yeast & Products Co. and Charmin Paper Mills have announced the signing of an agreement for production, sales, and product development of torula yeast. Under terms of the agreement, Charmin will produce the torula yeast at its 10 million pound-a-year plant now being built at Green Bay, Wis., and Red Star will begin researches in torula yeast with a view to developing additional new uses and a full line of products.

Torula yeast, a high vitamin and amino acid product, will be produced from waste liquors produced in the manufacture of sulfite pulp. It was first produced in Germany and other European countries during World War II when it was used to supplement the vitamin and protein requirements in their national diets. A study of the process first began in this country in 1943, when the Sulphite Pulp Manufacturers' Research League, an organization of 13 pulp mills in Wisconsin and Michigan, started laboratory and pilot plant work. In 1948, the first commercial feed yeast plant was built by Lake States Yeast Corp. at Rhinelander, Wis., adjacent to the Rhinelander Paper Corp. The plant has now been taken over by the mill and is producing 3 million pounds of the yeast annually.

The process used by Lake States and Rhinelander was described in a Staff-Industry Collaborative report in the August 1951 issue of *Industrial & Engineering Chemistry*. The process is a continuous one, unique in the production of yeast. The waste sulfite liquor from the paper mill is passed through a screen to remove the solids and stripped of sulfur dioxide. The liquor is then cooled and allowed to flow into the fermentor, where diammonium phosphate, potassium chloride, and ammonia are added to provide the nutrient. After an initial inoculation with a laboratory culture of

Torulopsis utilis, no further inoculations are required.

The complex reactions by which hexose and pentose sugars from wood, nitrogen, phosphorous, potassium, and minor trace elements are converted is not yet understood completely. However, it is probable that the sugars first undergo a phosphorylation and splitting to three-carbon compounds and, then, to two-carbon compounds, such as ethyl alcohol, acetic acid, and acetaldehyde.

In 1951 it was reported that the torula yeast product from the Lake States' plant contained 417.3 γ of niacin per gram of yeast, 45.0 γ of riboflavin, 37.2 γ of pantothenic acid, 33.4 γ of pyridoxin hydrochloride, and smaller amounts of folic acid, thiamine, and folic acid. A typical amino acid assay showed almost 7% of glutamic acid, about 4% lysine, about 3.5 to 4% each of isoleucine, leucine, and arginine, and smaller amounts of eight other amino acids.

The principal outlet for torula yeast is in animal feed supplements, the usual recommendation being 50 pounds of yeast per ton of poultry feed. However, the nutritional value of the yeast may make it potentially useful in human food.

These possibilities are being investigated by Red Star under its agreement with Charmin. The announcement from these two companies also suggests that its possibilities as a basic material for pharmaceuticals is also being studied.

Emulsol Appoints Sales Representatives in Philadelphia

The Emulsol Corp. has appointed Wm. Gillespie & Son as representative in the Philadelphia area to the confectionery bakers, bakery suppliers, and ice cream and other food processors in the sale of Emulsol's albumens and various edible emulsifier specialty products. The Gilles-

Research

Garbage Economical Source Of Humus at \$15 per Ton

A relatively rapid method for converting municipal garbage into humus is reported in a new technical bulletin recently released by the University of California. The bulletin contains a detailed description of laboratory and pilot plant studies of bacterial composting methods.

In the investigations municipal garbage was combined with sewage sludge and the refuse was converted to humus without the addition of decomposition agents or chemicals. Biggest problem of the process is aeration of the material. The bacteria which are responsible for the conversion of garbage to humus are aerobic and various methods are described for turning the compost heat to provide the organisms with air.

The California report says that they expect the research to be of inestimable value in encouraging the development of commercial composting in that state. Since California depends greatly upon the large scale farming of heavy or formerly arid soils the organic matter provided by compost should find a ready market. Engineers estimate that the cost of the process should be about \$15 per ton.

Burned Brushland Makes Good Pasture

Much of the brushland of the state of California can be converted to rangeland by burning, according to Frank J. Veihmeyer of the University of California. Mr. Veihmeyer, chairman of the irrigation department at the university, addressed the recent meeting of the American Geophysical Union.

He reported on studies conducted in his department on the water permeability of soil following burning. According to these studies, burning brushland does