Loading the planter with seed from a scoop-type spatula.

When in use, the depth gauge holds the planter upright and at the proper depth. A small quantity of seed is poured into a scoop-type spatula, and individual seeds are selected and guided into each hole of the planter with a small wooden dowel (Fig. 3). The blades of the planter are then spread slightly to release the seed. The planter must be used with dry soil.

A PROCEDURE FOR PROJECTING YIELDS FOR LINEAR PROGRAMMING OF DRYLAND WHEAT FARMS IN EASTERN COLORADO

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Linear programs for economic evaluation of farming methods have become an important tool in agricultural research. In many of these programs, accuracy is dependent on the evaluation of management practices applicable to some period in the future and the effect which these practices will have on the average yield of crops. This paper presents the first and most time-consuming part of the method used to project average wheat yields for 1970 in eastern Colorado. This method of projecting yields is based on historical county averages and associates harvested yields with soils and precipitation zones. It does not refine yields among various crop rotations nor does it include abandonment and specify yields on a planted acre basis. Both of these steps are necessary before linear programming individual farms, but are beyond the intent of this paper.

Two variables which affect yields of dryland wheat in eastern Colorado, where alternate wheat-fallow is practiced, are tillage methods and fertilizer use. The use of fertilizer and expected response for the region is based on soil type and precipitation zone. The expected response is based on tices on wheat yields depends on both the type of tillage and the number of operations. While the acceptance of subtillage is less accurate than that for fertilizer use, evidence that an average difference of about 2 bushels per acre exists between black fallow and stubble mulch. This figure has been used in projecting 1970 wheat yields in this study. However, the effect of tillage will depend on the amount of precipitation received and the soil to store the water. Therefore, the value used to prove tillage practices vary from one set to another.

In developing the procedure for projecting yields by linear programming of wheat farms in eastern Colorado, counties were grouped into areas based on average harvested acre yields and percent abandonment of winter wheat. Counties in each area have similar average precipitation. However, very few counties in eastern Colorado lie totally within one precipitation zone. Crop yields are largely regulated by the amount of precipitation received in a given area.

The projection of yield increases is further complicated by the variation in soil within a given county. Soil types within a county must also be considered since they are closely related to productivity. For this study, broad classifications of sandyland and hardland were used since they reflect the relative productivity of the soils included.

To evaluate present average yields of wheat, it was necessary to estimate yield increases for 1970, it was necessary to base the present average harvested acre yields on precipitation zones and land type. The areas used in this study are based on the land resource areas of Colorado proposed by Payne and Romine. This was accomplished by estimating the deviation from the county average due to each soil-climate region. The deviation due to precipitation zone was based on an average increase of 3 bushels of wheat per inch of precipitation due to land types is based on the different water-holding capacity of the soils involved. Soil types were selected to illustrate the method of estimating average yield increases with wheat. Table 1 shows the components of projected yields for Baca County in southeastern Colorado and Sedgwick County in the northwestern part of the State.

Columns 7 and 8 of this table adjust the present harvested acre yield according to soil-climate regimes. Columns 9 and 10 are the estimated increases due to acceptance of subtillage and nitrogen use as a response to fertilizer is obtained. These columns reflect known experimental findings that average expected to adopt in the short run. The final figure is thus obtained for each soil-climate zone.