In agricultural regions where rainfall is sufficient, an excess of soluble salts does not ordinarily accumulate in the soil, but in large areas of the Southwest where agriculture is carried on under conditions of irrigation, steps must be taken to prevent an excessive soil salinity. This problem is particularly applicable to those areas of the Southwest where rice, citrus fruits, vegetables, cotton, sorghums, alfalfa, and other crops are dependent upon irrigation for growth.

Some of the problems involved in soil salinity and steps that may be taken to avoid soil deterioration or crop losses resulting from excess quantities of salt in the soil are discussed by H. E. Hayward in an article in the *Yearbook of Agriculture, 1943-1947*, published by the United States Department of Agriculture. This discussion should be of interest to irrigation farmers in the Southwest who face the problem of controlling soil salinity, for irrigation water contains soluble salts which may lower the productivity of the land, reduce crop yields, and bring about economic losses.

The two major phases of the salt problem, according to Mr. Hayward, are the maintenance of the proper salt balance in the soil and soil solution and the prevention of soil deterioration resulting from the presence of too much sodium. Soil may be saline because of its origin and formation, or, if the addition of salt to the soil exceeds its removal, soils that are slightly salty may become highly saline. A favorable salt balance results from the use of irrigation water with low salt content, from adequate irrigation, and from proper drainage.

Good drainage must be maintained to control salinity. This means that the water table should be at least five or six feet below the surface and that the soil should be open enough to permit surface water to reach the water table. An observation well may be constructed so that the water level may be determined at all times. If natural drainage is inadequate and the water table gets too high, artificial drainage may be necessary. The methods of artificial drainage most often used are tile systems, open drains, and pumped wells. However, wells for this purpose are satisfactory only where the surface soil is permeable and is underlain with gravel deposits. This method is especially advantageous if the salt content of the water is not too high, for the water may be used for irrigation.

The amount of water applied in irrigation is a primary consideration in saline or potentially saline areas. In supplying water to an area, one must take account of the needs of growing plants, of evaporation, leakage, run-off, and leaching. The last of these is important in carrying excess salt down below the root zone. Both underirrigation and over-irrigation should be avoided. Salt will accumulate if a soil is underirrigated and all the water applied is used by the plants or evaporates. Likewise, overirrigation is dangerous, especially where drainage is poor, since the excess water passing into the subsoil may cause a rise in the water table and bring about an increased accumulation of salt in the root zone.

Where an excessive amount of salt does accumulate in the soil, certain cultural practices may be followed which lessen its effect on growing crops. For example, the seeding
of certain crops on shoulders instead of on the top of row beds has proved helpful. Plants are more sensitive to salt in the seeding state than when they are more mature. Seedlings of relatively salt-tolerant plants, such as cotton and alfalfa, may be retarded in growth or die if the soil is moderately saline. It is important that the seed bed be prepared carefully and the soil leached before seeding. Where a raised-bed method and furrow irrigation are used, soluble salts tend to accumulate toward the peak of the convex beds. If the seed is planted on the shoulders of the bed, the danger of salt injury is lessened. It is important, also, that the soil be sufficiently moist to germinate the seed; it should not be allowed to become dry during seedling stage because salts may accumulate in the row.

The second phase of the salt problem—control of sodium in the soil—is particularly important to maintenance of soil structure. In this connection, it should be mentioned that salt constituents such as sodium, calcium, and magnesium stick to or are adsorbed upon the surfaces of particles of clay and organic matter in the soil. The degree to which this takes place, especially the adsorption of sodium, greatly influences the physical properties of soils. Those saturated with calcium and magnesium usually have a good granular structure. Soils containing appreciable amounts of adsorbed sodium ordinarily have poor structure. Studies of saline soils have shown that when sodium makes up 10 percent or more of the total of adsorbed calcium, magnesium, potassium, and sodium, the soil structure deteriorates, the soil becomes tight or impermeable to water and air, infiltration of irrigation water is retarded, and drainage is difficult. If the irrigation water applied to the soil is high in sodium, these unfavorable changes in the physical condition of the soil may take place.

When high-sodium conditions exist, the essential consideration, according to Mr. Hayward, is to remove the excess sodium. Leaching alone may not do this; it may even aggravate the soil condition. The application of soil amendments to replace the sodium with calcium is a generally recognized process for improving impermeable alkali soils. Gypsum, sulphur, lime, or calcium chloride may be used to supply a source of soluble calcium or to make more soluble the calcium already present in the soil in the form of lime. The proper application of these amendments for these purposes involves considerable understanding of the characteristics of soils and soil components, and it may be advisable, therefore, to consult a soil specialist before undertaking such a program.

In saline areas, the land can be farmed successfully if the soil salinity is reduced to moderate levels and proper management practices are followed. It is important to select crops that are well suited to the prevailing climatic conditions and that are sufficiently salt-tolerant. In general, a species of plant will tolerate more salt when grown under the climatic conditions best suited to it. Several crops have been tentatively classified on the basis of salt tolerance. According to Mr. Hayward, milo, Bermuda grass, and Rhodes grass are strongly salt-tolerant. Alfalfa, cotton, tomatoes, sorghums, and several rye grasses are regarded as having good tolerance. Onions, squash, rice, barley, wheat, and flax are moderately salt-tolerant. Within given species, certain varieties or strains may be more salt-tolerant than others. Further research is under way to determine the varieties or strains best adapted to saline conditions. Reports of this work, which will be made available by the Department of Agriculture from time to time, will be of particular interest to farmers of irrigated lands in the Southwest.

FARM MANAGEMENT

Building Land With Legumes in Seven Steps

Under the same heading as above, Editor Eugene Butler published in the August issue of The Progressive Farmer a very helpful article on the use of legumes for soil building purposes in that part of Texas where cotton and corn are the principal row crops. According to Mr. Butler, it does not matter whether a farmer has a two-year rotation of
corn and cotton or a three-year rotation with corn, cotton, and small grain, for he can still fit a soil-improving, winter-growing legume between the corn and cotton crops. The legume should follow the corn instead of the cotton, for a farmer cannot get vetch or Austrian peas turned under and the land ready to plant corn early enough to make a good yield, but the legume can be out of the way in plenty of time for cotton. The entire process of soil building by this method is outlined by Mr. Butler in seven steps.

Step I comes after corn harvest and consists of cutting the stalks and disking the land. The stalk cutter-disk combination cuts the stalks in short lengths and conditions the land in one operation. Step II involves breaking the land thoroughly, which puts the land in shape for planting the various winter legume crops. In Step III, the legume seed are inoculated, which is an inexpensive insurance against failure. The planting of winter legumes between September 15 and November 15, with adequate fertilizer applied, comprises Step IV. Winter legumes should be planted on beds or the land bedded immediately after planting, for bedded land warms up more quickly and provides better drainage for the plants. The bedding operation is counted as Step V in this program. In Step VI, vines are cut loose from the tops of the beds with a tandem disk harrow. Step VII involves cutting the vines from sides of beds and re-forming the beds, both of which may be accomplished with a 26-inch solid sweep set with point down. The vines remaining on the sides of the beds are sheared off, and the beds are built up again ready for planting cotton. Since the soil is somewhat loose, care should be taken not to plant the cotton-seed too deep. If other conditions are favorable, says Mr. Butler, beds handled in this way need to stand only about 10 days before planting, and fewer days if there is rain.

Farmers Advised to Plow Under Cotton Stalks

The sooner Texas cotton farmers plow under their cotton stalks, the more weevils and pink bollworms will starve out and freeze during the winter, says C. A. King, associate extension entomologist of Texas A. & M. College. As evidence of this fact, it may be noted that since 1943 the Lower Rio Grande Valley has had cleanup campaigns ranging from very poor in the fall to excellent in early August. After a very poor cleanup in the fall of 1944, 51 percent of the squares on the following season’s cotton were punctured by the boll weevil. After an excellent cleanup in early August of 1946, however, only 3 percent of the squares were punctured the following season. In central Texas last year, Williamson County had a county-wide stalk cleanup program completed September 30; this year on July 30, 27 percent of the squares had been punctured. In contrast, in the adjoining county of Milam, where there was no county-wide stalk destruction campaign last season, 63 percent of the squares were punctured by the same date.

Those figures mean profits for Williamson County but losses for Milam County, says Mr. King. Besides killing the insects, turning under the stalks makes the soil richer by returning organic matter to the soil. So the earlier a farmer turns under his cotton stalks, the longer the starvation period will be and the better the insect control next season, says Mr. King.

Careful Selection of Higher Producing Rams Advised

The rancher who wants to increase his production of wool must improve his sheep by a careful selection of breeding stock. Because the influence of the ram is spread over 80 to 200 replacements in the four years of his use, careful selection of the ram is most important. The problem facing the rancher is how to select from his herd the sheep that produce wool most efficiently. This problem is discussed briefly by P. E. Neale, animal husbandman of the New Mexico Agricultural Experiment Station, in press bulletin 1023 issued recently by the station.

Mr. Neale identifies the physical characteristics required of sheep for higher wool
production as a long staple, a fine wool, a large amount of clean wool from a grease fleece, and a large size animal when other things are equal. However, sheepmen generally estimate the value of a fleece merely from its grease weight and the length of the wool, as the fineness of fiber and its shrinkage cannot be determined accurately without laboratory analysis. In practical application, the sheep are graded for wool length, the fleece weighed, and then only the longest-wooled, heaviest-fleeced sheep are selected for the top producers. This system has merit in the selection of top-producing ewes, because it tends to raise the average wool production and a small error in the selection of a large number of sheep does not make a great difference. However, this method is too inaccurate for use in the selection of individual rams, says Mr. Neale, because, as pointed out in a study made at the New Mexico Agricultural Experiment Station, the wool-producing ability of individual sheep can be determined accurately only by use of laboratory facilities where fleeces can be measured and scoured. In the study, the wool-producing ability of 66 pure-bred rams owned by a New Mexico sheepman was tested. The laboratory analysis showed that the wool-producing ability of these rams varied extremely. On the basis of the market value at that time for clean wool in Boston, the value of the fleeces produced by the rams varied from $16.95 down to $3.24—a difference of $13.71 between the fleeces from rams that were fed and cared for as a group. This analysis leads one to the conclusion that the wool-producing ability of individual rams varies too widely for estimates to be satisfactory in their selection. Laboratory analysis of actual shrinkage, said Mr. Neale, is the only method that will give the true value of wool produced.

FARM PRICES
Provisions of 1948 Rice Support Program

The Department of Agriculture recently announced the provisions that will be included in its price support program for 1948-crop rice. According to these provisions, loan and purchase agreement rates per hundred pounds on each lot of rough rice will be computed on the basis of the quantity of head rice and broken rice contained in the lot, as shown by a milling quality test in accordance with U.S. standards for rough rice. The bottom limit of the milling yield on which loans and purchase agreements will be made is 25 pounds of head rice per 100 pounds of rough rice. Three additional varieties of rice—Blue Bonnet, Magnolia, and Prelude—will be eligible for price support. Loans and purchase agreements will be made available through January 31, 1949, instead of December 13, 1948, as previously announced.

ANNOUNCEMENTS
Meetings

The Panhandle South Plains Fair will be held September 27–October 2 at Fair Park in Lubbock, Texas.

The Southwestern Cotton Mechanization Conference, sponsored by the National Cotton Council, will be held at Lubbock, Texas, October 14 to 16.

The Texas Cooperative Ginners Association will hold its annual meeting at the Blackstone Hotel, Fort Worth, Texas, January 10 and 11, 1949.

Publications

Oklahoma Agricultural Experiment Station, Stillwater, Oklahoma:


Texas Agricultural Experiment Station, College Station, Texas:


Cattle Feeding Studies at the Spur Station, 1947-48, Progress Report 1126, by P. T. Marion, and others.

Copies of these publications may be secured by request to their respective publishers.