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ON DETERMINING UNHARVESTED WINTER WHEAT ACREAGE FROM LANDSAT

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Nine Landsat passes for one locality and one crop year were examined to determine methods of discriminating harvested from unharvested winter wheat. The nine passes included all growth stages of importance to the Large Area Crop Inventory Experiment (LACIE) including pre-planting and post-harvesting.

Two approaches were utilized in the study. One was based on the examination of the temporal-spectral characteristics of various quality wheat fields within the test site. The other was based on a Landsat wheat yield prediction technique.

Approach 1 requires the examination of the identified wheat fields on each pass with a harvestable/unharvestable decision made for each field after each pass or after some number of passes. The decision can be made on the basis of the change in MSS band radiance curves. This method assumes that all wheat fields can be identified at some point in the crop growth period.

Approach 2 required establishment of a yield estimation technique from Landsat data alone. Based on knowledge of the estimated yield and reasons for abandonment of fields a yield threshold can be set, below which fields will be abandoned (i.e., not harvested).

The following results were obtained:

- MSS band evaluation -
Each MSS band from 4 to 7 had a lower radiance value when an unharvestable or plowed field was observed. For harvestable fields, the higher the ultimate yield, the greater the difference between band 5 and 6 with 6 being higher. The higher the yield, the more cases where band 7 was higher than band 6.
- Yield -

The yield prediction model was optimized for low yield fields. The model utilized TVI values for fall establishment and tillering, the square of those terms and the value at heading. The model had an R^2 greater than .86 and the variables were shown to be independent.