USE OF CLIMATIC AND FALL DORMANCY DATA TO DESCRIBE VARIETIES FOR CALIFORNIA

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Alfalfa researchers in California must contend with several production areas located in very different environments. The University of California currently conducts alfalfa forage trials of some type at well over twenty locations. For the most part, the similarities and dissimilarities among these areas have neither been studied nor utilized in comprehensive alfalfa programs. In 1969, the Western Alfalfa Improvement Conference established the Committee on Ecological zones with the following charge: 1) determine if alfalfa production areas can be linked climatically so that varietal evaluation will not have to be conducted in as many locations; 2) develop the ground work for possible regional testing programs based on climatically similar regions; and 3) provide an acceptable means for agricultural experiment stations and other agencies to exchange data from regional testing programs.

The committee collected climatological data from 243 locations in the western region including 30 locations in California. Data from each location included latitude, longitude, elevation, and 30-year averages for mean temperature, mean maximum temperature, mean minimum temperature, number of frost-free days, and annual precipitation. Data from each location were subjected to simple correlation and cluster analyses. Cluster analysis is a statistical procedure which was used to group geographic regions into sets or clusters continuing those locations which are most similar based on the parameters used in the analysis. The function of the cluster analysis was to generate hypotheses rearding the similarity of geographic regions based on their climates. The dissimilarity among these regions could then be evaluated in experiments (variety trials) designed with specific statistical tests in mind.

Using latitude, elevation, mean temperature, number of frost-free days, and annual precipitation we identified 8 clusters or location groupings for California. Locations within clusters should be climatically more similar than locations among clusters.

In order to test the above hypothesis, it is recommended that uniform variety trials be established. We propose establishment of permanent University of California variety trials at El Centro, Lancaster-Palmdale, Bishop, West Side Field Station, Davis, Scott Valley, Cedarville, and Tulelake.

Fall dormancy is easy to evaluate and is the most important single factor used by alfalfa scientists to determine the area of adaptation of an experimental cultivar. Historically in California fall dormancy has been determined somewhat subjectively based on observation. Until recently, the greatest accumulation of data on fall dormancy response of alfalfa cultivars was in Minnesota. However, data were not available to show how fall dormancy determinations in Minnesota related to fall dormancy in other areas. Data accumulated over the past several years by Teuber and several other alfalfa scientists in California and other states show a strong correlation between fall dormancy ratings in Minnesota and several locations in California.

Fall dormancy or natural plant height was determined by cutting plants back (leaving about 2 inches of stubble) on one of four dates in the fall (August 15, September 7, October 3, and October 23). Following 3.5 weeks of regrowth approximately 100 individuals from each cultivar in the test were scored on a 1 to 10 scale; each division on the scale being approximately equal to .5 cm in plant height.

Due to the strong relationship between Fall Dormancy Ratings at all locations we propose to determine fall dormancy at Davis in order to separate cultivars into groups which can be evaluated in one or more of the permanent University of California variety trials. This should reduce the number of cultivars which need to be tested at any one location.

The cluster analysis we used is not responsive to several parameters important in alfalfa production since data were not available. These include average daily high and low temperatures during the growing season, seasonal distribution of precipitation, incidence of economically important stress producing organisms, and soil type. These and other parameters will contribute to the within group variation. Nonetheless, the present analysis provides the basic framework necessary to develop a standard variety testing program.

Final choice of what cultivar a grower produces will be dependent on those characteristics necessary for that farm. Data obtained from the permanent University of California variety trials will contribute to this decision.

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