We were not able to obtain any well-domented estimates of the maximum yields obtainable under field conditions with which ours could be compared, but our estimates of the saturation quantities of water are comparable with those given in most sources. A number of alternative estimates of desirable deltas are given in Table 5.1. The diversity of opinion disclosed by this table is sometimes substantial, particularly in the case of sugarcane, which is the critical crop in the water economy of the Former Punjab. The trials at the Lyallpur Farm, reported by Gill, showed that sugar cane evapotranspired 64 acre-inches of water per acre, agreeing exactly with the prediction of the Blaney-Criddle formula. Nevertheless Gill recommends a water supply of 77 inches because in other experiments, also at Lyallpur, yields per acre were found to increase up to that level of irrigation, at least. The U. S. Weather Bureau estimate of evapotranspiration during the typical growing season for sugarcane, which we adopted, is 11 inches lower than either of these two. The discrepancy can be explained, at least in part, by the small size of the Lyallpur plot, which meant that the air into which the evapotranspired water vapor passed was continually being replaced by new, dry air. This "edge effect" would not occur in a large area of sugarcane. Loss of water by deep percolation does not account for the discrepancy, for no such loss was recorded in the Lyallpur trials.

Gill reports the saturating water supply for wheat to be 19 inches, 5 inches more than the Weather Bureau estimate. Much of this discrepancy can be explained by the fact that Gill includes presowing irrigation, which recharges the moisture content of the root zone, while the Weather Bureau estimate does not. The presowing water is not, of course, lost if the moisture content of the soil is maintained throughout the growing season, but remains after the harvest to be used by the next crop. For this reason we have not ineluded it in our estimates of water requirements. This decision seems sound for double-cropped fields, but is more debatable if only a single crop is planted during the year.

Efficient Cropping Patterns

The water response curves computed by the methods described above make it possible to estimate the cropping patterns that make efficient use of both land and water under varying conditions. To illustrate this possibility we shall present a sample computation that was made, based upon the data for the million-acre tract in the Lower Chenab Canal region analysed in Chapter 5. From a technical point of view the interesting feature of this calculation is that it simultaneously produces recommendations for the optimal depth of irrigation of each crop and for the optimal acreage to be devoted to each crop. The efficient use of water, particularly, requires a wise decision in both of these dimensions.