MEETING AGRICULTURE'S WATER REQUIREMENTS

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Since 1940 several developments have made us realize that immediate steps must be taken to improve the utilization and increase the conservation of water for agriculture. These events are attributed to World War II, droughts, increases in population, industry, irrigated land and pollution of streams and lakes.

Our population and need for water for irrigation and other purposes has increase above normal expectations. The 1955 Agriculture Year Book indicated that the greatest single use of fresh water in the United States was for irrigation, or about half of the fresh water we use annually. However, the use of water by cities for domestic and industrial purposes is increasing rapidly and in some areas is competing more and more with water required to meet the present needs and expansion of irrigated agriculture.

According to the census reports in 1939, there were about 17,243,400 acres in irrigated farms in the 17 Western States. By 1949 the acreage had risen to 24,270,600 acres. The increase in irrigated lands in the 31 Eastern states doubled during the same period. In 1958 it is estimated that the total irrigated area in the United States is over 30 million acres, of which about 28 million is in the 17 Western states.

Since water is the limiting factor in the expansion of agricultural areas of the West, the determination of irrigation requirements of various crops and conservation of existing water supplies are of greatest importance in the economy of this area. Considerably more land with soils suitable for irrigation is available for development than there is water with which to irrigate it. Careful use of irrigation seldom exist where water is plentiful, but where it is scarce, conserving methods are the rule; wasteful practices are avoided, and water is carefully applied. The most economical use of water generally prevails where there is a diminishing supply and the cost is high. Under these conditions economy in irrigation methods, involving a better understanding of the water requirements of agricultural plants, will benefit all irrigated areas.

The design and construction of irrigation systems usually involve consideration of either of two sets of conditions. In one the area to be irrigated has been determined and the water supply is ample; in the other the known water supply is limited, while the area which

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may be irrigated is restricted only by the available water. In both cases the total quantity of water to be considered by the engineer is the irrigation requirements of the crops combined with transmission and other losses in canals.

Although a knowledge of consumptive use is important in the case of a large irrigation project, and especially a river system as a whole, it may not be as important to the individual farm as the efficiency with which the water is distributed and applied, especially on a long shoestring project. Irrigation authorities have estimated that in some areas less than one-fourth of the water diverted from the source actually becomes available for use by the plant.

Conservation of present water supply by improved irrigation practices and reduction of conveyance losses in canals and farm laterals would provide one of the largest possibilities for expanding irrigated agriculture in many areas of the West. Methods of reducing these losses is being studied by our Western Soil and Water Management Research Branch.

Another great source of water supply is the salvage of water now wasted by phreatophytes. It has been estimated that the annual evaporation and transpiration losses along water courses in the 17 western states amounts to more than 25,000,000 acre-feet or about twice the average annual flow of the Colorado River. However, it is doubtful, if it is practical, to salvage more than 50 percent of this loss. This, if feasible, would be enough water to irrigate some 4,000,000 acres of agricultural lands in these states.

Thus a large increase in the proportionate use of developed water supplies can well be made available for agriculture through conservation and reuse. The present supplies can be extended through:

1. Adoption of laws for controlling the conservation and distribution of surface and ground-water supplies for beneficial use.

2. Improved planning of river basin developments to store water now lost by flow into the ocean and reduce other wastes.

3. Reclamation of sewage and other waste water.

4. More efficient reuse of industrial waters.

5. Better land-use practices to conserve precipitation.

6. Increasing irrigation efficiencies on farms and projects.

7. Increased use of ground water.

Some of the new sources of water being investigated by Federal and State agencies include:

1. Reduction of evaporation loss from lakes and reservoirs.

2. Reduction of losses through evapotranspiration by natural vegetation.

3. Desalting sea water and saline ground water.

4. Cloud seeding to control precipitation.

5. Recharging ground water basins during wet periods to supply water during droughts.

6. Increased use of ground waters by pumping.

Sound development of further irrigation will require not only finding new water supplies but the better management and more efficient use of existing supplies. Thus continued and additional research studies by the Soil and Water Conservation Research Division of the United States Agriculture Research Service and the State Agricultural Experiment Stations are needed to solve the water-supply problems of the nation which will become more serious for years to come.