

in use barely a month, shows definite promise, Gardner says.

Gardner has also turned to mathematics in an attempt to approach soil conditioner evaluation quantitatively. In water infiltration studies, he uses  $Q = At^B$ , from which he derives  $dQ/dt = ABt^{(B-1)}$ , where  $Q$  is infiltration,  $t$  is time, and  $A$  and  $B$  are parameters of the system. Gardner also uses  $S = Et^F$  in a similar fashion for relating depth of wetting to time.

So far Gardner finds, with the infiltration equation, that position of the curves (plotting rate *vs.* time) is a function of  $A$  and  $B$ , with  $(B - 1)$  being the slope of the curve. He has also determined that the curve approaches horizontal as aggregates get larger. Gardner feels that these equations, or ones similar to them, will permit a truer quantitative representation of soil conditioner action.

Meanwhile, still remaining is the problem of relating soil structure in the laboratory with yield in the field. As one person questioned "Will we wind up with fine, precise laboratory methods only to take our practices to the field and stumble over much cruder results based on total yield?" Such a fear was coun-

tered in part by L. A. Richards, U. S. Salinity Laboratory, Riverside, who notes some of their modulus of rupture tests in the laboratory are coordinating rather well with field results: for example, good yields with beans where the modulus of rupture is 100 millibars; virtually no yield at 200 millibars.

Nearly all soil conditioner work is done in terms of 3-inch, 6-inch, or greater depths. Yet, according to comment from an Arizona representative, crust formation after planting and after rains probably has caused more replanting than any other single factor in Arizona. Why, he wonders, is not more work being done on the very top levels of the soil—say, the top centimeter?

Soil conditioners have yet to make a big splash down on the farm. Western soil scientists expect no great use farm-wise in the near future, plan to continue refining and extending their tests meanwhile. Picture use-wise is not all black, however. Good results are being obtained on turfs—golf courses, football fields, baseball fields—and seem to offer the best potential at the present for larger-than-home-gardener-volume, cost considered.

eases by destroying fungi in surrounding soil. Treatments are easily applied with inexpensive equipment readily adapted to a tractor cotton planter, stated Johnston.

Regrowth of young tender leaves on cotton plants after defoliation often causes a stained, lower grade of cotton when crushed by a mechanical picker. No defoliant will prevent regrowth entirely, observed Johnston. However, 1953 field trials demonstrated that one chemical defoliant inhibited regrowth for as long as 30 days.

Under what conditions will defoliation pay? Widespread field tests conducted in the Mississippi Delta last year in several locations give partial answers. Each location consisted of defoliated, desiccated, and untreated plots. All plots were harvested with a spindle picker. Extremely dry weather in 1953 led to considerable natural defoliation, so there was only a slight improvement in cotton quality in the defoliated plots. There were some advantages in picker efficiency. Similar experiments in California's San Joaquin Valley upgraded cotton but showed little if any benefit in picker efficiency except in special cases where plants were lodged, reports Johnston.

## Cotton Research Aims for Lower Production Costs, Future Markets

New consumer products, greater yields of higher quality fiber and seed listed as goals

CORPUS CHRISTI.—Largely as a result of research, one section of the cotton industry, seed crushing, has progressed from a few struggling plants 50 years ago to a \$300 million annual enterprise today. This was no accident, John F. Moloney, National Cottonseed Products Association, emphasized to the 15th annual Cotton Congress, held here recently. Millions of dollars worth of research—his association alone spent \$1 million during the last 10 years—provided the foundation for this expansion.

In his keynote address, Burris C. Jackson, general chairman of the congress, emphasized the need for increased research activities if cotton is to maintain its present market position with other fiber and seed competitors. Competing industries are spending large sums on research and the cotton industry must follow suit, Jackson cautioned. During the general decline in textiles consumption since the middle of 1953, cotton has fared better than many other fibers. Use is down only 5% as compared with a 15% cut in rayon, comments Jackson.

Last year's per capita consumption of cotton was 28 pounds—2 pounds under 1948. To maintain its position research must be accelerated to provide answers to cotton's production, processing, and marketing problems.

A well planned insect control program could profit a grower \$16 in cotton production for every \$2 invested in chemical control, according to J. C. Gaines, Texas A&M College entomologist. Combinations of weevicides with DDT give adequate control of all species of boll weevils, bollworms, and the pink bollworm. Chemical control is a valuable aid in reducing damage by the pink bollworm, but may not always be relied upon to control the pest economically, stated Gaines.

Soreshin or seedling blight has often been serious on young cotton plants when germination and seedling growth is retarded by cool, damp weather, said the National Cotton Council research head, H. G. Johnston. Fungicides are being sprayed or dusted into furrows at planting time to reduce losses from these dis-

## Weeds Cost Western Canada \$255 Million Last Year

Weeds robbed western Canadian farmers of \$255 million last year, according to E. G. Anderson of Ottawa. This statement was made in a paper delivered before the Agricultural Pesticide Technical Society of the Agricultural Institute of Canada at its annual conference at MacDonald College in Quebec last month.

Mr. Anderson said this amounted to \$1028 for the average farm in Alberta, Saskatchewan, and Manitoba or 20% of the total value of the major crops grown in these provinces. In all, Canadian average crop losses through weed damage were 10% of the total crop, he estimated. In the U. S. also losses were about 10% of the total crop, compared with 27.8% in India and 7 to 20% in England. Much loss was avoided in Canada through use of 2,4-D and other weed control chemicals, such as the estimated \$17 million cost of spraying 9 million acres in the Prairies, where the increase in revenue was put at \$45 million or 20% of the cost of the seeded acreage.

Referring to the cost of weed control research, Mr. Anderson said that for every dollar invested Canadian farmers gained \$381.

Animal agriculture was a strong feature of the institute's program. L. A. Maynard of the Cornell University



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school of nutrition said that the future of the dairy industry lies in concentrating on the sale of whole milk and possibly on cheese, but butter will have to compete with fortified vegetable fats. He advised the dairy industry to get away from fixed standards and find more economical outlets for its fats, such as dairy spreads using skim milk solids.

J. C. Hackney of Braun & Co., Vancouver, discussing consumer preferences for livestock products, said his

studies show that beef is the most popular meat by far, making up 37% of all demand. Smoked meat makes up 12% of demand, with fresh pork at 11%, poultry at 10%, and lamb and fish with 3% each. He said there was a special need to produce more lamb and promote for year-round consumption. Consumption of meat in the U. S. is appreciably higher per person than in Canada, which should ensure continuing markets for Canadian livestock producers, he said.

Also in Africa, ACRI has assisted Liberia in the establishment of a cocoa-growing industry.

In the Western Hemisphere, Schwarz stated, ACRI's efforts have been concentrated on building up a core of specialists in cocoa culture, production, and research. At the same time, the institute has pushed research and development at its research center, dealing with pests and disease control, development of improved species, and plant nutrition. Scientists are currently at work on high-yield plant materials that promise to afford 10 times the 100 to 200 pounds per acre cocoa yields currently realized in Mexico and Ecuador, Schwarz reported.

**By-Products Used.** Much discussion following the panel presentation was devoted to the use of confectionery coatings, based on "hard butter" or hydrogenated (hardened) vegetable oils and dry portions of the cocoa bean previously considered by-products. "Fair-weather" interest has delayed scientific development of such coatings as replacements for traditional pure chocolate coatings, according to J. J. Alikonis of Paul F. Beich Co., and has left the confectionery industry poorly equipped to handle such emergencies as the current cocoa market situation. Interest is now at an all-time high, said Alikonis, and confectioners have an unprecedented opportunity to improve and extend the use of confectioners' coatings.

Actually, marked improvement in the quality of such coatings has been effected during the past few months, and their use is expected to expand rapidly—especially as long as raw material prices are exceptionally high. A subcommittee on confectionery coatings, operating under the NCA's research and development committee, presented during the panel discussion its preliminary, confidential report outlining basic precautionary steps that should be followed by confectioners in adapting their processes to use of the new coatings.

### Industry

#### **Columbia River Chemicals' NH<sub>3</sub> Plant to Be Built by Fluor**

Columbia River Chemicals, Inc., has awarded the contract for its proposed nitrogen fertilizer plant near Pasco, Wash., to Fluor Corp. The plant will produce 160 tons of anhydrous ammonia a day, 110 tons a day of urea, and 140 tons of ammonium sulfate a day, according to the principals, W. R. McRae, and A. F. D. Short. The output will be for agricultural purposes, it was said, except for 50 tons of each day's anhydrous ammonia and 15 tons of urea each day.

## Cocoa Supply Expected to Improve

CHICAGO.—With the price of cocoa beans towering in the 60 to 70 cents-per-pound range, after an abrupt rise from about 40 cents in November 1953, large numbers of seriously concerned confectioners were on hand here last week for a panel discussion dealing with cocoa beans, chocolate, and confectioners' coatings. Staged during the annual convention of the National Confectioners' Association as a joint session with the Associated Retail Confectioners of the U. S., the half-day panel played to a standing-room-only audience. According to Philip P. Gott, NCA president, the price of cocoa beans—now about 13 times the 5 cents-per-pound level of 1941—is forcing candy makers to decide whether to reduce the amount of chocolate in their products, or raise their prices to correspond with those of their

raw materials. The latter alternative would almost certainly mean elimination of the traditional 5-cent candy bar.

While it by no means solves the immediate problem of prohibitive cocoa bean prices, the long-term outlook in the cocoa situation is generally favorable, according to Jacob M. Schaffer of the Business and Defense Services Administration. Production trends are up in the two principal Latin American producing countries, Brazil and the Dominican Republic, Schaffer reported.

Some of this increased production, Schaffer observed, may be attributed to application of improved practices developed through years of research at experiment stations. In Brazil, for example, more attention has been given to rehabilitation of existing plantations and trees than to extending cultivation to new acreage. In Puerto Rico and areas in which improved practices have been applied under controlled methods, production has been raised from the usual level of about 100 pounds of cocoa beans per acre to a level of 500 to 600 pounds per acre. New plantings are going ahead at a good rate in many areas. One such area is Costa Rica, which in the next few years will show a "very substantial increase" in production, Schaffer said.

**New Production.** The American Cocoa Research Institute, according to ACRI consultant L. J. Schwarz, has been working steadily not only in the Western Hemisphere, but in promising areas throughout the world, to establish new production wherever feasible, and to improve production practices wherever possible. In the past two or three years alone, said Schwarz, ACRI has supervised the cutting out of some 27 million diseased trees in the Gold Coast area of Africa, in order to combat swollen shoot disease. Removal of affected trees is the only control method known thus far; the disease is now coming under control, Schwarz observed, and production in the Gold Coast area should improve henceforth.

Justin J. Alikonis (right), director of research for the Paul F. Beich Co. and president of AACT, receives the Stroud Jordon Award from Hans Dresel of Felton Chemical, award winner in 1953. The award is presented for "outstanding contributions in the field of candy technology"

